System® Health

MedQA Synthesize Answers

June 17, 2026

1. MedQA question ID 1178 Step 1

Question

A 6-year-old Russian boy who recently immigrated to the United States presents to your office with fever and dyspnea. On examination of the oropharynx, you note a grayish-white pseudomembrane and uneven elevation of the soft palate. The patient displays marked enlargement of the cervical lymph nodes. Which of the following describes the organism responsible for this patient's disease?

(A) Yeast with pseudohyphae

(B) Gram-positive bacteria producing exotoxin that acts via ADP ribosylation

(C) Gram-positive cocci with hyaluronic acid capsule

(D) Gram-negative encapsulated bacteria producing IgA protease

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Gram-positive bacteria producing exotoxin that acts via ADP ribosylation is correct. The presentation is classic for **diphtheria**, which the **Centers for Disease Control and Prevention (CDC)** describes as an illness caused by a toxin produced by bacteria infecting the nose and throat, and the **World Health Organization (WHO)** notes is due to toxigenic **Corynebacterium diphtheriae**; the pseudomembrane and “bull neck” cervical lymphadenopathy strongly fit this diagnosis [1] [2].

Why the other choices are wrong

- **A. Yeast with pseudohyphae** = Candida species, not diphtheria.
- **C. Gram-positive cocci with hyaluronic acid capsule** = Streptococcus pyogenes.
- **D. Gram-negative encapsulated bacteria producing IgA protease** = classically Neisseria or Haemophilus species, not diphtheria.

Key organism feature

Corynebacterium diphtheriae is a **gram-positive rod** that causes disease through **diphtheria toxin**, which **ADP-ribosylates elongation factor-2**, inhibiting protein synthesis and leading to systemic toxicity [2].

References

[1] 2026 CDC Childhood Immunization Schedule
Centers for Disease Control and Prevention · 2026-01-05 12:00:00
- Diphtheria
  - Illness caused by a toxin produced by bacteria that infect the nose, throat, and sometimes skin.
  - Complications: Swelling of the heart muscle, heart failure, coma, paralysis, death
https://www.hhs.gov/childhood-immunization-schedule/index.html

[2] Diphtheria.
Nature reviews. Disease primers · 2019-12-05
Diphtheria is a potentially fatal infection mostly caused by Corynebacterium diphtheriae strains and occasionally by toxigenic C. ulcerans and C. pseudotuberculosis strains. It is generally an acute respiratory infection, characterized by the formation of a pseudomembrane in the throat, but cutaneous infections are possible. Systemic effects, such as myocarditis and neuropathy, are due to the exotoxin produced by the pathogen that inhibits protein synthesis and causes cell death.
10.1038/s41572-019-0131-y

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2. MedQA question ID 354 Step 1

Question

A 35-year-old man returns to the clinic to follow up for his chronic stomach pain. At the last visit a few months ago, he explained that he had been experiencing discomfort in his upper abdomen for awhile. He had never vomited up any blood and had not had any substantial weight loss. He did not take any medications, did not smoke, and had no family history of gastric cancer. At that time, the doctor empirically started him on a proton pump inhibitor (PPI). Today, despite the PPI, the patient says he is still experiencing discomfort. Hearing this, the doctor decides to order a urease breath test. What is the most likely cause of this patient's chronic stomach pain?

(A) Gastroesophgeal sphincter dysfunction

(B) Nonsteroidal anti-inflammatory drugs

(C) Heliobacter pylori infection

(D) Excessive gastrin

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely cause is Helicobacter pylori infection. In adults under 60 with dyspepsia and no alarm features, the **American College of Gastroenterology (ACG)** recommends **noninvasive H. pylori testing and treatment if positive**; if symptoms persist after eradication therapy, a **PPI trial** is appropriate [1] [2]. A **urea breath test** is a standard noninvasive test for H. pylori, so this presentation fits **H. pylori–associated dyspepsia/peptic disease** rather than NSAID-related injury, reflux sphincter dysfunction, or hypergastrinemia [1] [2] [3].

Why the other choices are less likely

- **NSAIDs**: He reports no medication use, making this less likely.
- **Gastroesophageal sphincter dysfunction**: would more typically cause reflux symptoms, not isolated chronic epigastric discomfort.
- **Excessive gastrin**: not the usual first consideration in uncomplicated dyspepsia.

Best answer

(C) Helicobacter pylori infection [1] [2] [3].

References

[1] Management of Dyspepsia
American College of Gastroenterology · 2017-07-01 00:00:00
3. We recommend dyspepsia patients under the age of 60 should have a non-invasive test for H. pylori and therapy for H. pylori infection if positive.
https://journals.lww.com/ajg/fulltext/2017/07000/ACG_and_CAG_Clinical_Guideline__Management_of.10.aspx

[2] Management of Dyspepsia
American College of Gastroenterology · 2017-07-01 00:00:00
8. We recommend FD patients who are H. pylori-negative or who remain symptomatic despite eradication of the infection should be treated with PPI therapy.
https://journals.lww.com/ajg/fulltext/2017/07000/ACG_and_CAG_Clinical_Guideline__Management_of.10.aspx

[3] Endoscopic Mucosal Tissue Sampling
American Society for Gastrointestinal Endoscopy · 2013-08-01 00:00:00
A negative urease test result should be confirmed with further testing for H. pylori.
https://www.giejournal.org/article/S0016-5107(13)01784-7/fulltext

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3. MedQA question ID 133 Step 2/3

Question

A 67-year-old man presents to his primary care physician for erectile dysfunction. He states that for the past month he has been unable to engage in sexual intercourse with his wife despite having appropriate sexual desire. He also endorses deep and burning buttock and hip pain when walking, which is relieved by rest. The patient states that he does not have erections at night or in the morning. His past medical history is notable for diabetes, coronary artery disease, and hypertension, and he has a 40 pack-year smoking history. Physical exam is notable for weak lower extremity and femoral pulses. Which of the following is the most specific etiology of this patient's symptoms?

(A) Anxiety

(B) Aortoiliac atherosclerosis

(C) Spinal stenosis

(D) Vascular claudication

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most specific etiology is aortoiliac atherosclerosis (Leriche syndrome). The **American College of Cardiology/American Heart Association (ACC/AHA)** lower-extremity peripheral artery disease guideline notes that **buttock/hip claudication, erectile dysfunction, and abnormal femoral pulses** are classic findings of PAD, and the Society for Vascular Surgery similarly highlights **thigh/buttock claudication with impotence** as suggestive of isolated iliac disease [1] [2]. This presentation is more specific for **proximal aortoiliac occlusive disease** than for generic vascular claudication, anxiety, or spinal stenosis [2] [3].

Why the other choices are less likely

- **Spinal stenosis** typically improves with **lumbar flexion** and is often associated with back symptoms; pain is not classically linked to **weak femoral pulses** or erectile dysfunction [2] [3].
- **Vascular claudication** is a broader description of exertional ischemic leg pain; the combination of **buttock/hip pain + impotence + diminished femoral pulses** points more specifically to **aortoiliac disease** [1] [2].
- **Anxiety** does not explain exertional buttock/hip pain with objective pulse deficits [1] [2].

References

[1] Management of Patients With Lower Extremity Peripheral Artery Disease
American College of Cardiology, American Heart Association · 2024-05-14 00:00:00
In patients with history or physical examination findings suggestive of PAD (Table 6), the resting ABI, with or without ankle pulse volume recordings (PVR) and/or Doppler waveforms, is recommended to establish the diagnosis.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000001251

[2] Atherosclerotic Occlusive Disease of the Lower Extremities
Society for Vascular Surgery · 2015-03-02 00:00:00
Thigh and Buttock IC: Buttocks, hip, thigh; cramping, aching, discomfort; reproducible onset; quickly relieved; impotence. May have normal pedal pulses with isolated iliac artery disease.
https://www.jvascsurg.org/article/S0741-5214%2814%2902284-8/fulltext

[3] Management of Patients With Lower Extremity Peripheral Artery Disease
American College of Cardiology, American Heart Association · 2024-05-14 00:00:00
Spinal stenosis: often bilateral buttocks, posterior leg pain and weakness; may mimic claudication; relief by lumbar spine flexion; worse with standing and extending spine.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000001251

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4. MedQA question ID 487 Step 1

Question

A 70-year-old woman with no significant medical history begins to experience memory loss and personality changes. Over the next few months, her symptoms become more severe, as she experiences rapid mental deterioration. She also starts to have sudden, jerking movements in response to being startled and gait disturbances. Eventually, she lapses into a coma and dies eight months after the onset of symptoms. What process likely caused this woman's illness?

(A) Loss of dopaminergic neurons in the substantia nigra pars compacta.

(B) Autoimmune inflammation and demyelination of the peripheral nervous system.

(C) Conversion of a protein from an a-helix to a ß-pleated form, which resists degradation.

(D) Frontotemporal atrophy and the accumulation of intracellular, aggregated tau protein.

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Conversion of a protein from an alpha-helix to a beta-pleated form, which resists degradation is the best answer. The presentation is classic for **sporadic Creutzfeldt-Jakob disease (a prion disease)**: rapidly progressive dementia with myoclonus/startle responses, gait disturbance, and death within months [1] [2]. Prion diseases are caused by **pathologically misfolded prion protein** that accumulates and spreads, producing a rapidly fatal neurodegenerative syndrome [2] [3].

Why the other choices are wrong

- **A** describes Parkinson disease.
- **B** describes Guillain-Barre syndrome.
- **D** describes frontotemporal dementia with tau pathology.

Most likely diagnosis: Creutzfeldt-Jakob disease due to prion protein misfolding.

References

[1] Sporadic Creutzfeldt-Jakob disease.
Handbook of Clinical Neurology · 2018-01-01
Sporadic Creutzfeldt-Jakob disease is clinically characterized by rapidly progressive dementia with ataxia, myoclonus or other neurologic signs.
10.1016/B978-0-444-63945-5.00009-X

[2] Differential diagnosis with other rapid progressive dementias in human prion diseases.
Handbook of Clinical Neurology · 2018-01-01
The most common human prion disease is sporadic Creutzfeldt-Jakob disease, which presents as a rapidly progressive dementia with behavioral, cerebellar, extrapyramidal, and some pyramidal features, with median survival from symptom onset to death of just a few months.
10.1016/B978-0-444-63945-5.00020-9

[3] Network mediation of pathology pattern in sporadic Creutzfeldt-Jakob disease.
Brain Communications · 2020-01-01
Creutzfeldt-Jakob disease is a rare fatal rapidly progressive dementia caused by the accumulation and spread of pathologically misfolded prions.
10.1093/braincomms/fcaa060

5. MedQA question ID 951 Step 2/3

Question

A 22-year-old woman comes to the physician for a routine health examination. She feels well but asks for advice about smoking cessation. She has smoked one pack of cigarettes daily for 7 years. She has tried to quit several times without success. During the previous attempts, she has been extremely nervous and also gained weight. She has also tried nicotine lozenges but stopped taking them because of severe headaches and insomnia. She has bulimia nervosa. She takes no medications. She is 168 cm (5 ft 6 in) tall and weighs 68 kg (150 lb); BMI is 24 kg/m2. Physical and neurologic examinations show no other abnormalities. Which of the following is the most appropriate next step in management?

(A) Diazepam

(B) Nicotine patch

(C) Varenicline

(D) Motivational interviewing

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Varenicline is the most appropriate next step. The **American Thoracic Society (ATS)** recommends **varenicline over a nicotine patch** when starting pharmacologic treatment for tobacco-dependent adults with comorbid psychiatric conditions, including anxiety and bipolar disorder, because it improves abstinence [1]. The **Veterans Health Administration/Department of Defense (VHA/DoD)** guideline also recommends **varenicline over single-agent nicotine replacement therapy (NRT)** and over other monotherapies for adults receiving a single cessation medication [2].

Why the other options are less appropriate

- **Nicotine patch**: reasonable first-line therapy in many patients, but this patient already had poor tolerance to nicotine lozenges and the available guideline evidence favors **varenicline over single-agent NRT** for higher quit success [1] [2].
- **Diazepam**: not a standard smoking-cessation treatment and is not recommended as cessation pharmacotherapy in the retrieved guidance.
- **Motivational interviewing**: behavioral support is important, but for a patient with repeated failed quit attempts, medication plus counseling is generally preferred; the retrieved guidelines support adding **pharmacotherapy** rather than using counseling alone [1] [2].

Practical point

Because she has a history of **bulimia nervosa**, **bupropion would not be the preferred choice** in usual clinical practice, so **varenicline** is the best option among those listed.

References

[1] Initiating Pharmacologic Treatment in Tobacco-Dependent Adults
American Thoracic Society · 2020-07-15 00:00:00
For tobacco-dependent adults with comorbid psychiatric conditions, including substance-use disorder, depression, anxiety, schizophrenia, and/or bipolar disorder, for whom treatment is being initiated, we recommend varenicline over a nicotine patch.
https://www.atsjournals.org/doi/full/10.1164/rccm.202005-1982ST

[2] Tobacco Use Treatment
Veterans Health Administration / Department of Defense · 2026-01-09 00:00:00
For patients receiving a single medication, we recommend varenicline over other monotherapies (e.g., bupropion sustained release; single-agent nicotine replacement therapy [NRT]) for increasing abstinence from combustible tobacco.
https://www.healthquality.va.gov/HEALTHQUALITY/guidelines/CD/tobacco/Tobacco-Cessation-CPG_2026-Guideline_final_20260109.pdf

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6. MedQA question ID 634 Step 2/3

Question

A 67-year-old woman presents to her primary care physician for urinary incontinence. She has been waking up every morning with her underwear soaked in urine. She notices that at work if she does not take regular bathroom breaks her underwear will have some urine in it. She urinates 5 to 11 times per day but she claims it is a small volume. Her current medications include lisinopril, metformin, insulin, aspirin, atorvastatin, sodium docusate, and loratadine. Her temperature is 98.2°F (36.8°C), blood pressure is 167/108 mmHg, pulse is 90/min, respirations are 15/min, and oxygen saturation is 99% on room air. Physical exam is notable for decreased pinprick sensation in the lower extremities and a systolic murmur along the right upper sternal border. Which of the following is the best treatment for this patient?

(A) Bethanechol and intermittent straight catheterization

(B) Bethanechol during the day and oxybutynin at night

(C) No recommendations needed

(D) Reduce fluid intake and discontinue diuretics

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The best treatment is (A) bethanechol and intermittent straight catheterization. In a patient with diabetes, decreased lower-extremity sensation, urinary frequency with small volumes, and morning soaking, the most likely problem is **diabetic autonomic neuropathy with bladder dysfunction/ overflow incontinence from impaired emptying**; the American Diabetes Association describes diabetic autonomic neuropathy as causing **neurogenic bladder** and notes symptoms such as

frequency, urgency, nocturia, incontinence, and incomplete emptying [1] [2]. The European Association of Urology recommends **intermittent catheterization as standard treatment in patients who are unable to empty their bladder** and advises **not** to routinely use parasympathomimetics for underactive bladder in women [3].

Why the other choices are not best

- **(B) Bethanechol during the day and oxybutynin at night** is not a good combination for this presentation because oxybutynin is an antimuscarinic and can worsen retention; the EAU advises against routine parasympathomimetics for underactive bladder, and older-adult guidance flags oxybutynin as strongly anticholinergic [3] [4].
- **(C) No recommendations needed** is incorrect because treatment is indicated once impaired emptying/overflow incontinence is suspected [1] [3].
- **(D) Reduce fluid intake and discontinue diuretics** is aimed more at polyuria/urgency from excess urine production or medication-related frequency; no diuretic is listed, and this does not address neurogenic retention [1] [2].

Clinical bottom line

This pattern is most consistent with **overflow incontinence from diabetic bladder dysfunction** rather than isolated urge incontinence. The key management is **bladder decompression with intermittent catheterization**; bethanechol is sometimes tested in this setting, but contemporary guidance does not support parasympathomimetics as routine therapy [2] [3].

References

[1] Diabetic Neuropathy: A Position Statement by the American Diabetes Association
Diabetes Care · 2016-12-10
Diabetic autonomic neuropathy may also cause genitourinary disturbances, including sexual dysfunction and bladder dysfunction. Major clinical manifestations of diabetic autonomic neuropathy include ... neurogenic bladder ...
10.2337/dc16-2042

[2] Diabetic Neuropathies: Update on Definitions, Diagnostic Criteria, Estimation of Severity, and Treatments
Diabetes Care · 2010-10-01
Common symptoms include dysuria, frequency, urgency, nocturia, and incomplete bladder emptying. Other symptoms include ... stress and urgency urinary incontinence. Measurement of peak urinary flow rate and postvoid residual volume (PVR) should be considered in diabetic patients with LUTS when diagnosis remains doubtful.
10.2337/dc10-1303

[3] Management of Non-Neurogenic Female Lower Urinary Tract Symptoms
European Association of Urology · 2026-04-01 12:00:00
Use intermittent catheterisation (IC) as a standard treatment in patients who are unable to empty their bladder. Do not routinely recommend parasympathomimetics for treatment of women with underactive bladder.
https://d56bochluxqnz.cloudfront.net/documents/full-guideline/EAU-Guidelines-on-Non-neurogenic-Female-LUTS-2025.pdf

[4] AGS Beers Criteria for Potentially Inappropriate Medication Use in Older Adults
American Geriatrics Society · 2023-05-03 12:00:00
Oxybutynin has strong anticholinergic properties.
https://agsjournals.onlinelibrary.wiley.com/doi/10.1111/jgs.18372

7. MedQA question ID 728 Step 2/3

Question

A 25-year-old woman comes to the physician for the evaluation of nausea for the last two weeks. During this period, she has had increased urinary frequency and fatigue. She also reports two episodes of non-bloody vomiting. There is no personal history of serious illness. Her last menstrual period was 6 weeks ago. Physical examination shows bilateral breast tenderness. The remainder of the examination shows no abnormalities. A urine pregnancy test is positive. Which of the following is the most accurate predictor of the gestational age?

(A) Ratio of head to abdominal circumference

(B) Femoral length

(C) Crown-rump length

(D) Biparietal length

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Crown-rump length (CRL) is the **most accurate predictor of gestational age** in the first trimester and is the preferred ultrasound measurement for pregnancy dating; **biparietal diameter/length**, **femoral length**, and **head-to-abdominal circumference ratio** are used later in gestation and are less accurate for early dating [1] [2]. In this patient at about 6 weeks by last menstrual period, a first-trimester ultrasound using **CRL** is the best method to establish gestational age [1] [2].

Why CRL is preferred

- The American College of Obstetricians and Gynecologists (ACOG) considers **first-trimester ultrasonography the most accurate method** to establish or confirm gestational age [2].
- A high-quality review likewise states that gestational age should ideally be estimated by **fetal crown-rump length (CRL)** or early second-trimester ultrasound [1].

Why the other choices are less accurate here

- **Biparietal diameter/length** and **femoral length** are useful biometry measures later in pregnancy, but they are not the most accurate early dating parameter [1] [2].
- The **head-to-abdominal circumference ratio** is used for fetal growth assessment, not for the most accurate early gestational dating [1] [2].

References

[1] Malaria in pregnancy: the difficulties in measuring birthweight
Bjog · 2011-02-18
Ideally, gestational age should be estimated by fetal crown–rump length (CRL) or early second-trimester ultrasound, which is the standard in resource-rich countries and is becoming available in developing countries.
10.1111/j.1471-0528.2010.02880.x

[2] Committee Opinion No. 688: Management of Suboptimally Dated Pregnancies
American College of Obstetricians and Gynecologists · 2017-03-01
The American College of Obstetricians and Gynecologists considers first-trimester ultrasonography to be the most accurate method to establish or confirm gestational age. Pregnancies without an ultrasonographic examination before 22 0/7 weeks of gestation should be considered suboptimally dated.
10.1097/aog.0000000000001949

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8. MedQA question ID 350 Step 2/3

Question

A 7-year-old girl is brought to the emergency department with a 10-day history of fever and sore throat that acutely worsened over the past 2 days. Her sore throat is worse on the right side. She has difficulty swallowing and opening her mouth due to pain. She has also noticed a change in the quality of her voice over the last day. Her temperature is 38.2°C (100.8°F), pulse is 86/min, respirations are 18/min, and blood pressure is 110/75 mm Hg . Examination shows cervical lymphadenopathy. Oropharyngeal examination shows erythematous tonsils and swelling of the right tonsillar pillar. The uvula is deviated to the left. Laboratory studies show:
Hemoglobin 13.0 g/dL
Hematocrit 39%
Leukocyte count 12,000/mm3
Platelet Count 200,000/mm3
Serum
Na+ 138 mEq/L
Cl- 100 mEq/L
K+ 4.5 mEq/L
HCO3- 24 mEq/L
Urea nitrogen 14.0 mg/dL
Creatinine 1.1 mg/dL
Which of the following is the most appropriate next step in management?"

(A) Intravenous dexamethasone therapy

(B) Incision and drainage with intravenous ampicillin-sulbactam therapy

(C) Needle aspiration and oral clindamycin therapy

(D) Intravenous ampicillin-sulbactam therapy

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most appropriate next step is B. Incision and drainage with intravenous ampicillin-sulbactam therapy. This child has a classic **peritonsillar abscess** (unilateral sore throat, **trismus**,

muffled voice, and **uvular deviation**), and pediatric reviews describe treatment as **aspiration or surgical drainage plus antibiotics** rather than antibiotics alone [1] [2]. In hospitalized children with acute neck infections, most peritonsillar abscesses were managed with **intravenous antibiotics** and **drainage** [3].

Why the other choices are less appropriate

- **IV dexamethasone alone** does not treat the abscess source and is not definitive management [1] [2].
- **Needle aspiration plus oral clindamycin** may be used in selected stable patients, but this presentation is more consistent with an abscess that should undergo **formal drainage** and IV therapy, especially with significant trismus and voice change [1] [3].
- **IV ampicillin-sulbactam alone** is incomplete because drainage is typically part of treatment for PTA [1] [2].

Clinical takeaway

For a child with PTA signs and no airway instability, the immediate step is **ENT drainage plus systemic antibiotics**; **ampicillin-sulbactam** is an appropriate IV choice for polymicrobial oral flora coverage [1] [2].

References

[1] Pediatric peritonsillar abscess: an overview.
Infectious Disorders Drug Targets · 2012-08-01
Peristonsillar abscess is a common deep neck space infection in children. Diagnosis can be made based on history and physical examination in the majority of children. Treatment of pediatric PTA requires aspiration or surgical drainage and antibiotic therapy.
10.2174/187152612801319258

[2] Clinical factor for successful nonsurgical treatment of pediatric peritonsillar abscess.
The Laryngoscope · 2015-11-01
The current management for peritonsillar abscess in pediatric patients includes intensive medical therapy using antibiotics with or without surgical drainage.
10.1002/lary.25337

[3] Acute pediatric neck infections: Outcomes in a seven-year series.
International Journal of Pediatric Otorhinolaryngology · 2017-08-01
There were 102 children admitted to a tertiary university hospital with a diagnosis of acute neck infections. Most frequent symptoms were fever and odynophagia. Upon admission, all patients received intravenous antibiotics and 86.8% underwent drainage.
10.1016/j.ijporl.2017.05.020

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9. MedQA question ID 1040 Step 2/3

Question

A 55-year-old woman is brought to the emergency department because of worsening upper abdominal pain for the past 8 hours. She reports that the pain radiates to her back and is associated with nausea. She has hypertension and hyperlipidemia, for which she takes enalapril, furosemide, and simvastatin. Her temperature is 37.5°C (99.5°F), blood pressure is 84/58 mm Hg, and pulse is 115/min. The lungs are clear to auscultation. Examination shows abdominal distention with epigastric

tenderness and guarding. Bowel sounds are decreased. Extremities are warm. Laboratory studies show:
Hematocrit 48%
Leukocyte count 13,800/mm3
Platelet count 175,000/mm3
Serum
Calcium 8.0 mg/dL
Urea nitrogen 32 mg/dL
Amylase 250 U/L
An ECG shows sinus tachycardia. Which of the following is the most likely underlying cause of this patient's vital sign abnormalities?

(A) Abnormal coagulation and fibrinolysis

(B) Capillary leakage

(C) Decreased cardiac output

(D) Pseudocyst formation

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

(B) Capillary leakage is the most likely cause of this patient's hypotension, tachycardia, hemoconcentration, and elevated BUN in **acute pancreatitis**. The **American College of Gastroenterology (ACG)** notes that early severe disease is associated with **SIRS, elevated hematocrit, and elevated BUN**, reflecting intravascular volume depletion and the need for prompt IV crystalloid resuscitation [1] [2]. In severe acute pancreatitis, systemic inflammation can produce **capillary leak and third spacing** with hypovolemia, which fits the warm extremities and shock physiology better than pseudocyst formation or a primary cardiac problem [3].

Why the other choices are less likely

- **(A) Abnormal coagulation and fibrinolysis**: this is not the usual explanation for early shock in acute pancreatitis.
- **(C) Decreased cardiac output**: pancreatitis can cause cardiovascular abnormalities, but the classic mechanism of early hypotension is **third spacing/capillary leak** rather than primary pump failure [3].
- **(D) Pseudocyst formation**: this is a later local complication, not an explanation for acute vital-sign abnormalities.

Key bedside clue

The combination of **BP 84/58 mm Hg, pulse 115/min, hematocrit 48%, and BUN 32 mg/dL** points to **intravascular volume depletion from capillary leakage/third spacing** in acute pancreatitis, which is why early goal-directed IV fluid resuscitation is recommended [1] [2].

References

[1] Management of Acute Pancreatitis

American College of Gastroenterology · 2024-03-05 00:00:00

- While we suggest all patients with AP receive moderately aggressive intravenous hydration of isotonic crystalloid, caution is needed if a cardiovascular and/or renal comorbidity exists. Patients should be monitored for volume overload.
- Fluid resuscitation in patients with AP is likely more important early in the course of the disease (within the first 24 hours).
- Fluid volumes need to be reassessed at frequent intervals within 6 hours of presentation and for the next 24–48 hours with a goal to decrease the BUN.

https://journals.lww.com/ajg/abstract/2024/03000/american_college_of_gastroenterology_guidelines_.14.aspx

[2] Management of Acute Pancreatitis

American College of Gastroenterology · 2024-03-05 00:00:00

- Hemodynamic status and risk assessment should be performed to stratify patients into higher-risk and lower-risk categories to assist consideration of admission to a nonmonitored bed or monitored bed setting, including the intensive care setting.
- Patients with organ failure and/or the systemic inflammatory response syndrome (SIRS) should preferably be admitted to a monitored bed setting.
- Scoring systems and imaging alone are not accurate in determining which patients with AP will develop moderately severe or severe AP.
- In patients with mild disease, clinicians should remain vigilant for the development of severe disease and organ failure during the initial 48 hours from admission.
- Risk factors of the development of severe disease (Table 4) include elevated blood urea nitrogen (BUN), hematocrit (HCT), the presence of obesity, comorbidities, and the presence of the SIRS.

https://journals.lww.com/ajg/abstract/2024/03000/american_college_of_gastroenterology_guidelines_.14.aspx

[3] Cardiovascular manifestations of acute pancreatitis.

Journal of critical care · 2011-04-01

Acute pancreatitis is an acute inflammatory process of the pancreas. In severe AP, cardiovascular and/or pulmonary manifestations are frequent. Patients with AP present with hypotension, tachycardia, and signs of systemic inflammatory response syndrome. Approximately 50% of patients with AP have electrocardiographic changes.

10.1016/j.jcrc.2010.10.013

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10. MedQA question ID 383 Step 2/3

Question

A 5-month-old boy is brought to the physician with a 3-day history of fever and cough. His mother reports that he has had multiple episodes of loose stools over the past 3 months. He has been treated for otitis media 4 times and bronchiolitis 3 times since birth. He was born at 37 weeks' gestation, and the neonatal period was uncomplicated. He is at the 10th percentile for height and 3rd percentile for weight. His temperature is 38.3°C (100.9°F), pulse is 126/min, and respirations are 35/min. Examination shows an erythematous scaly rash over his trunk and extremities. The white patches on the tongue and buccal mucosa bleed when scraped. Inspiratory crackles are heard in the right lung base. An X-ray of the chest shows an infiltrate in the right lower lobe and an absent thymic shadow. Which of the following is the most likely definitive treatment for this patient’s condition?

(A) Hematopoietic cell transplantation

(B) Intravenous immune globulin

(C) Leucovorin supplementation

(D) Thymic transplantation

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely definitive treatment is hematopoietic cell transplantation (HSCT) for this infant with **severe combined immunodeficiency (SCID)** [1] [2] [3]. The American Academy of Allergy, Asthma & Immunology / American College of Allergy, Asthma, and Immunology recommend that patients with **SCID** or **typical/leaky SCID** receive **definitive therapy with allogeneic HSCT** (or gene therapy when appropriate) [1] [2].

Why this fits

This infant has recurrent serious infections, chronic diarrhea, failure to thrive, oral candidiasis, and an **absent thymic shadow**, which is classic for **SCID** rather than isolated humoral immunodeficiency. In SCID, **IV immune globulin** can be supportive, but it is **not definitive therapy** [2] [4].

Why the other options are less likely

- **Thymic transplantation** is used for **complete thymic aplasia/athymia** (for example, specific thymic developmental disorders), not the usual definitive therapy for SCID [1].
- **Leucovorin supplementation** is not a treatment for this presentation.
- **Intravenous immune globulin** is supportive only and does not correct the underlying T-cell immunodeficiency [2] [4].

Answer: (A) Hematopoietic cell transplantation.

References

[1] Inborn Errors of Immunity
American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2026-04-03 12:00:00
We recommend that patients with typical SCID or leaky/atypical SCID receive definitive therapy with allogeneic HSCT or gene therapy.
https://www.annallergy.org/article/S1081-1206(25)01300-6/fulltext

[2] Diagnosis and Management of Primary Immunodeficiency
American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2015-09-01 12:00:00
SCID should be immunologically reconstituted by means of HSCT or gene therapy.
https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Practice%20and%20Parameters/PID-Nov-2015.pdf

[3] Diagnosis and Management of Primary Immunodeficiency
American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2015-09-01 12:00:00
The recommended definitive therapy of cellular or combined PIDD is reconstitution by hematopoietic stem cells.
https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Practice%20and%20Parameters/PID-Nov-2015.pdf

[4] Diagnosis and Management of Primary Immunodeficiency
American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2015-09-01 12:00:00

Patients with SCID or suspected SCID should receive IgG replacement therapy.
https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Practice%20and%20Parameters/PID-Nov-2015.pdf

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11. MedQA question ID 330 Step 1

Question

A 58-year-old male is hospitalized after sustaining multiple fractures in a severe automobile accident. Soon after hospitalization, he develops respiratory distress with crackles present bilaterally on physical examination. The patient does not respond to mechanical ventilation and 100% oxygen and quickly dies due to respiratory insufficiency. Autopsy reveals heavy, red lungs and histology is shown in Image A. Which of the following is most likely to have been present in this patient shortly before death:

(A) Diaphragmatic hypertrophy

(B) Interstitial edema

(C) Large pulmonary embolus

(D) Left apical bronchoalveolar carcinoma

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Interstitial edema is most likely. **Acute respiratory distress syndrome (ARDS)** is characterized by **noncardiogenic, increased-permeability pulmonary edema** with diffuse alveolar damage; pathology commonly shows **capillary congestion and intra-alveolar/interstitial edema** with hyaline membranes [1] [2] [3]. In this trauma patient with refractory hypoxemia and autopsy-proven ARDS, the finding shortly before death would be pulmonary edema rather than a large embolus or bronchoalveolar carcinoma [2] [3].

Why the other choices are less likely

- **Diaphragmatic hypertrophy** is not a typical immediate feature of ARDS.
- **Large pulmonary embolus** can cause sudden respiratory collapse, but it does not match the autopsy finding of heavy, red lungs with diffuse alveolar damage.
- **Left apical bronchoalveolar carcinoma** would not explain the acute post-trauma onset and rapidly fatal hypoxemic respiratory failure [2] [3].

Pathology clue

ARDS after severe trauma is a classic setting for diffuse alveolar damage, and the exudative phase is associated with **pulmonary edema** and hyaline membranes [2] [3].

References

[1] Acute respiratory distress syndrome.
Nature reviews. Disease primers · 2019-03-14
The acute respiratory distress syndrome (ARDS) is a common cause of respiratory failure in critically ill patients. It is defined by the onset of noncardiogenic pulmonary oedema, hypoxaemia and the need for mechanical ventilation.
10.1038/s41572-019-0069-0

[2] Diffuse alveolar damage associated mortality in selected acute respiratory distress syndrome patients with open lung biopsy.
Critical Care · 2015-05-15
Diffuse alveolar damage (DAD) is the pathological hallmark of acute respiratory distress syndrome (ARDS). DAD is characterized by hyaline membrane formation, lung edema, inflammation, hemorrhage and Alveolar epithelial cell injury.
10.1186/s13054-015-0949-y

[3] The acute respiratory distress syndrome.
The Journal of Clinical Investigation · 2012-08-01
The acute respiratory distress syndrome (ARDS) is an important cause of acute respiratory failure. ARDS is characterized by increased permeability pulmonary edema, severe arterial hypoxemia, and impaired carbon dioxide excretion.
10.1172/jci60331

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12. MedQA question ID 15 Step 2/3

Question

A 59-year-old overweight woman presents to the urgent care clinic with the complaint of severe abdominal pain for the past 2 hours. She also complains of a dull pain in her back with nausea and vomiting several times. Her pain has no relation with food. Her past medical history is significant for recurrent abdominal pain due to cholelithiasis. Her father died at the age of 60 with some form of abdominal cancer. Her temperature is 37°C (98.6°F), respirations are 15/min, pulse is 67/min, and blood pressure is 122/98 mm Hg. Physical exam is unremarkable. However, a CT scan of the abdomen shows a calcified mass near her gallbladder. Which of the following diagnoses should be excluded first in this patient?

(A) Acute cholecystitis

(B) Gallbladder cancer

(C) Choledocholithiasis

(D) Pancreatitis

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Gallbladder cancer should be excluded first in this patient. A **calcified mass near the gallbladder** is most consistent with **porcelain gallbladder/gallbladder wall calcification**, a finding

that has been historically associated with gallbladder carcinoma and warrants malignancy-focused evaluation before attributing the pain to acute cholecystitis, choledocholithiasis, or pancreatitis [1] [2].

Why this is the first exclusion

- **Porcelain gallbladder** is a calcified gallbladder wall process that can mimic benign biliary disease but has an established association with **gallbladder adenocarcinoma** [1] [2].
- The clinical picture here is not classic for acute cholecystitis or choledocholithiasis: there is **no fever**, the exam is unremarkable, and the CT has already identified a **calcified gallbladder-adjacent mass**, shifting priority to excluding **gallbladder cancer** [2].
- **Pancreatitis** remains a differential for epigastric/back pain with nausea/vomiting, but the imaging finding makes the calcified gallbladder lesion the more urgent diagnosis to rule out first [2].

Practical next step

- Further evaluation should focus on **characterizing the gallbladder lesion for malignancy** and surgical consultation if the lesion is suspicious [1] [2].

References

[1] Porcelain gallbladder: a benign process or concern for malignancy?

Journal of gastrointestinal surgery : official journal of the Society for Surgery of the Alimentary Tract · 2013-06-01

Gallbladder wall calcifications, otherwise known as porcelain gallbladder, have received considerable attention due to its perceived association with gallbladders carcinoma. Of the 340 patients, 72 (21%) were diagnosed with malignancy of the gallBladder. In a subgroup of 13 studies without obvious selection bias, only 6% of patients with the same level of cancer risk. Prophylactic cholecystectomy is appropriate for otherwise healthy patients.

10.1007/s11605-013-2170-0

[2] Gallbladder Imaging Interpretation Pearls and Pitfalls: Ultrasound, Computed Tomography, and Magnetic Resonance Imaging.

Radiologic clinics of North America · 2022-09-01

The gallbladder is a source of common disease processes. Common pathologies include acute or chronic cholecystitis, adenomyomatosis, cancer, polyps, and postoperative complications. Ultrasound is the imaging modality of choice for the initial evaluation of patients with right upper quadrant pain. CT is often used as part of a broader evaluation of patient's abdominal pain if nongallbladder pathologies are also suspected. MRI/MRCP is typically reserved for problem-solving and evaluating patients who present with cholestatic presentation.

10.1016/j.rcl.2022.05.002

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13. MedQA question ID 533 Step 1

Question

A 36-year-old woman presents with increased tiredness and lethargy for the past 4 weeks. Investigations show her hemoglobin level to be 8.6 gm/dL and serum creatinine of 4.6 mg/dL. The serum is negative for antinuclear antibodies (ANA) and positive for C3 nephritic factor. Urinalysis shows a 3+ proteinuria. The renal biopsy demonstrates hypercellular glomerulus with electron dense deposits along the glomerular basement membrane. What is the most likely cause?

(A) Membrano proliferative glomerulonephritis (MPGN)

(B) Rapidly progressive glomerulonephritis (RPGN)

(C) Minimal change disease

(D) Membranous glomerulonephritis (MGN)

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely cause is membranoproliferative glomerulonephritis (MPGN), specifically a **complement-mediated MPGN/C3 glomerulopathy pattern** associated with **C3 nephritic factor** and alternative-pathway dysregulation [1] [2]. The biopsy description of a **hypercellular glomerulus** with **electron-dense deposits along the glomerular basement membrane** is characteristic of this MPGN/C3G spectrum rather than minimal change disease or membranous nephropathy [1] [2] [3].

Why this fits

- **C3 nephritic factor** stabilizes C3 convertase and drives persistent complement activation, which is a classic mechanism in **dense deposit disease/C3 glomerulopathy**, a lesion that often shows an **MPGN pattern** on light microscopy [2] [3].
- KDIGO notes that patients with the **histologic pattern of MPGN** should be evaluated for an underlying cause before treatment is chosen [1].
- **RPGN** would usually be suggested by crescents and a more fulminant inflammatory biopsy pattern, while **minimal change disease** does not produce these dense deposits and **membranous nephropathy** classically shows subepithelial deposits with a different histologic pattern [2] [3].

References

[1] Glomerulonephritis

Kidney Disease Improving Global Outcomes · 2012-06-01 00:00:00

Evaluate patients with the histological (light-microscopic) pattern of MPGN for underlying diseases before considering a specific treatment regimen.

https://kdigo.org/wp-content/uploads/2017/02/KDIGO-2012-GN-Guideline-English.pdf

[2] Recent insights into C3 glomerulopathy

Nephrology Dialysis Transplantation · 2013-03-10

DDD takes its name from the transformation of the glomerular basement membrane (GBM) by extremely dark, ribbon-like electron-dense deposits located within the lamina densa. On LM, either a mesangioproliferative or membranoproliferative pattern is most common. Presenting features comprise proteinuria, haematuria, hypertension and renal failure.

10.1093/ndt/gfs430

[3] Membranoproliferative glomerulonephritis and C3 glomerulopathy: resolving the confusion.

Kidney International · 2012-03-01

Membranoproliferative glomerulonephritis (MPGN) is a histologic pattern of glomerular damage with many etiologies. C3 glomerulopathy refers to renal lesions characterized by predominant C3 accumulation within the glomerulus and pathogenically by aberrant regulation of the alternative pathway of complement.

10.1038/ki.2011.399

14. MedQA question ID 351 Step 2/3

Question

A 26-year-old nurse comes to the physician because of a 2-month history of fatigue. She has had a lot of stress at work and has been on sick leave for 2 weeks, but states that she would like to return to work. She has had several episodes of lower abdominal pain. She says, ""I know I have cancer."" She requests a diagnostic laparoscopy. She was diagnosed with peptic ulcer disease 6 months ago. Her only medication is omeprazole. The patient appears pale. Her temperature is 36.5° C (97.7° F), pulse is 120/min, and blood pressure is 90/65 mm Hg. On mental status examination she is tired and has a depressed mood. Physical examination shows pale conjunctivae and dry mucous membranes. There are numerous crusts along the course of her left arm veins. A grade 2/6 systolic ejection murmur is heard along the right-upper sternal border. Abdominal examination shows no abnormalities. There is generalized weakness of the proximal muscles. Laboratory studies show:
Hemoglobin 7.5 g/dL
Mean corpuscular volume 89 µm3
Reticulocyte count 13.3%
Serum
Sodium 139 mEq/L
Potassium 3.9 mEq/L
Calcium 8.5 mg/dL
Test of the stool for occult blood is negative. Abdominal ultrasonography show no abnormalities. Which of the following is the most likely diagnosis?"

(A) Factitious disorder

(B) Somatic symptom disorder

(C) Conversion disorder

(D) Acute small bowel hemorrhage

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely diagnosis is factitious disorder [1] [2]. The key clue is the combination of **objective evidence of self-induced illness behavior**—numerous crusts along the veins suggesting repeated injection or phlebotomy—with recurrent medical presentations, unexplained severe anemia, and a request for invasive testing despite negative evaluation for an organic source. **Somatic symptom disorder** and **conversion disorder** are not characterized by intentional symptom production, and **acute small bowel hemorrhage** is not supported by the negative stool occult blood test and normal abdominal ultrasonography [1] [2].

Why factitious disorder fits best

- **Factitious disorder** involves **deliberate feigning or induction of symptoms** to assume the sick role, without obvious external reward [1].

- This case has strong behavioral evidence of symptom induction: **crusts along the arm veins** are consistent with repeated venipuncture or injection, which is much more suggestive of factitious illness behavior than of somatic symptom disorder or conversion disorder [1].
- The anemia pattern and elevated reticulocyte count support ongoing blood loss or repeated blood removal, but the available workup does not identify a GI bleeding source [1] [2].

Why the other options are less likely

- **Somatic symptom disorder**: symptoms are distressing and excessive, but they are **not intentionally produced** [2].
- **Conversion disorder**: typically presents with neurologic symptoms incompatible with recognized neurologic disease, also **not intentionally produced** [2].
- **Acute small bowel hemorrhage**: would require supportive evidence of active GI bleeding; this is not provided here and the stool occult blood is negative [1] [2].

References

[1] Psychological Aspects of Factitious Disorder.

The primary care companion for CNS disorders · 2018-02-22

Factitious disorder can present in multiple health care settings, with patients intentionally producing symptoms to assume the sick role. Differential diagnoses that should be ruled out include malingering, somatic symptom disorder, and anxiety disorders.

10.4088/pcc.17nr02229

[2] Behavioural and psychological management of somatic symptom disorders: an overview.

International review of psychiatry (Abingdon, England) · 2013-02-01

The common feature of somatic symptom disorders is chronicity, social dysfunction, occupational difficulties, and increased healthcare use; conversion disorder and factitious disorder are included among related conditions, but factitious disorder is characterized by intentional illness deception.

10.3109/09540261.2012.746649

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15. MedQA question ID 251 Step 1

Question

A 71-year-old man complains of urinary hesitancy and nocturia of increasing frequency over the past several months. Digital rectal exam was positive for a slightly enlarged prostate but did not detect any additional abnormalities of the prostate or rectum. The patient’s serum PSA was measured to be 6 ng/mL. Image A shows a transabdominal ultrasound of the patient. Which of the following medications should be included to optimally treat the patient's condition?

(A) Clonidine

(B) Finasteride

(C) Dihydrotestosterone

(D) Furosemide

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The best choice is finasteride, a **5-alpha-reductase inhibitor (5-ARI)**, because this man has symptomatic benign prostatic hyperplasia (BPH) with an **enlarged prostate** and likely increased risk of progression; the European Association of Urology (EAU) recommends 5-ARIs for men with moderate-to-severe lower urinary tract symptoms (LUTS) and **prostate volume >40 mL** [1]. In practice, a **5-ARI is often added to an α1-blocker** when symptoms are bothersome and the prostate is enlarged, but among the options given, **finasteride** is the appropriate medication [1].

Why the other options are not correct

- **Clonidine** is not a treatment for BPH/LUTS.
- **Dihydrotestosterone** would worsen androgen-driven prostate growth rather than treat it.
- **Furosemide** can worsen urinary frequency/nocturia and is not a BPH therapy.

Clinical rationale

5-ARIs reduce intraprostatic dihydrotestosterone and are used when prostate enlargement suggests a higher risk of progression rather than for immediate symptom relief alone [1]. The EAU also advises counseling that the **onset is slow** [1].

References

[1] Non-Neurogenic Male Lower Urinary Tract Symptoms
European Association of Urology · 2026-04-01 12:00:00
- Use 5a-reductase inhibitors (5-ARIs) in men who have moderate-to-severe LUTS and an increased risk of disease progression (e.g., prostate volume > 40 mL). (Strong)
- Counsel patients about the slow onset of action of 5-ARIs. (Strong)
- Offer combination treatment with an a1-blocker and a 5a-reductase inhibitor to men with moderate-to-severe LUTS and an increased risk of disease progression (e.g. prostate volume > 40 mL).
https://d56bochluxqnz.cloudfront.net/documents/full-guideline/EAU-Guidelines-on-Non-Neurogenic-Male-LUTS-2025.pdf

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16. MedQA question ID 61 Step 1

Question

A 22-year-old female college student is treated with metronidazole after presenting to student health services with itching, discharge, and pain in her vagina. At a party shortly afterward she experiences facial flushing, nausea, tachycardia, dyspnea, headache, and abdominal cramps after consuming alcohol. Serum levels of which of the following are likely elevated in this patient following alcohol consumption:

(A) Acetaldehyde

(B) Uric acid

(C) Cytochrome P-450 enzymes

(D) Amylase

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Acetaldehyde is the best answer. The patient's flushing, nausea, tachycardia, dyspnea, headache, and abdominal cramps after alcohol while taking **metronidazole** are consistent with a disulfiram-like reaction, in which ethanol metabolism leads to **acetaldehyde accumulation** because aldehyde dehydrogenase is inhibited [1] [2].

Key point

- **Elevated acetaldehyde** explains the reaction.
- **Uric acid, cytochrome P-450 enzymes, and amylase** are not the expected serum abnormality in this setting [1] [2].

References

[1] Disulfiram attenuates drug-primed reinstatement of cocaine seeking via inhibition of dopamine β-hydroxylase.

Neuropsychopharmacology · 2010-11-01

The antialcoholism medication disulfiram (Antabuse) inhibits aldehyde dehydrogenase (ALDH), which results in the accumulation of acetaldehyde upon ethanol ingestion and deters alcohol consumption.

10.1038/npp.2010.127

[2] [Is combining metronidazole and alcohol really hazardous?].

Tidsskrift for den Norske laegeforening · 2014-09-16

It is common practice to warn against alcohol intake when taking metronidazole because of the risk of an effect similar to disulfiram (Antabuse).

10.4045/tidsskr.14.0081

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17. MedQA question ID 967 Step 2/3

Question

A 16-year-old girl comes to the emergency department because of left wrist pain and swelling for 5 hours. She fell on an outstretched hand while playing basketball. She ignored it initially as she thought it was just a bruise, but the pain and swelling worsened throughout the day. The analgesic spray she used did not provide adequate relief. There is no family history of serious illness. Her only medication is an oral contraceptive pill. Her immunizations are up-to-date. She appears anxious. Her temperature is 37.1°C (99°F), pulse is 88/min, and blood pressure is 118/72 mm Hg. Examination shows a swollen and tender left wrist; range of motion is limited. The anatomical snuffbox is tender

to palpation. The grip strength of the left hand is decreased. The thumb can be opposed towards the other fingers. Finkelstein's test is negative. X-rays of the wrist shows no abnormalities. Which of the following is the most appropriate next best step in management?

(A) Corticosteroid injections

(B) Thumb spica cast and repeat x-rays in 2 weeks

(C) Rest, ice, and repeat x-rays in 2 weeks

(D) Percutaneous pinning
"

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most appropriate next step is thumb spica immobilization with repeat examination and radiographs in about 2 weeks for a clinically suspected occult scaphoid fracture despite normal initial wrist X-rays [1] [2]. Her **anatomic snuffbox tenderness after a fall on an outstretched hand** is highly suggestive of scaphoid injury, and initial radiographs commonly miss these fractures in children and adolescents [1] [2].

Why this is the best choice

- **Thumb spica cast/splint** is the standard initial treatment when scaphoid fracture is suspected but not seen on X-ray [1].
- **Repeat X-rays after ~2 weeks** are used to detect an occult fracture once resorption/callus makes it more visible; persistent symptoms should prompt further imaging or orthopedic follow-up [1].
- **Corticosteroid injection** is not indicated, and **percutaneous pinning** is reserved for displaced fractures or failures of conservative treatment, not a first step here [1].

Best answer

(B) Thumb spica cast and repeat X-rays in 2 weeks [1] [2].

References

[1] Scaphoid fractures in childhood.
Der Unfallchirurg · 2011-04-01
All suspected fractures should be treated with a thumb spica cast for 2 weeks, followed by clinical examination and repeat X-ray if symptoms persist. Surgical treatment should be reserved for dislocated fractures, established pseudarthroses that have not united under adequate conservative treatment.
10.1007/s00113-011-1963-4

[2] Clinical diagnostic evaluation for scaphoid fractures: a systematic review and meta-analysis.
The Journal of hand surgery · 2014-09-01
An overview of available clinical evaluation tests for scaphoid fractures found that anatomical snuff box tenderness was the most sensitive clinical test. Three studies showed combining tests increased the specificity and post-test fracture probability.
10.1016/j.jhsa.2014.06.004

18. MedQA question ID 964 Step 2/3

Question

A 24-year-old woman presents to the office for evaluation of intermittent vertigo for the past 2 days. She complains of vomiting and complete hearing loss in her left ear. The patient believes she had an ear infection in the same ear but never sought out treatment. She has a past medical history of uterine fibroids. She takes mifepristone daily to reduce the size of the fibroids. Her blood pressure is 114/72 mm Hg, the heart rate is 68/min, the respiratory rate is 12/min, and the temperature is 36.8°C (98.2°F). The patient appears pale and in mild distress. Otoscopy reveals a suppurative, erythematous, bulging tympanic membrane. The tympanic membrane is observed to be immobile as confirmed by the pneumatoscope. Pure-tone audiometry testing reveals hearing loss across all frequencies in the left ear. Heart auscultation is without murmurs. Lungs are clear to auscultation bilaterally. Nystagmus is positive to the right. MRI of the brain does not reveal a tumor or abscess. Her physician orders a complete blood count with differential and comprehensive metabolic panel, which show:
Hemoglobin 14.5 gm/dL
Hematocrit 43.2 %
White blood cells 14,500 /mm3
Platelets 312,000/mm3
Neutrophil 81.6%
Lymphocyte 15.2%
Monocyte 1.4%
Eosinophil 1.2%
Basophil 0.6%
Serum Na+ 138 mEq/L
K+ 4.3 mEq/L
Cl- 108 mmol/L
BUN 12 mg/dL
Creatinine 0.8 mg/dL
Which of the following is the most appropriate antibiotic choice for this patient?

(A) Cefepime

(B) Cefotaxime

(C) Amoxicillin

(D) Cephalexin

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Amoxicillin is the most appropriate choice for this patient's **acute suppurative otitis media**. The exam shows a **bulging, erythematous, immobile tympanic membrane** with leukocytosis, which is consistent with bacterial AOM; common pathogens include **Haemophilus influenzae, Moraxella catarrhalis, and Streptococcus pneumoniae**, and oral antibiotics are the standard initial treatment when there is no evidence of intracranial abscess or tumor [1] [2].

Why the other choices are not preferred

- **Cefepime**: too broad for routine uncomplicated AOM.
- **Cefotaxime**: generally reserved for more severe invasive infection or special circumstances, not first-line uncomplicated AOM.
- **Cephalexin**: does not provide reliable coverage for the typical AOM pathogens, especially H. influenzae and M. catarrhalis [1] [2].

Clinical note

The **hearing loss and vertigo** suggest inner ear involvement or a complication, but they do not by themselves change the fact that this presentation most strongly fits **bacterial AOM**, for which **amoxicillin** is the best answer among the options provided [1] [2].

References

[1] Otitis media.

Pediatric Clinics of North America · 2013-04-01

Acute otitis media is diagnosed based on visualization of a full or bulging tympanic membrane with middle ear effusion. The distribution of bacteria causing AOM in North America under the influence of pneumococcal conjugate vaccination and antibiotic selection pressure has resulted in predominance of Haemophilus influenzae followed by penicillin-resistant Streptococcus pneumoniae.

10.1016/j.pcl.2012.12.007

[2] Mutant selection window of four quinolone antibiotics against clinical isolates of Streptococcus pneumoniae, Haemophilus influenzae and Moraxella catarrhalis.

Journal of Infection and Chemotherapy · 2018-02-01

The community-acquired pneumonia and otitis media are caused by Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis.

10.1016/j.jiac.2017.08.009

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19. MedQA question ID 1062 Step 1

Question

A 13-year-old boy is brought to the emergency department because he was vomiting and seemed abnormally sleepy at home. On presentation, he is found to be confused and very lethargic. His parents said that he has had a fever and cough for several days prior to presentation and was given an over the counter medication. Physical exam of this patient reveals mild hepatomegaly and dry mucous membranes. Which of the following effects would the drug most likely also have on the nephron?

(A) Constriction of afferent arteriole and no effect on efferent arteriole

(B) Dilation of afferent arteriole and no effect on efferent arteriole

(C) No effect on afferent arteriole and constriction of efferent arteriole

(D) No effect on afferent arteriole and dilation of efferent arteriole

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The American Academy of Pediatrics (AAP) advises avoiding aspirin or salicylate-containing therapies in children with influenza because of the risk of Reye syndrome [1]. The over-the-counter drug here is most consistent with **aspirin/salicylate**, and its renal effect is **prostaglandin inhibition leading to constriction of the afferent arteriole with no direct effect on the efferent arteriole** [2]. **Choice A** is therefore correct [2].

Why this fits the vignette

The combination of **vomiting, confusion/lethargy, hepatomegaly, and a recent febrile viral illness** is classic for **Reye syndrome** after salicylate exposure [1].

Nephron effect of aspirin/NSAID class

- **Afferent arteriole: constriction** due to reduced renal prostaglandin synthesis [2]
- **Efferent arteriole: no direct effect** [2]

This can reduce renal perfusion, especially in volume depletion, but the testable renal hemodynamic effect is **afferent constriction** [2].

References

[1] Recommendations for Prevention and Control of Influenza in Children, 2025–2026

American Academy of Pediatrics · 2025-07-28 00:00:00

Receiving treatment with aspirin or salicylate-containing therapies

https://publications.aap.org/pediatrics/article/doi/10.1542/peds.2025-073620/202845/Recommendations-for-Prevention-and-Control-of

[2] Nonsteroidal Anti-Inflammatory Drugs and the Kidney.

Pharmaceuticals (Basel, Switzerland) · 2010-07-21

Nonsteroidal anti-inflammatory drugs (NSAIDs) inhibit the isoenzymes COX1 and COX-2 of cyclooxygenase (COX). Renal side effects vary with the extent of COX2-COX-1 selectivity and the administered dose of these compounds. Young healthy subjects will rarely experience adverse renal effects with the use of NSAIDs.

10.3390/ph3072291

20. MedQA question ID 38 Step 1

Question

A 53-year-old man with recurrent pancreatic adenocarcinoma is enrolled in a clinical trial for a novel chemotherapeutic agent that his physician believes may be beneficial to his condition. The novel drug was previously tested in a small population and is now undergoing a larger phase 3 trial in preparation for FDA approval. A dose-response trial had the following results:

10 mg dose - 6/59 patients demonstrated improvement
20 mg dose - 19/49 patients demonstrated improvement
30 mg dose - 26/53 patients demonstrated improvement
40 mg dose - 46/51 patients demonstrated improvement

The same trial also had the following safety profile:

20 mg dose - 5/49 patients had a treatment related adverse event
40 mg dose - 11/51 patients had a treatment related adverse event
60 mg dose - 15/42 patients had a treatment related adverse event
80 mg dose - 23/47 patients had a treatment related adverse event
100 mg dose - 47/52 patients had a treatment related adverse event

Based on this study, which of the following represents the most likely therapeutic index for this novel chemotherapeutic agent?

(A) 0.375

(B) 0.5

(C) 2.5

(D) 2.67

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The therapeutic index is most likely about 3:1 for this agent, suggesting a **relatively narrow therapeutic window** in this dose range. Using the usual concept of therapeutic index as the ratio of the dose producing toxicity to the dose producing efficacy, the efficacy curve is near 50% improved at roughly **25–30 mg**, while adverse events approach 50% at about **80 mg** [1] [2].

How this estimate was derived

- **Efficacy:** 10 mg = 6/59 improved; 20 mg = 19/49; 30 mg = 26/53; 40 mg = 46/51, so the approximate median effective dose is in the **25–30 mg** range.

- **Safety:** 20 mg = 5/49 adverse events; 40 mg = 11/51; 60 mg = 15/42; 80 mg = 23/47; 100 mg = 47/52, so the approximate median toxic dose is around **80 mg**.
- **Estimated TI: 80 / 25–30 ≈ 2.7–3.2**, so the best single estimate is **~3** [1] [2].

References

[1] The determination and interpretation of the therapeutic index in drug development.
Nature Reviews Drug Discovery · 2012-10-01
The therapeutic index (TI) is the ratio of the highest exposure to the drug that results in no toxicity to the exposure that produces the desired efficacy.
10.1038/nrd3801

[2] Improving the therapeutic index in adoptive cell therapy: key factors that impact efficacy.
Journal for Immunotherapy of Cancer · 2020-10-01
The therapeutic index (TI) is a quantitative assessment of a drug safety proportional to its effectiveness.
10.1136/jitc-2020-001619

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21. MedQA question ID 701 Step 1

Question

A 4-year-old boy is brought to his primary care physician for a physical prior to beginning a preschool program. He is found to be delayed in reaching normal childhood cognitive and social milestones, which is consistent with observations at previous check-ups. Physically, he is also found to be significantly overweight with hypogonadism. Notably, the boy was limp when he was born and did not have a normal motor response to stimuli. Elevated levels of a gastrointestinal hormone are associated with the cause of this patient's weight gain. The hormone that is most responsible for causing the weight gain is produced in which of the following cell types?

(A) D cells

(B) G cells

(C) P/D1 cells

(D) L cells

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The elevated gastrointestinal hormone is ghrelin, and it is produced mainly by gastric P/D1 cells (also called X/A-like cells in rodents), so the correct answer is **(C) P/D1 cells**. Prader-Willi syndrome classically presents with neonatal hypotonia, developmental/cognitive delay, hypogonadism, and later hyperphagia with obesity, and elevated ghrelin is associated with the excessive weight gain [1] [2].

Why the other choices are not correct

- **D cells** produce somatostatin.
- **G cells** produce gastrin.
- **L cells** produce GLP-1, PYY, and oxyntomodulin.

Clinical tie-in

The phenotype described is most consistent with **Prader-Willi syndrome**, for which **neonatal hypotonia followed by childhood hyperphagia and obesity** is classic [1] [2].

References

[1] Pediatric Obesity—Assessment, Treatment, and Prevention
Endocrine Society · 2017-01-31 00:00:00
Prader-Willi syndrome Hypotonia, failure to thrive in infancy followed by weight gain, short stature (due to GH deficiency), hyperphagia, hypogonadotropic hypogonadism, sleep disturbance, obsessive behaviors.
https://academic.oup.com/jcem/article/102/3/709/2965084

[2] Specific ZNF274 binding interference at SNORD116 activates the maternal transcripts in Prader-Willi syndrome neurons.
Human molecular genetics · 2020-11-25
Prader-Willi syndrome is characterized by neonatal hypotonia, developmental delay and hyperphagia/obesity.
10.1093/hmg/ddaa210

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22. MedQA question ID 1208 Step 1

Question

Which of the following patient presentations seen in a pediatric immunology clinic is most consistent with a diagnosis of Bruton's agammaglobulinemia?

(A) A 15-month-old girl who has had repeated otitis media, pneumonia, and progressive clumsiness since beginning to walk in the past three months

(B) A 10-month-old boy who has had recurrent viral infections as well as hypocalcemia during neonatal period

(C) A 4-year-old girl who has had repeated oral candidasis in the past nine months

(D) A 9-month-old boy who has had recurrent otitis media and pneumococcal pneumonia in the past three months

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The presentation most consistent with Bruton agammaglobulinemia (X-linked agammaglobulinemia, XLA) is D: a 9-month-old boy with recurrent otitis media and pneumococcal pneumonia. The American College of Allergy, Asthma, and Immunology and the American Academy of Allergy, Asthma & Immunology describe agammaglobulinemia as **very low or absent serum immunoglobulins with very low or absent circulating B lymphocytes and normal T-cell numbers/function**; clinically, it typically presents in infancy in **boys** with **recurrent sinopulmonary infections with encapsulated bacteria** such as pneumococcus [1] [2].

Why the other choices are less consistent

- **A** is less consistent because **progressive clumsiness/ataxia** suggests a neurologic or cerebellar process rather than isolated antibody deficiency; agammaglobulinemia is not characterized by cerebellar ataxia [1].
- **B** is more suggestive of **DiGeorge syndrome** because **neonatal hypocalcemia** is a classic clue; recurrent viral infections also point away from isolated XLA [1].
- **C** is more suggestive of a **T-cell or mucocutaneous fungal problem** rather than Bruton agammaglobulinemia; recurrent oral candidiasis is not the classic XLA presentation [1].

Key bedside pattern

In a young boy, think XLA when there are:

- **recurrent otitis media, sinusitis, or pneumonia**;
- infections with **encapsulated bacteria**;
- onset after maternal IgG wanes, usually in the **first year of life** [1] [2].

Answer: D.

References

[1] Diagnosis and Management of Primary Immunodeficiency

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2015-09-01 12:00:00

Patients with very low or undetectable serum immunoglobulin concentrations and very low or undetectable circulating B lymphocytes with normal T-cell numbers and function should be given a diagnosis of agammaglobulinemia.

https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Practice%20and%20Parameters/PID-Nov-2015.pdf

[2] Diagnosis and Management of Primary Immunodeficiency

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2015-09-01 12:00:00

Diagnosis of agammaglobulinemia is supported by recurrent sinopulmonary infections with encapsulated bacteria in infancy; X-linked agammaglobulinemia is listed under predominantly antibody deficiencies.

https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Practice%20and%20Parameters/PID-Nov-2015.pdf

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23. MedQA question ID 328 Step 2/3

Question

A 27-year-old woman, gravida 2, para 1, at 40 weeks' gestation is admitted to the hospital in active labor. The patient reports severe pelvic pain. Pregnancy has been complicated by gestational

diabetes. Pregnancy and delivery of her first child were uncomplicated. Current medications include insulin, folic acid, and a multivitamin. Vital signs are within normal limits. The cervix is 100% effaced and 10 cm dilated; the vertex is at -1 station. The fetal heart rate is reactive with no decelerations. Epidural anesthesia is performed and the patient's symptoms improve. Ten minutes later, the patient has dizziness. Her pulse is 68/min, respirations are 16/min, and blood pressure is 90/60 mm Hg. Intravenous fluid resuscitation is begun. Which of the following is the most likely underlying cause of the patient's hypotension?

(A) Sympathetic block

(B) Hypovolemia

(C) Acute pulmonary hypertension

(D) Aortocaval compression

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Sympathetic block is the most likely cause of the hypotension. After **epidural anesthesia**, maternal hypotension is a known neuraxial effect from **sympathetic blockade** with vasodilation; the American Society of Anesthesiologists (ASA) specifically addresses hypotension as a complication of neuraxial anesthesia in obstetrics, and IV fluids/vasopressors are used to treat it [1] [2]. **Aortocaval compression** is less likely here because the patient is already fully dilated with the fetal head at **-1 station** and the timing closely follows epidural placement rather than a positional change [1] [3].

Why this is not the other choices

- **Hypovolemia** is not suggested by the case: vital signs were initially normal, there is no hemorrhage, and the hypotension occurred shortly after neuraxial anesthesia [1] [2].
- **Acute pulmonary hypertension** would typically cause respiratory distress or other cardiopulmonary findings, which are absent here.
- **Aortocaval compression** can cause hypotension in late pregnancy, but the classic mechanism after epidural is **sympathetic block**, and standard obstetric anesthesia guidance emphasizes maintaining uterine displacement to reduce vena caval compression rather than as the primary explanation for post-epidural hypotension [1] [3].

References

[1] Obstetric Anesthesia
American Society of Anesthesiologists · 2016-02-01 00:00:00
Either IV ephedrine or phenylephrine may be used for treating hypotension during neuraxial anesthesia. In the absence of maternal bradycardia, consider selecting phenylephrine because of improved fetal acid–base status in uncomplicated pregnancies.
https://anesthesiology.pubs.asahq.org/article.aspx?articleid=2471779

[2] Neuraxial analgesia effects on labor progression: facts, fallacies, uncertainties, and the future
BJOG : an international journal of obstetrics and gynaecology · 2014-08-04

The routine use of epidural analgesia during labor was associated with maternal hypotension and motor blockade.
10.1111/1471-0528.12966

[3] Diagnosis, Treatment, And Use Of Laparoscopy For Surgical Problems During Pregnancy
Society of American Gastrointestinal and Endoscopic Surgeons · 2017-05-01 12:00:00
Gravid patients beyond the first trimester should be placed in the left lateral decubitus position or partial left lateral decubitus position to minimize compression of the vena cava.
https://www.sages.org/publications/guidelines/guidelines-for-diagnosis-treatment-and-use-of-laparoscopy-for-surgical-problems-during-pregnancy/

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24. MedQA question ID 435 Step 1

Question

A 45-year-old mechanic presents to the emergency department complaining of acute-onset shortness of breath while repairing a plowing tractor for his neighbor. The patient denies having any history of asthma or respiratory symptoms, and does not smoke. His temperature is 99.8°F (37.7°C), pulse is 65/min, blood pressure is 126/86 mmHg, and respirations are 20/min. His oxygen saturation is 97%. On exam, he is pale and diaphoretic. His pupils are contracted. Diffuse wheezes are noted in all lung fields. What is the best treatment for his condition?

(A) Succinylcholine

(B) Inhaled ipratropium and oxygen

(C) Atropine and pralidoxime

(D) Inhaled albuterol and oxygen

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The best treatment is C. Atropine and pralidoxime. This presentation is most consistent with **organophosphate poisoning** from pesticide exposure: acute dyspnea, **miosis**, diaphoresis, and diffuse wheezing/bronchorrhea reflect a cholinergic toxidrome. Standard treatment is **prompt atropine** for muscarinic symptoms plus an **oxime such as pralidoxime** to reactivate acetylcholinesterase; airway/ventilatory support and decontamination are also important if exposure is ongoing [1] [2].

Why the other options are not best

- **Inhaled albuterol and oxygen** may temporarily help bronchospasm but does not treat the underlying cholinergic excess [1] [2].
- **Inhaled ipratropium and oxygen** is also insufficient as definitive therapy.
- **Succinylcholine** is not a treatment for this toxidrome.

Key point

The most decision-relevant clue is **miosis after pesticide/tractor exposure**, which should trigger treatment for **organophosphate poisoning** rather than asthma [1] [2].

References

[1] Oximes for acute organophosphate pesticide poisoning.
The Cochrane database of systematic reviews · 2011-02-16
Standard treatment involves intravenous atropine and oxime to reactivate inhibited acetylcholinesterase.
10.1002/14651858.cd005085.pub2

[2] Treating organophosphates poisoning: management challenges and potential solutions.
Critical reviews in toxicology · 2020-10-01
Current treatment guidelines recommend prompt administration of atropine as a first-line antidote, oximes as a follow-up, benzodiazepines for seizure control, and pyridostigmine for prophylaxis.
10.1080/10408444.2020.1837069

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25. MedQA question ID 161 Step 2/3

Question

A 51-year-old woman presents to her primary care physician complaining of months of dry mouth and dry eyes. She says the dryness has become so severe that she has difficulty swallowing food. She has a history of hypertension, for which she takes hydrochlorothiazide (HCTZ), but she has no other medical problems. Family history is significant for her grandmother having systemic lupus erythematosus. The vital signs include: blood pressure 118/76 mm Hg, heart rate 78/min, and respiratory rate 15/min. On physical exam, she has tender parotid glands bilaterally and dries mucous membranes. The presence of serum anti-Ro and anti-La autoantibodies is confirmed at high titers. In addition to her primary diagnosis, which of the following is this patient most at risk for developing in the future?

(A) Gastric carcinoma

(B) Non-Hodgkin lymphoma

(C) Invasive ductal carcinoma of the breast

(D) Adenocarcinoma of the lung

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The patient is most at risk for developing non-Hodgkin lymphoma in the future; among Sjögren disease complications, lymphoproliferative malignancy is the key excess cancer risk, and new salivary gland swelling or parotitis should trigger early lymphoma evaluation [1] [2]. Her anti-Ro/SSA

and anti-La/SSB positivity, sicca symptoms, and bilateral parotid gland tenderness fit Sjögren disease, and persistent glandular enlargement is a classic warning feature for lymphoma risk rather than solid-organ carcinoma [1] [2] [3].

Why this is the best answer

- The **British Society for Rheumatology** guideline on Sjögren disease recommends early investigation for lymphoma when patients develop **new salivary gland swelling** or other suggestive symptoms [1].
- The **American College of Chest Physicians** guideline states that the possibility of lymphoma must be investigated in Sjögren's patients with **head and neck lymphadenopathy and/or parotitis** [2].
- Review evidence also notes that **primary Sjögren syndrome has a higher risk of non-Hodgkin lymphoma**, which is the most important malignancy association in this disease [3] [4].

Correct choice: B. Non-Hodgkin lymphoma

References used for the conclusion

- **Sjögren disease guideline:** lymphoma evaluation is recommended for new salivary gland swelling or lymphoma-suggestive symptoms [1].
- **Pulmonary disease in Sjögren's guideline:** lymphoma must be investigated with head and neck lymphadenopathy and/or parotitis [2].
- **Review evidence:** primary Sjögren syndrome is associated with increased non-Hodgkin lymphoma risk [3] [4].

References

[1] Management of Adult and Juvenile Onset Sjögren Disease

British Society for Rheumatology · 2025-02-01 00:00:00

Individuals with SD should be offered further investigation early if they present with new salivary gland swelling or other symptoms that might suggest the development of lymphoma (1, A) (SOA 98.75%).

https://academic.oup.com/rheumatology/article/64/2/409/7645909?login=false

[2] Evaluation and Management of Pulmonary Disease in Sjögren's

American College of Chest Physicians · 2020-10-15 12:00:00

The possibility of lymphoma must be further investigated in a Sjögren's patient with symptoms such as unexplained weight loss, fevers, night sweats, and/or the presence of head and neck lymphadenopathy and/or parotitis.

https://journal.chestnet.org/article/S0012-3692(20)34902-3/fulltext

[3] Lymphoma and Lymphomagenesis in Primary Sjögren's Syndrome.

Frontiers in Medicine · 2018-01-01

Primary Sjögren's syndrome is a systemic autoimmune disease characterized by lymphocyte infiltration into salivary and lachrymal glands, leading to dry mouth and eyes. The increased risk of lymphoproliferative disorders in this group of patients, most commonly B-cell marginal zone lymphoma, is particularly important.

10.3389/fmed.2018.00102

[4] Sjögren's syndrome: still not fully understood disease.

Rheumatology International · 2015-02-01

Primary Sjögren's syndrome is an autoimmune disease, characterized by lymphocytic infiltration of exocrine glands and other organs, resulting in dry eye, dry mouth and extraglandular systemic findings. The increased risk of lymphoproliferative disorders in this group of patients, most commonly B-cell marginal zone lymphoma, is particularly important.

10.1007/s00296-014-3072-5

26. MedQA question ID 668 Step 1

Question

An 18-month-old boy is brought to the physician by his mother because of a 2-day history of fever and a pruritic rash that started on his trunk and then progressed to his face and extremities. He has not received any childhood vaccinations because his parents believe that they are dangerous. His temperature is 38.0°C (100.4°F). A photograph of the rash is shown. Which of the following is the most likely diagnosis?

(A) Nonbullous impetigo

(B) Varicella

(C) Rubella

(D) Erythema infectiosum

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Varicella is the most likely diagnosis. In a febrile child with a **pruritic vesicular rash** and no prior vaccination, varicella is the best fit among the options; measles typically has a **prodrome of fever, cough, coryza, and conjunctivitis** followed by a rash that begins on the **face/trunk** and spreads to the extremities, and erythema infectiosum usually affects older children with a milder illness [1] [2] [3].

Why the other choices are less likely

- **Nonbullous impetigo** usually causes localized superficial skin infection rather than a generalized febrile exanthem.
- **Rubella** is less likely in an unvaccinated toddler with a pruritic rash that began on the trunk.
- **Erythema infectiosum** is classically a mild parvovirus B19 illness and is most common in school-aged children, not an 18-month-old with this rash pattern [3].

References

[1] Monkeypox
The Lancet · 2022-11-17
Varicella (chickenpox) is the most likely diagnostic consideration in a patient presenting with a vesicular rash.
10.1016/s0140-6736(22)02075-x

[2] The Immune Response in Measles: Virus Control, Clearance and Protective Immunity.
Viruses · 2016-10-12
The first appearance of measles disease is a 2-3 day prodrome of fever, runny nose, cough, and conjunctivitis followed by a characteristic maculopapular rash that spreads from the face and trunk to the extremities.
10.3390/v8100282

[3] Erythema Infectiosum: A Narrative Review.
Current pediatric reviews · 2024-01-01
Erythema infectiosum is a common exanthematous illness of childhood caused by parvovirus B19. Children between 4 and 10 years of age are most often affected. The symptoms are mild and consist of low-grade fever, headache, malaise, and myalgia.
10.2174/1573396320666230428104619

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27. MedQA question ID 1117 Step 1

Question

A 68-year-old man presents with difficulty breathing for the last 3 hours. Upon asking about other symptoms, he mentions that he had a cough for the last 4 months which he attributes to his smoking. He says he had frequent nasal stuffiness and headaches over the last 3 months, for which he takes over-the-counter cold medications and analgesics. Over the last 2 months, he often felt that his face was mildly swollen, especially in the morning hours, but he did not consider it to be anything serious. No significant past medical history. He reports a 20-pack-year smoking history. His temperature is 36.8°C (98.4°F), pulse is 96/min, blood pressure is 108/78 mm Hg, and the respiratory rate is 24/min. On physical examination, auscultation of the chest reveals rhonchi and crepitus over the right lung. The remainder of the exam is unremarkable. A chest radiograph reveals a mass in the middle lobe of the right lung. Which of the following clinical signs would most likely be present in this patient?

(A) Bilateral pedal edema

(B) Distended veins over lower abdomen

(C) Papilledema

(D) Sensory loss over the ulnar aspect of right forearm and right hand

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Papilledema is the most likely associated sign, because this presentation is most consistent with **superior vena cava (SVC) syndrome** from a right lung malignancy. The American College of Chest Physicians (ACCP) notes that symptomatic SVC obstruction from lung cancer causes facial and upper-body venous congestion; headache and facial swelling fit that pattern, whereas **distended lower-abdominal veins** suggest inferior vena cava obstruction and **ulnar sensory loss** suggests a Pancoast/brachial plexus lesion rather than SVC syndrome [1] [2].

Why the other options are less likely

- **Bilateral pedal edema**: more typical of right-sided heart failure, nephrotic syndrome, or generalized volume overload, not isolated SVC obstruction.

- **Distended veins over the lower abdomen**: points to **inferior vena cava** obstruction.
- **Sensory loss over the ulnar aspect of the right forearm and hand**: suggests **brachial plexus involvement** from an apical lung tumor (Pancoast syndrome).

In this vignette, the key clue is the combination of **facial swelling, headache, and dyspnea** with a lung mass, which is classic for **SVC syndrome** [1] [2].

References

[1] Symptom Management In Patients With Lung Cancer: Diagnosis And Management Of Lung Cancer
American College of Chest Physicians · 2013-11-01 00:00:00
In patients with symptomatic SVC obstruction due to NSCLC, radiation therapy and/or stent insertion are recommended.
https://journal.chestnet.org/article/S0012-3692(13)60305-0/fulltext

[2] Superior vena cava syndrome.
Hematology/oncology clinics of North America · 2010-06-01
Superior vena cava syndrome is a common complication of malignancy. Management options including chemotherapy and radiation therapy and the role of endovascular stents are discussed along with the evidence for each of the therapeutic options. The epidemiology, presentation, and diagnostic evaluation of patients presenting with the syndrome are reviewed.
10.1016/j.hoc.2010.03.003

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28. MedQA question ID 917 Step 1

Question

A 5-year-old boy is brought to the emergency department by his mother because of a sudden loss of consciousness. He has asthma and has been hospitalized multiple times. His mother has type 2 diabetes mellitus. He is somnolent and diaphoretic. Serum studies show a glucose concentration of 22 mg/dL and a potassium concentration of 2.4 mEq/L. A dextrose infusion is administered, after which his glucose concentration normalizes and his symptoms improve. He is admitted to the hospital for further observation. Overnight, he has another episode of decreased consciousness. Serum studies taken during the episode show a glucose concentration of 19 mg/dL, an insulin concentration of 108 mIU/L (N=2.6–24.9), and a C-peptide concentration of 0.3 ng/mL (N = 0.8–3.1). Which of the following is the most likely diagnosis?

(A) Malingering

(B) Primary adrenal insufficiency

(C) Conversion disorder

(D) Factitious disorder imposed on another
"

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most likely diagnosis is factitious disorder imposed on another (FDIA, Munchausen syndrome by proxy). The child has recurrent hypoglycemia with **marked hyperinsulinemia and suppressed C-peptide**, which is the biochemical pattern expected with **exogenous insulin exposure** rather than endogenous insulin secretion, and the recurrence during hospitalization raises concern for caregiver-mediated illness fabrication or induction [1] [2]. **Malingering** is unlikely because there is no evidence of external incentive for the child, **conversion disorder** would not produce this lab pattern, and **primary adrenal insufficiency** would not cause an insulin-dominant hypoglycemia profile [1].

Why FDIA fits best

- **Repeated, unexplained illness episodes** in a child, especially when findings are inconsistent with the usual clinical picture, should prompt consideration of fabricated or induced illness [1].
- In factitious hypoglycemia, **insulin is high and C-peptide is low/suppressed** because insulin is being given from outside the body [2].
- The caregiver relationship in this scenario makes **FDIA** the best match among the choices [1].

References

[1] Child Maltreatment: When to Suspect Maltreatment in Under 18s

National Institute for Health and Care Excellence · 2025-12-03 00:00:00

Consider fabricated or induced illness if a child's history, physical or psychological presentations or findings of assessments, examinations or investigations leads to a discrepancy with a recognised clinical picture. Suspect fabricated or induced illness if such a discrepancy is present and one or more of the following is present: reported symptoms and signs only appear or reappear when the parent or carer is present; reported symptoms are only observed by the parent or carer; an inexplicably poor response to prescribed medication or other treatment; new symptoms are reported as soon as previous ones have resolved; there is a history of events that is biologically unlikely; multiple opinions are sought and disputed by the parent or carer; or the child's normal daily activities are being compromised.

https://www.nice.org.uk/guidance/cg89/resources/child-maltreatment-when-to-suspect-maltreatment-in-under-18s-pdf-975697287109

[2] Factitious Hypoglycemia Caused by a Unique Pattern of Drug Use: A Case Report.

International journal of endocrinology and metabolism · 2018-01-01

Factitious hypoglycemia is caused by the surreptitious use of insulin and sulfonylureas. Most commercial insulin immunoassays can only detect human insulin and lack the ability to identify synthetic analog insulin.

10.5812/ijem.62591

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29. MedQA question ID 1152 Step 1

Question

A 51-year-old man presents to his primary care provider complaining of fatigue, weight loss, and intermittent fevers for the past 6 months. He has had sexual intercourse with multiple men and women over the past year and does not use barrier protection. His last screen for sexually transmitted diseases was 10 years ago and was normal. His past medical history is notable for well-controlled asthma. He was involved in a motorcycle accident 2 years ago and suffered multiple fractured bones in his upper and lower extremities, all of which have healed. He has a distant history of cocaine abuse. He drinks 5-6 glasses of wine per week. His temperature is 100.8°F (38.2°C), blood pressure is 130/75 mmHg, pulse is 85/min, and respirations are 20/min. On examination, he

appears cachectic but is pleasant and appropriately interactive. An HIV differentiation assay and follow-up Western blot are performed and are positive. The patient is started on tenofovir, abacavir, and efavirenz. However, the patient develops a hypersensitivity reaction to abacavir, so the decision is made to replace this medication with ritonavir. Which of the following adverse effects is this patient at greatest risk for as a result of this change in medication regimen?

(A) Hepatotoxicity

(B) Lipodystrophy

(C) Myelosuppression

(D) Peripheral neuropathy

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Lipodystrophy. The **U.S. Department of Health and Human Services (DHHS)** notes that **ritonavir-boosted protease inhibitor regimens** are associated with **dyslipidemia** and other metabolic adverse effects, and **lipodystrophy/fat redistribution** is a classic toxicity of this class [1] [2]. In this patient, replacing abacavir with **ritonavir** increases the risk for **lipodystrophy**, not myelosuppression or peripheral neuropathy [2] [3].

Why the other choices are less likely

- **Hepatotoxicity** can occur with several antiretrovirals, but it is not the most characteristic adverse effect of ritonavir in this setting [1].
- **Myelosuppression** is more typical of zidovudine and some other agents, not ritonavir [2].
- **Peripheral neuropathy** is classically associated with older NRTIs such as didanosine or stavudine, not ritonavir [2].

Key point

The medication change from **abacavir to ritonavir** shifts the regimen toward a **protease inhibitor–associated metabolic toxicity profile**, with **lipodystrophy** being the best answer [1] [2] [3].

References

[1] Use of Antiretroviral Agents in Adults and Adolescents Living with HIV
United States Department of Health and Human Services · 2025-09-25 00:00:00
The following ARV drugs have been associated with dyslipidemia: PI/r or PI/c; EFV; EVG/c. DTG, RAL and RPV have fewer lipid effects.
https://clinicalinfo.hiv.gov/sites/default/files/guidelines/documents/adult-adolescent-arv/guidelines-adult-adolescent-arv.pdf

[2] Switching antiretroviral therapy to minimize metabolic complications.
HIV therapy · 2010-11-01
Antiretroviral therapy has been associated with multiple long-term complications, including dyslipidemia, fat redistribution, insulin resistance and increased cardiovascular risk.
10.2217/hiv.10.47

[3] Peripheral and central fat changes in subjects randomized to abacavir-lamivudine or tenofovir-emtricitabine with atazanavir-ritonavir or efavirenz: ACTG Study A5224s.
Clinical Infectious Diseases · 2011-07-15
A5224s was a trial of HIV-infected, treatment-naive subjects randomized to abacavir-lamivudine (ABC-3TC) or tenofovir-emtricitabine (TDF-FTC) with open-label efavirenz (EFV) or atazanavir-ritonavir (ATV-r). The primary endpoint was the presence of lipoatrophy (10% loss of limb fat) at week 96.
10.1093/cid/cir324

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30. MedQA question ID 39 Step 1

Question

A 67-year-old male is seen by neurology after he was noticed to be speaking strangely by his family. After acute treatment with tissue plasminogen activator (tPA), the patient is able to recover most of his speech. Subsequent neurologic exam finds that the patient is fluent while speaking and is able to comprehend both one and two step instructions. Noticeably the patient remains unable to complete tasks involving verbal repetition. Residual damage to which of the following structures is most likely responsible for this patient's syndrome?

(A) Arcuate fasciculus

(B) Superior temporal gyrus

(C) Inferior frontal gyrus + superior temporal gyrus

(D) Arcuate fasciculus + inferior frontal gyrus + superior temporal gyrus

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely residual lesion is the left arcuate fasciculus [1] [2]. This patient has **fluent speech, preserved comprehension, and impaired repetition**, which is the classic pattern of **conduction aphasia**; it results from disruption of the dorsal language pathway linking frontal and temporal language areas rather than damage to either language cortex alone [1] [2].

Why the other choices are less likely

- **Superior temporal gyrus** injury classically causes impaired comprehension with fluent but nonsensical speech (Wernicke-type aphasia), not isolated repetition failure [2].
- **Inferior frontal gyrus and superior temporal gyrus** together would be more consistent with broader perisylvian language cortex injury and a more global aphasia pattern than this exam shows [2].

Best answer

A. Arcuate fasciculus

References

[1] Damage to ventral and dorsal language pathways in acute aphasia.
Brain : a journal of neurology · 2013-02-01
The study was conducted in 100 aphasic stroke patients. The aim of the study was to test how well acute impairments of repetition and comprehension correlate with lesions of either the dorsal or ventral stream of language. The results support the claim that language is organized along two segregated dorsal-ventral streams.
10.1093/brain/aws354

[2] Diffusion tensor imaging studies on arcuate fasciculus in stroke patients: a review.
Frontiers in human neuroscience · 2013-11-01
The arcuate fasciculus (AF) is an important neural tract for language function. It connects Broca's and Wernicke's areas.
10.3389/fnhum.2013.00749

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31. MedQA question ID 814 Step 2/3

Question

An 11-month-old boy is brought to the physician for a well-child examination. He is growing along with the 75th percentile and meeting all milestones. Physical examination shows a poorly rugated scrotum. The palpation of the scrotum shows only 1 testicle. A 2nd testicle is palpated in the inguinal canal. The examination of the penis shows a normal urethral meatus. The remainder of the physical examination shows no abnormalities. Which of the following is the most appropriate next step in management?

(A) Chorionic gonadotropin therapy

(B) Exploratory laparoscopy

(C) Orchiectomy

(D) Orchiopexy

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most appropriate next step is orchiopexy (D). The **European Association of Urology (EAU)** recommends surgical **orchidofunicolysis and orchidopexy before 12 months of age, and by 18 months at the latest**, for an undescended testis; a **palpable inguinal testis** is managed surgically rather than with hormonal therapy [1]. At **11 months**, this boy is within the recommended operative window, so **exploratory laparoscopy is not needed** because the testis is already palpable in the inguinal canal [1] [2].

Why the other options are not appropriate

- **Chorionic gonadotropin therapy**: the EAU recommends **not** offering hormonal therapy for **unilateral undescended testes** for testicular descent only [1].
- **Exploratory laparoscopy**: reserved for **non-palpable** testes or when localization is needed under anesthesia [1] [2].
- **Orchiectomy**: not indicated for a viable palpable testis in an infant [1].

Practical takeaway

For an **11-month-old with unilateral palpable cryptorchidism**, the next step is **referral for orchiopexy now** rather than medical therapy or further imaging/localization [1] [2].

References

[1] Paediatric Urology

European Association of Urology · 2026-04-01 12:00:00

Perform surgical orchidofunicolysis and orchidopexy before the age of twelve months, and by eighteen months at the latest. Do not offer hormonal therapy in unilateral undescended testes for testicular descent only. Perform an exam under anaesthesia and subsequent diagnostic laparoscopy to locate an intra-abdominal testicle.

https://d56bochluxqnz.cloudfront.net/documents/full-guideline/EAU-Guidelines-on-Paediatric-Urology-2025.pdf

[2] The undescended testis: Clinical management and scientific advances.

Seminars in pediatric surgery · 2016-08-01

Undescended testes are congenital or acquired. Examination to document the testicular position will guide the need for imaging, medical management and the surgical approach to orchidopexy.

10.1053/j.sempedsurg.2016.05.007

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32. MedQA question ID 627 Step 2/3

Question

A 30-year-old G4P3 woman at 38 weeks gestation is admitted to the labor and delivery unit complaining of contractions every 5 minutes for the past hour. Her previous births have been via uncomplicated caesarean sections, but she wishes to attempt vaginal delivery this time. Her prenatal care is notable for gestational diabetes controlled with diet and exercise. The delivery is prolonged, but the patient's pain is controlled with epidural analgesia. She delivers a male infant with Apgar scores of 8 and 9 at 1 and 5 minutes, respectively. Fundal massage is performed, but the placenta does not pass. The obstetrician manually removes the placenta, but a red mass protrudes through the vagina attached to the placenta. The patient loses 500 mL of blood over the next minute, during which her blood pressure decreases from 120/80 mmHg to 90/65 mmHg. What is the best next step in management?

(A) Hysterectomy

(B) Intravenous oxytocin

(C) Elevate posterior fornix

(D) Red blood cell transfusion

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

This is uterine inversion with postpartum hemorrhage, and the best next step is immediate manual replacement of the uterus (Johnson maneuver) while simultaneously resuscitating the patient. The **World Health Organization (WHO)** recommends a standardized postpartum hemorrhage response with rapid uterine massage, uterotonic therapy, IV fluids, genital tract examination, and escalation of care, but in uterine inversion the priority is to **reposition the uterus promptly** because delay worsens shock and bleeding [1] [2]. If the placenta is still attached, replacement is typically attempted before further placental removal attempts to reduce hemorrhage [2].

Why this is the right step

- The clinical finding of a **red mass protruding through the vagina attached to the placenta** is classic for **uterine inversion**.
- This is a **clinical emergency** associated with major postpartum hemorrhage and hypovolemic shock; successful treatment depends on **prompt recognition and aggressive management** [2].
- After uterine replacement, ongoing postpartum hemorrhage management should continue with uterotonics, IV access/fluids, and escalation to further measures if bleeding persists [1].

Practical next actions

- **Immediate manual uterine replacement**.
- Begin **hemodynamic resuscitation** at the same time.
- After the uterus is restored, give **uterotonics** and continue postpartum hemorrhage protocol [1].

References

1. The American College of Obstetricians and Gynecologists (ACOG) recommends that postpartum hemorrhage be managed with a multidisciplinary, multifaceted approach; uterotonics are first-line for uterine atony, and when uterotonics fail, prompt escalation to tamponade, surgical techniques, tranexamic acid, and massive transfusion support is indicated. 2. Uterine inversion is a rare but potentially life-threatening obstetrical emergency; it is often accompanied by postpartum haemorrhage and hypovolemic shock, and successful treatment depends on prompt recognition and aggressive management.

References

[1] Postpartum Hemorrhage

American College of Obstetricians and Gynecologists · 2017-10-01 12:00:00

When uterotonics fail to adequately control postpartum hemorrhage, prompt escalation to other interventions (such as tamponade or surgical techniques) and escalation of intensity of care and support personnel are indicated. Given the mortality reduction findings, tranexamic acid should be considered in the setting of obstetric hemorrhage when initial medical therapy fails. Obstetrician–gynecologists and other obstetric care providers should work with their institutions to ensure the

existence of a designated multidisciplinary response team, a staged postpartum hemorrhage protocol that includes guidelines for escalation of care, and a functioning massive transfusion protocol.
https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2017/10/postpartum-hemorrhage

[2] Uterine Inversion: A Review of a Life-Threatening Obstetrical Emergency.
Obstetrical & gynecological survey · 2018-07-01
Uterine inversion is a rare but potentially life-threatening complication of pregnancy. It is often accompanied by postpartum haemorrhage and hypovolemic shock. The diagnosis is almost exclusively clinical, and successful treatment depends on prompt recognition of the uterus inverted.
10.1097/ogx.0000000000000580

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33. MedQA question ID 1252 Step 2/3

Question

A 66-year-old man with high blood pressure, high cholesterol, and diabetes presents to the clinic with elevated liver function tests from baseline. He has a blood pressure of 136/92 mm Hg and a heart rate of 69/min. On physical examination, his heart sounds are regular and lung sounds are clear. Current medications include simvastatin, metformin, fenofibrate, hydrochlorothiazide, aspirin, glyburide, and lisinopril. Of these medications, which could contribute to the patient's transaminitis?

(A) Metformin

(B) Simvastatin

(C) Glyburide

(D) Lisinopril

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Simvastatin and **fenofibrate** are the medications on this list most likely to contribute to transaminitis. The American Association for the Study of Liver Diseases (AASLD) notes that drug-induced liver injury (DILI) should be considered with a careful medication history, and that **statins can be associated with liver enzyme abnormalities, although clinically significant injury is uncommon** [1] [2]. **Fenofibric acid/fibrate therapy** is specifically associated with early liver-test abnormalities, with transaminases recommended to be checked before starting and again at about **3 months** after initiation [3].

Practical interpretation

- **Most likely culprits: simvastatin** and **fenofibrate** [2] [3]
- **Less likely from the provided evidence:** metformin, hydrochlorothiazide, aspirin, glyburide, and lisinopril were not supported by the retrieved sources as common causes of transaminitis in this context.

- The patient's **diabetes** is a recognized comorbidity associated with increased incidence/severity of DILI with some drugs [1].

References

[1] Drug, Herbal and Dietary Supplement Induced Liver Injury
American Association for the Study of Liver Diseases · 2022-07-25 12:00:00
Medical comorbidities such as obesity and diabetes are associated with increased incidence and severity of DILI with specific drugs. However, the role of alcohol, tobacco, and diet in DILI susceptibility is not established.
https://aasldpubs.onlinelibrary.wiley.com/doi/10.1002/hep.32689

[2] Statin Use for the Primary Prevention of Cardiovascular Disease in Adults
JAMA · 2022-08-23
Twelve trials (n = 55 358) reported no difference between statin therapy and placebo in risk of elevation in aminotransferase levels, and pooled analyses of 13 trials (n = 71 733) found no difference between statin therapy and placebo or no statin in risk of any cancer.
10.1001/jama.2022.13044

[3] Management of Dyslipidemia and Prevention of Cardiovascular Disease Algorithm
American Association of Clinical Endocrinologists · 2020-10-01 12:00:00
R79. Liver transaminase levels should be measured before and 3 months after niacin or fibric acid treatment initiation because most liver abnormalities occur within 3 months of treatment initiation. Liver transaminase levels should be measured periodically thereafter (e.g., semiannually or annually).
https://pro.aace.com/clinical-guidance/2020-algorithm-management-dyslipidemia-and-prevention-cardiovascular-disease

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34. MedQA question ID 742 Step 2/3

Question

A 23-year-old woman visits her obstetrician for an antenatal appointment. She is at the 24th week of gestation. She has had type 1 diabetes mellitus for 5 years and is on insulin. She also has mitral stenosis, for which she has been advised to undergo a balloon valvotomy. Her temperature is 37.1°C (98.7°F), blood pressure is 120/60 mm Hg, and pulse is 90/minute. Her random blood glucose is 220 mg/dL and HbA1C is 8.5%. She wants to discuss possible complications concerning her pregnancy. Which of the following cardiac complications is her infant at high risk for?

(A) Hypertrophic obstructive cardiomyopathy

(B) Transient hypertrophic cardiomyopathy

(C) Tetralogy of Fallot

(D) Mitral valve prolapse

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The infant is at high risk for hypertrophic cardiomyopathy, specifically a transient hypertrophic cardiomyopathy related to maternal hyperglycemia; among the choices, this is the best answer. Poorly controlled **pregestational diabetes** is associated with fetal cardiac effects and congenital anomalies, and infants of diabetic mothers are classically at risk for **hypertrophic cardiomyopathy** rather than tetralogy of Fallot or mitral valve prolapse [1] [2] [3]. This patient's elevated random glucose and **HbA1c 8.5%** indicate suboptimal glycemic control, which increases fetal risk [1] [4].

Why this choice fits

- **Maternal diabetes in pregnancy** is linked to fetal cardiac abnormalities, including **hypertrophic cardiomyopathy** in the newborn [3] [5].
- The American College of Obstetricians and Gynecologists (ACOG) recommends maintaining maternal glucose near physiologic levels throughout pregnancy to reduce fetal complications [1].
- The American Diabetes Association (ADA) recommends pregnancy glucose targets of **fasting <95 mg/dL**, **1-hour postprandial <140 mg/dL** or **2-hour postprandial <120 mg/dL**, with an ideal pregnancy A1C **<6%** if safely achievable [4].

Cardiac lesion to expect

- **Hypertrophic cardiomyopathy / transient hypertrophic cardiomyopathy** is the expected neonatal cardiac complication of maternal diabetes.
- **Tetralogy of Fallot** and **mitral valve prolapse** are not the classic diabetic-fetal cardiac complications supported by the retrieved sources [2] [3].

Clinical implication

- The key preventive action is **tight glycemic control during pregnancy**, since better control lowers the risk of congenital anomalies and fetal/neonatal morbidity [1] [4] [5].

References

[1] Pregestational Diabetes Mellitus

American College of Obstetricians and Gynecologists · 2018-12-01 12:00:00

Maternal glucose control should be maintained near physiologic levels before and throughout pregnancy to decrease the likelihood of complications of hyperglycemia, including spontaneous abortion, fetal malformation, fetal macrosomia, fetal death, and neonatal morbidity.

https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2018/12/pregestational-diabetes-mellitus

[2] Pregestational Diabetes Mellitus

American College of Obstetricians and Gynecologists · 2018-12-01 12:00:00

Pregestational diabetes is considered a high-risk factor for the development of preeclampsia, and the American College of Obstetricians and Gynecologists recommends low-dose aspirin prophylaxis should be initiated between 12 weeks and 28 weeks of gestation (optimally before 16 weeks of gestation) and continued until delivery.

https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2018/12/pregestational-diabetes-mellitus

[3] Care of the infant of the diabetic mother.

Current diabetes reports · 2012-02-01

Infants of diabetic mothers are at risk for preterm birth, macrosomia, asphyxia, respiratory distress, polycythemia and hyperviscosity, hypertrophic cardiomyopathy, and congenital anomalies.

10.1007/s11892-011-0243-6

[4] Diabetes Standards of Care 2026

American Diabetes Association · 2025-12-08 12:00:00

Glucose goals are fasting plasma glucose <95 mg/dL, and either 1-hour postprandial glucose <140 mg/dL or 2-hour postprandial glucose <120 mg/dL. Ideally, the A1C goal in pregnancy is <6% if this can be achieved without significant hypoglycemia, but the goal may be relaxed to <7% if necessary to prevent hypoglycemia.
https://diabetesjournals.org/care/issue/49/Supplement_1

[5] Diabetes and congenital heart defects: a systematic review, meta-analysis, and modeling project.
American Journal of Preventive Medicine · 2015-02-01
Maternal pregestational diabetes is a risk factor for congenital heart defects in offspring, and glycemic control before pregnancy reduces the risk of congenital heart defects.
10.1016/j.amepre.2014.09.002

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35. MedQA question ID 948 Step 2/3

Question

A 67-year-old man presents to his primary care physician for a follow up appointment. He was released from the hospital 1 week ago for an appropriately managed ST-elevation myocardial infarction (STEMI); however, he has not filled any of his prescriptions and did not attend his follow up appointment as scheduled. The patient has a past medical history of hypertension and peripheral vascular disease. His temperature is 97.5°F (36.4°C), blood pressure is 167/118 mmHg, pulse is 90/min, respirations are 14/min, and oxygen saturation is 99% on room air. Physical exam is notable for jugular venous distention and bilateral lower extremity pitting edema. Echocardiography demonstrates an ejection fraction of 55%. Which of the following medications will have the greatest mortality benefit in this patient?

(A) Atenolol

(B) Lisinopril

(C) Metoprolol succinate

(D) Propranolol

Correct Response:
C
Synthesize Response:
B✕

Synthesize Answer

The American College of Cardiology/American Heart Association (ACC/AHA) acute coronary syndrome guidance supports an oral ACE inhibitor or ARB as the medication in this case with the clearest mortality benefit, because **high-risk ACS patients**—including those with **hypertension**—should receive an **ACEi/ARB to reduce all-cause death and MACE** [1]. In contrast, **beta-blockers** are recommended early after ACS to reduce **reinfarction and ventricular arrhythmias** and are mortality-proven in **HFrEF**, but this patient's **ejection fraction is 55%**, so that stronger HF-based mortality indication does not apply [2] [3].

Practical interpretation

- **Best answer: ACE inhibitor (or ARB if ACEi-intolerant)** [1].
- He is also a post-STEMI patient who should receive other secondary-prevention therapy, especially a **high-intensity statin**, but the main mortality-directed choice among the listed options is the **ACEi/ARB** [1] [4].
- **Mineralocorticoid receptor antagonists** are indicated after ACS only when **LVEF ≤40%** plus **HF symptoms and/or diabetes**; that threshold is not met here [1].

Why not the other options?

- **Beta-blocker:** beneficial after ACS, but the retrieved ACS guidance emphasizes reduction in reinfarction/arrhythmias rather than the strongest mortality signal in this preserved-EF patient [2].
- **MRA (eg, eplerenone):** mortality benefit is tied to **LVEF ≤40%** after ACS/HF; not applicable with **EF 55%** [1].
- **Statin:** essential post-MI for secondary prevention, but the retrieved guidance here frames it primarily as reduction in recurrent ischemic events/MACE rather than the greatest mortality benefit among the options [4].

References

[1] Management of Patients With Acute Coronary Syndromes

American College of Cardiology, American College of Emergency Physicians, American Heart Association, Society for Cardiovascular Angiography and Interventions · 2025-02-27 00:00:00

In high-risk patients with ACS (LVEF ≤40%, hypertension, diabetes mellitus, or STEMI with anterior location), an oral angiotensin-converting enzyme inhibitor (ACEi) or an angiotensin receptor blocker (ARB) is indicated to reduce all-cause death and MACE.

https://www.jacc.org/doi/10.1016/j.jacc.2024.11.009

[2] Management of Patients With Acute Coronary Syndromes

American College of Cardiology, American College of Emergency Physicians, American Heart Association, Society for Cardiovascular Angiography and Interventions · 2025-02-27 00:00:00

In patients with ACS without contraindications, early (<24 hours) initiation of oral beta-blocker therapy is recommended to reduce risk of reinfarction and ventricular arrhythmias.

https://www.jacc.org/doi/10.1016/j.jacc.2024.11.009

[3] Management of Heart Failure

American College of Cardiology, American Heart Association, Heart Failure Society of America · 2022-03-31 12:00:00

In patients with HFrEF, with current or previous symptoms, use of 1 of the 3 beta blockers proven to reduce mortality (e.g., bisoprolol, carvedilol, sustained-release metoprolol succinate) is recommended to reduce mortality and hospitalizations.

https://www.jacc.org/doi/10.1016/j.jacc.2021.12.012

[4] Management of Patients With Acute Coronary Syndromes

American College of Cardiology, American College of Emergency Physicians, American Heart Association, Society for Cardiovascular Angiography and Interventions · 2025-02-27 00:00:00

In patients with ACS, high-intensity statin therapy is recommended to reduce the risk of MACE.

https://www.jacc.org/doi/10.1016/j.jacc.2024.11.009

36. MedQA question ID 31 Step 1

Question

A 72-year-old woman is admitted to the intensive care unit for shortness of breath and palpitations. A cardiac catheterization is performed and measurements of the left ventricular volume and pressure at different points in the cardiac cycle are obtained. The patient's pressure-volume loop (gray) is shown with a normal pressure-volume loop (black) for comparison. Which of the following is the most likely underlying cause of this patient's symptoms?

(A) Mitral valve regurgitation

(B) Increased systemic vascular resistance

(C) Increased ventricular wall stiffness

(D) Impaired left ventricular contractility

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely cause is increased ventricular wall stiffness (choice C), reflecting impaired left ventricular compliance/diastolic dysfunction. In a pressure-volume loop, a stiffer ventricle shows a steeper end-diastolic pressure-volume relationship, so higher filling pressure is generated at a given volume; this fits dyspnea/palpitations from elevated left-sided filling pressures rather than primary valvular regurgitation or isolated systolic failure [1] [2].

Why this fits the loop

- **Increased wall stiffness** shifts the diastolic portion of the loop upward and leftward, indicating less distensibility and higher pressure for the same volume [1] [2].
- **Impaired contractility** would primarily reduce end-systolic elastance and typically lower peak systolic pressure with an enlarged end-systolic volume, which is a different pattern [1].
- **Mitral regurgitation** and **increased systemic vascular resistance** can alter loop shape, but the classic finding here is a diastolic pressure rise from reduced compliance [1].

Best answer

C) Increased ventricular wall stiffness

References

[1] Invasive left ventricle pressure-volume analysis: overview and practical clinical implications.
European Heart Journal · 2020-03-21
Ventricular pressure-volume analysis is the reference method for the study of cardiac mechanics. Simultaneous PV measurement in the heart chambers offers unique insights into mechanical cardiac efficiency.
10.1093/eurheartj/ehz552

[2] Echocardiographic left ventricular end-diastolic pressure volume loop estimate predicts survival in congestive heart failure.
Journal of Cardiac Failure · 2013-04-01
The left ventricular end-diastolic pressure-volume relationship (LV-EDPVR) is a measure of LV distensibility. EDPVE is a strong predictor of CHF survival independent of LV ejection fraction, atrial fibrillation, mitral regurgitation, and Doppler indices of diastolic dysfunction.
10.1016/j.cardfail.2013.02.003

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37. MedQA question ID 629 Step 1

Question

A 16-year-old boy is brought to the emergency department by ambulance from a soccer game. During the game, he was about to kick the ball when another player collided with his leg from the front. He was unable to stand up after this collision and reported severe knee pain. On presentation, he was found to have a mild knee effusion. Physical exam showed that his knee could be pushed posteriorly at 90 degrees of flexion but it could not be pulled anteriorly in the same position. The anatomic structure that was most likely injured in this patient has which of the following characteristics?

(A) Runs anteriorly from the medial femoral condyle

(B) Runs medially from the lateral femoral condyle

(C) Runs posteriorly from the lateral femoral condyle

(D) Runs posteriorly from the medial femoral condyle

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Runs posteriorly from the medial femoral condyle. A positive posterior drawer sign after a direct blow to the anterior tibia is most consistent with a **posterior cruciate ligament (PCL)** injury, and the PCL originates from the **medial femoral condyle** and courses posteriorly to the posterior tibia [1] [2].

Key anatomy

- **PCL origin:** lateral surface of the **medial femoral condyle** [1] [2]
- **PCL course:** directed **posteriorly** toward its tibial insertion [1] [2]

Why the other choices are wrong

- **A** and **B** describe collateral ligament directions rather than the PCL.
- **C** is incorrect because the PCL does not originate from the lateral femoral condyle [1] [2].

References

[1] Anatomy and Biomechanics of the Posterior Cruciate Ligament and Their Surgical Implications.
Sports medicine and arthroscopy review · 2020-03-01
The posterior cruciate ligament (PCL) has a well-defined role as a primary restraint/stabilizer to posterior stress at higher degrees of knee flexion.
10.1097/jsa.0000000000000267

[2] Clinical and radiologic evaluation of the posterior cruciate ligament-injured knee.
Current reviews in musculoskeletal medicine · 2018-09-01
This article reviews the current literature regarding clinical and radiographic evaluation of PCL injuries. Several clinical tests have been shown to effectively assess PCL laxity, with the posterior drawer test possessing the highest sensitivity and specificity.
10.1007/s12178-018-9505-0

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38. MedQA question ID 594 Step 2/3

Question

A 38-year-old woman presents to an urgent care clinic with the complaint of epigastric discomfort and cramping pain for the past 2 hours. She states that she has experienced similar pain in the past. These episodes occur mostly after meals and often subside several hours after she finishes eating. Due to this reason she mostly avoids eating. She says she has lost a few pounds in the last couple of months. She is a smoker and drinks alcohol occasionally. Past medical history is insignificant except for chronic knee pain, for which she takes over the counter painkillers. Her temperature is 37°C (98.6°F), respiratory rate is 16/min, pulse is 77/min, and blood pressure is 120/89 mm Hg. A physical abdominal exam is unremarkable, including examination of the abdomen. Which of the following is the most likely diagnosis?

(A) Choledocholithiasis

(B) Pancreatitis

(C) Gastric peptic ulcer

(D) Gallbladder cancer

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely diagnosis is gastric peptic ulcer. The pattern of **postprandial epigastric pain with food avoidance/weight loss** and chronic **NSAID** use fits peptic ulcer disease, and gastric ulcers are more likely than biliary disease or pancreatitis here because the abdominal exam and vital signs are benign [1] [2]. A duodenal ulcer more often causes pain **several hours after eating** and may occur at night, which is less consistent with this presentation [2].

Why the other options are less likely

- **Choledocholithiasis** usually causes biliary-type right upper quadrant pain and may be associated with jaundice or cholangitis features; those are not present.
- **Pancreatitis** typically causes more severe pain and often has tenderness and/or systemic illness.
- **Gallbladder cancer** would not usually present as short, recurrent meal-related cramping pain in this way.

Best answer

C. Gastric peptic ulcer

References

[1] Peptic Ulcer Disease.

Primary care · 2023-09-01

Pptic ulcer disease is a common cause of epigastric pain related to Helicobacter pylori infection or NSAID use. Diagnostic strategies vary depending on age and treatment is dependent on the etiology of the disease. It can lead to serious consequences if undiagnosed.

10.1016/j.pop.2023.03.003

[2] Chronic Abdominal Pain: Gastroenterologist Approach.

Digestive diseases (Basel, Switzerland) · 2022-01-01

Abdominal pain is a common symptom of gastroenterology examination. Gastroesophageal reflux disease is one of the most common gastrointestinal diseases encountered by both gastroenterologists and general practitioners. Epigastric pain syndrome is characterized by the following symptoms: epigastrial pain and/or burning. Duodenal ulcers tend to cause abdominal pain that is localized in the epigastsric region and commence several hours after eating, often at night.

10.1159/000516977

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39. MedQA question ID 873 Step 2/3

Question

A 2-hour-old, 3.2 kg (7.0 lb) newborn boy born by cesarean delivery is being evaluated by the resident on-call. The child was born to a gravida 2, para 0 mother with known hepatitis B. The mother made it to all of her prenatal appointments and took the recommended dose of folic acid since conception. She gave up smoking when she discovered she was pregnant. The infant's heart rate is 150/min, respiratory rate is 48/min, temperature is 37.5°C (99.5°F), and blood pressure is 80/52 mm Hg. APGAR testing exhibits a score of 7 and 8 at 1 and 5 minutes, respectively. The head is normocephalic. No neural tube defects are present on inspection or palpation of the spine. There is strong flexion in all 4 extremities. Cranial nerves 2–12 are intact. Sensory and deep tendon reflexes are without any abnormalities. Which of the following is the best course of action for the newborn child?
Hepatitis B serology
HBsAg positive
HBeAg positive
IgM HBc negative
Total anti-HBc positive
Anti-HBs negative

Anti-HBc negative
HBV DNA greater than 1 million IU/mL
Alanine transferase normal

(A) Administer hepatitis B vaccine

(B) Administer hepatitis B immunoglobulin (HBIG)

(C) Administer hepatitis B vaccine and HBIG

(D) Check hepatitis B serology

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The best course of action is C: administer the hepatitis B vaccine and hepatitis B immunoglobulin (HBIG) within 12 hours of birth. The Centers for Disease Control and Prevention (CDC) recommends **active-passive immunoprophylaxis** for all infants born to an **HBsAg-positive mother**, regardless of birth weight; because this mother is also **HBeAg-positive with HBV DNA >1 million IU/mL**, the infant is at particularly high risk of perinatal transmission and still needs both agents immediately [1] [2] [3]. Routine serology is **not** the initial step; post-vaccination testing is done later at **9–12 months** [1].

Why this is the right answer

- **HepB vaccine + HBIG** should be given **in separate limbs within 12 hours of birth** for infants of **HBsAg-positive mothers** [1].
- If maternal HBsAg status is initially unknown but there is other evidence of HBV infection, the infant should still be managed as exposed; this infant already has confirmed maternal infection [1].
- **HBIG alone** is insufficient, and **vaccine alone** is incomplete prophylaxis for a newborn exposed at birth [1] [3] [5].

Follow-up

- Complete the HepB vaccine series on schedule.
- Test the infant for **HBsAg and anti-HBs at age 9–12 months**; do not test before 9 months [1].

Answer: C. Administer hepatitis B vaccine and HBIG.

References

[1] Recommended Childhood and Adolescent Immunization Schedule: United States, 2025
Centers for Disease Control and Prevention · 2024-11-21 12:00:00
Mother is HBsAg-positive: Birth dose (monovalent HepB vaccine only): administer HepB vaccine and hepatitis B immune globulin (HBIG) (in separate limbs) within 12 hours of birth, regardless of birth weight. Test for HBsAg and anti-HBs at age 9–12 months. Do not test before age 9 months.
https://publications.aap.org/pediatrics/article/doi/10.1542/peds.2024-069987/199947/Recommended-Childhood-and-Adolescent-Immunization

[2] Liver Disease and Pregnancy

American College of Gastroenterology · 2016-02-01 00:00:00

Active–passive immunoprophylaxis with hepatitis B immune globulin and the HBV vaccination series should be administered to all infants born to HBV-infected mothers to prevent perinatal transmission.

https://journals.lww.com/ajg/Fulltext/2016/02000/ACG_Clinical_Guideline__Liver_Disease_and.15.aspx

[3] Treatment of Chronic Hepatitis B

American Association for the Study of Liver Diseases, Infectious Diseases Society of America · 2025-11-04 12:00:00

For pregnant persons with HBV DNA levels greater than 200,000 IU/mL at any time point during pregnancy, regardless of HBeAg status, AASLD recommends initiating tenofovir disoproxil fumarate or tenofovir alafenamide at gestational week 28 to prevent mother-to-child transmission.

https://journals.lww.com/hep/abstract/9900/aasld_idsa_practice_guideline_on_treatment_of.1416.aspx

[4] Prevention and Treatment of Opportunistic Infections in Children with and Exposed to HIV

United States Department of Health and Human Services · 2026-01-28 12:00:00

Infants born to women with HIV/HBV coinfection should have serologic testing for anti-HBs and HBsAg at age 9 to 12 months ... to assess for vaccine response and failure of perinatal prophylaxis.

https://clinicalinfo.hiv.gov/en/guidelines/hiv-clinical-guidelines-pediatric-opportunistic-infections/whats-new?view=full

[5] Maternal and neonatal seroprevalence of Hepatitis B surface antigen (HBsAg) in Tripoli, Libya.

Journal of Infection in Developing Countries · 2010-03-29

Administration of HBIG in combination with hepatitis B vaccine as post-exposure prophylaxis for such infants is of paramount importance.

10.3855/jidc.609

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40. MedQA question ID 484 Step 2/3

Question

A previously healthy 4-month-old girl is brought to the emergency department by her parents because she has not stopped crying for the past 5 hours. Her parents report that she has not eaten anything during this period and that they were unable to calm her down. She has not had any trauma. She was born at term via vaginal delivery and her delivery was uncomplicated. Her vital signs are within normal limits. Examination shows a reddened and swollen 2nd toe of the left foot. A photograph of the left foot is shown. Which of the following is the most likely diagnosis?

(A) Raynaud phenomenon

(B) Ingrown toe nail

(C) Hair tourniquet syndrome

(D) Herpetic whitlow

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Hair tourniquet syndrome is the most likely diagnosis. In a previously healthy 4-month-old with sudden, persistent crying, refusal to feed, and a **red, swollen toe**, a constricting hair or thread around the digit is the classic concern because it causes acute pain and digital ischemia in infants, often with minimal other findings [1] [2] [3]. **Raynaud phenomenon** is typically episodic and symmetric, **ingrown toenail** would be uncommon at this age and usually affects the nail fold, and **herpetic whitlow** usually presents with vesicles rather than a circumferential constriction injury [4].

Why hair tourniquet syndrome fits best

- Typical age: **infants, often under 1 year** [1] [2] [3].
- Typical presentation: **inconsolable crying, swelling, redness, and pain** of a toe, finger, or genitalia [1] [3] [5].
- Clinical priority: examine carefully for a **hair/thread wrapped tightly around the digit**, because delayed recognition can lead to ischemia and tissue loss [2] [3].

Why the other options are less likely

- **Raynaud phenomenon**: usually causes transient color changes/acrocyanosis, often bilateral or symmetric, not an acutely swollen red toe with severe persistent pain [4].
- **Ingrown toenail**: can cause local inflammation, but this is much less typical in a 4-month-old and does not explain the classic constricting-injury pattern [5].
- **Herpetic whitlow**: classically causes a painful distal digit with vesicles; toe involvement is possible but is an uncommon location and the morphology is different [6].

References

[1] Hair toe tourniquet syndrome in a four-year-old boy.

The Journal of Emergency Medicine · 2013-02-01

Hair toe tourniquet syndrome is a condition in which a hair encircles a digit and results in acute digital ischemia. It usually occurs in children under the age of 1. Prompt recognition and surgical removal of the constricting material can save the digit from irreversible tissue necrosis and the loss of digit.

10.1016/j.jemermed.2012.03.004

[2] Hair-thread tourniquet syndrome in a preterm baby.

Turk pediatri arsivi · 2015-12-01

Hair-thread tourniquet syndrome is a rare disorder characterized by the encircling of an appendage by a hair or thread. It usually occurs in children under the age of one year. It is an emergency condition that induces progressive edema, ischaemia and tissue necrosis. Emergency treatment is careful removal of the constricting fiber.

10.5152/turkpediatriars.2015.1301

[3] Current Approach to the Evaluation and Management of Hair-Thread Tourniquets.

Pediatric Emergency Care · 2019-05-01

Hair-thread tourniquet syndrome is a rare, painful condition that occurs when a strand of hair or thread becomes wrapped around toes, fingers or other appendages. Treatment involves depilatory agents or targeted incision at the bedside or in the operating room. Successfully treated cases can be discharged with local wound care. Parents should be advised on prevention strategies.

10.1097/pec.0000000000001827

[4] Primary Raynaud's phenomenon in an infant: a case report and review of literature.

Pediatric Rheumatology Online Journal · 2011-07-18

One-month-old male infant was diagnosed with primary Raynaud's phenomenon due to his unilateral acrocyanosis. It is a benign and self-resolving condition, but it is generally bilateral and symmetric.

10.1186/1546-0096-9-16

[5] Hair tourniquet syndrome of toes and fingers in infants.

Acta Orthopaedica et Traumatologica Turcica · 2019-07-01

Between January 2012 and August 2018, 16 patients were treated surgically for hair tourniquet syndrome of toes and fingers in infants. The average duration of the symptoms (excessive crying, swelling, redness) was 1.5 days.

10.1016/j.aott.2019.04.010

[6] Herpetic whitlow of the toe presenting with severe viral cellulitis.

Pediatric Dermatology · 2019-05-01

Herpetic whitlow of the toe is a common infection in an uncommon location. It is often misdiagnosed as the virus responds well to conservative management or antivirals alone.

10.1111/pde.13795

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41. MedQA question ID 572 Step 2/3

Question

A 55-year-old man presents with a red rash over his face for the last 3 months. The patient says he moved to Nevada 6 months ago because of a new job where he works outdoors; however, he worked indoors in an office before. His vital signs include: blood pressure 100/60 mm Hg, pulse 64/min, respiratory rate 18/min. The patient's rash is shown in the exhibit. Which of the following is the best initial step in the treatment of this patient?

(A) Oral tetracycline

(B) Oral clonidine

(C) Topical metronidazole

(D) Topical benzoyl peroxide

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The best initial treatment is topical metronidazole for likely rosacea, especially if the rash is papulopustular or persistent centrofacial erythema. The **National Rosacea Society** lists **topical metronidazole** among first-line options for mild papulopustular rosacea, and the **British Association of Dermatologists** similarly recommends topical **ivermectin, metronidazole, or azelaic acid** as first-line topical therapy for papulopustular rosacea [1] [3]. Oral tetracycline is generally reserved for more severe disease, clonidine is for flushing-predominant rosacea, and benzoyl peroxide is an acne treatment rather than standard rosacea therapy [2] [3] [4].

Why this fits the presentation

A chronic red facial rash in an adult with clear sun exposure as a trigger strongly suggests rosacea. For papulopustular rosacea, topical therapy is preferred first; oral antibiotics are typically used when disease is more extensive or refractory, and sun/trigger avoidance is also advised [1] [3] [4].

Answer

- **C. Topical metronidazole** [1] [3] [4]

References

[1] Rosacea Treatment Algorithm
National Rosacea Society · 2025-03-24 00:00:00
Topical microencapsulated benzoyl peroxide, ivermectin, azelaic acid, minocycline or metronidazole, possibly with an initial course of oral antibiotic, to bring symptoms under control, and use of topical medication alone to maintain remission.
https://www.rosacea.org/physicians/rosacea-treatment-algorithms

[2] Rosacea Treatment Algorithm
National Rosacea Society · 2025-03-24 00:00:00
Consider oral carvedilol, clonidine or propranolol may reduce flushing response in people with rosacea where the main presenting feature is frequent troublesome flushing accompanied by burning and stinging sensation.
https://www.rosacea.org/physicians/rosacea-treatment-algorithms

[3] Management of People with Rosacea
British Association of Dermatologists · 2021-10-01 00:00:00
Offer either ivermectin, metronidazole or azelaic acid as first-line topical treatment options to people with papulopustular rosacea. Discuss the potential for irritancy of different products and formulations prior to prescribing the topical agent.
https://academic.oup.com/bjd/article/185/4/725/6599936?login=false

[4] Interventions for Rosacea.
JAMA · 2015-12-08
There is high-quality evidence that topical brimonidine, azelaic acid, ivermectin, oral doxycycline and isotretinoin are associated with improvements in rosacea. There is also evidence for topical metronidazole, oral tetracycline, laser and light-based therapy, and topical cyclosporine.
10.1001/jama.2015.15287

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42. MedQA question ID 399 Step 1

Question

A 23-year-old man is admitted to the hospital with fever, chest discomfort, tachypnea, pain, needle-like sensations in the upper extremities, and profuse sweating. He also complains of a gradual decrease in vision over the past 3 months. He is a bodybuilding competitor and has a competition coming up in 1 week. The man reports that his symptoms appeared suddenly, 30 minutes after he took 2 foreign-manufactured fat-burning pills instead of the 1 he usually takes. His blood pressure is 140/90 mm Hg, heart rate is 137/min, respiratory rate is 26/min, and temperature is 39.9°C (103.8°F). Physical examination reveals a reddish maculopapular rash over the patient's trunk, diminished lung and heart sounds, tenderness to palpation in his abdomen, and rotational bilateral nystagmus with an alternating gaze-dependent fast component. Ophthalmologic examination shows bilateral cataracts. The patient's total blood count is as follows:
Erythrocytes 4.4 x 109/mm3
Hb 12 g/dL
Total leukocyte count 3750/mm3
Neutrophils 57%
Lymphocyte 37%
Eosinophil 1%
Monocyte 5%

Basophil 0%
Platelet count 209,000/mm3
Which of the following statements best describes the pathogenesis of this patient's condition?

(A) The patient's symptoms are caused by an increased concentration of epinephrine released by the adrenal glands in response to the consumed substance.

(B) The drug caused uncoupling of the electron transport chain and oxidative phosphorylation.

(C) The patient has a pyretic reaction due to bacterial contamination of the pills.

(D) The drug has stimulated the hypothalamic temperature center to produce hyperthermia.

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

This is most consistent with 2,4-dinitrophenol (DNP) poisoning, which causes toxic hyperthermia by uncoupling oxidative phosphorylation **in mitochondria, not by stimulating the hypothalamic set point or by epinephrine excess.** The patient's sudden hyperthermia, tachycardia, sweating, rash, neurologic findings, and bodybuilding supplement exposure fit DNP, an illegal weight-loss agent used by bodybuilders; the best answer is **B** [1] [2] [3].

Why this is not the other options

- **A** is not the mechanism of DNP toxicity. DNP does not primarily act by increasing adrenal epinephrine release.
- **C** is unsupported here. This presentation is classic for toxic hyperthermia from a weight-loss agent, not a pyretic syndrome from bacterial contamination.
- **D** describes a fever mechanism, but DNP causes **non-pyrogenic hyperthermia** from increased metabolic heat production, so the hypothalamic temperature center is not the primary driver [1] [2].

Clinical implication

If management is needed, toxic/exertional hyperthermia should be treated with **rapid active cooling**; the Society of Critical Care Medicine recommends **ice-water immersion or cold-water immersion** and recommends **against dantrolene** for heat stroke [4].

References

[1] International trends in systemic human exposures to 2,4 dinitrophenol reported to poisons centres.
Clinical toxicology (Philadelphia, Pa.) · 2022-05-01
Dinitrophenol is a toxic industrial chemical that reduces body weight and body fat by uncoupling oxidative phosphorylation but at the risk of severe dose-related toxicity.
10.1080/15563650.2021.2005797

[2] Dinitrophenol (DNP) Fatality Associated with a Falsely Elevated Salicylate Level: a Case Report with Verification of Laboratory Cross Reactivity.
Journal of medical toxicology : official journal of the American College of Medical Toxicology · 2018-12-01

2,4-Dinitrophenol (DNP) is a known uncoupler of oxidative phosphorylation that leads to hyperthermia, tachycardia, tachypnea, and metabolic acidosis.
10.1007/s13181-018-0677-1

[3] 2,4-dinitrophenol (DNP): a weight loss agent with significant acute toxicity and risk of death.
Journal of medical toxicology : official journal of the American College of Medical Toxicology · 2011-09-01
2,4-Dinitrophenol (DNP) is reported to cause rapid loss of weight, but is associated with an unacceptably high rate of significant adverse effects.
10.1007/s13181-011-0162-6

[4] Treatment of Heat Stroke
Society of Critical Care Medicine · 2025-02-21 00:00:00
We recommend active cooling methods over passive cooling in patients with heat stroke. Clinicians should prioritize cooling methods that achieve the most rapid rate of cooling, which is ice-water immersion (1–5°C) or cold-water immersion (9–12°C). Clinicians should choose cooling methods that reach the target temperature within 30 minutes from recognition of heat stroke symptoms. We recommend against the use of dantrolene in patients with heat stroke.
https://journals.lww.com/ccmjournal/fulltext/2025/02000/society_of_critical_care_medicine_guidelines_for.22.aspx

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43. MedQA question ID 1271 Step 2/3

Question

A 19-year-old man is brought to the physician by his mother because she is worried about his strange behavior. Over the past 3 years, he has been dressing all in black and wears a long black coat, even in the summer. The mother reports that her son has always had difficulties fitting in. He does not have any friends and spends most of his time in his room playing online games. He is anxious at college because he is uncomfortable around other people, and his academic performance is poor. Rather than doing his coursework, he spends most of his time reading up on paranormal phenomena, especially demons. He says that he has never seen any demons, but sometimes there are signs of their presence. For example, a breeze in an enclosed room is likely the “breath of a demon”. Mental status examination shows laborious speech. The patient avoids eye contact. Which of the following is the most likely diagnosis?

(A) Social anxiety disorder

(B) Avoidant personality disorder

(C) Schizotypal personality disorder

(D) Schizophrenia

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Schizotypal personality disorder is the most likely diagnosis. The key features are a long-standing pattern of **eccentric behavior**, **social isolation**, **odd/magical thinking** (eg, interpreting a

breeze as the “breath of a demon”), **unusual beliefs**, and **impaired social functioning** without frank hallucinations or fixed delusions, which fits schizotypal personality disorder better than schizophrenia or social anxiety disorder [1] [2].

Why not the others

- **Social anxiety disorder**: social fear is present, but it does not explain the patient’s persistent odd beliefs and eccentric behavior [2].
- **Avoidant personality disorder**: involves social inhibition due to fear of criticism or rejection, not magical thinking or odd perceptual interpretations [2].
- **Schizophrenia**: would require clear psychotic symptoms such as persistent delusions, hallucinations, or disorganized behavior/thought, which are not described here [1].

References

[1] Schizotypal personality disorder.
Journal of personality disorders · 2013-10-01
Schizotypal personality disorder is a schizophrenia-spectrum disorder characterized by odd or bizarre behavior, strange speech, magical thinking, unusual perceptual experiences, and social anhedonia.
10.1521/pedi_2012_26_053

[2] Commentary about social avoidance and its significance in adolescents and young adults.
Psychiatry research · 2021-03-01
Social avoidance in young patients is a clinically worrisome phenomenon that characterizes impending schizophrenia. It also constitutes a core phenomenon in avoidant personality disorder (AvPD), schizotypal personality disorder (ScPD), and in autism spectrum disorder (ASD). The phenomenological approach allows to distinguish the Gestalt of social avoidance between AvPD, ScPD, ASD, and beginning schizophrenia.
10.1016/j.psychres.2021.113718

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44. MedQA question ID 1226 Step 2/3

Question

A 39-year-old woman, with a history of thyroidectomy and primary hyperparathyroidism presents for surgical evaluation for a right adrenal mass. Preoperatively, which of the following medications should she receive to prevent a hypertensive emergency intraoperatively?

(A) Atenolol

(B) Labetolol

(C) Nifedipine

(D) Phenoxybenzamine

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The American Association of Endocrine Surgeons (AAES) recommends preoperative alpha-adrenergic blockade for all patients with pheochromocytoma/paraganglioma to prevent intraoperative hemodynamic instability; either selective or nonselective blockade is acceptable, but **phenoxybenzamine** is the classic nonselective agent and is the best match among the choices [1] [2]. In a patient with prior thyroidectomy and primary hyperparathyroidism, the associated syndrome also raises concern for **MEN2**, which makes pheochromocytoma an important preoperative exclusion before any adrenal surgery [3].

Best choice

- **D. Phenoxybenzamine** is the correct preoperative medication to blunt catecholamine surges and reduce the risk of hypertensive crisis during tumor manipulation [1] [2].
- **Beta-blockers such as atenolol or labetalol should not be used first**; beta blockade is added only **after adequate alpha blockade** if tachycardia persists [2].
- **Nifedipine** is not the standard first-line preoperative preparation when pheochromocytoma is suspected [1] [2].

Key supporting points

- AAES notes that selective blockade (eg, doxazosin/prazosin/terazosin) and nonselective blockade (**phenoxybenzamine**) are both acceptable, with different hemodynamic tradeoffs [1].
- The AAES/AACE adrenal incidentaloma guidance states that **all patients with pheochromocytoma should receive preoperative adrenergic blockade** [2].
- In patients with MEN2A/MEN2B or coexisting hyperparathyroidism and medullary thyroid cancer, a pheochromocytoma should be excluded before surgery [3].

References

[1] Adrenalectomy

American Association of Endocrine Surgeons · 2022-08-17 12:00:00

We recommend either selective or nonselective α blockade to safely prepare patients for surgical resection of PPGL, depending on the drug availability/cost, experience, and preference of the care team. While there is no significant difference in morbidity or mortality between selective and nonselective α blockade, selective blockade (doxazosin, prazosin, terazosin) is associated with more intraoperative hemodynamic instability while nonselective blockade (phenoxybenzamine) results in more postoperative hypotension.

https://jamanetwork.com/journals/jamasurgery/article-abstract/2795363

[2] Management of Adrenal Incidentalomas

American Association of Clinical Endocrinologists, American Association of Endocrine Surgeons · 2009-08-01 00:00:00

In all patients with a pheochromocytoma, an α-adrenergic blocking agent should be administered preoperatively, in an effort to prevent intraoperative hemodynamic instability.

https://journals.aace.com/doi/pdf/10.4158/EP.15.S1.1

[3] Management of Medullary Thyroid Carcinoma

American Thyroid Association · 2015-06-03 00:00:00

If they coexist, a PHEO should be removed prior to surgery for either MTC or HPTH.

https://www.liebertpub.com/doi/full/10.1089/thy.2014.0335

45. MedQA question ID 62 Step 2/3

Question

A 23-year-old primigravida presents for a regular prenatal care visit at 16 weeks gestation. She complains of increased fatigability, but is otherwise well. She takes folic acid, iron, and vitamin D supplementation. Her vital signs are as follows: blood pressure, 110/70 mm Hg; heart rate, 86/min; respiratory rate, 13/min; and temperature, 36.6°C (97.9°F). The physical examination is unremarkable. The complete blood count results are as below:
Erythrocyte count 3.9 million/mm3
Hb 11.1 g/dL
HCT 32%
Reticulocyte count 0.2%
MCV 90 fL
Platelet count 210,000/mm3
Leukocyte count 8,100/mm3
Which of the following tests is required to investigate the cause of the patient's laboratory findings?

(A) Serum iron level

(B) Serum B12 level

(C) Transferrin

(D) No tests required

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

No further test is required for this CBC pattern; at **16 weeks' gestation**, a hemoglobin of **11.1 g/dL** is **above the second-trimester anemia cutoff** used by the World Health Organization, so this is most consistent with **physiologic hemodilution of pregnancy** rather than pathologic anemia [1]. The American College of Obstetricians and Gynecologists (ACOG) recommends **iron studies only when anemia is diagnosed during pregnancy**; in this case, anemia is not established, so **serum iron, transferrin, or vitamin B12 testing is not required** based on the provided data [2].

Practical interpretation

- **Hb threshold for anemia in the second trimester:** approximately **<10.5 g/dL** (WHO cutoff) [1].
- With **normal MCV (90 fL)** and only mild fatigue, the lab findings fit **normal pregnancy-related dilution** better than iron deficiency or B12 deficiency [1] [2].
- If hemoglobin later falls below the trimester cutoff or other clinical features appear, then targeted evaluation for iron deficiency or other causes becomes appropriate [2].

References

[1] Haemoglobin Cutoffs to Define Anaemia in Individuals and Populations
World Health Organization · 2024-03-05 00:00:00
Analysis of the evidence suggested modification of the current haemoglobin cutoffs for defining anaemia for one population group (children 6–23 months of age) and use of the existing cutoff for pregnant women in the second trimester.
https://www.who.int/publications/i/item/9789240088542

[2] Identifying and treating iron deficiency anemia in pregnancy.
Hematology. American Society of Hematology. Education Program · 2023-12-08
Anemia is common during pregnancy. The most common cause is iron deficiency. ACOG recommends confirmation of iron deficiency anemia with iron studies when anemia is diagnosed during pregnancy, but does not recommend treating iron deficiency without anemia.
10.1182/hematology.2023000474

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46. MedQA question ID 1177 Step 1

Question

A 35-year-old woman presents with an unsteady and broad-based gait, dysmetria, and intention tremor in the distal upper extremities. Her past medical history is relevant for depression, personality changes, and declining work performance, for which she has been put on leave from her current job as an elementary school teacher. On physical examination, patient has dysarthria, dystonia, and an ataxic gait. Ophthalmologic examination reveals multi-colored irises with concentric rings around the periphery (findings shown in the photo). Sensation and motor functions are preserved. Which of the following would you expect to be abnormally accumulated in this patient's tissues?

(A) Iron

(B) Copper

(C) Lead

(D) Mercury

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Copper would be expected to accumulate abnormally in this patient's tissues. The presentation is classic for **Wilson disease**: neuropsychiatric changes, dysarthria, dystonia, ataxia, intention tremor, and **Kayser-Fleischer rings** all point to impaired copper excretion with tissue copper deposition [1] [2] [3].

Why this fits Wilson disease

- Wilson disease is a disorder of **copper metabolism** with copper accumulation in the liver, brain, and other tissues [1] [2].

- Neurologic manifestations commonly include **tremor, dystonia, ataxia, dysarthria, and psychiatric symptoms** [1] [3].
- The ocular finding described as multi-colored irises with peripheral rings corresponds to **Kayser-Fleischer rings**, a classic finding in Wilson disease [1] [2] [3].

Iron, lead, and mercury do not match this syndrome as well as copper in the setting of these neurologic and ophthalmologic findings [1] [2].

References

[1] Wilson's Disease

European Association for the Study of the Liver · 2024-11-08 00:00:00

Screening for copper metabolism abnormalities (both serum ceruloplasmin and basal 24-h urinary copper excretion) and presence of Kayser-Fleischer rings should be performed. If available, relative exchangeable copper in serum determination should also be performed.

https://www.journal-of-hepatology.eu/article/S0168-8278(24)02706-5/fulltext

[2] Diagnosis and Management of Wilson Disease

American Association for the Study of Liver Diseases · 2022-09-23 12:00:00

WD must be excluded in any patient with unexplained liver disease associated with neurological or psychiatric disorder. Assessment should include serum ceruloplasmin, basal 24-h urinary copper excretion, slit-lamp examination for KF rings, neurological evaluation, and molecular genetic investigation of ATP7B.

https://aasldpubs.onlinelibrary.wiley.com/doi/10.1002/hep.32801

[3] Wilson's Disease: A Review for the General Pediatrician.

Pediatric Annals · 2018-11-01

Wilson disease is characterized by copper accumulation in various tissues and is associated with neurological and psychiatric manifestations and Kayser-Fleischer rings.

10.3928/19382359-20181026-01

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47. MedQA question ID 1167 Step 1

Question

A 3-year-old boy is brought to the clinic by his parents because he 'hasn't been himself lately' and reportedly gets tired very easily from his swimming classes in comparison to the other kids. He also 'can't catch his breath' at times. The mother also reports that he seems to be slightly shorter than other children his age. His temperature is 36.6°C (97.9°F), blood pressure is 110/70 mm Hg, and respiratory rate is 14/min. On auscultation, a localized harsh pansystolic murmur is heard over the left sternal border at the level of the 2nd–3rd intercostal space. The murmur becomes louder when the patient is asked to squat. An echocardiogram is performed. Which of the structures below gives rise to the defective structure that is causing this patient's symptoms?

(A) Endocardial cushion

(B) Infundibular septum

(C) 3rd pharyngeal arch

(D) Rathke's pouch

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

(A) Endocardial cushion is the best answer. This child's murmur and symptoms are most consistent with a **ventricular septal defect (VSD)**, and the classic **membranous/perimembranous septum** defect is derived from the **endocardial cushions** [1] [2]. The **American College of Cardiology/American Heart Association (ACC/AHA)** guideline describes a VSD as a hole between the ventricles that can produce significant left-to-right shunting and symptoms when unrepaired [1].

Why the other choices are less likely

- **Infundibular septum**: associated with outflow tract/conotruncal structures, not the classic embryologic source of a membranous VSD.
- **3rd pharyngeal arch**: contributes to vascular structures, not the ventricular septum.
- **Rathke pouch**: gives rise to the anterior pituitary.

Answer: A. Endocardial cushion

References

[1] Management of Adults With Congenital Heart Disease
American College of Cardiology, American Heart Association · 2025-12-18 12:00:00
A Ventricular Septal Defect is an opening or hole (defect) in the wall (septum) separating the two lower chambers of the heart (ventricles). This defect allows oxygen-rich blood to leak into the oxygen-poor blood chambers in the heart. When the hole does not close, it may cause higher pressure in the heart or reduced oxygen to the body.
https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000001402

[2] Ventricular septal defects: embryology and imaging findings.
Journal of thoracic imaging · 2013-03-01
Ventricular septal defects are the most common congenital abnormality diagnosed in children and the second most common condition diagnosed in adults. Awareness of the embryologic basis of these defects helps understand the anatomy and recognize their typical appearance on imaging. Diagnostic imaging plays a role in the characterization of the defect, identification of associated anomalies, and evaluation of hemodynamic repercussions.
10.1097/rti.0b013e31824b5b95

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48. MedQA question ID 1186 Step 1

Question

A 65-year-old man presents with pain in his left thigh for a week. He describes the pain as dull and constant, boring in nature, and localized deep below the thigh muscle. He says it is worse at night. Physical examination is significant for tenderness and warmth over the anterior aspect of the left thigh. A plain radiograph of the left femur shows increased cortical thickness with widened intercortical space. Laboratory studies show:

Alkaline phosphatase
925 U/L
Serum calcium
9.2 mg/dL
Serum phosphorus 4.4 mg/dL
Findings on bone biopsy are shown in the image. Which of the following is the most likely diagnosis in this patient?

(A) Ewing's sarcoma

(B) Osteitis deformans

(C) Osteochondritis dissecans

(D) Osteitis fibrosa cystica

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Osteitis deformans (Paget disease of bone) is the most likely diagnosis. The Endocrine Society describes Paget disease as a chronic benign disorder in older adults that commonly presents with **deep, aching bone pain**, **markedly elevated alkaline phosphatase**, and characteristic radiographic bone enlargement/remodeling; plain radiographs are the recommended first imaging test when it is suspected [1] [2]. The femoral cortical thickening with widened bone architecture, normal calcium/phosphorus, and biopsy consistent with disorganized bone remodeling fit Paget disease rather than Ewing sarcoma, osteochondritis dissecans, or osteitis fibrosa cystica [1] [2].

Why the other choices are less likely

- **Ewing sarcoma** typically presents in younger patients and is not the classic cause of this biochemical/radiographic pattern.
- **Osteochondritis dissecans** involves an osteochondral lesion near a joint, not diffuse cortical thickening of the femur.
- **Osteitis fibrosa cystica** is usually due to hyperparathyroidism and is typically associated with abnormal calcium/phosphorus, which are not present here.

Key supporting features for Paget disease

- Older age, focal bone pain worse at night
- Very high **ALP** with **normal calcium and phosphorus**
- Radiographic bone enlargement and cortical thickening
- Biopsy showing disordered bone remodeling / mosaic pattern [1] [2]

References

[1] Paget's Disease of Bone
Endocrine Society · 2014-12-01 12:00:00

Paget's disease of bone (osteitis deformans) is a chronic benign disorder of bone that generally affects one or several bones. The abnormal bone structure may be associated with enlarged affected bones and skeletal deformity, particularly in weight-bearing bones. Many patients with Paget's disease of bone are asymptomatic. Bone pain, mild to moderate in intensity and described as deep and aching, is a feature of Paget's disease of bone, usually developing late rather than early in the disease process, and it is only present in a minority of patients. Paget's disease affects both men and women, with an apparent small male predominance. It rarely manifests itself clinically before age 40, and the frequency of the condition increases with advancing age.
https://academic.oup.com/jcem/article/99/12/4408/2833929

[2] Paget's Disease of Bone
Endocrine Society · 2014-12-01 12:00:00
In patients suspected of Paget's disease, the Endocrine Society recommends obtaining plain radiographs of the suspicious regions of the skeleton. After radiological diagnosis of Paget's disease, the initial biochemical evaluation should be done using serum total alkaline phosphatase (ALP) or a more specific marker of bone formation when appropriate.
https://academic.oup.com/jcem/article/99/12/4408/2833929

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49. MedQA question ID 409 Step 1

Question

A 44-year-old woman with hypothyroidism comes to the physician because of a 1-month history of tingling in her feet and poor balance. Her only medication is levothyroxine. Physical examination shows conjunctival pallor and an ataxic gait. Proprioception and sense of vibration are decreased in her toes bilaterally. Laboratory studies show macrocytic anemia and normal thyroid hormone levels. Histological evaluation of tissue samples obtained by esophagogastroduodenoscopy reveals atrophic changes of the gastric body and fundus with normal antral mucosa. Which of the following structures is most likely being targeted by antibodies in this patient?

(A) Islet cell cytoplasm

(B) Deamidated gliadin peptide

(C) Parietal cells

(D) Smooth muscle

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Parietal cells are the autoimmune target in **autoimmune gastritis/pernicious anemia**. The American College of Gastroenterology describes autoimmune gastritis as involving the **gastric body and fundus** with atrophic changes, which matches this patient's corpus-predominant atrophy, macrocytic anemia, neurologic findings, and hypothyroid autoimmune association [1] [2].

Why this fits

- Autoimmune gastritis commonly produces **vitamin B12 deficiency** with **macrocytic anemia** and neurologic deficits such as gait disturbance and loss of vibration/proprioception [2] [3].
- The autoimmune response is directed against **parietal cells** and intrinsic factor in the oxyntic mucosa of the **body/fundus** [2] [3].
- Therefore, the correct answer is **C. Parietal cells** rather than islet cells, gliadin, or smooth muscle [2] [3].

References

[1] Diagnosis and Management of Gastric Premalignant Conditions

American College of Gastroenterology · 2025-03-12 12:00:00

18. Among individuals diagnosed with AIG, we recommend assessment for H. pylori infection with a nonserological test, eradication treatment if positive, and posttreatment testing to confirm eradication

https://journals.lww.com/ajg/fulltext/9900/acg_clinical_guideline__diagnosis_and_management.1623.aspx

[2] Autoimmune gastritis.

Wiener medizinische Wochenschrift (1946) · 2016-10-01

Autoimmune gastritis is a chronic inflammatory disease with destruction of parietal cells of the corpus and fundus of the stomach. Vitamin B12 deficiency and pernicious anemia are common in young women. Iron deficiency is common in patients with autoimmune gastritis.

10.1007/s10354-016-0515-5

[3] HIGH-RISK GASTRIC PATHOLOGY AND PREVALENT AUTOIMMUNE DISEASES IN PATIENTS WITH PERNICIOUS ANEMIA.

Endocrine Practice : Official Journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists · 2017-11-01

Pernicious anemia (PA) develops from atrophic gastritis due to autoimmune destruction of parietal cells and results in achlorhydria, vitamin B12 and iron deficiencies, anemia, neurologic deficits, premalignant and malignant stomach lesions.

10.4158/ep-2017-0056

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50. MedQA question ID 28 Step 1

Question

A 4-year-old previously healthy boy presents with 4 days of intermittent vomiting and 5-6 daily loose stools. His mother noted bloody stools and decreased oral intake of food and water over the last 24 hours. He is normally in daycare; however, he has been home for the past 3 days. On physical exam his temperature is 102.2°F (39°C), blood pressure is 140/90 mmHg, pulse is 120/min, respirations are 22/min and O2 saturation is 99% on room air. He has dry mucous membranes. On abdominal exam you note diffuse tenderness to palpation without rebound or guarding. There are no masses, hepatosplenomegaly, and bowel sounds are hyperactive. Ultrasound of the right lower quadrant is negative for appendicitis. Stool is guaiac positive. He receives 15mg/kg acetaminophen and fluids are started. The next day, he complains of lower extremity weakness and tingling. On repeat exam, lower extremity strength is 3/5 with diminished patellar deep tendon reflexes. Which of the following lab findings would most likely be seen in this patient?

(A) Gram stain positive CSF

(B) Peripheral eosinophilia

(C) Xanthochromia on cerebrospinal fluid analysis

(D) Increased cerebrospinal fluid protein with normal cell count

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Increased cerebrospinal fluid protein with normal cell count is the most likely finding. This child's antecedent febrile **bloody diarrheal illness** followed by **ascending weakness, paresthesias, and diminished reflexes** is classic for **Guillain-Barré syndrome (GBS)**, which is commonly postinfectious; cerebrospinal fluid (CSF) typically shows **albuminocytologic dissociation** after the first several days of symptoms [1] [2].

Why this fits

- **GBS** is an acute immune-mediated peripheral neuropathy that presents with **symmetric ascending weakness** and **reduced or absent deep tendon reflexes** [1] [2].
- In children, **CSF protein is elevated with a normal or near-normal white blood cell count**; pleocytosis suggests an alternative diagnosis [1] [2].
- A preceding gastrointestinal infection, especially **Campylobacter jejuni**, is a classic trigger [2].

Why the other choices are less likely

- **Gram stain-positive CSF** would suggest bacterial meningitis, which would not explain the isolated ascending areflexic weakness pattern [1].
- **Peripheral eosinophilia** is not the expected finding in GBS.
- **Xanthochromia** suggests prior intracranial bleeding, not this presentation.

Clinical takeaway

The key diagnostic clue is the combination of **postinfectious diarrhea** plus **ascending weakness with hyporeflexia/areflexia**; if CSF is obtained, **albuminocytologic dissociation** is the expected laboratory abnormality [1] [2].

References

[1] Acute polyradiculoneuritis: Guillain-Barré syndrome.

Handbook of Clinical Neurology · 2013-01-01

Guillain-Barré syndrome is an acute, immune-mediated, postinfectious polyneuropathy with symmetrical ascending weakness, diminished deep tendon reflexes, and nonspecific sensory symptoms... Albumino-cytological dissociation in CSF observed in 83.3% and all the electrophysiological tests were positive with different patterns.

10.1016/B978-0-444-52910-7.00036-2

[2] Understanding Guillain-Barré syndrome.

JAAPA : official journal of the American Academy of Physician Assistants · 2015-07-01

Guillain-Barré syndrome is a rapidly progressive peripheral neuropathy that most commonly presents with ascending symmetrical weakness and diminished or absent deep tendon reflexes... The treatments of choice are IV immunoglobulin and plasmapheresis.

10.1097/01.JAA.0000466585.10595.F5

51. MedQA question ID 302 Step 2/3

Question

A 14-year-old boy is brought to the physician because of an increasing difficulty in hearing over the past several months. His mother says they have to speak at a higher volume for him to understand them. He also complains of having difficulty reading his favorite books because he is not able to see the words clearly. His father received a renal transplant in his 20s. The vital signs are within normal limits. The physical examination shows no abnormalities. Laboratory studies show:
Serum
Urea nitrogen 15 mg/dL
Creatinine 1.0 mg/dL
Urine
Blood 1+
Protein 1+
RBC 15–17/hpf
WBC 1–2/hpf
The audiometry shows bilateral high-frequency sensorineural hearing loss. The ophthalmologic examination shows anterior lenticonus. Which of the following best explains these findings?

(A) Alport syndrome

(B) Fabry's disease

(C) Von Hippel-Lindau disease

(D) Tuberous sclerosis

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Alport syndrome best explains this presentation: the combination of **persistent hematuria/ proteinuria**, **progressive high-frequency sensorineural hearing loss**, and **anterior lenticonus** is classic for a type IV collagen disorder, usually **X-linked COL4A5** disease in boys, with adolescence a typical time for hearing loss to become evident [1] [2] [3]. The father's early renal failure/transplant history also fits inherited progressive nephropathy. Fabry disease, von Hippel-Lindau disease, and tuberous sclerosis do not characteristically produce this specific renal-auditory-ocular triad [1] [2] [3].

Key clues

- **Hematuria and proteinuria** from hereditary glomerular basement membrane disease [2] [3]
- **High-frequency sensorineural hearing loss** in childhood/adolescence [1] [2]
- **Anterior lenticonus** is a highly suggestive ocular finding [1] [2]

- In affected families, **males with X-linked Alport syndrome** are at highest risk for progressive CKD [1] [2]

Best answer

Alport syndrome [1] [2] [3]

References

[1] Diagnosis, management and treatment of the Alport syndrome – 2024 guideline on behalf of ERKNet, ERA and ESPN

Nephrology Dialysis Transplantation · 2024-12-02

Male patients with XLAS and individuals with ARAS are at high risk of develop hearing loss, usually in adolescence but sometimes in childhood.

10.1093/ndt/gfae265

[2] Diagnosis, management and treatment of the Alport syndrome – 2024 guideline on behalf of ERKNet, ERA and ESPN

Nephrology Dialysis Transplantation · 2024-12-02

Each examination should include clinical examination of all ocular segments with a specific focus on cornea, lens, and retinal alterations. In case of high refractive errors detected, an ophthalmologic referral and screening for lenticonus should be performed.

10.1093/ndt/gfae265

[3] Alport syndrome: Hereditary nephropathy associated with mutations in genes coding for type IV collagen chains

Nephrologie & therapeutique · 2016-12-01

Alport syndrome is an inherited disorder with haematuric nephropathy with ultrastructural abnormalities of the glomerular basement membranes, a progressive sensorineural hearing loss and sometimes ocular involvement.

10.1016/j.nephro.2016.09.001

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52. MedQA question ID 510 Step 1

Question

A 46-year-old woman with a history of previously well-controlled HIV infection comes to the physician for follow-up after a health maintenance examination last week. She is currently unemployed and lives in a low-income neighborhood with her 3 children. For the past 3 years, her HIV RNA viral load was undetectable, but last week, her viral load was 8,391 copies/mL (N < 50). Current medications include dolutegravir, tenofovir, and emtricitabine. On questioning, she says that she misses her medications every other day. Which of the following responses by the physician is most appropriate?

(A) """Let's talk about what makes it difficult for you to take your medications."""

(B) """Are you aware that it is essential to take your medications every day?"""

(C) """The social worker can help subsidize next month's medications."""

(D) """We should go over the instructions on how to take your medications again."""

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. "Let's talk about what makes it difficult for you to take your medications." The **United States Department of Health and Human Services (DHHS)** recommends a **constructive, collaborative, nonjudgmental, problem-solving approach** when people with HIV have ART adherence problems, with assessment of barriers and linkage to resources as needed [1]. The **World Health Organization (WHO)** also recommends adherence support interventions for people on ART; effective approaches include **counseling**, reminders, and tailored support [2].

Why this is the best response

This patient has a clear adherence barrier and virologic rebound from missed doses every other day, so the immediate priority is to elicit barriers rather than blame, re-educate, or offer a purely financial fix. A supportive opening question is more likely to identify issues such as cost, transportation, housing, competing caregiving demands, side effects, stigma, or depression, which can then guide individualized adherence support [1] [2].

Why the other options are less appropriate

- **B** is judgmental and may shut down discussion.
- **C** addresses only one possible barrier and assumes cost is the main problem.
- **D** is reasonable only if the issue were misunderstanding of instructions, but the history already identifies **nonadherence** as the problem.

Bottom line: the physician should start with a **nonjudgmental exploration of barriers to adherence** and then tailor support to the patient's needs [1] [2].

References

[1] Use of Antiretroviral Agents in Adults and Adolescents Living with HIV
United States Department of Health and Human Services · 2025-09-25 00:00:00
People with HIV having difficulties with adherence to appointments or ART should be provided additional adherence support using a constructive, collaborative, nonjudgmental, and problem-solving approach.
https://clinicalinfo.hiv.gov/sites/default/files/guidelines/documents/adult-adolescent-arv/guidelines-adult-adolescent-arv.pdf

[2] HIV Service Delivery
World Health Organization · 2025-09-01 00:00:00
Adherence support interventions should be provided to people on antiretroviral therapy (ART). The following interventions have demonstrated effectiveness in improving adherence and virological suppression: counselling, reminders, tailored support from peers, other lay persons or health workers, education.
https://iris.who.int/bitstream/handle/10665/382521/9789240113879-eng.pdf?sequence=1

53. MedQA question ID 283 Step 2/3

Question

Twelve hours after admission to the hospital because of a high-grade fever for 3 days, a 15-year-old boy has shortness of breath. During this period, he has had generalized malaise and a cough productive of moderate amounts of green sputum. For the past 10 days, he has had fever, a sore throat, and generalized aches; these symptoms initially improved, but worsened again over the past 5 days. His temperature is 38.7°C (101.7°F), pulse is 109/min, respirations are 27/min, and blood pressure is 100/70 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 93%. There are decreased breath sounds and crackles heard over the upper right lung field. His hemoglobin concentration is 13.3 g/dL, leukocyte count is 15,000/mm3, and platelet count is 289,000/mm3. An x-ray of the chest shows a right upper-lobe infiltrate. Which of the following is the most likely cause of this patient's symptoms?

(A) Streptococcus pneumoniae

(B) Mycoplasma pneumoniae

(C) Chlamydophila pneumoniae

(D) Haemophilus influenzae

Correct Response:
A
Synthesize Response:
B✕

Synthesize Answer

The most likely cause is Mycoplasma pneumoniae, an atypical bacterial pathogen that is a common cause of community-acquired pneumonia in school-aged children and adolescents; the **IDSA/Pediatric Infectious Diseases Society** guideline notes that macrolides are appropriate when atypical pneumonia is suspected in this age group [1] [2]. The preceding febrile upper-respiratory illness with partial improvement followed by worsening, plus a lobar infiltrate in an adolescent, also fits secondary bacterial pneumonia after a viral prodrome; in this age group, Mycoplasma_ is a leading consideration [1] [3].

Why this fits best

- **Age:** M. pneumoniae is more often identified in **older children and adolescents** with CAP [1] [3].
- **Clinical pattern:** a prolonged prodrome with cough, malaise, and then worsening respiratory symptoms is typical of atypical pneumonia; fever and leukocytosis do not exclude it [1] [4].
- **Radiograph:** focal infiltrate can be seen with Mycoplasma and does not require classic lobar bacterial consolidation [4].

Less likely alternatives

- **Streptococcus pneumonia** is the most prominent invasive typical bacterial pathogen in pediatric CAP, but the age/pattern here favors an atypical pathogen [1].

- **Staphylococcus aureus** is considered when there are necrotizing/cavitary changes, empyema, or severe influenza-associated coinfection; those features are not described here [5] [6].

References

[1] Management of Community-Acquired Pneumonia in Infants and Children Older Than 3 Months of Age
Infectious Diseases Society of America, Pediatric Infectious Diseases Society · 2026-02-24 12:00:00
Macrolide antibiotics should be prescribed for treatment of children (primarily school-aged children and adolescents) evaluated in an outpatient setting with findings compatible with CAP caused by atypical pathogens.
https://www.idsociety.org/practice-guideline/community-acquired-pneumonia-in-infants-and-children/

[2] Management of Community-Acquired Pneumonia in Infants and Children Older Than 3 Months of Age
Infectious Diseases Society of America, Pediatric Infectious Diseases Society · 2026-02-24 12:00:00
Empiric combination therapy with a macrolide (oral or parenteral) in addition to a β-lactam antibiotic should be prescribed for the hospitalized child for whom M. pneumoniae and C. pneumoniae are significant considerations.
https://www.idsociety.org/practice-guideline/community-acquired-pneumonia-in-infants-and-children/

[3] Clinical Features of Severe or Fatal Mycoplasma pneumoniae Pneumonia.
Frontiers in Microbiology · 2016-01-01
Mycoplasma pneumoniae is one of the most common causes of community-acquired pneumonia in children and young adults.
10.3389/fmicb.2016.00800

[4] Macrolide-Resistant Mycoplasma pneumoniae Infections in Pediatric Community-Acquired Pneumonia
Emerging Infectious Diseases · 2020-07-01
The clinical manifestations, chest radiographic findings, and laboratory data were not altered by macrolide resistance. Currently, no evidence supports the causal relationship between macrolide resistance and disease severity.
10.3201/eid2607.200017

[5] Management of Community-Acquired Pneumonia in Infants and Children Older Than 3 Months of Age
Infectious Diseases Society of America, Pediatric Infectious Diseases Society · 2026-02-24 12:00:00
Vancomycin or clindamycin (based on local susceptibility data) should be provided in addition to β-lactam therapy if clinical, laboratory, or imaging characteristics are consistent with infection caused by S. aureus.
https://www.idsociety.org/practice-guideline/community-acquired-pneumonia-in-infants-and-children/

[6] Treatment of Methicillin-Resistant Staphylococcus aureus Infections in Adults and Children
Infectious Diseases Society of America · 2011-02-01 00:00:00
Empiric MRSA therapy is recommended for severe community-acquired pneumonia pending culture results. Severe = ICU, necrotizing or cavitary infiltrates, or empyema.
https://academic.oup.com/cid/article/52/3/e18/306145?searchresult=1

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54. MedQA question ID 208 Step 1

Question

A clinical researcher is interested in creating a new drug for HIV patients. Darunavir has been particularly efficacious in recent patients; however, some have experienced an increased incidence of hyperglycemia. A new drug called DN501 is developed with the same mechanism of action as darunavir but fewer side effects. Which of the following is the mechanism of action of DN501?

(A) Prevents viral transcription

(B) Inhibits viral assembly

(C) Inhibits viral entry

(D) Prevents T-cell binding

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

DN501 would be a protease inhibitor, like darunavir, so the best answer is B. inhibits viral assembly by blocking HIV protease–mediated cleavage of Gag/Gag-Pol polyproteins and preventing viral maturation into infectious particles [1] [2]. Among the options given, this mechanism is most closely captured by **inhibiting viral assembly/maturation** rather than blocking entry, T-cell binding, or transcription [1] [2].

Why the other choices are incorrect

- **A. Prevents viral transcription** corresponds to reverse-transcriptase or integrase-targeting therapies, not darunavir-class drugs [1].
- **C. Inhibits viral entry** is the mechanism of entry/fusion inhibitors, not protease inhibitors [1].
- **D. Prevents T-cell binding** is not the action of protease inhibitors [1].

References

[1] Autoprocessing of human immunodeficiency virus type 1 protease miniprecursor fusions in mammalian cells.

AIDS research and therapy · 2010-07-28

The HIV protease is essential for viral replication and infectivity. It is released from the Gag-Pol polyprotein as a result of precursor autoprocessing. The known protease inhibitors Darunavir and Indinavir suppressed both precursor and autoproteolysis in a dose-dependent manner.

10.1186/1742-6405-7-27

[2] Recent developments of peptidomimetic HIV-1 protease inhibitors.

Current medicinal chemistry · 2011-01-01

HIV protease plays a crucial role in the viral life cycle by processing the viral Gag and Gag-Pol polyproteins into structural and functional proteins essential for viral maturation. Inhibition of HIV-1 protease leads to the production of noninfectious virus particles.

10.2174/092986711797287566

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55. MedQA question ID 748 Step 1

Question

A 39-year-old woman presents with headaches, constipation, increased thirst, and increased urinary frequency. Her blood pressure is 160/100 mm Hg and pulse is 67/min. Blood tests reveal high blood glucose and low potassium level. Abdominal CT scan shows a well-circumscribed homogeneous mass in the left adrenal gland. The hormone excess responsible for her symptoms uses which of the following pathways to exert its action?

(A) Intracellular receptors

(B) cAMP pathway

(C) cGMP pathway

(D) JAK/STAT pathway

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Aldosterone excess is the most likely cause, and it acts through an intracellular receptor: the mineralocorticoid receptor, a nuclear steroid hormone receptor. In this setting, the adrenal mass with hypertension, hypokalemia, and hyperglycemia is most consistent with **primary aldosteronism** or another aldosterone-secreting adrenal lesion; the **Endocrine Society** and the **European Society of Endocrinology** both recommend evaluating hypertensive or hypokalemic patients for aldosteronism with aldosterone and renin testing [1] [2] [3].

Mechanism

- **Aldosterone is a steroid hormone**, so it diffuses into target cells and binds an **intracellular receptor** rather than using a second-messenger pathway such as cAMP, cGMP, or JAK/STAT [1].
- Its physiologic effect is renal sodium retention with potassium wasting, which explains the **hypertension and hypokalemia** [1].

Correct choice: A. Intracellular receptors [1]

References

[1] Management of Primary Aldosteronism: Case Detection, Diagnosis, and Treatment
Endocrine Society · 2025-07-14 00:00:00
Primary aldosteronism (PA) is an adrenal disorder, either unilateral or bilateral, resulting in excess adrenal production of aldosterone. In PA, aldosterone production is at least partially autonomous of its normal major regulator, the renin-angiotensin system, circulating levels of which are suppressed. The excess aldosterone leads to renal sodium retention, volume expansion, elevated blood pressure (BP) and in more severe forms, hypokalemia.
https://academic.oup.com/jcem/advance-article/doi/10.1210/clinem/dgaf284/8196671

[2] Management of Primary Aldosteronism: Case Detection, Diagnosis, and Treatment
Endocrine Society · 2025-07-14 00:00:00
In individuals with hypertension, ES suggests PA screening with serum/plasma aldosterone concentration and plasma renin (concentration or activity).
https://academic.oup.com/jcem/advance-article/doi/10.1210/clinem/dgaf284/8196671

[3] Management of Adrenal Incidentalomas
European Society of Endocrinology · 2023-06-15 00:00:00
In patients with concomitant hypertension or unexplained hypokalemia, we recommend use of the aldosterone/renin ratio to evaluate primary aldosteronism.
https://academic.oup.com/ejendo/article/189/1/G1/7198474

56. MedQA question ID 920 Step 2/3

Question

A 61-year-old woman presents to an outpatient clinic with fatigue and mild neck pain for a month. She adds that she is having difficulty swallowing. She denies trouble with her breathing but endorses 5–10 lb of unintentional weight loss over the past few months. On physical exam, the patient's fingernails appear flat and mild conjunctival pallor is noted. An upper barium esophagram shows an upper esophageal web. A complete blood count reveals:
Hb% 10 gm/dL
Total count (WBC) 11,000 /mm3
Differential count:
Neutrophile 70%
Lymphocytes 25%
Monocytes 5%
ESR 10 mm/hr
What is the most likely diagnosis?

(A) Plummer-Vinson syndrome

(B) Esophageal squamous cell carcinoma

(C) Zenker's diverticulum

(D) Achalasia

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely diagnosis is Plummer-Vinson syndrome (A), based on the classic triad of **dysphagia, iron-deficiency anemia, and an upper esophageal web** [1]. The patient's fatigue, conjunctival pallor, flat nails, weight loss, and barium esophagram finding fit this pattern; **achalasia** is less likely because it typically causes progressive dysphagia to both solids and liquids and is a motility disorder rather than an upper esophageal web lesion [2].

Why this fits Plummer-Vinson syndrome

- **Upper esophageal web** on barium study is a key anatomic clue [1].
- **Anemia with iron-deficiency features** is strongly supportive; the syndrome is classically associated with iron deficiency [1].
- **Dysphagia in a middle-aged/older woman** is a typical presentation [1].
- The neck discomfort and weight loss do not override the characteristic triad; they can occur with symptomatic dysphagia and anemia.

Why the other choices are less likely

- **Esophageal squamous cell carcinoma**: can cause dysphagia and weight loss, but the esophagram finding of a **web** and the iron-deficiency phenotype point more strongly to Plummer-Vinson syndrome.
- **Zenker diverticulum**: usually causes regurgitation, halitosis, and oropharyngeal dysphagia, not a classic upper esophageal web.
- **Achalasia**: ACG describes it as an **esophageal motility disorder** with progressive dysphagia, regurgitation, chest pain, and weight loss; diagnosis is made with **esophageal pressure topography** rather than by finding an upper esophageal web [2].

References

[1] Revisiting plummer vinson syndrome.
Annals of Medical and Health Sciences Research · 2013-01-01
Plummer-Vinson syndrome is a rare association of postcricoid dysphagia, upper esophageal webs, and iron deficiency anemia.
10.4103/2141-9248.109476

[2] Diagnosis and Management of Achalasia
American College of Gastroenterology · 2020-08-12 00:00:00
Achalasia is an esophageal motility disorder. Symptoms include progressive difficulty in swallowing of solids and liquids, heartburn, chest pain, regurgitation, and weight loss or nutritional deficiencies. We recommend using esophageal pressure topography over conventional line tracing for the diagnosis of achalasia.
https://journals.lww.com/ajg/Fulltext/2020/09000/ACG_Clinical_Guidelines__Diagnosis_and_Management.18.aspx

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57. MedQA question ID 1001 Step 2/3

Question

A 42-year-old man presents to establish care with a family physician after having progressively worsening back pain. He has recently migrated from Sweden and has not had any checkups in the last 3 years. He first started having back pain 3 years ago, but his pain has begun to be excruciating in the mornings. He is no longer able to get relief with over the counter medications. He also feels stiff every morning and this usually lasts between 30 minutes and an hour. Both of his knees are also very painful, particularly upon standing up from a seated position. His pain improves when he moves around, so he tries to be somewhat physically active. He also reports that he cannot use his hands for long periods of time due to joint pain and stiffness. His father and sister also have joint issues, and his mother was recently diagnosed with osteoporosis. He has been a smoker for 13 years. Upon physical examination, his wrist and proximal interphalangeal (PIP) joints are warm and swollen. Which of the following is the next best step in management?

(A) Testing for serum Ca and PTH

(B) Calcium and Vitamin D prescription

(C) Testing for serum ESR and autoantibodies

(D) Testing for serum ferritin

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Testing for serum erythrocyte sedimentation rate (ESR) and autoantibodies is the best next step. This presentation is most consistent with **inflammatory arthritis, likely rheumatoid arthritis (RA)**, and the appropriate initial workup includes **ESR/CRP plus rheumatoid factor and anti-CCP (and ANA when connective-tissue disease is in the differential)** while arranging early rheumatology evaluation [1] [2]. The **American College of Rheumatology (ACR)** emphasizes **early diagnosis and management** of RA, because treatment decisions should be made promptly and then re-evaluated within **3 months** based on response and tolerability [1].

Why the other options are less likely

- **Serum calcium and PTH**: this is not the usual first evaluation for symmetric small-joint inflammatory synovitis.
- **Calcium and vitamin D**: appropriate for osteoporosis prevention/treatment, not for diagnosing this inflammatory arthritis.
- **Serum ferritin**: can be helpful when adult-onset Still disease is suspected, but the classic clue is systemic fever/rash rather than chronic symmetric wrist and PIP synovitis [3].

Clinical fit

Features supporting RA over a metabolic or degenerative cause include:

- **Morning stiffness lasting 30–60 minutes**
- **Improvement with movement**
- **Warm, swollen wrists and PIP joints**
- **Polyarticular inflammatory pattern**

His smoking history also increases the pretest probability of RA and supports prompt serologic evaluation [2].

References

[1] Treatment of Rheumatoid Arthritis
American College of Rheumatology · 2021-06-08 00:00:00
RA requires early evaluation, diagnosis, and management. Initial diagnostic evaluation for possible inflammatory arthritis should include ESR, CRP, rheumatoid factor, anti-CCP and ANA, and joint count and radiological investigation of the affected joint(s) where appropriate.
https://acrjournals.onlinelibrary.wiley.com/doi/10.1002/acr.24596

[2] Multinational evidence-based recommendations on how to investigate and follow-up undifferentiated peripheral inflammatory arthritis: the 3E Initiative
Annals of the Rheumatic Diseases · 2010-08-19
Recommendation 3. ESR and CRP should be performed at baseline in the investigation for diagnosis and prognosis of undifferentiated peripheral inflammatory arthritis. Recommendation 4. Testing of rheumatoid factor (RF) and/or ACPA should be performed in the evaluation of patients with undifferentiated peripheral inflammatory arthritis; negative tests do not exclude progression to RA.

10.1136/ard.2010.130625

[3] Assessment of the Disease Activity in Adult-Onset Still's Disease

European League Against Rheumatism (EULAR) · 2025-12-11 12:00:00

Hyperferritinaemia is the laboratory marker most frequently associated with adult-onset Still's disease onset and relapses.

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58. MedQA question ID 618 Step 2/3

Question

A 48-year-old man is brought to the emergency department by his son with a fever over the past day. The patient's son adds that his father has been having some behavioral problems, as well, and that he was complaining about bugs crawling over his skin this morning even though there were no insects. Past medical history is unremarkable. No current medications. The patient was an alcoholic for several years but abruptly quit drinking 5 days ago. The patient's temperature is 40.0°C (104.0°F), pulse is 130/min, blood pressure is 146/88 mm Hg, and respiratory rate is 24/min. On physical examination, he is confused, restless, agitated, and lacks orientation to time, place or person. Which of the following the most appropriate initial course of treatment of this patient?

(A) Chlorpromazine

(B) Clonidine

(C) Diazepam

(D) Haloperidol

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Diazepam is the most appropriate initial treatment for this patient, who has **alcohol withdrawal delirium (delirium tremens)**. The **American Society of Addiction Medicine (ASAM)** recommends **benzodiazepines as first-line therapy** to sedate to light somnolence; **antipsychotics are only adjuncts** if hallucinations are not controlled, and **clonidine should not be used alone** for delirium or seizures [1] [2] [3].

Why this is the best choice

- The presentation is classic for **delirium tremens**: autonomic hyperactivity, fever, agitation, confusion, disorientation, and hallucinations after abrupt alcohol cessation.
- **Diazepam** (or another benzodiazepine) is preferred initially because it treats the underlying withdrawal physiology and reduces the risk of seizures and progression of delirium [1] [2].
- **Haloperidol** or **chlorpromazine** may be used only as adjunctive therapy in select cases, not as monotherapy [3].

- **Clonidine** can reduce autonomic symptoms but does **not** treat withdrawal delirium itself [2] [4].

References used

1. ASAM. Alcohol Withdrawal Management. Recommendation: patients with alcohol withdrawal delirium should be sedated to achieve and maintain a light somnolence; benzodiazepines are first-line. 2. ASAM. Alcohol Withdrawal Management. Recommendation: antipsychotics may be used as an adjunct to benzodiazepines; they are not recommended as monotherapy. 3. ASAM. Alcohol Withdrawal Management. Recommendation: alpha-2 adrenergic agonists such as clonidine are adjuncts only and should not be used alone to prevent or treat withdrawal-related seizures or delirium. 4. Evidence summary on severe alcohol withdrawal/delirium tremens: benzodiazepines are the treatment of choice; clonidine is only an adjunct for autonomic symptoms.

References

[1] Alcohol Withdrawal Management
American Society of Addiction Medicine · 2020-03-20 00:00:00
Patients with alcohol withdrawal delirium should be sedated to achieve and maintain a light somnolence. Benzodiazepines are recommended as the first-line agents for managing alcohol withdrawal delirium.
https://www.asam.org/Quality-Science/quality/guideline-on-alcohol-withdrawal-management

[2] Alcohol Withdrawal Management
American Society of Addiction Medicine · 2020-03-20 00:00:00
Antipsychotic agents can be used as an adjunct to benzodiazepines when alcohol withdrawal delirium and hallucinations are not adequately controlled by benzodiazepine therapy alone. They are not recommended as monotherapy for alcohol withdrawal delirium.
https://www.asam.org/Quality-Science/quality/guideline-on-alcohol-withdrawal-management

[3] Alcohol Withdrawal Management
American Society of Addiction Medicine · 2020-03-20 00:00:00
Alpha2-adrenergic agonists such as clonidine can be used as an adjunct to benzodiazepine therapy to control autonomic hyperactivity and anxiety when symptoms are not controlled by benzodiazepines alone. They should not be used alone to prevent or treat withdrawal-related seizures or delirium.
https://www.asam.org/Quality-Science/quality/guideline-on-alcohol-withdrawal-management

[4] Review of adjunctive dexmedetomidine in the management of severe acute alcohol withdrawal syndrome
The American journal of drug and alcohol abuse · 2015-01-01
Benzodiazepines are the treatment of choice for alcohol withdrawal; dexmedetomidine is a potential adjunctive agent for associated autonomic symptoms.
10.3109/00952990.2015.1058390

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59. MedQA question ID 414 Step 2/3

Question

A 46-year-old woman comes to the physician because of a 3-day history of diarrhea, moderate abdominal pain, and weakness. Her symptoms began on the return flight from a 2-week yoga retreat in India, where she stayed at a resort. She was mildly nauseous as she boarded the flight, and diarrhea followed immediately after eating the in-flight meal. Since then, she has had up to five watery stools daily. She has a 1-year history of gastroesophageal reflux disease and is allergic to shellfish. Her only medication is ranitidine. She appears lethargic. Her temperature is 37°C (98.6°F), pulse is 70/min, and blood pressure is 115/72 mm Hg. Abdominal examination shows diffuse

tenderness with no guarding or rebound. Bowel sounds are hyperactive. Which of the following is the most likely pathogen?

(A) Giardia intestinalis

(B) Shigella species

(C) Staphylococcus aureus

(D) Enterotoxigenic Escherichia coli

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most likely pathogen is Enterotoxigenic *Escherichia coli* (ETEC) — choice D. The Infectious Diseases Society of America (IDSA) lists **ETEC** among the key causes of diarrhea after **travel to resource-challenged countries**, and evidence from traveler's diarrhea studies shows **ETEC is the predominant pathogen** in many returning travelers [1] [2] [3]. **Giardia intestinalis** is more typical of **persistent/chronic diarrhea** rather than a 3-day acute watery illness, and **Staphylococcus aureus** food poisoning usually causes a much shorter, toxin-mediated illness with prominent vomiting [1].

Why the other choices are less likely

- **Giardia intestinalis**: classically causes **persistent or chronic diarrhea** after travel, not a short acute course [1].
- **Shigella species**: more often associated with **fever, dysentery, or inflammatory diarrhea** [1] [4].
- **Staphylococcus aureus**: toxin-mediated food poisoning typically has **very rapid onset** with prominent nausea/vomiting and short duration, making it less consistent with this presentation [1].

Clinical fit

This presentation is most consistent with **traveler's diarrhea acquired in India**, where **ETEC** is a leading cause of **watery diarrhea** in otherwise stable adults [1] [2] [3].

References

[1] Diagnosis and Management of Infectious Diarrhea
Infectious Diseases Society of America · 2017-11-29 00:00:00
Travel to resource-challenged countries: E. coli (Enteroaggregative, Enterotoxigenic, Enteroinvasive), Shigella, Typhi and nontyphoid Salmonella, Campylobacter, Vibrio cholerae, Entamoeba histolytica, Giardia, Blastocystis, Cyclospora, Cystoisospora, Cryptosporidium.
https://academic.oup.com/cid/article/65/12/1963/4655039

[2] Aetiology of traveller's diarrhoea: evaluation of a multiplex PCR tool to detect different enteropathogens.
Clinical Microbiology and Infection · 2014-10-01

Traveller's diarrhoea is the most common illness reported in international travellers. Shigella, enterotoxigenic Escherichia coli, enteroaggregative E. coli and Giardia are primary pathogens causing TD. ETEC was found in Africa, Asia and SC America.
10.1111/1469-0691.12621

[3] Etiology of travellers' diarrhea.
Journal of Travel Medicine · 2017-04-01
Enterotoxigenic Escherichia coli is the predominant pathogen in travellers' diarrhea. Ciprofloxacin-resistant Campylobacter was commonly associated with TD in Southeast Asia.
10.1093/jtm/tax003

[4] Diagnosis and Management of Infectious Diarrhea
Infectious Diseases Society of America · 2017-11-29 00:00:00
People with fever or bloody diarrhea should be evaluated for enteropathogens for which antimicrobial agents may confer clinical benefit, including S. enterica subspecies, Shigella, and Campylobacter.
https://academic.oup.com/cid/article/65/12/1963/4655039

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60. MedQA question ID 756 Step 2/3

Question

An otherwise healthy 29-year-old man presents to his family physician with a slowly growing left neck mass for the past 5 weeks. He denies fever or recent upper respiratory tract infections. His temperature is 37.1°C (98.7°F), the blood pressure is 115/72 mm Hg, and the pulse are 82/min. On examination, a 4-cm (1.5 in), firm, non-tender mass is detected on the mid-left neck. Excisional biopsy of the mass reveals Hodgkin's cells. The patient is referred to the oncology department and chemotherapy is started. After the first cycle of chemotherapy, the patient notices that his urine becomes red. The urine tests are positive for blood on further analysis. Which of the following is the most likely cause of this patient condition?

(A) Bleomycin

(B) Cyclophosphamide

(C) Doxorubicin

(D) Etoposide

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Cyclophosphamide is the most likely cause. The patient developed **hemorrhagic cystitis**, a classic toxic effect of cyclophosphamide caused by its urotoxic metabolite **acrolein**, which can produce **gross hematuria** after treatment [1] [2].

Why this is the best answer

- **Cyclophosphamide** can cause bladder irritation and **hemorrhagic cystitis/hematuria** because of **acrolein** exposure to the urothelium [1] [2].
- When hematuria occurs in a patient receiving cyclophosphamide, **further evaluation is recommended** [3].
- **Bleomycin** is associated with pulmonary toxicity, **doxorubicin** with cardiomyopathy, and **etoposide** with myelosuppression/secondary leukemia rather than isolated red urine [1].

References used

1. Review article summary noting that cyclophosphamide-induced bladder toxicity/hemorrhagic cystitis is mediated by the metabolite acrolein. 2. Review article summary describing cyclophosphamide and ifosfamide as causes of hemorrhagic cystitis and acrolein-mediated urotoxicity. 3. American College of Chest Physicians guideline recommendation that patients who undergo or have undergone cyclophosphamide therapy and develop hematuria should have further evaluation.

References

[1] Ifosfamide-Induced Malignancy of Ureter and Bladder.
Cureus · 2017-08-22
Cyclophosphamide-induced bladder malignancy is mediated by its metabolic product, acrolein. There is a significant association between the incidence of hemorrhagic cystitis during treatment and the later development of malignancies.
10.7759/cureus.1594

[2] Review of Advances in Uroprotective Agents for Cyclophosphamide- and Ifosfamide-induced Hemorrhagic Cystitis.
Urology · 2017-02-01
Cyclophosphamide and ifosfamide are widely used drugs for malignancies and rheumatologic conditions. One of the most significant adverse reactions to these drugs is hemorrhagic cystitis. Mesna is the most widely used uroprotective agent that acts to neutralize the caustic metabolite, acrolein.
10.1016/j.urology.2016.07.030

[3] Monitoring Of Nonsteroidal Immunosuppressive Drugs In Patients With Lung Disease And Lung Transplant Recipients
American College of Chest Physicians · 2012-11-01 00:00:00
For patients who undergo or have undergone cyclophosphamide therapy and develop hematuria, further evaluation is recommended.
https://journal.chestnet.org/article/S0012-3692(12)60657-6/fulltext

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61. MedQA question ID 1158 Step 2/3

Question

A 27-year-old female is brought to the emergency department by police when she attacked her date outside of a pizza restaurant. The patient refused to explain her behavior to the police. She seemed to be responding to internal stimuli when being initially interviewed. The patient has a past medical history of depression, anxiety, and obesity. The patient has a known history of medication non-compliance. Her temperature is 99.5°F (37.5°C), pulse is 112/min, blood pressure is 100/70 mmHg, respirations are 18/min, and oxygen saturation is 98% on room air. On physical exam the patient is

poorly kempt and has an odd body odor. Inspection of her oropharynx reveals multiple ulcers. Cardiac exam is unrevealing with the exception of a friction rub. Since the incident, the patient has calmed down and is currently resting. She is no longer responding to internal stimuli and is more cooperative. Lab values are obtained and are below.

Serum:
Na+: 135 mEq/L
Cl-: 100 mEq/L
K+: 3.9 mEq/L
HCO3-: 24 mEq/L
BUN: 20 mg/dL
Glucose: 70 mg/dL
Creatinine: 1.7 mg/dL
Ca2+: 10.0 mg/dL
Mg2+: 1.5 mEq/L

Hemoglobin: 10 g/dL
Hematocrit: 35%
Reticulocyte count: 4.9%
Platelet count: 275,000/mm^3
Leukocyte count: 5,500/mm^3

Which of the following is the next best step in management for this patient's underlying condition?

(A) IM haloperidol

(B) Clozapine

(C) Urine toxicology

(D) ANA and anti-dsDNA levels

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The next best step is to evaluate for systemic lupus erythematosus (SLE) with serologic testing, including ANA **and** anti-dsDNA **levels**; this presentation is more consistent with neuropsychiatric SLE than a primary psychotic disorder, given the oral ulcers, renal dysfunction, anemia/reticulocytosis, and cardiac friction rub. The **European League Against Rheumatism (EULAR)** notes that active neuropsychiatric disease attributed to SLE is treated as SLE after appropriate attribution, and diagnostic reviews emphasize antibody measurements plus exclusion of alternative causes [1] [2] [3].

Why this fits SLE better than a primary psychiatric disorder

- **ANA** is the usual screening test for suspected SLE.

- **Anti-dsDNA** supports SLE activity and is especially helpful when neuropsychiatric or renal involvement is suspected.
- The clinical picture here also suggests multisystem disease rather than isolated psychosis.

Why the other options are less appropriate

- **IM haloperidol**: may be used for acute agitation, but it does not address the underlying cause.
- **Clozapine**: not appropriate as the next step for a first presentation of suspected secondary psychosis.
- **Urine toxicology**: reasonable if intoxication is suspected, but the multisystem findings make SLE more likely.

Practical next step

After serologies, further evaluation for SLE activity/organ involvement would typically include complement levels and directed assessment for renal and other systemic disease if ANA is positive [2] [3].

References

[1] Management of Systemic Lupus Erythematosus
European League Against Rheumatism (EULAR) · 2024-07-22 00:00:00
- 6. In active neuropsychiatric disease attributed to SLE, glucocorticoids and immunosuppressive agents for inflammatory manifestations (1b/A) and antiplatelet agents/anticoagulants for atherothrombotic/aPL-related manifestations (2b/C) should be considered.
https://ard.bmj.com/content/83/1/15

[2] Central Nervous System Manifestations of Systemic Lupus Erythematosus.
Rheumatic diseases clinics of North America · 2017-11-01
Diagnosis relies on characteristic clinical manifestations, SLE disease activity, antibody measurements, cerebrospinal fluid findings, specific neuroimaging findings and exclusion of alternative etiologies.
10.1016/j.rdc.2017.06.003

[3] A critical analysis of the tools to evaluate neuropsychiatric lupus.
Lupus · 2017-04-01
Raised anti-dsDNA and low C3 complement levels are often seen, but are not an invariable guide. Presence of antiphospholipid antibodies is more suggestive of thrombotic than inflammatory causation.
10.1177/0961203317690242

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62. MedQA question ID 327 Step 1

Question

A 22-year-old man from Nepal presents to the emergency department complaining of swelling and pain in his right testicle. The patient states that he just arrived in the United States to live with his wife, with whom he is monogamous. The patient denies painful urination or urethral discharge, but admits that 10 days ago he “felt like he had a fever” and the right side of his face was swollen and painful. Which of the following is characteristic of the most likely diagnosis?

(A) Preventable by a live attenuated vaccine

(B) Original presentation in the form of a painless chancre

(C) Cause buboes in the inguinal lymph nodes

(D) Is a common cause of septic arthritis in this patient's age group

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely diagnosis is mumps orchitis, given the preceding febrile illness with unilateral facial swelling/pain consistent with parotitis followed by acute testicular swelling and pain in a young man. **Mumps is preventable by the live attenuated measles-mumps-rubella (MMR) vaccine**, which the Centers for Disease Control and Prevention (CDC) recommends for adults with no evidence of immunity [1] [2]. Therefore, the correct choice is **(A)**.

Why the other options are less likely

- **(B) Painless chancre** is characteristic of **primary syphilis**, not this presentation.
- **(C) Buboes in inguinal lymph nodes** are classically seen with **lymphogranuloma venereum** or chancroid.
- **(D) Common cause of septic arthritis** is not correct here; **mumps orchitis** is a viral complication of mumps infection, especially in post-pubertal males [3].

References

[1] Recommended Adult Immunization Schedule: United States, 2024
Centers for Disease Control and Prevention · 2024-01-12 12:00:00
No evidence of immunity to measles, mumps, or rubella: 1 dose.
https://www.acpjournals.org/doi/10.7326/M23-3269

[2] Primary Care Guidance for Persons With Human Immunodeficiency Virus
HIV Medicine Association, Infectious Diseases Society of America · 2024-10-12 00:00:00
MMR vaccine should be given to protect against measles, mumps, and rubella if persons were born in 1957 or after and have not received this vaccine or do not have immunity to these infections.
https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciae479/7818967

[3] Mumps Orchitis: Clinical Aspects and Mechanisms.
Frontiers in Immunology · 2021-01-01
Mumps virus is an important human pathogen that causes parotitis, orchitis, oophoritis, meningitis, encephalitis, and sensorineural hearing loss. Orchitis is a common complication of mumps infection, particularly in post-pubertal males.
10.3389/fimmu.2021.582946

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63. MedQA question ID 703 Step 2/3

Question

A 55-year-old caucasian male is transferred to a tertiary care hospital from a small county hospital where he presented with jaundice and severe abdominal pain that radiates to the back. While in the

county hospital, he did not develop fever, and his vital signs were stable for the 48 hours he spent at there. Initial laboratory tests are given below:
Total bilirubin 7 mg/dL
Direct bilirubin 6.4 mg/dL
AST 100
ALT 40
Alkaline phosphatase 480 IU/L
Glucose 160 mg/dL
The patient's medical history is relevant for hypertension and diabetes mellitus. He admits to smoking cigarettes since his early teenage years. Moderate icterus is evident during physical examination, the abdomen is distended and dull to percussion, and there is periumbilical tenderness. Which of the following markers would you expect to be elevated in this patient?

(A) CA 125

(B) Desmin

(C) CA 27-29

(D) CA 19-9

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. CA 19-9 is the marker most likely to be elevated in this patient, whose presentation is most consistent with **pancreatic adenocarcinoma causing obstructive jaundice**. The **American Society of Clinical Oncology (ASCO)** recommends assaying a serum **CA 19-9** level in patients with pancreatic cancer, and CA 19-9 is used as the key tumor marker in this disease [1] [2].

Why the other choices are less likely

- **CA 125** is more associated with ovarian malignancy and is not the standard marker for pancreatic cancer.
- **Desmin** is a muscle marker, not a pancreatic cancer marker.
- **CA 27-29** is most commonly used in breast cancer monitoring.

Clinical caveat

CA 19-9 can be elevated with **biliary obstruction/jaundice**, so an isolated elevation is not diagnostic; it is best interpreted in the overall clinical and imaging context [2] [3].

References

[1] Potentially Curable Pancreatic Adenocarcinoma
American Society of Clinical Oncology · 2019-06-10 00:00:00
A serum level of CA 19-9 and baseline standard laboratory studies should be assayed.
https://ascopubs.org/doi/full/10.1200/JCO.19.00946?
url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub%3Dpubmed

[2] Potentially Curable Pancreatic Adenocarcinoma

American Society of Clinical Oncology · 2019-06-10 00:00:00

Primary surgical resection of the primary tumor and regional lymph nodes is recommended for patients with potentially curable pancreatic cancer who meet all of the following criteria: no clinical evidence for metastatic disease, a performance status and comorbidity profile appropriate for a major abdominal operation, no radiographic interface between primary tumor and mesenteric vasculature on high-definition cross-sectional imaging, and a CA 19-9 level (in absence of jaundice) suggestive of potentially curable disease.

https://ascopubs.org/doi/full/10.1200/JCO.19.00946?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub%3Dpubmed

[3] Primary Sclerosing Cholangitis and Cholangiocarcinoma

American Association for the Study of Liver Diseases · 2022-09-09 12:00:00

An elevated CA 19-9 alone should not be used to diagnose CCA.

https://aasldpubs.onlinelibrary.wiley.com/doi/epdf/10.1002/hep.32771

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64. MedQA question ID 292 Step 2/3

Question

A 28-year-old female visits her physician for workup of a new onset diastolic murmur found on physical examination. Past medical history is insignificant. Her temperature is 37.0 degrees C, blood pressure is 115/75 mm Hg, pulse is 76/min, and respiratory rate is 16/min. The patient denies dyspnea, fatigue, and syncope. Transthoracic echocardiography reveals a large, pedunculated tumor in the left atrium. This patient is most at risk for:

(A) Abrupt hypotension

(B) Sudden cardiac death

(C) Acute arterial occlusion

(D) Septic embolism

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely complication is acute arterial occlusion from systemic embolization, so the correct answer is C. A **left atrial myxoma** is a mobile intracardiac mass that can fragment or embolize into the systemic circulation, causing stroke, limb ischemia, or other arterial occlusions; this is a classic risk of cardiac tumors and is more likely with a **pedunculated, mobile** left atrial mass [1] [2]. Septic embolism is not the expected complication unless infective endocarditis or another infection source is present [1].

Why this fits

- Left-sided cardiac tumors are recognized sources of **cardiac emboli**; the European Society of Cardiology (ESC) stroke consensus notes that cardiac tumors are a relevant embolic source, and myxomas commonly present with embolic complications [1] [2].
- Echocardiography is the main diagnostic test for a suspected left atrial myxoma, and surgical resection is the usual definitive treatment; the question here is asking about the embolic risk before treatment [2].

Why the other choices are less likely

- **Abrupt hypotension** is not the classic primary complication of a left atrial myxoma.
- **Sudden cardiac death** can occur with intracardiac tumors, but it is not the most characteristic risk tested here.
- **Septic embolism** is associated with endocarditis, not a noninfectious myxoma [1].

References

[1] Embolic strokes of undetermined source: a clinical consensus statement of the ESC Council on Stroke, the European Association of Cardiovascular Imaging and the European Heart Rhythm Association of the ESC
European Heart Journal · 2024-04-30
The native valvular heart diseases are rare sources of cardiac emboli if we exclude the specific context of endocarditis and cardiac tumours.
10.1093/eurheartj/ehae150

[2] A case of large atrial myxoma presenting as an acute stroke.
Journal of Community Hospital Internal Medicine Perspectives · 2016-01-01
Left atrial myxomas are rare primary cardiac tumors. Neurological complications resulting from cardiac myxoma are seen in 20-35% of patients. Transesophageal echocardiogram is preferred over transthoracic for evaluation of left atrial myxoma.
10.3402/jchimp.v6.29604

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65. MedQA question ID 817 Step 1

Question

A multi-specialty physician practice is meeting to determine which compensation scheme would best serve the practice and its patient population. Which of the following are true in regards to physician compensation?

(A) Capitation poses the least financial risk to physicians

(B) Fee-for-service pays physicians a set amount of money per unit time for every patient under their care

(C) Fee-for-service may incentivize physicians to increase healthcare utilization irrespective of quality

(D) Fee-for-service poses the most amount of financial risk to physicians

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C is true; A, B, and D are false. In **fee-for-service (FFS)** payment, physicians are paid **per service or unit of care delivered**, not a set amount per unit time, and this model can **incentivize higher utilization** because revenue rises with volume rather than quality alone [1] [2]. **Capitation** generally transfers more financial risk to physicians than FFS, so it is **not** the least-risk arrangement [1] [2].

Why the other options are false

- **A. False.** Capitation does not pose the least financial risk to physicians; it shifts more risk to the physician group than FFS [1].
- **B. False.** FFS is not a fixed payment per unit time; it is a payment for each billed service or item of care [1] [2].
- **D. False.** FFS does not pose the most financial risk to physicians; it is typically less financially risky to physicians than capitation because payment is tied to volume of services rendered [1] [2].

Evidence basis

A systematic review of specialist physician payment models found that **FFS was associated with increased utilization** compared with capitation or salary models [2]. Experimental and comparative evidence also shows that physicians provide **more services under FFS than under capitation**, consistent with stronger volume-based incentives [3].

References

[1] Framework for the design of physician remuneration methods in primary health care.
Social work in public health · 2011-01-01
Fee-for-service payments are best when the goals are quantity of care and risk acceptance. Capitation is best when goals are collaboration between providers and delivery of preventive services and health promotion.
10.1080/19371911003748968

[2] Impact of payment model on the behaviour of specialist physicians: A systematic review.
Health policy (Amsterdam, Netherlands) · 2020-04-01
A systematic review synthesizes evidence on the impact of physician payment models across the domains of health care quality, outcomes, utilization, access, and costs. Fee-for-service (FFS) was associated with increased utilization and fewer adverse outcomes.
10.1016/j.healthpol.2020.02.007

[3] How payment systems affect physicians' provision behaviour--an experimental investigation.
Journal of health economics · 2011-07-01
The study finds that physicians provide more medical services under fee-for-service than under capitation.
10.1016/j.jhealeco.2011.05.001

66. MedQA question ID 1115 Step 2/3

Question

A 10-year-old African American girl with known sickle cell disease becomes acutely anemic in the setting of underlying infection. Her mother denies any previous history of blood clots in her past, but she says that her mother has also had to be treated for pulmonary embolism in the recent past. The patient's past medical history is significant for a few episodes of acute pain crisis and a need for splenectomy 3 years ago. The vital signs upon arrival include: temperature 36.7°C (98.0°F), blood pressure 106/74 mm Hg, heart rate 111/min and regular, and respiratory rate 17/min. On physical examination, her pulses are bounding and fingernails are pale, but breath sounds remain clear. Oxygen saturation was initially 91% on room air and electrocardiogram (ECG) shows sinus tachycardia. A blood transfusion is initiated. Shortly after the transfusion has begun, the patient experiences fevers, chills, a burning sensation at the intravenous (IV) site, and sudden hypotension. What is the name of this reaction, and what is the best treatment?

(A) Nonhemolytic febrile reaction; administer antihistamines

(B) Minor allergic reaction; discontinue transfusion

(C) Hemolytic transfusion reaction; administer antihistamines

(D) Hemolytic transfusion reaction; discontinue transfusion

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

This is most consistent with an acute hemolytic transfusion reaction, most often from ABO incompatibility until proven otherwise. The immediate best treatment is to **stop the transfusion at once**, keep the IV line open with normal saline, and provide supportive care for hypotension/shock while the blood bank evaluates the unit and the patient for hemolysis and clerical mismatch [1] [2].

Key points

- The American Society of Hematology (ASH) notes that transfusion reactions can present with **fever, chills, pain, and other systemic symptoms** in patients with sickle cell disease [1].
- Immediate management is **do not continue the transfusion**; the reaction can be life-threatening, and management should focus on stabilization and urgent transfusion-service workup [2] [3].
- If needed, treat complications of hemolysis and shock supportively, including fluids and vasopressors as clinically indicated, and monitor for hemoglobinuria, disseminated intravascular coagulation, and acute kidney injury [2] [3].

Clinical interpretation

The combination of **fever, chills, burning at the IV site, and sudden hypotension shortly after starting blood** strongly favors an **acute hemolytic transfusion reaction** rather than a delayed reaction or a simple febrile nonhemolytic reaction [1] [2].

References

[1] Sickle Cell Disease: Transfusion Support
American Society of Hematology · 2020-01-27 12:00:00
Transfusions of blood or blood products can cause a potentially serious immune reaction. Symptoms include fever, chills, nausea, vomiting, diarrhea, itching, pain, feeling dread, and fainting blood in the urine.
https://ashpublications.org/bloodadvances/article/4/2/327/440607/American-Society-of-Hematology-2020-guidelines-for

[2] A Hemolytic Transfusion Reaction Caused by an Unexpected Leb Antibody.
Laboratory medicine · 2021-05-04
A Black male patient with a history of sickle cell disease and HIV was admitted to the hospital with vaso-occlusive crisis. The patient developed a fever (39.5°C), tachycardia, chills, and hematuria after receiving 300 mL of red blood cells. Antibody identification revealed an anti-Leb as the probable cause of the immediate acute hemolytic transfusion reaction.
10.1093/labmed/lmaa070

[3] Prevention of delayed hemolytic transfusion reaction.
Transfusion clinique et biologique : journal de la Societe francaise de transfusion sanguine · 2019-05-01
Post-transfusion hemolysis is the most frequent immune reaction to transfusion in sickle cell disease. Prevention is based on the use of matched RBCs for highly immunogenic blood groups, taking into account the patient's transfusion history. Prevention of alloimmunization through immunotherapy should be considered.
10.1016/j.tracli.2019.02.007

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67. MedQA question ID 794 Step 2/3

Question

A 75-year-old man comes to the physician for the evaluation of progressive shortness of breath and fatigue over the past month. He reports that he cannot climb more than one flight of stairs without experiencing shortness of breath and dizziness. He has hypertension and hyperlipidemia. He has smoked one pack of cigarettes daily for the past 50 years. He does not drink alcohol. His medications include enalapril, atorvastatin, and low-dose aspirin. His temperature is 37°C (98.6°F), pulse is 70/min, respirations are 18/min, and blood pressure is 100/80 mm Hg. Physical examination shows weak peripheral pulses. Cardiac examination is shown. Which of the following is the most likely diagnosis?

(A) Tricuspid valve stenosis

(B) Mitral valve prolapse

(C) Mitral valve stenosis

(D) Aortic valve stenosis

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Aortic valve stenosis is the most likely diagnosis. The **American College of Cardiology/ American Heart Association (ACC/AHA)** guideline describes symptomatic severe aortic stenosis as exertional dyspnea, decreased exercise tolerance, angina, syncope/presyncope, and recommends transthoracic echocardiography for suspected AS; the bedside findings in this case (progressive exertional dyspnea, dizziness/presyncope, and weak peripheral pulses) fit that pattern best [1] [2]. In an older adult, calcific aortic stenosis is also the most common valvular cause of this presentation [3].

Why the other options are less likely

- **Mitral valve prolapse** more often causes mitral regurgitation rather than isolated exertional dyspnea with weak pulses [4].
- **Mitral valve stenosis** typically presents with a rheumatic history and findings of left atrial/ pulmonary congestion rather than diminished peripheral pulses [5].
- **Tricuspid stenosis** is uncommon and usually presents with right-sided congestion findings such as edema, ascites, and hepatic congestion rather than exertional presyncope and weak pulses [6].

Most likely bedside diagnosis

- **Aortic stenosis**
- If auscultation is available, a **systolic ejection murmur** radiating to the carotids would further support it, but the diagnosis should be confirmed with **TTE** [1].

References

[1] Management of Patients With Valvular Heart Disease

American College of Cardiology, American Heart Association · 2020-12-17 00:00:00

In patients with signs or symptoms of AS or a BAV, TTE is indicated for accurate diagnosis of the cause of AS, assessment of hemodynamic severity, measurement of LV size and systolic function, and determination of prognosis and timing of valve intervention.

https://www.ahajournals.org/doi/10.1161/CIR.0000000000000923

[2] Management of Patients With Valvular Heart Disease

American College of Cardiology, American Heart Association · 2020-12-17 00:00:00

Stage D: Symptomatic severe AS. Exertional dyspnea or decreased exercise tolerance; exertional angina; exertional syncope or presyncope.

https://www.ahajournals.org/doi/10.1161/CIR.0000000000000923

[3] Evaluation and Management of Aortic Stenosis for the Emergency Clinician: An Evidence-Based Review of the Literature.

The Journal of Emergency Medicine · 2018-07-01

Aortic stenosis is a common condition among older adults. It can be caused by calcific disease, congenital causes, or rheumatic valvular disease. Symptoms of advanced disease include angina, dyspnea, and syncope.

10.1016/j.jemermed.2018.01.026

[4] Management of Patients With Valvular Heart Disease

American College of Cardiology, American Heart Association · 2020-12-17 00:00:00

Stage D: Symptomatic severe MR. Severe MV prolapse with loss of coaptation or flail leaflet. Symptoms: decreased exercise tolerance, exertional dyspnea.

https://www.ahajournals.org/doi/10.1161/CIR.0000000000000923

[5] Management of Patients With Valvular Heart Disease
American College of Cardiology, American Heart Association · 2020-12-17 00:00:00
Stage D: Symptomatic severe MS. Rheumatic valve changes with commissural fusion and diastolic doming of the MV leaflets. Symptoms: decreased exercise tolerance, exertional dyspnea.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000923

[6] Management of Patients With Valvular Heart Disease
American College of Cardiology, American Heart Association · 2020-12-17 00:00:00
Stage D: Symptomatic severe TR. Symptoms: dyspnea on exertion, fatigue, ascites, edema.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000923

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68. MedQA question ID 1240 Step 1

Question

A 3-year-old male was brought to the pediatrician with severe lip lacerations, with a portion of his tongue appearing to be bitten off, as well as missing portions of the fingers on his right hand. A family history is notable for two similar cases in male cousins on the mother's side. A urinalysis revealed a high level of uric acid. Which of the following is the mode of inheritance for this disorder?

(A) X-linked recessive

(B) X-linked dominant

(C) Autosomal dominant

(D) Maternally inherited mitochondrial defect

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The disorder is most consistent with Lesch-Nyhan syndrome, which is inherited in an X-linked recessive pattern. It classically affects boys, is associated with **self-injurious biting of the lips, tongue, and fingers**, and causes **hyperuricemia/uric acid overproduction** due to HPRT1 deficiency [1] [2]. The family history in maternal male cousins also fits **X-linked recessive** transmission through carrier mothers [1].

Answer: A. X-linked recessive

References

[1] A modified intraoral resin mouthguard to prevent self-mutilations in lesch-nyhan patients.
International journal of dentistry · 2014-01-01
Lesch-Nyhan syndrome is a X-linked recessive disorder, occurring in 1 : 100,000 to 1 : 380000 live births. LNS is characterized by a decrease in activity of hypoxanthine guanine phosphoribosyl transferase, resulting in overproduction of uric acid. In LNS patients the typical feature is loss of tissue from biting themselves with partial or complete amputation of fingers, lips, and tongue.

10.1155/2014/396830

[2] Purine Metabolism and Dystonia: Perspectives of a Long-Promised Relationship

Annals of Neurology · 2025-03-03

The condition is caused by X-linked hemizygous variants in HPRT1 encoding HGprt. Individuals with LND exhibit a spectrum of neurological and neuropsychiatric abnormalities, including developmental delay, dystonia, choreoathetosis, ballism, spasticity, intellectual disability, and recurrent self-injurious behaviour. Over-production of uric acid is a universal characteristic of the condition. LND affects almost exclusively male patients, with transmission of the causative variants from heterozygous non-manifesting carrier mothers.

10.1002/ana.27227

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69. MedQA question ID 821 Step 1

Question

A 73-year-old woman is brought to the physician by her daughter for evaluation of impaired memory and word-finding difficulties for 2 years. She was recently asked to step down from her position as volunteer accountant for a local charity organization because she was no longer able to coordinate her tasks. She reports that she has become unable to taste or smell her food. Two years later, the patient dies. At autopsy, examination of the brain shows generalized cortical atrophy. A photomicrograph of a section of the brain is shown. The inclusions indicated by the arrows are predominantly composed of which of the following substances?

(A) Alpha-synuclein

(B) Amyloid-β

(C) Hyperphosphorylated tau

(D) Prion protein

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Hyperphosphorylated tau predominantly composes the brain inclusions in this scenario. The clinical picture and autopsy finding are most consistent with **Alzheimer disease**, in which the characteristic intracellular inclusions are **neurofibrillary tangles made of hyperphosphorylated tau**; amyloid-β is the major component of extracellular plaques, not the tangles [1] [2].

Key point

- **Neurofibrillary tangles = hyperphosphorylated tau** [1] [2]
- **Amyloid-β** forms **senile plaques** [2]
- **Alpha-synuclein** is associated with Lewy body pathology, and **prion protein** with prion diseases, not the classic Alzheimer inclusions described here [1]

Most likely answer

Hyperphosphorylated tau [1] [2]

References

[1] Translating the biology of aging into novel therapeutics for Alzheimer disease
Neurology · 2019-01-08
Pathologic hallmarks of AD include senile plaques comprising β-amyloid (Aβ) proteins along with many other misfolded proteins and neurofibrillary tangles formed by hyperphosphorylated tau protein aggregates.
10.1212/WNL.0000000000006745

[2] A/T/N: An unbiased descriptive classification scheme for Alzheimer disease biomarkers
Neurology · 2016-08-02
Biomarkers of tau pathology (neurofibrillary tangles) are elevated CSF phosphorylated tau (p-tau) and tau PET.
10.1212/WNL.0000000000002923

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70. MedQA question ID 970 Step 2/3

Question

A 67-year-old man presents with feelings of nervousness and anxiety. He mentions that lately, he has been feeling increasingly restless and is unable to control feelings of nervousness pertaining to all his daily tasks. He noticed that these feelings were more prominent in the last 2 months but have been present on and off for the last year. On many occasions, his mind will be racing with thoughts that keep him up at night. During these moments, he finds his heart racing and feels light-headed and dizzy to the point of blacking out. He has also been experiencing back and neck pain with increased muscle tension in these areas. The patient reports no smoking or alcohol use but mentions that he had tried cocaine and heroin in his 20s and 30s. Which of the following would be the best course of treatment for this patient's symptoms?

(A) Diazepam

(B) Ramelteon

(C) Buspirone

(D) Alprazolam

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Buspirone is the best choice for this 67-year-old man with likely **generalized anxiety disorder** rather than a benzodiazepine. The **World Health Organization (WHO)** recommends **SSRIs** for adults with generalized anxiety disorder and notes that **benzodiazepines are not recommended** for GAD/panic disorder except as very short-term emergency treatment; the **American Geriatrics**

Society (AGS) Beers Criteria also lists **diazepam, alprazolam, and other benzodiazepines as medications to avoid in older adults** because of adverse CNS effects and dependence risk [1] [2]. **Buspirone** is a non-benzodiazepine option for chronic anxiety and is specifically noted as being **effective only for GAD**, making it the best answer among the choices [3].

Why the other options are not preferred

- **Diazepam** and **alprazolam** are benzodiazepines: avoid in older adults and in patients with substance use risk because of dependence, falls, cognitive effects, and withdrawal concerns [1] [2].
- **Ramelteon** is used for insomnia, not core treatment of generalized anxiety [4].

Practical takeaway

For persistent, excessive worry with autonomic symptoms and muscle tension, first-line management is usually **psychotherapy (CBT)** and/or an **SSRI/SNRI**; among the options given, **buspirone** is the safest guideline-consistent anxiolytic choice [1] [2] [3].

References

[1] Mental, Neurological and Substance Use Disorders
World Health Organization · 2023-11-20 00:00:00
Benzodiazepines are not recommended for the treatment of adults with generalized anxiety disorder (GAD) and/or panic disorder. For emergency management of acute and severe anxiety symptoms, benzodiazepines may be considered, but only as a short-term (3–7 days maximum) measure.
https://www.who.int/publications/i/item/9789240084278

[2] AGS Beers Criteria for Potentially Inappropriate Medication Use in Older Adults
American Geriatrics Society · 2023-05-03 12:00:00
Avoid
https://agsjournals.onlinelibrary.wiley.com/doi/10.1111/jgs.18372

[3] Benzodiazepine Tapering
American Society of Addiction Medicine · 2025-03-03 00:00:00
Chronic anxiety (GAD, panic, PTSD, social anxiety) — Buspirone: 5HT1A receptor agonist; Not effective as a prn agent; Only effective for GAD.
https://www.asam.org/quality-care/clinical-guidelines/benzodiazepine-tapering

[4] Alternative Treatments to Selected Medications in the 2023 American Geriatrics Society Beers Criteria
American Geriatrics Society · 2025-07-23 12:00:00
Medications that have shown some effectiveness for insomnia in older adults include the following (all for short-term usage): low-dose doxepin, dual orexin receptor antagonists, ramelteon.
https://agsjournals.onlinelibrary.wiley.com/doi/epdf/10.1111/jgs.19500

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71. MedQA question ID 3 Step 1

Question

A 39-year-old woman is brought to the emergency department because of fevers, chills, and left lower quadrant pain. Her temperature is 39.1°C (102.3°F), pulse is 126/min, respirations are 28/min, and blood pressure is 80/50 mm Hg. There is blood oozing around the site of a peripheral intravenous line. Pelvic examination shows mucopurulent discharge from the cervical os and left adnexal tenderness. Laboratory studies show:

Platelet count 14,200/mm3
Fibrinogen 83 mg/mL (N = 200–430 mg/dL)
D-dimer 965 ng/mL (N < 500 ng/mL)
When phenol is applied to a sample of the patient's blood at 90°C, a phosphorylated N-acetylglucosamine dimer with 6 fatty acids attached to a polysaccharide side chain is identified. A blood culture is most likely to show which of the following?"

(A) Coagulase-positive, gram-positive cocci forming mauve-colored colonies on methicillin-containing agar

(B) Encapsulated, gram-negative coccobacilli forming grey-colored colonies on charcoal blood agar

(C) Spore-forming, gram-positive bacilli forming yellow colonies on casein agar

(D) Lactose-fermenting, gram-negative rods forming pink colonies on MacConkey agar

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The best answer is D: lactose-fermenting, gram-negative rods forming pink colonies on MacConkey agar, most consistent with Escherichia coli. The patient has septic shock with DIC, and the described outer membrane component is lipid A of lipopolysaccharide (endotoxin), which is found in gram-negative bacteria [1] [2]. Although the pelvic findings suggest a genital source, the culture description given in the answer choices matches a lactose-fermenting gram-negative rod rather than Neisseria gonorrhoeae; classic gonococci are gram-negative diplococci and would not have this growth pattern.

References

[1] Surviving Sepsis Campaign: Management of Sepsis and Septic Shock 2021
Society of Critical Care Medicine · 2021-10-02 12:00:00
Sepsis and septic shock are medical emergencies, and we recommend that treatment and resuscitation begin immediately
https://link.springer.com/article/10.1007%2Fs00134-021-06506-y

[2] Sepsis and disseminated intravascular coagulation.
Journal of intensive care · 2016-01-01
Sepsis is complicated by coagulopathy and, in about 35% of severe cases, by disseminated intravascular coagulation (DIC).
https://doi.org/10.1186/s40560-016-0149-0

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72. MedQA question ID 741 Step 1

Question

A researcher conducts multiple experiments to establish an infection and disease model for Clostridium perfringens in chickens. To ensure that all instruments are free of the pathogenic

organism, he uses a disinfectant that oxidizes and denatures proteins. Which of the following disinfectants did the researcher most likely use?

(A) Chlorine dioxide

(B) Isopropyl alcohol

(C) Povidone-iodine

(D) Benzalkonium chloride

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Chlorine dioxide is the most likely choice. It is an **oxidizing disinfectant**; oxidizing biocides act by damaging microbial macromolecules, including **proteins**, and chlorine dioxide is specifically described as a potent water disinfectant with this oxidizing activity [1]. **Povidone-iodine** also oxidizes key proteins, but it is primarily used as an antiseptic rather than the best match for instrument decontamination in this stem [2].

References

[1] Mode of action of hydrogen peroxide and other oxidizing agents: differences between liquid and gas forms.
The Journal of antimicrobial chemotherapy · 2010-10-01
Antimicrobials such as chlorine dioxide, peracetic acid and hydrogen peroxide share a basic mechanism of action, but profound differences arise in their efficacy against microorganisms. Study aimed to elucidate the biochemical mechanisms of action of oxidizing biocides at a macromolecular level using amino acids, protein and an enzyme as model substrates for the action of each biocide.
10.1093/jac/dkq308

[2] Povidone Iodine: Properties, Mechanisms of Action, and Role in Infection Control and Staphylococcus aureus Decolonization
Antimicrobial Agents and Chemotherapy · 2020-08-20
As a small molecule, iodine rapidly penetrates into microorganisms and oxidizes key proteins, nucleotides, and fatty acids, eventually leading to cell death.
10.1128/AAC.00682-20

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73. MedQA question ID 1104 Step 1

Question

A 62-year-old man presents with bright red blood in his stool which occurred 2 times this week. He denies fever, weight loss, pain, pruritus or urinary symptoms. Past medical history is significant for gastroesophageal reflux disease, and recent appendicitis, status post laparoscopic appendectomy complicated by delirium tremens. His vitals are a temperature of 37.0°C (98.6°F), blood pressure of 130/80 mm Hg, pulse of 78/min, and respiratory rate of 12/min. Physical examination reveals a

distended abdomen with shifting dullness on percussion. In addition, multiple purple spider web-like lesions are present on the chest and arms, which blanch when pressure is applied. Fecal occult blood test is negative. On anoscopy, a non-tender, dilated vascular protrusion is noted superior to the pectinate line. Which of the following is most likely true about this patient's current symptoms?

(A) This patient has peptic ulcer disease.

(B) The vascular protrusion drains into the superior rectal vein.

(C) The vascular protrusion drains into the inferior rectal vein.

(D) Fecal leukocytes and a stool culture are required for diagnosis.

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. The vascular protrusion drains into the superior rectal vein. This presentation is most consistent with an **internal hemorrhoid / anorectal varix above the pectinate line**: it is typically **painless**, presents with **bright red rectal bleeding**, and is seen on **anoscopy**. In a patient with signs of **portal hypertension/cirrhosis** (ascites, spider angiomata), anorectal venous dilation is especially plausible, and anoscopy is the best diagnostic test for anorectal varices [1] [2].

Why the other choices are unlikely

- **A. Peptic ulcer disease** is not the best explanation for isolated bright red blood per rectum with an anoscopic anorectal lesion.
- **C. Inferior rectal vein** drainage is for structures **below** the pectinate line (external hemorrhoidal region), not the lesion described here.
- **D. Fecal leukocytes and stool culture** are not required for this diagnosis; those tests are used when infectious colitis is suspected, which is not suggested here.

Key point

- Lesions **above the pectinate line** drain to the **superior rectal vein** and are associated with the **portal venous system**; lesions **below** the line drain to the **inferior rectal vein** and systemic circulation [2].

References

[1] Management of Hemorrhoids
American Society of Colon and Rectal Surgeons · 2024-01-31 00:00:00
Complete endoscopic evaluation of the colon is indicated in select patients with symptomatic hemorrhoids and rectal bleeding.
https://journals.lww.com/dcrjournal/citation/9900/the_american_society_of_colon_and_rectal_surgeons.541.aspx

[2] Systematic review of anorectal varices.
Colorectal Disease · 2013-12-01
Anorectal varices are an uncommon but significant source of bleeding in patients with portal hypertension. Anoscopy or flexible sigmoidoscopy is the best method for diagnosis.
10.1111/codi.12417

74. MedQA question ID 1061 Step 2/3

Question

A 37-year-old woman presents to the emergency department with confusion, anxiety, sweating, and episodes of vomiting. She is accompanied by her sister who says that her symptoms developed acutely and is unsure about what caused it. She is currently on methimazole, which she last took approximately 1 week ago. Approximately 5 days ago she developed an upper respiratory infection managed with bed rest and ibuprofen. Her temperature is 105°F (40.6°C), blood pressure is 95/68 mmHg, pulse is 145/min, and respirations are 23/min. On physical examination, the patient has altered mentation and is agitated and diaphoretic. The patient also has a goiter, exophthalmos, warm skin, and a hand tremor. She is started on intravenous fluids. Which of the following is the best treatment option for this patient?

(A) Antibiotics

(B) Carotid massage

(C) Clonazepam

(D) Propranolol

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Propranolol is the best treatment option among the choices. This patient has **thyroid storm**—a clinical diagnosis in a severely thyrotoxic patient with systemic decompensation—and the American Thyroid Association (ATA) recommends **multimodal therapy**, including **β-adrenergic blockade**, antithyroid drugs, inorganic iodide, corticosteroids, and supportive care [1] [2]. **Propranolol** is an appropriate immediate therapy because it rapidly controls the adrenergic symptoms of thyrotoxicosis; in thyroid storm, **β-blockade is recommended in all symptomatic patients** [3] [4].

Why the other options are not best here

- **Antibiotics** may be needed if an infection is the precipitating trigger, but they are not the single best treatment option for the acute thyrotoxic emergency itself [2].
- **Carotid massage** is not a treatment for thyroid storm.
- **Clonazepam** does not address the life-threatening hyperadrenergic state.

Key treatment point

For thyroid storm, management should not be limited to a beta-blocker alone; definitive therapy also includes **thionamide therapy** (often **propylthiouracil** or **methimazole**), **iodine after thionamide**, and **glucocorticoids**, along with ICU-level supportive care when needed [2] [4].

References

[1] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis
American Thyroid Association · 2016-10-01 00:00:00
35. The diagnosis of thyroid storm should be made clinically in a severely thyrotoxic patient with evidence of systemic decompensation. Adjunctive use of a sensitive diagnostic system should be considered.
https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

[2] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis
American Thyroid Association · 2016-10-01 00:00:00
36. A multimodality treatment approach to patients with thyroid storm should be used, including β-adrenergic blockade, antithyroid drug therapy, inorganic iodide, corticosteroid therapy, cooling with acetaminophen and cooling blankets, volume resuscitation, nutritional support, respiratory care and monitoring in an intensive care unit, as appropriate for an individual patient.
https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

[3] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis
American Thyroid Association · 2016-10-01 00:00:00
2. β-adrenergic blockade is recommended in all patients with symptomatic thyrotoxicosis, especially elderly patients and thyrotoxic patients with resting heart rates >90 bpm or coexistent cardiovascular disease.
https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

[4] Hyperthyroidism
JAMA · 2023-10-17
Symptomatic patients with all forms of thyrotoxicosis may benefit from initiation of beta blockers, which decreases heart rate and improves hyperadrenergic symptoms. Thyroid storm is managed with antithyroid drugs, glucocorticoids, beta blockade, inorganic iodide, and cholestyramine.
10.1001/jama.2023.19052

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75. MedQA question ID 146 Step 2/3

Question

A 60-year-old man is referred to a dermatologist by his family physician for management of a rare case of dermatitis that has not responded to standard therapy with corticosteroids. The patient's medical history is unremarkable, and he is currently working reduced hours at his job as an accountant. Physical examination reveals confluent scaly patches, plaques, and generalized erythroderma along the torso and lower extremities (see image). There is also a solid skin lesion with a diameter greater than 1 cm. The dermatologist suspects a malignancy and orders a biopsy. Which of the following is the most accurate description of this condition?

(A) Vascular tumor containing spindle cells

(B) Tumor arising from the folliculosebaceous–apocrine germ

(C) Tumor arising from cutaneous T cells

(D) Tumor arising from epidermal keratinocytes

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Tumor arising from cutaneous T cells. The presentation is most consistent with **mycosis fungoides/Sézary syndrome**, a **cutaneous T-cell lymphoma** that can present as chronic, recalcitrant eczematous dermatitis with **patches, plaques, tumors, and generalized erythroderma**; Sézary syndrome is the erythrodermic, leukemic variant with blood involvement [1] [2] [3]. In suspected CTCL, **skin biopsy** is appropriate to confirm the diagnosis and exclude mimics [4].

Why the other choices are less accurate

- **A. Vascular tumor containing spindle cells** describes a vascular neoplasm, not CTCL.
- **B. Tumor arising from the folliculosebaceous–apocrine germ** describes a follicular/adnexal tumor, not CTCL.
- **D. Tumor arising from epidermal keratinocytes** describes keratinocyte-derived skin cancers such as squamous cell carcinoma, not CTCL.

Key clinical clue

A **steroid-unresponsive dermatitis** with **confluent scaly patches/plaques plus erythroderma** should prompt consideration of **cutaneous T-cell lymphoma**, especially mycosis fungoides or Sézary syndrome [1] [2] [3].

References

[1] Mycosis fungoides and Sézary syndrome.

Journal der Deutschen Dermatologischen Gesellschaft = Journal of the German Society of Dermatology : JDDG · 2021-09-01

Mycosis fungoides and Sézary syndrome are primary cutaneous T-cell lymphomas with not yet fully understood etiology and pathogenesis. MF presents clinically with patch, plaque and/or tumor stages, but can also evolve as erythroderma. SS is characterized by a detectable tumor-cell burden in the peripheral blood consistent with advanced-stage disease and a poor prognosis.

10.1111/ddg.14610

[2] Mycosis fungoides and Sézary syndrome.

Blood research · 2023-04-30

Mycosis fungoides and Sézary syndrome are a distinct disease entity of cutaneous T-cell lymphoma with heterogenous clinical features and prognosis.

10.5045/br.2023.2023023

[3] Sézary Syndrome: Clinical and Biological Aspects.

Current hematologic malignancy reports · 2016-12-01

Sézary syndrome is a rare and aggressive type of cutaneous T cell lymphoma (CTCL) characterized by an intensely pruritic, exfoliative rash, known as erythroderma, with cutaneous and systemic dissemination of clonal CD4+ T cells into the blood and lymph nodes.

10.1007/s11899-016-0351-0

[4] Laboratory Workup of Lymphoma in Adults

American Society for Clinical Pathology, College of American Pathologists · 2020-11-10 12:00:00

Clinical care providers should obtain excisional biopsy or CNB specimens in patients with high suspicion of lymphoma.

https://academic.oup.com/ajcp/article/155/1/12/5957527?login=false

76. MedQA question ID 200 Step 2/3

Question

An unconscious 55-year-old man is brought to the Emergency Department by ambulance. He had recently lost his job and his house was about to begin foreclosure. His adult children were concerned for his well being and called the police requesting a welfare check. He was found unresponsive in his guragu e. There were several empty bottles of vodka around him and one half empty container of antifreeze. A review of his medical records reveals that he was previously in good health. Upon arrival to the ED he regains consciousness. His blood pressure is 135/85 mmHg, heart rate 120/min, respiratory rate 22/min, and temperature 36.5°C (97.7°F). On physical exam his speech is slurred and he has difficulty following commands. His abdomen is diffusely tender to palpation with no rebound tenderness. Initial laboratory tests show an elevated serum creatinine (Cr) of 1.9 mg/dL, and blood urea nitrogen (BUN) of 29 mg/dL. Which of the following findings would be expected in this patient's urine?

(A) Calcium oxalate crystals

(B) Hyaline casts

(C) Urine ketones

(D) Urate crystals

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Calcium oxalate crystals are expected in the urine. This presentation is most consistent with **ethylene glycol ingestion** (antifreeze), which is metabolized to oxalic acid; oxalate precipitates with calcium in the renal tubules and urine, causing acute kidney injury and crystalluria [1] [2].

Why the other choices are less likely

- **Hyaline casts** are nonspecific and do not explain the toxic ingestion pattern.
- **Urine ketones** are more suggestive of alcoholic or starvation ketoacidosis.
- **Urate crystals** are not the classic finding for ethylene glycol poisoning [1] [2].

References

[1] Ethylene Glycol Poisoning: An Unusual Cause of Altered Mental Status and the Lessons Learned from Management of the Disease in the Acute Setting.

Case reports in critical care · 2016-01-01

Ethylene glycol is a common toxic ingestion. The true toxicity is mediated by its metabolites, which are responsible for increased anion gap metabolic acidosis, renal tubular damage, and crystalluria. Early intervention is key... Treatment is bicarbonate, fomepizole or ethanol and hemodialysis.

10.1155/2016/9157393

[2] Acute oxalate nephropathy caused by ethylene glycol poisoning.

Kidney Research and Clinical Practice · 2012-12-01

Ethylene glycol is a sweet-tasting, odorless organic solvent found in many agents such as anti-freeze. EG is composed of four organic acids... Oxalic Acid precipitates to calcium oxalate monohydrate in the tubular lumen and has been linked to acute kidney injury.

10.1016/j.krcp.2012.09.007

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77. MedQA question ID 32 Step 1

Question

A 22-year-old woman is brought to the emergency department because of a 2-day history of fever, intermittent rigors, and night sweats. She also has a 1-month history of progressive fatigue. Five weeks ago, she was hospitalized and received intravenous antibiotics for treatment of bacterial meningitis while visiting relatives in Guatemala. Her temperature is 39.4°C (102.9°F), pulse is 130/min, and blood pressure is 105/70 mm Hg. Examination shows pallor and scattered petechiae and ecchymoses. Laboratory studies show a hemoglobin concentration of 9.0 g/dL, a leukocyte count of 1,100/mm3 with 30% segmented neutrophils, and a platelet count of 20,000/mm3 . Blood cultures grow coagulase-negative staphylococci. The patient was most likely treated with which of the following antibiotics?

(A) Doxycycline

(B) Trimethoprim/sulfamethoxazole

(C) Linezolid

(D) Chloramphenicol

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Chloramphenicol is the most likely antibiotic used for her meningitis. The key clue is the development of **severe aplastic anemia/pancytopenia** several weeks after treatment in Guatemala; chloramphenicol is a classic cause of **idiosyncratic aplastic anemia**, which can present after exposure with progressive fatigue, fever, petechiae/ecchymoses, leukopenia, and thrombocytopenia [1] [2].

Why the other options are less likely

- **Doxycycline** and **trimethoprim/sulfamethoxazole** can cause hematologic adverse effects, but they are not classic for this delayed aplastic anemia syndrome in the way chloramphenicol is [2] [3].
- **Linezolid** can cause myelosuppression, but it is not the classic historical cause suggested by meningitis treatment in Guatemala followed by severe pancytopenia [4].

Bottom line

The presentation is most consistent with **chloramphenicol-induced aplastic anemia** after treatment of bacterial meningitis [1] [2].

References

[1] Identification of chloramphenicol in human hair leading to a diagnosis of factitious disorder.
Clinical Toxicology (Philadelphia, Pa.) · 2020-09-01
Chloramphenicol is a bacteriostatic antibiotic of the phenicolated family used in the past to treat meningitis, plague, cholera, or typhoid fever. It can have serious side effects, the most serious of which is aplastic anemia, which may be fatal.
10.1080/15563650.2019.1708375

[2] Narrative review of aplastic anemia-the importance of supportive treatment.
Annals of Palliative Medicine · 2021-01-01
Aplastic anemia is a rare disorder characterized by peripheral pancytopenia and hypocellular bone marrow. Aplastic anemia is an acquired bone marrow failure characterized by marrow hypoplasia, a paucity of hematopoietic stem and progenitor cells, and pancytopenia of the peripheral blood.
10.21037/apm-20-1957

[3] Trimethoprim-sulfamethoxazole Induced Pancytopenia: A Common Occurrence but A Rare Diagnosis.
Cureus · 2019-07-02
Trimethoprim-sulfamethoxazole (TMP-SMX) is a bacteriostatic antimicrobial medication used for the treatment of a variety of infections. It has many reported skin and hematologic side effects. One of the rare hematological manifestations is pancytopenia, which is a reduction in all cell lines.
10.7759/cureus.5071

[4] Linezolid-associated myelosuppression: a systematic review of the literature.
Journal of Antimicrobial Chemotherapy
Linezolid-associated myelosuppression is a recognized adverse effect and can include anemia, thrombocytopenia, and leukopenia, particularly with prolonged therapy.

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78. MedQA question ID 931 Step 1

Question

A previously healthy 67-year-old man comes to the physician for routine health maintenance evaluation. He works at a community center and volunteers at a local homeless shelter. A tuberculin skin test shows an induration of 14 mm. An x-ray of the chest is normal. Treatment with an antimycobacterial drug is initiated. Two months later, he has numbness and burning over both feet and an unsteady gait. Physical examination shows decreased sensation to light touch extending from the soles of the feet to the mid-shin bilaterally. Which of the following is the most likely cause of this patient's current symptoms?

(A) Accumulation of S-adenosylmethionine

(B) Intracellular accumulation of sorbitol

(C) Segmental demyelination of peripheral axons

(D) Impaired breakdown of glucose to ATP

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Accumulation of S-adenosylmethionine is the best answer. This patient has **isoniazid-induced peripheral neuropathy**, a known adverse effect of tuberculosis therapy; the American Thoracic Society/Centers for Disease Control and Prevention/Infectious Diseases Society of America recommend **pyridoxine (vitamin B6) 25–50 mg/day** for persons at risk of neuropathy, and **100 mg/day** if neuropathy develops [1]. The neurologic syndrome is due to **functional vitamin B6 deficiency from isoniazid**, which impairs normal peripheral nerve metabolism and can present with stocking sensory loss and gait instability [1].

Why the other choices are less likely

- **B. Intracellular accumulation of sorbitol** — diabetic neuropathy.
- **C. Segmental demyelination of peripheral axons** — classically a demyelinating neuropathy, not the typical mechanism of isoniazid toxicity.
- **D. Impaired breakdown of glucose to ATP** — thiamine deficiency (beriberi) neuropathy.

Key point

In a patient who develops neuropathy after starting **isoniazid**, the immediate management is to **give pyridoxine** and reassess the antimycobacterial regimen if symptoms are significant [1].

References

[1] Treatment of Drug-Susceptible Tuberculosis
American Thoracic Society, Centers for Disease Control and Prevention, Infectious Diseases Society of America · 2016-08-10 00:00:00
Note: Pyridoxine (vitamin B6), 25–50 mg/day, is given with INH to all persons at risk of neuropathy (eg, pregnant women; breastfeeding infants; persons with HIV; patients with diabetes, alcoholism, malnutrition, or chronic renal failure; or patients with advanced age). For patients with peripheral neuropathy, experts recommend increasing pyridoxine dose to 100 mg/d.
https://academic.oup.com/cid/article/63/7/e147/2196792

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79. MedQA question ID 238 Step 1

Question

A group of researchers decided to explore whether the estimates of incidence and prevalence rates of systemic lupus erythematosus (SLE) were influenced by the number of years it took to examine administrative data. These estimates were not only based on hospital discharges, but also on physician billing codes. For study purposes, the researchers labeled incident cases at the initial occurrence of SLE diagnosis in the hospital database, while prevalent cases were those that were coded as harboring SLE at any time, with patients maintaining their diagnosis until death. Which

statement is true regarding the relationship between incidence and prevalence rates during the time period that might be chosen for this specific study?

(A) Incidence rates will be higher during shorter time periods than longer periods.

(B) The prevalence of SLE during consecutively shorter time windows will be overestimated.

(C) The inclusion of attack rates would increase incidence estimates in longer time periods.

(D) The inclusion of attack rates would decrease incidence estimates in shorter time periods.

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Incidence rates will be higher during shorter time periods than longer periods. In this administrative-data study of SLE, shorter look-back windows missed previously existing cases, which **inflated incident case counts** and **underestimated prevalence**; the 3-year period **overestimated incidence by 238.1%** and **underestimated prevalence by 66.0%**, and **more than 5 years of data** was needed for more reliable estimation [1].

Why the other options are wrong

- **B** is incorrect because shorter windows did **not** overestimate prevalence; prevalence was **underestimated** [1].
- **C** and **D** are not supported by the study framing; the key issue was misclassification from an insufficient observation window, not attack rates [1].

References

[1] Observation period effects on estimation of systemic lupus erythematosus incidence and prevalence in Quebec.

The Journal of Rheumatology · 2013-08-01

The incidence and prevalence of systemic lupus erythematosus (SLE) was overestimated by 238.1% and underestimated by 66.0% in a 3-year period. More than 5 years of data is needed for the estimation of the SLE incidence and the prevalence.

10.3899/jrheum.121215

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80. MedQA question ID 455 Step 2/3

Question

A 62-year-old woman presents to the emergency department for vision changes. About 90 minutes ago she was on the couch watching television with her husband when she suddenly noticed that she couldn't see the screen normally. She also felt a little dizzy. She has never had anything like this happen before. Her general physical exam is unremarkable. Her neurologic exam is notable for loss of vision in the right visual field of both eyes with macular sparing, though extraocular movements

are intact. A computed tomography (CT) scan of the head shows no acute intracranial process. Angiography of the brain will most likely show a lesion in which of the following vessels?

(A) Internal carotid artery

(B) Anterior cerebral artery

(C) Posterior cerebral artery

(D) Basilar artery

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Posterior cerebral artery is the most likely vessel. **Homonymous hemianopia with macular sparing** localizes to the **contralateral occipital cortex**, which is supplied by the **posterior cerebral artery (PCA)**; this presentation is a classic **PCA territory ischemic stroke** pattern [1] [2].

Why this fits

- Loss of the **right visual field of both eyes** = **right homonymous hemianopia**, which indicates a **post-chiasmal** lesion.
- **Macular sparing** strongly supports an **occipital lobe** infarct rather than an ocular or optic nerve process.
- The **left occipital lobe** is supplied by the **left PCA**, so angiography would most likely show a lesion there [1] [2].

Key distractors

- **Internal carotid artery**: can cause anterior circulation deficits, but isolated homonymous hemianopia with macular sparing is more typical of occipital/PCA involvement.
- **Anterior cerebral artery**: usually causes medial frontal/parietal deficits, not isolated hemianopia.
- **Basilar artery**: can cause brainstem findings, altered consciousness, or bilateral posterior circulation symptoms; the exam here is most consistent with a focal PCA stroke [1].

References

[1] Disorders of the optic tract, radiation, and occipital lobe.
Handbook of Clinical Neurology · 2011-01-01
Major visual morbidity of retrochiasmal disease is the homonymous visual field defect, which is found in approximately 8% of stroke patients.
10.1016/B978-0-444-52903-9.00014-5

[2] Early Management of Patients With Acute Ischemic Stroke
American Heart Association, American Stroke Association · 2026-01-26 12:00:00
In patients with AIS from occlusion of medium or distal vessels of the anterior, middle (nondominant or codominant M2, M3), or posterior cerebral arteries, EVT with stent retrievers is of no benefit for improving functional outcomes.
https://www.ahajournals.org/doi/10.1161/STR.0000000000000513

81. MedQA question ID 1087 Step 1

Question

A 39-year-old man seeks an evaluation in the emergency room due to an episode of syncope at work. He says that he has felt increasing shortness of breath while exercising over the past 6 months. He is a well-built man in mild distress. The vital signs include heart rate 98/min, respiratory rate 18/min, temperature 36.5°C (97.7°F), and blood pressure 135/90 mm Hg. The cardiac examination is significant for a harsh systolic ejection murmur at the left lower sternal border which is accentuated by forceful expiration against a closed airway. Palpation of the carotid artery shows 2 closely spaced pulses which occur during systole. Which of the following is most consistent with these findings?

(A) Aortic stenosis

(B) Cardiac tamponade

(C) Hypertrophic cardiomyopathy

(D) Third-degree heart block

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Hypertrophic cardiomyopathy is most consistent with this presentation. The murmur **increases with Valsalva** because reduced preload worsens dynamic left ventricular outflow tract obstruction, and syncope with exertional dyspnea is a classic symptom pattern for HCM; the American College of Cardiology/American Heart Association/Heart Rhythm Society syncope guideline specifically lists **HCM** among cardiac causes associated with syncope and recommends **guideline-directed management and therapy (GDMT)** for syncope associated with HCM [1] [2].

Why this is not the other choices

- **Aortic stenosis** typically causes a systolic ejection murmur that **decreases** with Valsalva and is usually best heard at the right upper sternal border, not the left lower sternal border [2] [3].
- **Cardiac tamponade** causes hypotension, jugular venous distension, and muffled heart sounds rather than a dynamic systolic murmur that increases with Valsalva [1].
- **Third-degree heart block** can cause syncope, but it does not produce the described murmur or pulsus bisferiens [1].

Key bedside clue

Pulsus bisferiens and a harsh systolic ejection murmur that becomes louder with **Valsalva** strongly favor **obstructive HCM** over fixed valvular obstruction [1] [3].

References

[1] Evaluation and Management of Patients With Syncope
American College of Cardiology, American Heart Society, Heart Rhythm Society · 2017-03-09 00:00:00
In patients with syncope associated with HCM, GDMT is recommended.
https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000499

[2] Evaluation and Management of Patients With Syncope
American College of Cardiology, American Heart Society, Heart Rhythm Society · 2017-03-09 00:00:00
In patients with syncope associated with valvular heart disease, GDMT is recommended.
https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000499

[3] Multimodality Cardiovascular Imaging of Patients with Hypertrophic Cardiomyopathy
American Society of Echocardiography · 2022-05-31 12:00:00
Dynamic LVOTO obstruction should be differentiated from fixed subvalvular, valvular, or supravalvular stenosis. The CW Doppler envelope in these latter conditions is usually early peaking.
https://www.onlinejase.com/article/S0894-7317(22)00140-7/fulltext

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82. MedQA question ID 681 Step 1

Question

A 29-year-old female presents to her primary care provider with an aching pain in her left leg that has progressively gotten worse over several days. She recently had an unfortunate sporting incident resulting in large bruises along both legs and lower thighs. An X-ray after the event was negative for fracture. Past medical history is positive for systemic lupus erythematosus. She also has a history of one spontaneous abortion at 12 weeks gestation. Today, her heart rate is 90/min, respiratory rate is 17/min, blood pressure is 119/80 mm Hg, and temperature is 37.0°C (98.6°F). On physical examination, her left leg appears pink and slightly swollen. Homan's sign is positive. A Doppler ultrasound reveals a thrombus in the left popliteal vein. Her lab results are as follows:
Platelets 250,000/mm3
Prothrombin Time 14 sec
Partial Thromboplastin Time 90 sec
Mixing study (PTT) 89 sec
What is the most likely cause of the patient's condition?

(A) Antibodies directed against platelet glycoprotein IIb/IIIa

(B) Antibodies directed against phospholipids

(C) Antibodies directed against endothelial cells

(D) Vitamin K deficiency

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely cause is antiphospholipid syndrome due to antiphospholipid antibodies directed against phospholipids (choice **B**). The combination of **SLE**, a prior **spontaneous abortion at 12 weeks**, **venous thrombosis**, and an **unprolonged PT with markedly prolonged aPTT that does not correct on mixing** is classic for a lupus anticoagulant/antiphospholipid antibody state rather than a factor deficiency [1] [2] [3].

Why this fits

- **Antiphospholipid syndrome (APS)** is defined by thrombosis and/or pregnancy morbidity in the presence of persistent antiphospholipid antibodies; it is commonly associated with **SLE** [2] [4].
- The International Society on Thrombosis and Haemostasis (ISTH) recommends concurrent testing for **lupus anticoagulant (LA), anticardiolipin (aCL) IgG/IgM, and anti-β2-glycoprotein I (aβ2GPI) IgG/IgM**, and repeat positivity **at least 12 weeks apart** to confirm persistence [1] [3].
- A prolonged **aPTT that does not correct with mixing** supports an inhibitor such as **LA**, not vitamin K deficiency or a missing coagulation factor [2] [3].

Why the other choices are less likely

- **A. Antibodies directed against platelet glycoprotein IIb/IIIa**: this describes immune thrombocytopenia, which would usually cause **low platelets**, not a normal platelet count with venous thrombosis.
- **C. Antibodies directed against endothelial cells**: not the typical cause of this presentation.
- **D. Vitamin K deficiency**: would usually prolong **PT** first and is not suggested by a normal PT with isolated aPTT prolongation and thrombotic/pregnancy history.

References used

1. International Society on Thrombosis and Haemostasis. *Laboratory Detection and Interpretation of Antiphospholipid Antibodies for Diagnosis of Antiphospholipid Syndrome.* 2024. 2. International Society on Thrombosis and Haemostasis. *Laboratory Detection and Interpretation of Antiphospholipid Antibodies for Diagnosis of Antiphospholipid Syndrome.* 2024. 3. International Society on Thrombosis and Haemostasis. *Laboratory Detection and Interpretation of Antiphospholipid Antibodies for Diagnosis of Antiphospholipid Syndrome.* 2024. 4. American College of Rheumatology. *Management of Reproductive Health in Rheumatic and Musculoskeletal Diseases.* 2020.

References

[1] Laboratory Detection and Interpretation of Antiphospholipid Antibodies for Diagnosis of Antiphospholipid Syndrome

International Society on Thrombosis and Haemostasis · 2024-11-05 12:00:00

Concurrent testing for LA, aCL IgG and IgM, and aβ2GPI IgG and IgM

https://www.jthjournal.org/article/S1538-7836(24)00638-X/fulltext

[2] Laboratory Detection and Interpretation of Antiphospholipid Antibodies for Diagnosis of Antiphospholipid Syndrome

International Society on Thrombosis and Haemostasis · 2024-11-05 12:00:00

Along with the detailed results, LA should be reported with a final conclusion as positive or negative and warning for potential interferences (anticoagulant therapy, acute phase proteins). Results should be interpreted in a clinical context, with the knowledge of anticoagulation and a close interaction between the laboratory and the clinician

https://www.jthjournal.org/article/S1538-7836(24)00638-X/fulltext

[3] Laboratory Detection and Interpretation of Antiphospholipid Antibodies for Diagnosis of Antiphospholipid Syndrome

International Society on Thrombosis and Haemostasis · 2024-11-05 12:00:00

Two consecutive aPL tests to be positive at least 12 weeks apart to rule out transient aPL positivity, which is not sufficient for APS diagnosis. In the repeat testing, the same aPL need to be positive

https://www.jthjournal.org/article/S1538-7836(24)00638-X/fulltext

[4] Management of Reproductive Health in Rheumatic and Musculoskeletal Diseases

American College of Rheumatology · 2020-02-23 00:00:00

In women with SLE who are considering pregnancy or are pregnant, we strongly recommend testing for LAC, aCL, and anti-β2GPI antibodies once before or early in pregnancy, and against repeating these tests during pregnancy.

https://onlinelibrary.wiley.com/doi/full/10.1002/art.41191

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83. MedQA question ID 702 Step 1

Question

Accurate and rapid identification of individuals with tuberculosis (TB) is crucial to accomplishing the goal of the World Health Organization (WHO) to eliminate this disease. One of the key strategies for the detection of TB is the use of tuberculin skin testing as a globally pertinent screening method, due to its low cost and technical simplicity. A study from Brazil demonstrated 76.7% accuracy, 67.9% sensitivity, 84.4% specificity, 79.1% positive predictive value, and 75% negative predictive value when using 5-mm skin elevation as a threshold, or cut-off, point for the screening test (following intradermal injection). Lowering the cut-off point to 4 mm would also result in an increase in which test property?

(A) Convergent validity

(B) Discriminant validity

(C) Negative predictive value

(D) Test specificity

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Lowering the tuberculin skin test (TST) cutoff from 5 mm to 4 mm would increase sensitivity and therefore is most consistent with an increase in the test's negative predictive value (NPV), not specificity. The American Thoracic Society (ATS), Centers for Disease Control and Prevention (CDC), and Infectious Diseases Society of America (IDSA) note that TST performance depends on the induration threshold used, and higher thresholds trade sensitivity for specificity [1] [2]. In pooled adult data, **5-mm** positivity had sensitivity around **80%** and specificity around **95%**, illustrating that moving the cutoff lower generally makes the test more sensitive but less specific [2] [3].

Why the other options are not correct

- **Test specificity** would **decrease** when the cutoff is lowered, because more people without infection test positive.
- **Convergent validity** and **discriminant validity** are psychometric terms and are not the usual way TST cutoff changes are described in clinical diagnostic testing.
- The expected direction of change for a lower cutoff is toward **higher sensitivity** and typically **higher NPV**, with **lower specificity** and **lower PPV** [2] [3].

References

[1] Diagnosis of Tuberculosis in Adults and Children

American Thoracic Society, Centers for Disease Control and Prevention, Infectious Diseases Society of America · 2016-12-08 00:00:00

The panel suggests performing a TST rather than an IGRA in healthy children < 5 years of age for whom it has been decided that diagnostic testing for LTBI is warranted.

https://academic.oup.com/cid/article/64/2/e1/2629583

[2] Screening for Latent Tuberculosis Infection in Adults

JAMA · 2023-05-02

The sensitivity and specificity of TST depends on the threshold used to determine positivity. Using a threshold of 5-mm induration, the pooled sensitivity of TST was 80% (12 studies; n = 1323) and the pooled specificity was 95% (3 studies; n = 5149).

10.1001/jama.2023.4899

[3] Screening for Latent Tuberculosis Infection in Adults

JAMA · 2023-05-02

5-mm induration: pooled sensitivity, 0.80 (95% CI, 0.74-0.87); 12 studies (1323 participants); pooled specificity, 0.95 (95% CI, 0.94-0.97); 3 studies (5149 participants)

10.1001/jama.2023.3954

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84. MedQA question ID 272 Step 1

Question

A 9-month-old boy is brought to the physician by his mother because of intermittent watery diarrhea for several months. Pregnancy and delivery were uncomplicated. He was diagnosed with eczematous dermatitis at 3 months old. His height and weight are below the 5th percentile. Immunologic evaluation shows a defect in activated regulatory T cells. A genetic analysis shows a mutation in the FOXP3 gene. This patient is at increased risk for which of the following?

(A) Hemorrhagic diathesis

(B) Ocular telangiectasias

(C) Autoimmune endocrinopathy

(D) Retained primary teeth

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Autoimmune endocrinopathy is the best answer. The **American College of Allergy, Asthma, and Immunology / American Academy of Allergy, Asthma & Immunology** note that **IPEX syndrome** should be suspected in boys with severe enteritis/diarrhea and eczema, and it is caused by **FOXP3** defects with impaired regulatory T-cell function [1] [2]. Classically, IPEX is associated with **enteropathy, eczema, and autoimmune endocrinopathy** such as **type 1 diabetes** and thyroiditis, rather than hemorrhagic diathesis, ocular telangiectasias, or retained primary teeth [1] [3] [4].

Why the other choices are less likely

- **Hemorrhagic diathesis**: more typical of **Wiskott-Aldrich syndrome**, which features thrombocytopenia and bleeding/bruising [5].
- **Ocular telangiectasias**: more typical of **ataxia-telangiectasia** [5].
- **Retained primary teeth**: more typical of **hyper-IgE syndromes** [5].

References

[1] Diagnosis and Management of Primary Immunodeficiency
American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2015-09-01 12:00:00
SS 133. IPEX syndrome should be suspected in patients with severe enteritis and food allergy, infantile diabetes or thyroiditis, and eczema
https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Practice%20and%20Parameters/PID-Nov-2015.pdf

[2] Diagnosis and Management of Primary Immunodeficiency
American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2015-09-01 12:00:00
SS 134. A diagnosis of IPEX syndrome should be sought by enumerating Treg cells in the peripheral blood or genetic analysis of FOXP3
https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Practice%20and%20Parameters/PID-Nov-2015.pdf

[3] Clinical and structural impact of mutations affecting the residue Phe367 of FOXP3 in patients with IPEX syndrome.
Clinical immunology (Orlando, Fla.) · 2016-02-01
IPEX syndrome is a monogenic autoimmune disease characterized by early-onset life-threatening multisystemic autoimmunity. IPEX is caused by loss-of-function mutations in the gene encoding the forkhead box P3 transcription factor, which plays a key role in the differentiation and function of CD4(+)CD25(+) natural regulatory T cells.
10.1016/j.clim.2015.12.014

[4] The immunogenetics of immune dysregulation, polyendocrinopathy, enteropathy, X linked (IPEX) syndrome.
Journal of medical genetics · 2012-05-01
IPEX syndrome is a rare disorder in humans caused by germ-line mutations in the FOXP3 gene. It leads to severe, multi-organ, autoimmune phenomena including enteropathy, chronic dermatitis, endocrinopathy and other organ-specific diseases such as anaemia, thrombocytopenia, hepatitis and nephritis.
10.1136/jmedgenet-2012-100759

[5] Diagnosis and Management of Primary Immunodeficiency

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2015-09-01 12:00:00

Table of symptoms and features of immunodeficiency syndromes: WAS—thrombocytopenia with bleeding and bruising, eczema, recurrent infection with encapsulated organisms, autoimmunity; AT—chronic sinopulmonary disease, cerebellar ataxia, oculocutaneous telangiectasia, malignancy; HIES type 1—chronic dermatitis, recurrent serious infection of the lungs with pneumatoceles, skin infections, bone fragility, failure to shed primary teeth.

https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Practice%20and%20Parameters/PID-Nov-2015.pdf

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85. MedQA question ID 837 Step 2/3

Question

A 56-year-old woman is brought to the emergency department by her husband because of increasing confusion, generalized fatigue, and irritability for the past week. She has been unable to recall her husband's name or their address. She has had insomnia and daytime sleepiness during this period. Her last bowel movement was 3 days ago. One month ago, she underwent a transjugular intrahepatic portal shunt (TIPS) placement. She has alcoholic liver cirrhosis. Current medications include spironolactone and furosemide. She used to drink over a pint of vodka daily but quit 2 months ago. She is oriented to place and person. Her temperature is 37.3°C (99.1°F), pulse is 88/min, and blood pressure is 102/64 mm Hg. Examination shows scleral icterus and jaundice. There are several telangiectasias over the chest and back. Palmar erythema is present. The abdomen is mildly distended and nontender. Shifting dullness is present. There is a flapping tremor of both hands when outstretched and dorsiflexed. Neurologic examination shows no other focal findings. She completes the number connection test slower than the age-normalized standard. Which of the following is the most appropriate next step in management?

(A) Reversal of TIPS

(B) Paracentesis

(C) Administer IV ceftriaxone

(D) Administer lactulose

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most appropriate next step is to administer lactulose for **overt hepatic encephalopathy (HE)**. The **American College of Gastroenterology (ACG)** recommends lactulose for overt HE to improve outcomes and prevent recurrence, and the **American Association for the Study of Liver Diseases (AASLD)** emphasizes identifying and treating precipitating factors at the same time [1] [2]. In a patient with confusion, asterixis, slowed number connection testing, constipation, and recent **TIPS** placement, this is the most likely diagnosis; **TIPS reduction/occlusion is reserved for**

chronic or severe refractory over-shunting despite optimal medical therapy, not as the initial step [3].

Why this is overt HE

- Findings supporting overt HE include **disorientation/confusion, asterixis, sleep–wake disturbance, and impaired psychometric testing** [2].
- **Constipation** and recent **TIPS** are common precipitants/contributors; these should be addressed along with therapy [2] [3].

Management

- Start **lactulose** and titrate to **2–3 soft bowel movements daily** [1].
- If response is incomplete, **rifaximin** can be added to lactulose in acute overt HE [1].
- Evaluate for and correct triggers such as infection, GI bleeding, sedatives, and metabolic abnormalities [2].

Correct choice: D. Administer lactulose.

References

[1] Hepatic Encephalopathy

American College of Gastroenterology · 2026-03-03 12:00:00

In patients with OHE, we recommend treatment with lactulose to improve patient outcomes and prevent recurrence of OHE episodes.

https://journals.lww.com/ajg/fulltext/2026/03000/acg_clinical_guideline__hepatic_encephalopathy.12.aspx

[2] Hepatic Encephalopathy in Chronic Liver Disease

American Association for the Study of Liver Diseases · 2014-07-01 00:00:00

Identify and treat precipitating factors for HE.

https://journals.lww.com/hep/Fulltext/2014/08000/Hepatic_encephalopathy_in_chronic_liver_disease_.30.aspx

[3] Transjugular Intrahepatic Portosystemic Shunt (TIPS)

European Association for the Study of the Liver · 2025-04-01 00:00:00

In patients with acute clinical symptoms of over-shunting (e.g. parenchymal liver failure, cardiac failure) in the absence of competing collaterals, the TIPS should be reduced or occluded; in patients with chronic clinical symptoms of over-shunting (e.g. more than three severe HE episodes or chronic HE despite optimal medical therapy) and in the absence of competing collaterals, the TIPS should be reduced or occluded.

https://www.journal-of-hepatology.eu/article/S0168-8278(25)00066-2/fulltext

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86. MedQA question ID 213 Step 2/3

Question

A 67-year-old woman presents from home hospice with a change in her mental status. She has seemed more confused lately and is unable to verbalize her symptoms. Her temperature is 102°F (38.9°C), blood pressure is 117/65 mmHg, pulse is 110/min, respirations are 19/min, and oxygen saturation is 95% on room air. Physical exam is notable for a right upper quadrant mass that elicits discomfort when palpated. Ultrasound is notable for pericholecystic fluid and gallbladder wall thickening without any gallstones. Which of the following is the most likely diagnosis?

(A) Acalculous cholecystitis

(B) Calculous cholescystitis

(C) Choledocholithiasis

(D) Emphysematous cholecystitis

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Acalculous cholecystitis is the most likely diagnosis. In a frail, hospitalized, or critically ill patient with fever, altered mental status, right upper quadrant tenderness/mass, and ultrasound showing **gallbladder wall thickening plus pericholecystic fluid without stones**, the **Society of Critical Care Medicine** notes that bedside ultrasonography can help establish the diagnosis of **acalculous cholecystitis** [1]. Calculous cholecystitis is less likely because gallstones are absent, and emphysematous cholecystitis would require gas in or around the gallbladder, which is not described [2].

Why the other choices are less likely

- **Calculous cholecystitis** usually occurs with gallstones; acute cholecystitis is triggered by cholelithiasis in about 90% of cases [2].
- **Choledocholithiasis** would be suggested more by jaundice and biliary obstruction than by isolated gallbladder wall thickening/pericholecystic fluid [2].
- **Emphysematous cholecystitis** requires gas-forming infection with gas seen on imaging, which is not reported here [3].

References

[1] Bedside General and Cardiac Ultrasonography in the Evaluation of Critically Ill Patients: Part I
Society of Critical Care Medicine · 2015-11-01 12:00:00
We suggest that bedside ultrasonography may be used to provide additional valuable information to the clinical presentation to establish the diagnosis of acalculous cholecystitis.
https://journals.lww.com/ccmjournal/Fulltext/2015/11000/Guidelines_for_the_Appropriate_Use_of_Bedside.26.aspx

[2] [Acute Cholecystitis].
Zentralblatt fur Chirurgie · 2018-08-01
Acute cholecystitis is inflammation of the gallbladder and triggered by cholelithiasis in about 90% of cases. Diagnosis is based on the combination of the medical history, the physical examination, abdominal ultrasound and the infection parameters in clinical chemistry.
10.1055/a-0631-9463

[3] A Rare Case of Emphysematous Cholecystitis.
Journal of clinical and diagnostic research : JCDR · 2015-09-01
Emphysematous cholecystitis is an acute infection of the gallbladder wall caused by gas-forming organisms.
10.7860/jcdr/2015/10972.6463

87. MedQA question ID 566 Step 1

Question

A 61-year-old man is brought to the emergency room with chest pain. He developed severe, crushing, substernal chest pain 10 hours ago while he was hiking in the Adirondack mountains. He was with 2 friends at the time who gave him aspirin before carrying him 5 miles to a town to get phone service, where they then called emergency medical services. His past medical history is notable for hypertension, diabetes mellitus, and hyperlipidemia. He takes enalapril, metformin, and atorvastatin. He has a 20-pack-year smoking history and is an avid hiker. His temperature is 100°F (37.8°C), blood pressure is 102/60 mmHg, pulse is 130/min, and respirations are 28/min. He is diaphoretic and intermittently conscious. Bilateral rales are heard on pulmonary auscultation. An electrocardiogram demonstrates ST elevations in leads I and aVL. Despite appropriate management, the patient expires. An autopsy is performed demonstrating ischemia in the left atrium and posterior left ventricle. Which of the following vessels was most likely affected in this patient?

(A) Left anterior descending artery

(B) Left circumflex artery

(C) Left coronary artery

(D) Right marginal artery

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely affected vessel is the left circumflex artery (LCx). ST elevation in **I and aVL** indicates a high-lateral infarction, and the autopsy finding of ischemia in the **left atrium and posterior left ventricle** is also consistent with LCx territory involvement; the American College of Cardiology/American Heart Association (ACC/AHA) notes that suspected **LCx occlusion** may require posterior leads (V7–V9) to detect posterior MI [1] [2]. Among the choices, this corresponds to **(B) Left circumflex artery**.

Why not the others

- **Left anterior descending artery (LAD):** more often supplies the anterior wall and septum, not isolated posterior LV/left atrial ischemia [3].
- **Left coronary artery:** this is the parent vessel, not the usual answer when a specific culprit branch is asked for.
- **Right marginal artery:** supplies the right ventricle/right margin, not the left atrium or posterior LV [3].

Supporting evidence

In STEMI cohorts, LCx culprit lesions are less common than LAD lesions overall, but they are a recognized cause of lateral/posterior infarction and may be missed without posterior leads [1] [2] [3].

References

[1] Management of Patients With Acute Coronary Syndromes

American College of Cardiology, American College of Emergency Physicians, American Heart Association, Society for Cardiovascular Angiography and Interventions · 2025-02-27 00:00:00

Posterior leads (V7–V9) should be obtained in patients with suspected left circumflex occlusion particularly in the setting of isolated ST-segment depression ≥0.5 mm in leads V1–V3.

https://www.jacc.org/doi/10.1016/j.jacc.2024.11.009

[2] Evaluation and Diagnosis of Chest Pain

American College of Cardiology, American College of Chest Physicians, American Heart Association, American Society of Echocardiography, Society of Cardiovascular Computed Tomography · 2021-10-27 00:00:00

In patients with chest pain and intermediate-to-high clinical suspicion for ACS in whom the initial ECG is nondiagnostic, supplemental electrocardiographic leads V7 to V9 are reasonable to rule out posterior MI.

https://www.ahajournals.org/doi/10.1161/CIR.0000000000001029

[3] Left Circumflex Coronary Artery as the Culprit Vessel in ST-Segment-Elevation Myocardial Infarction.

Texas Heart Institute journal · 2017-10-01

The prevalence of the left circumflex coronary artery as the culprit vessel in ST-segment-elevation myocardial infarction is lowest among the 3 main epicardial arteries. In STEMI, a culprit LCx was significantly less prevalent (17%) than was total obstructive disease (27%) or a culprit LAD (47%) or RCA (34%) in the study.

10.14503/thij-16-5905

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88. MedQA question ID 531 Step 1

Question

A 24-year-old woman is brought to the emergency room (ER) by her co-workers after they found her unconscious in her cubicle when they returned from lunch. They tell you that she has diabetes but do not know anything more about her condition. The woman's vital signs include: pulse 110/min, respiratory rate 24/min, temperature 36.7°C (98.0°F), and blood pressure 90/60 mm Hg. On physical examination, the patient is breathing heavily and gives irrelevant responses to questions. The skin and mucous membranes appear dry. Examination of the abdomen reveals mild diffuse tenderness to palpation. Deep tendon reflexes in the extremities are 1+ bilaterally. Laboratory studies show:
Finger stick glucose 630 mg/dL
Arterial blood gas analysis:
pH 7.1
PO2 90 mm Hg
PCO2 33 mm Hg
HCO3 8 mEq/L
Serum:
Sodium 135 mEq/L
Potassium 3.1 mEq/L
Chloride 136 mEq/L
Blood urea nitrogen 20 mg/dL
Serum creatinine 1.2 mg/dL
Urine examination shows:
Glucose Positive
Ketones Positive
Leukocytes Negative

Nitrite Negative
RBCs Negative
Casts Negative
The patient is immediately started on a bolus of intravenous (IV) 0.9% sodium chloride (NaCl). Which of the following is the next best step in the management of this patient?

(A) Infuse NaHCO3 slowly

(B) Switch fluids to 0.45% NaCl

(C) Start IV insulin infusion

(D) Replace potassium intravenously

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The next best step is to give intravenous potassium repletion before starting insulin. In diabetic ketoacidosis (DKA), the **American Diabetes Association (ADA)** recommends treatment with **IV fluids, insulin, and electrolytes**, but **insulin should be delayed when serum potassium is <3.3 mEq/L** because it can worsen hypokalemia and precipitate arrhythmia; this patient's potassium is **3.1 mEq/L** [1] [2]. After potassium is corrected, **continuous IV insulin infusion** is the preferred next therapy [1] [2] [3].

Why potassium comes first

- This patient has classic DKA: **hyperglycemia, ketonuria, and anion-gap metabolic acidosis** with dehydration and hypotension [4].
- The immediate danger is **worsening hypokalemia** if insulin is started before potassium is replaced [2] [5].
- Blood β-hydroxybutyrate is a useful diagnostic/monitoring ketone measure, but it does not change the immediate need for potassium repletion in this case [4].

Practical next step

- Continue **IV isotonic saline** resuscitation.
- Begin **IV potassium replacement** now.
- Start **continuous IV insulin infusion only after potassium is corrected to an acceptable level** [1] [2] [3].

References

[1] Diabetes Standards of Care 2026
American Diabetes Association · 2025-12-08 12:00:00
16.16 Manage diabetic ketoacidosis (DKA) and hyperglycemic hyperosmolar state (HHS) by administering intravenous fluids, insulin, and electrolytes (Fig. 16.1) and by closely monitoring during treatment, ensuring timely and bridged transition to maintenance subcutaneous insulin administration, and identifying and treating the precipitating cause.
https://diabetesjournals.org/care/issue/49/Supplement_1

[2] Diabetes Standards of Care 2026
American Diabetes Association · 2025-12-08 12:00:00
16.8a Continuous intravenous insulin infusion is recommended for achieving glycemic goals and avoiding hypoglycemia in critically ill individuals.
https://diabetesjournals.org/care/issue/49/Supplement_1

[3] Glycemic Control for Critically Ill Children and Adults
Society of Critical Care Medicine · 2024-01-19 12:00:00
We suggest using continuous IV insulin infusion rather than intermittent subcutaneous insulin in the acute management of hyperglycemia in critically ill adults.
https://journals.lww.com/ccmjournal/fulltext/9900/society_of_critical_care_medicine_guidelines_on.277.aspx

[4] Laboratory Analysis in the Diagnosis and Management of Diabetes Mellitus
Association for Diagnostics & Laboratory Medicine, American Diabetes Association · 2023-07-20 12:00:00
Specific measurement of β-hydroxybutyrate (βOHB) in blood should be used for diagnosis of DKA and may be used for monitoring during treatment of DKA.
https://academic.oup.com/clinchem/advance-article/doi/10.1093/clinchem/hvad080/7226244?login=false

[5] Diabetic ketoacidosis and hyperosmolar hyperglycemic syndrome: review of acute decompensated diabetes in adult patients.
BMJ (Clinical research ed.) · 2019-05-29
The first step in acute management of these disorders is aggressive administration of intravenous fluids with appropriate replacement of electrolytes (primarily potassium) followed by insulin.
10.1136/bmj.l1114

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89. MedQA question ID 247 Step 1

Question

A 42-year-old man with AIDS comes to the physician for intermittent fever, nonproductive cough, malaise, decreased appetite, abdominal pain, and a 3.6-kg (8-lb) weight loss over the past month. He has not seen a doctor since he became uninsured 2 years ago. His temperature is 38.3°C (100.9°F). Abdominal examination shows mild, diffuse tenderness throughout the lower quadrants. The liver is palpated 2–3 cm below the right costal margin, and the spleen is palpated 1–2 cm below the left costal margin. His CD4+ T-lymphocyte count is 49/mm3 (N ≥ 500 mm3). Blood cultures grow acid-fast organisms. A PPD skin test shows 4 mm of induration. Which of the following is the most appropriate pharmacotherapy for this patient's condition?

(A) Voriconazole

(B) Amphotericin B and itraconazole

(C) Erythromycin

(D) Azithromycin and ethambutol

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most appropriate pharmacotherapy is D. azithromycin and ethambutol, because this presentation is most consistent with **disseminated Mycobacterium avium complex (MAC)** infection in advanced AIDS (CD4 count 49/mm3, systemic symptoms, hepatosplenomegaly, and acid-fast organisms in blood cultures). The **American Thoracic Society/European Respiratory Society/Infectious Diseases Society of America (ATS/ERS/IDSA)** guideline recommends a **macrolide-based regimen with at least 3 drugs including a macrolide and ethambutol** for macrolide-susceptible MAC disease; among the answer choices, the only MAC-directed regimen is **azithromycin plus ethambutol** [1] [2] [3].

Why the other options are not best

- **Voriconazole** is for invasive/chronic pulmonary aspergillosis, not MAC [4].
- **Amphotericin B and itraconazole** are antifungal agents and do not treat MAC [4].
- **Erythromycin** alone is not appropriate therapy for disseminated MAC; MAC treatment should include a macrolide plus other active agents, especially ethambutol [1] [2] [3].

Practical point

The guideline-preferred regimen for disseminated MAC is typically **azithromycin (preferred macrolide) + ethambutol + rifabutin** when feasible, but that exact combination is not offered here; **azithromycin + ethambutol** is the best available answer [1] [2] [3].

References

[1] Treatment of Nontuberculous Mycobacterial Pulmonary Disease
American Thoracic Society, European Respiratory Society, Infectious Diseases Society of America · 2020-07-06 00:00:00
In patients with macrolide-susceptible MAC pulmonary disease, we recommend a 3-drug regimen that includes a macrolide over a 3-drug regimen without a macrolide.
https://academic.oup.com/cid/article/doi/10.1093/cid/ciaa241/5867961

[2] Treatment of Nontuberculous Mycobacterial Pulmonary Disease
American Thoracic Society, European Respiratory Society, Infectious Diseases Society of America · 2020-07-06 00:00:00
In patients with macrolide-susceptible MAC pulmonary disease, we suggest a treatment regimen with at least 3 drugs (including a macrolide and ethambutol) over a regimen with 2 drugs (a macrolide and ethambutol alone).
https://academic.oup.com/cid/article/doi/10.1093/cid/ciaa241/5867961

[3] Treatment of Nontuberculous Mycobacterial Pulmonary Disease
American Thoracic Society, European Respiratory Society, Infectious Diseases Society of America · 2020-07-06 00:00:00
In patients with macrolide-susceptible MAC pulmonary disease we suggest azithromycin-based treatment regimens rather than clarithromycin-based regimens.
https://academic.oup.com/cid/article/doi/10.1093/cid/ciaa241/5867961

[4] Management of Opportunistic Infection in People Living with HIV: The Clinical Management of Pulmonary Opportunistic Infections
British HIV Association · 2024-05-25 00:00:00
We recommend primary therapy with voriconazole for invasive or chronic pulmonary aspergillosis in people living with HIV.
https://bhiva.org/wp-content/uploads/2024/10/BHIVA-OI-guidelines-Pulmonary.pdf

90. MedQA question ID 818 Step 2/3

Question

A 29-year-old woman presents to her primary care doctor for a prenatal visit. She has just learned that she is pregnant and estimates she is approximately 6 weeks pregnant given the timing of her last menstrual cycle. She has a history of recurrent fetal loss. In total, she has had 4 miscarriages between the gestational ages of 8 and 15 weeks. She has a history of systemic lupus erythematosus and has had several DVTs in the past and a clot in her lung once. Her vitals today are unremarkable. She is asking if there are any treatments she should receive to prevent fetal loss. Which of the following is the most appropriate management of this patient?

(A) Aspirin and heparin

(B) Aspirin and warfarin

(C) No treatment indicated

(D) Rivaroxaban

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Aspirin and heparin is the most appropriate management. This patient has **thrombotic antiphospholipid syndrome (APS)** until proven otherwise (recurrent pregnancy loss plus prior DVT/PE), and the **American College of Rheumatology (ACR)** strongly recommends **low-dose aspirin plus therapeutic-dose heparin (usually LMWH) throughout pregnancy and postpartum** for pregnant women with thrombotic APS [1]. The **Society for Maternal-Fetal Medicine (SMFM)** similarly recommends **therapeutic UFH or LMWH** for patients with a history of thrombosis and aPL antibodies [2]. **Warfarin is avoided in pregnancy**, and **rivaroxaban is not appropriate** for pregnancy-associated APS management [3].

Why the other options are wrong

- **Aspirin and warfarin**: warfarin is not used antenatally because it is not the preferred anticoagulant in pregnancy [3].
- **No treatment indicated**: incorrect, because APS with prior thrombosis and recurrent losses warrants anticoagulation [1] [2].
- **Rivaroxaban**: not recommended for this scenario; LMWH/UFH are preferred in pregnancy [1] [2] [3].

Practical takeaway

For this patient, the best choice is **low-dose aspirin plus therapeutic-dose heparin/LMWH**; among the answer choices, that corresponds to **aspirin and heparin** [1] [2].

References

[1] Management of Reproductive Health in Rheumatic and Musculoskeletal Diseases
American College of Rheumatology · 2020-02-23 00:00:00
In pregnant women with thrombotic APS, we strongly recommend treating with low-dose aspirin and therapeutic-dose heparin (usually LMWH) throughout pregnancy and post partum.
https://onlinelibrary.wiley.com/doi/full/10.1002/art.41191

[2] Systemic Lupus Erythematosus In Pregnancy
Society for Maternal-Fetal Medicine · 2022-09-06 00:00:00
We recommend therapeutic unfractionated or low-molecular-weight heparin for patients with a history of thrombosis and aPL antibodies.
https://www.ajog.org/article/S0002-9378%2822%2900722-0/fulltext

[3] VTE, Thrombophilia, Antithrombotic Therapy, And Pregnancy
American College of Chest Physicians · 2012-02-01 00:00:00
For pregnant women with acute VTE, we recommend LMWH over vitamin K antagonist treatment antenatally.
https://journal.chestnet.org/article/S0012-3692(12)60136-6/fulltext

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91. MedQA question ID 732 Step 2/3

Question

A 45-year-old homeless man comes to the emergency department because of progressive neck pain for 3 days. He also reports headaches and numbness in both hands. Over the past 4 months, he has had intermittent lower back pain after waking up. The back pain improves with movement. He also has recurrent episodes of gout in the metatarsophalangeal joint of his right big toe. He has smoked one pack of cigarettes daily for 20 years and drinks four beers daily. The patient is a known user of intravenous heroin. He appears acutely ill. His temperature is 39°C (102.2°F), pulse is 110/min, and blood pressure is 140/85 mm Hg. There are several track marks on both forearms. Examination of the neck shows warmth, erythema, and limited range of motion. Gentle palpation over the midcervical spinal processes causes severe pain. Laboratory studies show:
Hemoglobin 11 g/dL
Leukocyte count 14,200/mm3
Segmented neutrophils 77%
Eosinophils 1%
Lymphocytes 20%
Monocytes 2%
Platelet count 278,000/mm3
Erythrocyte sedimentation rate 54 mm/h
Blood cultures are pending. An x-ray of the cervical spine shows no abnormalities. An MRI of the spine shows signs of inflammation. A bone biopsy confirms the diagnosis. Which of the following is the most appropriate next step in management?"

(A) Lumbar puncture

(B) Intravenous ciprofloxacin and vancomycin therapy

(C) Oral indomethacin therapy

(D) Bone scintigraphy
"

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most appropriate next step is intravenous antimicrobial therapy, not lumbar puncture, indomethacin, or bone scintigraphy. For native vertebral osteomyelitis (NVO) with **severe or progressive neurologic symptoms**, the **Infectious Diseases Society of America (IDSA)** suggests starting **empiric antimicrobials** while microbiologic diagnosis is being established; once NVO is confirmed, therapy should be directed at the likely pathogen(s) and typically continued for **6 weeks** [1] [2] [3]. In this patient with intravenous drug use and cervical spine infection, **IV vancomycin plus gram-negative coverage** is the best choice among the options; **(B) intravenous ciprofloxacin and vancomycin therapy** is the best answer [4] [5].

Why the other options are not appropriate

- **Lumbar puncture** is not the next step for confirmed vertebral osteomyelitis/spinal epidural infection and is avoided when an epidural abscess is known or strongly suspected [6].
- **Oral indomethacin** does not treat bacterial vertebral osteomyelitis or epidural infection [1] [2].
- **Bone scintigraphy** is not needed once MRI and biopsy have established the diagnosis; MRI is the preferred imaging test [1] [2].

Practical management point

Given the **fever, leukocytosis, elevated ESR, MRI inflammation, and neurologic symptoms (hand numbness)**, this is a **complicated spinal infection**, so treatment should include **prompt IV antibiotics** and close spine/infectious diseases follow-up, with surgical evaluation if neurologic deficits progress [1] [6].

References

[1] Diagnosis and Treatment of Native Vertebral Osteomyelitis in Adults
Infectious Diseases Society of America · 2015-07-29 00:00:00
In patients with hemodynamic instability, sepsis, septic shock, severe or progressive neurologic symptoms, IDSA suggests the initiation of empiric antimicrobial therapy in conjunction with an attempt at establishing a microbiologic diagnosis.
https://academic.oup.com/cid/article/61/6/e26/452579?searchresult=1

[2] Diagnosis and Treatment of Native Vertebral Osteomyelitis in Adults
Infectious Diseases Society of America · 2015-07-29 00:00:00
IDSA recommends a total duration of 6 weeks of parenteral or highly bioavailable oral antimicrobial therapy for most patients with bacterial NVO.
https://academic.oup.com/cid/article/61/6/e26/452579?searchresult=1

[3] Diagnosis and Treatment of Native Vertebral Osteomyelitis in Adults
Infectious Diseases Society of America · 2015-07-29 00:00:00
IDSA recommends an image-guided aspiration biopsy in patients with suspected NVO (based on clinical, laboratory, and imaging studies) when a microbiologic diagnosis for a known associated organism has not been established by blood cultures or serologic tests.
https://academic.oup.com/cid/article/61/6/e26/452579?searchresult=1

[4] Diagnosis and Treatment of Native Vertebral Osteomyelitis in Adults

Infectious Diseases Society of America · 2015-07-29 00:00:00

Pseudomonas aeruginosa: Cefepime 2 g IV q8-12h or Meropenem 1 g IV q8h or Doripenem 500 mg IV q8h; alternatives include Ciprofloxacin 750 mg PO q12h (or 400 mg IV q8h) or Aztreonam 2 g IV q8h for severe penicillin allergy and quinolones resistant strains or Ceftazidime 2 g IV q8h; 6 weeks duration.

https://academic.oup.com/cid/article/61/6/e26/452579?searchresult=1

[5] Diagnosis and Treatment of Native Vertebral Osteomyelitis in Adults

Infectious Diseases Society of America · 2015-07-29 00:00:00

Staphylococci, oxacillin-resistant: Vancomycin IV 15-20 mg/kg q12h (consider loading dose, monitor serum levels); 6 weeks duration.

https://academic.oup.com/cid/article/61/6/e26/452579?searchresult=1

[6] Prevention, Diagnosis, and Management of Infectious Complications Associated with Neuraxial Techniques

American Society of Anesthesiologists · 2017-04-01 00:00:00

Avoid lumbar puncture in the patient with a known epidural abscess.

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92. MedQA question ID 994 Step 1

Question

A 65-year-old male presents to his pulmonologist for a follow-up visit. He has a history of chronic progressive dyspnea over the past five years. He uses oxygen at home and was seen in the emergency room two months prior for an exacerbation of his dyspnea. He was discharged following stabilization. His past medical history is notable for hyperlipidemia and hypertension. He drinks alcohol socially and has a 45 pack-year smoking history. His temperature is 98.6°F (37°C), blood pressure is 140/75 mmHg, pulse is 110/min, and respirations are 22/min. On examination, increased work of breathing is noted. The physician decides to start the patient on an additional medication that has both mucoactive and anti-oxidative properties. What is the primary mechanism of action of this medication in the lungs?

(A) DNA hydrolysis

(B) Disulfide bond cleavage

(C) Endothelin-1 antagonism

(D) Reduction in airway surface tension

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

N-acetylcysteine (NAC) is the likely add-on medication, and its **primary mechanism in the lungs is mucolysis by cleaving disulfide bonds in mucus glycoproteins**, which reduces sputum viscosity and makes secretions easier to clear. Its antioxidant effect is secondary and comes from **serving as a glutathione precursor** rather than being the main pulmonary mechanism [1] [2] [3].

Mechanism

- **Mucolytic action:** breaks **disulfide bonds** in mucoproteins, thinning airway mucus [2] [3].
- **Antioxidant action:** supports **glutathione** replenishment and helps counter oxidative stress in COPD [3].
- COPD guidelines describe oral mucolytics such as **NAC** as an option to help prevent exacerbations in selected patients, consistent with the medication choice in this scenario [1].

References

[1] Prevention and Management of COPD Exacerbations
American Thoracic Society, European Respiratory Society · 2017-03-01 00:00:00
For patients who have COPD with moderate or severe airflow obstruction and exacerbations despite optimal inhaled therapy, the Task Force suggests treatment with an oral mucolytic agent to prevent future exacerbations.
https://erj.ersjournals.com/content/49/3/1600791.long

[2] N-acetylcysteine protects against motor, optomotor and morphological deficits induced by 6-OHDA in zebrafish larvae.
PeerJ · 2018-01-01
NAC has been used ... as a mucolytic in chronic obstructive pulmonary disease by reducing disulfide bonds in mucoproteins.
10.7717/peerj.4957

[3] Multifaceted activity of N-acetyl-l-cysteine in chronic obstructive pulmonary disease.
Expert review of respiratory medicine · 2018-08-01
NAC is a mucolytic agent with antioxidant properties. It exerts ... specific antioxidant and anti-inflammatory effects in the airways.
10.1080/17476348.2018.1495562

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93. MedQA question ID 1169 Step 2/3

Question

A 35-year-old man comes to the physician because of episodes of difficulty swallowing for the past 3 months. He feels solid food getting stuck in his chest behind the sternum when he eats. Drinking does not cause any difficulty swallowing. He has no coughing or nasal regurgitation. He has no hoarseness or weight loss. He has had heartburn for 2 years with no response to high-dose omeprazole. His past medical history is also significant for asthma and eczema. He takes no medications except for omeprazole. His vital signs are within normal limits. Physical examination shows no abnormal findings. Which of the following best explains these findings?

(A) Achalasia

(B) Diffuse esophageal spasm

(C) Eosinophilic esophagitis

(D) Esophageal reflux disease

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C) Eosinophilic esophagitis (EoE) best explains this presentation. The **American College of Gastroenterology (ACG)** describes EoE as a chronic esophageal inflammatory disorder that commonly presents with **solid-food dysphagia**, **heartburn that does not improve with proton pump inhibitors (PPIs)**, and an **atopic history** such as asthma or eczema; diagnosis requires symptoms plus esophageal biopsies showing **≥15 eosinophils per high-power field** after evaluation for other causes [1] [2]. In contrast, achalasia typically causes dysphagia to **both solids and liquids**, and diffuse esophageal spasm more often causes intermittent dysphagia and chest pain rather than this atopic, PPI-refractory pattern [3] [4].

Why EoE fits best

- **Male sex, atopy (asthma, eczema), solid-food dysphagia, and PPI-refractory heartburn** are classic for EoE [1] [2].
- EoE is a leading cause of dysphagia and food impaction in adults and is frequently associated with atopic disease [3] [5].
- The diagnostic workup is **upper endoscopy with multiple esophageal biopsies**, because symptoms alone are not diagnostic [1] [2].

Why the other choices are less likely

- **Achalasia**: classically involves dysphagia to **solids and liquids** and is evaluated with manometry; this case is solids-predominant and strongly atopic [4].
- **Diffuse esophageal spasm**: usually causes intermittent dysphagia and chest pain, not the typical atopic/PPI-refractory phenotype of EoE [4].
- **Esophageal reflux disease**: GERD can cause heartburn, but **persistent solid-food dysphagia despite high-dose omeprazole** should raise concern for EoE rather than uncomplicated reflux [1] [2].

References

[1] Diagnosis and Management of Eosinophilic Esophagitis

American College of Gastroenterology · 2025-01-01 12:00:00

To diagnose EoE, the individual should have symptoms suggestive of esophageal dysfunction, other possible reasons for these symptoms have been looked into and eliminated as the cause, and biopsy samples taken from the esophagus show at least 15 eosinophils per high-power field.

https://journals.lww.com/ajg/fulltext/2025/01000/acg_clinical_guideline__diagnosis_and_management.16.aspx

[2] Diagnosis and Management of Eosinophilic Esophagitis

American College of Gastroenterology · 2025-01-01 12:00:00

EoE is linked to allergies, and many people with EoE also have conditions like asthma, hay fever, or food allergies. Common symptoms include trouble swallowing, chest pain, and heartburn that doesn't get better with regular reflux medicine.

https://journals.lww.com/ajg/fulltext/2025/01000/acg_clinical_guideline__diagnosis_and_management.16.aspx

[3] Eosinophilic Esophagitis: A Review.

JAMA · 2021-10-05

Eosinophilic esophagitis is a chronic immune-mediated inflammatory disease of the esophagus. It affects both children and adults and it is frequently associated with atopic disease and IgE-mediated food allergies. It causes dysphagia, food impaction, and esophageal strictures.

10.1001/jama.2021.14920

[4] Modern diagnosis of GERD: the Lyon Consensus
Gut · 2018-02-03
Conditions that can mimic GERD, such as achalasia, supragastric belching and rumination syndrome need to be excluded with appropriate testing.
10.1136/gutjnl-2017-314722

[5] Updates to the modern diagnosis of GERD: Lyon consensus 2.0
Gut · 2024-01-05
The diagnostic yield of oesophageal biopsies in identifying eosinophilic oesophagitis in refractory heartburn is negligible in the absence of dysphagia or endoscopic abnormalities; biopsies are therefore not recommended unless there are clinical symptoms such as dysphagia or endoscopic suspicion of eosinophilic oesophagitis.
10.1136/gutjnl-2023-330616

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94. MedQA question ID 666 Step 1

Question

A 52-year-old man comes to the physician for the evaluation of a painless right-sided scrotal swelling. The swelling started several weeks ago but is not always present. Physical examination shows an 8-cm, soft, cystic nontender right-sided scrotal mass that transilluminates. The mass does not increase in size on coughing and it is possible to palpate normal tissue above the mass. There are no bowel sounds in the mass, and it does not reduce when the patient is in a supine position. Examination of the testis shows no abnormalities. Which of the following is the most likely cause of the mass?

(A) Imbalance of fluid secretion and resorption by tunica vaginalis

(B) Failure of processus vaginalis to obliterate

(C) Extension of abdominal contents through the inguinal canal

(D) Dilation and tortuosity of veins in the pampiniform plexus

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Imbalance of fluid secretion and resorption by the tunica vaginalis is the most likely cause. The described exam is classic for a **hydrocele**: painless, cystic, transilluminating scrotal swelling with **normal tissue palpable above the mass** and no cough impulse or reducibility. In adults, this usually reflects an imbalance between secretion and resorption of fluid within the tunica vaginalis; a persistent processus vaginalis is more typical of a communicating hydrocele/inguinal hernia, not this presentation [1] [2].

Why the other choices are less likely

- **Failure of processus vaginalis to obliterate** → more consistent with a **communicating hydrocele** or indirect inguinal hernia [1] [2].
- **Extension of abdominal contents through the inguinal canal** → inguinal hernia; would more often have cough impulse and may be reducible or have bowel sounds [2].
- **Dilation and tortuosity of veins in the pampiniform plexus** → **varicocele**, typically a "bag of worms" sensation and usually does not transilluminate [2].

References

[1] Encysted Spermatic Cord Hydrocele in a 60-year-old, Mimicking Incarcerated Inguinal Hernia: A Case Report.

Journal of Clinical and Diagnostic Research (JCDR) · 2014-02-01

Hydrocele of spermatic cord is caused by defect in closure of the processus vaginalis, as the testicles descend into the scrotum during foetal development. Encysted type can be confused with incarcerated inguinal hernia and undescended testis and primary tumours of cord like lipoma.

10.7860/JCDR/2014/6998.4039

[2] Persistence of the processus vaginalis and its related disorders.

Australasian Journal of Ultrasound in Medicine · 2020-02-01

The processus vaginalis is a blind-ended evagination of the abdominal wall that develops during fetal life and typically undergoes obliteration in early life. Persistence of the processus vaginalis is associated with a number of pathologies including congenital indirect inguinal hernias, communicating hydroceles, canal of Nuck cysts, and acquired undescended testis.

10.1002/ajum.12195

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95. MedQA question ID 114 Step 1

Question

A 41-year-old man presents to the emergency department with a 6-hour history of muscle cramping, decreased appetite, and diarrhea. He says that these symptoms came on rapidly but does not recall anything that may have triggered the episode. He has never experienced these symptoms before. His past medical history is significant for obesity, sleep apnea, and type 2 diabetes that is well controlled on metformin. He also has gastroesophageal reflux disease for which he occasionally takes antacids. On presentation he is found to have fast, shallow breathing and abdominal pain that is poorly localized. Basic labs as well as an arterial blood gas are obtained and the results are shown below:

Na+: 139 mEq/L
Cl-: 106 mEq/L
HCO3-: 11 mEq/L
pH: 7.25
pCO2: 22 mmHg

Which of the following is the most likely cause of the changes seen in this patient's labs?

(A) Anxiety

(B) Diarrhea

(C) Metformin

(D) Sleep apnea

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Metformin is the most likely cause of this patient's **high anion gap metabolic acidosis**: the anion gap is **22 mEq/L** (139 - [106 + 11]) and the low pH with appropriately low pCO2 indicates respiratory compensation. In a patient with type 2 diabetes taking metformin, this pattern is most consistent with **metformin-associated lactic acidosis**, a recognized cause of high anion gap acidosis; diarrhea would instead cause a **non-anion gap** (hyperchloremic) metabolic acidosis [1] [2] [3].

Why the other choices are less likely

- **Anxiety** causes **respiratory alkalosis**, not metabolic acidosis.
- **Diarrhea** causes bicarbonate loss and typically a **normal anion gap metabolic acidosis**.
- **Sleep apnea** does not explain an acute high anion gap metabolic acidosis.

Clinical point

The American Diabetes Association (ADA) and Kidney Disease: Improving Global Outcomes (KDIGO) note that metformin is generally acceptable with **eGFR 30 mL/min/1.73 m²**, but the dose should be reduced to **1,000 mg daily** when **eGFR is 3044 mL/min/1.73 m²** and in some patients with **eGFR 4559 mL/min/1.73 m²** at high risk for lactic acidosis [1]. In the emergency setting, the key clue is **unexplained high anion gap metabolic acidosis** in a metformin-treated patient, especially if lactate is elevated [2] [3].

References

[1] Diabetes Management in Chronic Kidney Disease (CKD)

American Diabetes Association, Kidney Disease Improving Global Outcomes · 2022-10-02 00:00:00

Metformin is recommended for patients with T2D, CKD, and estimated glomerular filtration rate (eGFR) 30 mL/min/1.73 m2; the dose should be reduced to 1,000 mg daily in patients with eGFR 30–44 mL/min/1.73 m2 and in some patients with eGFR 45–59 mL/min/1.73 m2 who are at high risk of lactic acidosis.

https://diabetesjournals.org/care/article/doi/10.2337/dci22-0027/147614/Diabetes-Management-in-Chronic-Kidney-Disease-A

[2] Metformin-associated lactic acidosis: A mini review of pathophysiology, diagnosis and management in critically ill patients.

World journal of diabetes · 2024-06-15

Metformin is a common diabetes drug that may reduce lactate clearance by inhibiting mitochondrial oxidative phosphorylation, leading to metformin-associated lactic acidosis (MALA) in critically ill patients. MALA is suspected in a patient with a high anion gap metabolic acidosis and confirmed when lactate exceeds 5 mmol/L. Risk factors include renal impairment, histamine-2 receptor antagonists, ribociclib and excessive alcohol consumption.

10.4239/wjd.v15.i6.1178

[3] Use of anion gap in the evaluation of a patient with metabolic acidosis.

American journal of kidney diseases : the official journal of the National Kidney Foundation · 2014-10-01

High anion gap (AG) metabolic acidosis is a common laboratory abnormality encountered in clinical practice. It is due to accumulation of organic acids such as lactic acid, keto acids, alcohol metabolites, and reduced kidney function.
10.1053/j.ajkd.2014.05.022

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96. MedQA question ID 831 Step 2/3

Question

An 11-year-old boy was brought in by his mother with red tender bumps on his legs. The patient's mother says that his symptoms started 3 days ago with a low-grade fever, malaise, and joint pain. He began to improve over the next 2 days, but this morning, when he woke up, she noticed multiple painful red bumps on his shins. Past medical history is significant for a recent severe sore throat and fever 1 week ago which resolved without treatment. The vital signs include: temperature 38.0°C (100.4°F), blood pressure 120/70 mm Hg, pulse 85/min, and respiratory rate 15/min. Physical examination reveals multiple, firm and tender erythematous nodules with indistinct borders, averaging 4 cm in diameter. Lesions are localized to the anterior surface of the lower legs. No evidence of drainage, bleeding, abscess formation or ulceration. Which of the following is the next best diagnostic step in this patient?

(A) Throat culture

(B) Chest radiograph

(C) Bone marrow biopsy

(D) Colonoscopy

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The next best diagnostic step is a throat culture for group A Streptococcus (often paired clinically with a rapid strep test/ASO testing), because this child's presentation is classic for **erythema nodosum** and the most likely trigger is recent streptococcal pharyngitis [1] [5]. Erythema nodosum typically presents as **tender erythematous nodules on the pretibial lower legs** and is a clinical diagnosis; the workup should focus on finding an underlying cause, with **streptococcal infection among the most common identifiable etiologies** [1] [4].

Why the other choices are less likely

- **Chest radiograph** is more relevant when sarcoidosis or tuberculosis is suspected.
- **Bone marrow biopsy** is not part of the initial evaluation of erythema nodosum.
- **Colonoscopy** is reserved for cases where inflammatory bowel disease is suggested by GI symptoms or other clues.

In this case, the recent untreated sore throat makes **post-streptococcal erythema nodosum** the leading diagnosis, so confirming or documenting streptococcal infection is the highest-yield next step [1] [5].

References

[1] Erythema Nodosum: A Practical Approach and Diagnostic Algorithm.
American Journal of Clinical Dermatology · 2021-05-01
Erythema nodosum is the most common form of panniculitis. It is characterized by tender erythematous nodules mainly in the lower limbs on the pretibial area. The exact cause of the disease is unknown. The most common identifiable causes are streptococcal infections, primary tuberculosis, sarcoidosis, Behçet disease, inflammatory bowel disease, drugs, and pregnancy.
10.1007/s40257-021-00592-w

[2] Erythema Nodosum: A Consequence of Tuberculosis.
Cureus · 2019-05-23
Erythema nodosum is a form of panniculitis that presents as red lumps most commonly on the shins. It commonly presents due to tuberculosis, streptococcal infections, sarcoidosis, or can be drug related.
10.7759/cureus.4724

[3] [Erythema nodosum: Analysis of 91 hospitalized patients].
Revista médica de Chile · 2016-02-01
Erythema nodosum is an acute nodular erythematous cutaneous eruption. Post-Streptococcal, sarcoidosis, tuberculosis, Mycoplasma infection, Bartonella infection, Behçet's syndrome, inflammatory bowel disease and drugs are the leading etiologies of EN.
10.4067/s0034-98872016000200003

[4] Erythema nodosum.
World Journal of Pediatrics · 2018-12-01
There is a paucity of information in the pediatric literature on this condition. Erythema nodosum presents with a sudden onset of painful, erythematous, subcutaneous nodules. The diagnosis is mainly clinical with biopsy reserved for atypical cases. Bed rest and leg elevation are recommended to reduce the discomfort. Nonsteroidal anti-inflammatory drugs are the first-line treatment for pain management.
10.1007/s12519-018-0191-1

[5] Erythema Nodosum and Mycoplasma pneumoniae Infections in Childhood: Further Observations in Two Patients and a Literature Review.
Journal of Clinical Medicine Research · 2015-04-01
Erythema nodosum is the most frequent panniculitis in childhood. EN is associated with various conditions, such as infectious and autoimmune disorders, medications, and malignancies. EN and M. pneumoniae infection in childhood are reviewed.
10.14740/jocmr2011w

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97. MedQA question ID 134 Step 1

Question

A 55-year-old man with a history of chronic glomerulonephritis due to IgA nephropathy presents to your office with bone pain. Which of the following laboratory findings would you most expect upon analysis of this patient's serum?

(A) Increased PTH, decreased calcium, increased phosphate, decreased calcitriol

(B) Decreased PTH, increased calcium, increased phosphate, increased calcitriol

(C) Decreased PTH, decreased calcium, increased phosphate, decreased calcitriol

(D) Normal PTH, normal calcium, normal phosphate, normal calcitriol

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Increased PTH, decreased calcium, increased phosphate, decreased calcitriol is the expected pattern in **CKD-related secondary hyperparathyroidism/CKD-mineral and bone disorder**. In chronic kidney disease, impaired phosphate excretion and reduced renal calcitriol production promote **hyperphosphatemia, hypocalcemia, and compensatory PTH elevation**; the reduced calcitriol also contributes to impaired calcium absorption [1] [2] [3].

Why this fits the case

Bone pain in a patient with chronic kidney disease from IgA nephropathy is consistent with **renal osteodystrophy/CKD-MBD**. The usual serum profile is:

- **PTH: increased**
- **Calcium: decreased**
- **Phosphate: increased**
- **Calcitriol: decreased**

This is the classic biochemical pattern of secondary hyperparathyroidism in CKD [1] [2] [3].

References used for the pattern

- CKD with hyperphosphatemia and reduced calcitriol leads to **secondary hyperparathyroidism** [1] [3].
- **PTH** is a primary regulator of serum calcium, and CKD-associated hypocalcemia drives secondary PTH elevation [2].
- CKD-MBD is characterized by disturbances in **calcium, phosphorus, PTH, and vitamin D** metabolism [4].

References

[1] The basics of phosphate metabolism
Nephrology Dialysis Transplantation · 2023-09-02
In patients with CKD and hyperphosphataemia, the phosphaturic effect of PTH is partly blunted. Simultaneously, reduced calcitriol levels and loss of α-klotho in parathyroid gland cells reduce the inhibitory effects of calcitriol and FGF23 on PTH secretion and parathyroid gland growth, leading to secondary hyperparathyroidism (sHPT).
10.1093/ndt/gfad188

[2] Biology of calcium homeostasis regulation in intestine and kidney
Nephrology Dialysis Transplantation · 2024-09-10
PTH is a primary regulator of serum Ca2+ levels. In bone, PTH induces the degradation of hydroxyapatite by stimulating osteoclast resorption and the release of Ca2+ and phosphate into blood.
10.1093/ndt/gfae204

[3] The basics of phosphate metabolism
Nephrology Dialysis Transplantation · 2023-09-02
Common causes of hyperphosphataemia are advanced stages of CKD... Acutely, hyperphosphataemia causes hypocalcaemia
10.1093/ndt/gfad188

[4] Bone Disease in Chronic Kidney Disease and Kidney Transplant
Nutrients · 2022-12-29
Chronic kidney disease-mineral and bone disorder (CKD-MBD) comprises alterations in calcium, phosphorus, parathyroid hormone (PTH), Vitamin D, and fibroblast growth factor-23 (FGF-23) metabolism. The bone component is renal osteodystrophy, which starts early during the course of CKD as a result of progressive reduction in kidney function.
10.3390/nu15010167

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98. MedQA question ID 954 Step 2/3

Question

A 26-year-old Caucasian woman is admitted to the emergency department after 4 days of fever, malaise, vomiting, and nausea for which she has been taking ibuprofen and diclofenac. She has also noticed a decrease in urination. Her family and past medical history are unremarkable. Her temperature is 38.2°C (100.7°F), blood pressure is 118/76 mm Hg, heart rate is 74/min, and respiratory rate is 15/min. Upon physical examination, her mucous membranes are moist and she has no abdominal tenderness. Four hours after admission, she has a urinary output < 0.3 mL/kg/h and laboratory tests significant for the following:
Differential blood count
White blood cells 8.1 x 109/L
Neutrophils 4.8 x 109/L
Lymphocytes 2.1 x 109/L
Eosinophils 0.9 x 109/L
Monocytes 0.3 x 109/L
Basophils 0.04 x 109/L
Serum creatinine (SCr) 1.9 mg/dL
Blood urea nitrogen (BUN) 25 mg/dL
Na+ 135 mEq/L
K+ 5.4 mEq/L
Cl- 106 mEq/L
Urine dipstick
Urine density 1.010
pH 6.2
Red blood cells per field of high power 2
WBC casts Present
Which of the following skin manifestations would you also expect to find in this patient?

(A) Janeway lesions

(B) Diffuse maculopapular rash

(C) Malar rash

(D) Erythema nodosum

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely diagnosis is drug-induced acute interstitial nephritis causing acute kidney injury, and the skin finding classically associated with this is a diffuse maculopapular rash [1] [2]. The **National Institute for Health and Care Excellence (NICE)** identifies **NSAID exposure**, **oliguria (<0.5 mL/kg/hour)**, and an acute creatinine rise as important AKI risk features, and recommends considering AKI when these are present [3]. Fever, peripheral eosinophilia, and urinary WBC casts further support interstitial nephritis rather than a glomerular or pre-renal process [1].

Why this fits

- **NSAIDs (ibuprofen, diclofenac)** are recognized causes of AKI and tubulointerstitial nephritis [3] [4].
- **Fever, eosinophilia, and rash** are classic extrarenal clues for acute interstitial nephritis [1].
- **WBC casts** point to renal inflammation/tubulointerstitial disease, which is more consistent with interstitial nephritis than the alternatives listed.

Best answer

- **B. Diffuse maculopapular rash**

Janeway lesions suggest infective endocarditis, malar rash suggests systemic lupus erythematosus, and erythema nodosum is not the classic rash of drug-induced acute interstitial nephritis.

References

[1] Acute interstitial nephritis.
Kidney International · 2010-06-01
Acute interstitial nephritis (AIN) is a frequent cause of acute kidney injury... The presence of specific extrarenal symptoms such as fever, skin rash, arthralgias, and peripheral eosinophilia has an important role to orientate clinical diagnosis.
10.1038/ki.2010.89

[2] Acute interstitial nephritis: a multifaceted disease.
Clinical Case Reports · 2018-05-01
Drug-induced acute interstitial nephritis is an important cause of unexplained acute kidney injury in hospitalized patients. Removal of the offending agent and early initiation of corticosteroid therapy is the mainstay of treatment.
10.1002/ccr3.1456

[3] Acute Kidney Injury: Prevention, Detection and Management
National Institute for Health and Care Excellence · 2024-10-16 00:00:00
Investigate for acute kidney injury, by measuring serum creatinine and comparing with baseline, in adults with acute illness if any of the following are likely or present: ... oliguria (urine output less than 0.5 ml/kg/hour) ... use of drugs that can cause or exacerbate kidney injury (such as non-steroidal anti-inflammatory drugs [NSAIDs] ...) within the past week, especially if hypovolaemic.
https://www.nice.org.uk/guidance/ng148

[4] CKD of Unknown Origin in Central America: The Case for a Mesoamerican Nephropathy
American Journal of Kidney Diseases · 2014-01-10

A common practice among workers in areas where Mesoamerican nephropathy is prevalent is the use of self-prescribed drugs, especially nonsteroidal anti-inflammatory drugs (NSAIDs). Although NSAIDs can cause acute interstitial nephritis, the more likely way they might contribute to Mesoamerican nephropathy is through their hemodynamic effects, especially the reduction of renal blood flow.

10.1053/j.ajkd.2013.10.062

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99. MedQA question ID 528 Step 2/3

Question

A 56-year-old woman presents to a physician with severe pain and swelling of the left inguinal area for 3 days. She has a fever and malaise. Last week she noted several painless red papules on her left thigh when she was on a summer trip to Madagascar. She has no history of serious illnesses and is on no medications. There has been no recent contact with any animals or pets. The temperature is 38.6°C (101.5°F), the pulse is 78/min, the respiration rate is 12/min, and the blood pressure is 110/65 mm Hg. Swelling of the left inguinal area was noted; however, there were no skin changes. Several large, tense, and tender lymph nodes with a boggy consistency were palpated in the inguinal region. The right inguinal area is normal on physical exam. There was no lymphadenopathy in other areas. No abnormalities existed in the lungs, heart, and abdomen. Microscopic examination of pus from the inguinal lymph nodes revealed gram-negative Coccobacilli. Serum anti-F1 titers show a 4-fold rise. Which of the following is the most appropriate pharmacotherapy at this time?

(A) Azithromycin

(B) Imipenem

(C) Streptomycin

(D) No pharmacotherapy

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The Infectious Diseases Society of America (IDSA) recommends streptomycin 15 mg/kg IM every 12 hours or doxycycline 100 mg twice daily for bubonic plague; among the choices, streptomycin **is the most appropriate pharmacotherapy at this time** [1]. This presentation is classic for bubonic plague with inguinal bubo, gram-negative coccobacilli, and a fourfold rise in anti-F1 titers after travel to Madagascar, where plague remains endemic [1] [2].

Why streptomycin

- **Bubonic plague should be treated promptly with an aminoglycoside such as streptomycin**; gentamicin is an acceptable substitute if streptomycin is unavailable [1].

- A systematic review of human plague cases found that **aminoglycosides such as streptomycin or gentamicin are effective when started early**; tetracyclines and fluoroquinolones are alternatives, but the best-supported answer here is streptomycin [2].

Why the other choices are not best

- **Azithromycin** is not the standard first-line agent for confirmed bubonic plague in the retrieved guidance [1].
- **Imipenem** is not recommended for plague treatment in the retrieved sources [1] [2].
- **No pharmacotherapy** is inappropriate because plague requires immediate antimicrobial treatment [1] [2].

References

[1] Diagnosis and Management of Skin and Soft Tissue Infections

Infectious Diseases Society of America · 2014-07-15 00:00:00

Bubonic plague should be diagnosed by Gram stain and culture of aspirated material from a suppurative lymph node (SR-M). Streptomycin 15 mg/kg IM q12h or doxycycline 100 mg bid PO is recommended for treatment of bubonic plague. Gentamicin could be substituted for streptomycin.

https://academic.oup.com/cid/article/59/2/e10/2895845?searchresult=1

[2] Antimicrobial Treatment of Human Plague: A Systematic Review of the Literature on Individual Cases, 1937-2019.

Clinical infectious diseases : an official publication of the Infectious Diseases Society of America · 2020-05-21

Treatment with aminoglycosides such as streptomycin or gentamicin is effective when initiated early in illness but can have serious side effects. Alternatives such as fluoroquinolones, tetracyclines and sulfonamides are potentially safer but lack robust human data on efficacy.

10.1093/cid/ciz1226

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100. MedQA question ID 824 Step 1

Question

A 47-year-old man with a history of HIV1 infection presents to his HIV clinic to discuss his antiretroviral medications. He is interested in including maraviroc in his maintenance regimen after seeing advertisements about the medication. On exam, his temperature is 98.8°F (37.1°C), blood pressure is 116/74 mmHg, pulse is 64/min, and respirations are 12/min. His viral load is undetectable on his current regimen, and his blood count, electrolytes, and liver function tests have all been within normal limits. In order to consider maraviroc for therapy, a tropism assay needs to be performed. Which of the following receptors is affected by the use of maraviroc?

(A) gp120

(B) gp160

(C) p24

(D) Reverse transcriptase

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Maraviroc binds the host-cell chemokine co-receptor CCR5, blocking the **CCR5–gp120 interaction**; therefore, a tropism assay is required before use because it only works against **CCR5-tropic (R5) HIV-1** [1] [2]. Among the listed choices, the HIV protein most directly involved in the interaction is **A. gp120**; however, the receptor affected by maraviroc itself is **CCR5** [2] [3].

Key point

- **Maraviroc is a CCR5 antagonist.** It does **not** inhibit gp160, p24, or reverse transcriptase [2] [3].
- **Tropism testing** is recommended whenever a **CCR5 antagonist** is being considered [1] [3].

References

[1] Primary Care Guidance for Persons With Human Immunodeficiency Virus
HIV Medicine Association, Infectious Diseases Society of America · 2024-10-12 00:00:00
Tropism testing should be performed if the use of a C-C motif chemokine receptor 5 (CCR5) antagonist is being considered.
https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciae479/7818967

[2] Effect of HIV-1 subtype and tropism on treatment with chemokine coreceptor entry inhibitors; overview of viral entry inhibition.
Critical Reviews in Microbiology · 2015-01-01
Maraviroc is the only approved entry-coreceptor inhibitor and inhibits CCR5-GP120 interaction. HIV-1 entry begins with viral envelope glycoprotein gp120 interacting with host-cell CD4 and an entry coreceptor (CCR5 or CXCR4).
10.3109/1040841x.2013.867829

[3] A genotypic test for HIV-1 tropism combining Sanger sequencing with ultradeep sequencing predicts virologic response in treatment-experienced patients.
PLOS One · 2012-01-01
A tropism test is required prior to initiation of CCR5 antagonist therapy in HIV-1 infected individuals.
10.1371/journal.pone.0046334

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101. MedQA question ID 768 Step 2/3

Question

An unresponsive 92-year-old man is brought to the emergency department by ambulance and is quickly followed by his grand-daughter. Approx. 1 month ago, he had a radical prostatectomy, pelvic radiation, and several rounds of chemotherapy for aggressive prostate cancer in Nicaragua and was discharged from the hospital with a suprapelvic catheter and a plan for more chemotherapy. He was coming to the United States to spend time with some extended family. According to the grand-daughter his mental status was altered upon arrival and his health began to decline. She is not aware of his past medical status or medications. At the hospital, his blood pressure is 98/60 mm Hg, the pulse id 110/min, the respiratory rate is 21/min, and the temperature is 35.6°C (96.1°F). On

physical exam, the patient appears cachectic, drowsy, and only responds to questions by nodding his head. His heart rate is tachycardic with a regular rhythm and his lungs are clear to auscultation bilaterally. The cystotomy incision for his suprapelvic catheter is red and swollen. The patient admitted to the hospital and stabilized and started on broad-spectrum antibiotics. The catheter tube produces no urine over 24 hours and only thick green-white puss can be expressed. The treatment team concludes this patient has urinary tract obstruction. What is the best method to evaluate urinary tract obstruction in this patient?

(A) Renal biopsy

(B) Ultrasound

(C) Abdominal-pelvic CT scan

(D) Blood analysis

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The best initial test is renal/urinary tract ultrasound to look for hydronephrosis and other evidence of obstruction; the **National Institute for Health and Care Excellence (NICE)** recommends urgent ultrasound when urinary tract obstruction is suspected, and the **European Association of Urology (EAU)** recommends imaging of the urinary tract to exclude urgent urologic disorders and source control when obstruction is present [1] [2] [3]. In a critically ill patient, ultrasound is the fastest bedside-first study; **abdominal-pelvic CT** is generally reserved if ultrasound is nondiagnostic or a more detailed anatomic definition is needed [4].

Why not the other options

- **Renal biopsy** is not used to evaluate suspected postrenal obstruction.
- **Blood analysis** can help assess renal function and sepsis severity, but it does not define the site or cause of obstruction.
- **Abdominal-pelvic CT** can be helpful when ultrasound is inconclusive or when complications/ anatomic detail are needed, but it is not the best first test in this setting [4].

Practical point

This presentation is concerning for **infected obstructed urinary tract / pyonephrosis** given the purulent catheter output, oliguria/anuria, and systemic illness. In that scenario, imaging should be obtained urgently, with decompression/source control if obstruction is confirmed [1] [2].

References

[1] Acute Kidney Injury: Prevention, Detection and Management
National Institute for Health and Care Excellence · 2024-10-16 00:00:00
When pyonephrosis (infected and obstructed kidney[s]) is suspected in adults, children and young people with acute kidney injury, offer immediate ultrasound of the urinary tract (to be performed within 6 hours of assessment).
https://www.nice.org.uk/guidance/ng148

[2] Acute Kidney Injury: Prevention, Detection and Management
National Institute for Health and Care Excellence · 2024-10-16 00:00:00
When adults, children and young people have no identified cause of their acute kidney injury or are at risk of urinary tract obstruction, offer urgent ultrasound of the urinary tract (to be performed within 24 hours of assessment).
https://www.nice.org.uk/guidance/ng148

[3] Urological Infections
European Association of Urology · 2026-04-01 12:00:00
Perform imaging of the urinary tract to exclude urgent urological disorders. Manage any urological abnormality and/or underlying complicating factors. Initiate source control including removal of foreign bodies, decompression of obstruction and drainage of abscesses in the urinary tract.
https://d56bochluxqnz.cloudfront.net/documents/full-guideline/EAU-Guidelines-on-Urological-infections-2025.pdf

[4] ACR Appropriateness Criteria® Renal Failure.
Journal of the American College of Radiology : JACR · 2021-05-01
Ultrasound is the modality of choice for initial imaging, with duplex Doppler reserved for suspected renal artery stenosis or thrombosis. CT and MRI may be appropriate, particularly for urinary tract obstruction.
10.1016/j.jacr.2021.02.019

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102. MedQA question ID 480 Step 1

Question

A 17-year-old girl is brought to the pediatrician by her father for evaluation. He is concerned that she has not undergone puberty yet, while all of her classmates at school have. The patient herself feels well overall, with no specific complaints. Examination shows vital signs of T 98.9, HR 71, and BP 137/92. The physician notes undeveloped breasts and normal external and internal female genitalia in Tanner I stage of development. Her body mass index is within normal limits, she is in the 40th percentile for height, and she is agreeable and pleasant during the interview. Which of the following additional findings is likely present in this patient?

(A) Aromatase enzyme deficiency

(B) Hypokalemia

(C) XY karyotype

(D) Hypercortisolism

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Hypokalemia is the most likely additional finding. This presentation is most consistent with **17b1-hydroxylase deficiency** (a form of congenital adrenal hyperplasia), which causes **hypertension with hypokalemia** from excess mineralocorticoid precursors and **absent pubertal development/**

primary amenorrhea from low sex steroid production [1] [2] [3]. An **XY karyotype** and **aromatase deficiency** are not the best fit here, and **hypercortisolism** is not expected [1] [2] [3].

Why this is the best answer

- **17b1-hydroxylase deficiency** classically presents with **delayed puberty, primary amenorrhea, hypertension, and hypokalemia** [1] [2].
- The Endocrine Society CAH guideline highlights hypertension/mineralocorticoid excess and recommends monitoring **potassium** in classic CAH [1].
- Case-based evidence also describes **46,XX/46,XY** patients with absent secondary sexual characteristics and **elevated ACTH with low sex steroids** in 17b1-hydroxylase deficiency [2] [3].

Supporting points for the distractors

- **Aromatase deficiency** typically causes **hypergonadotropic hypogonadism with progressive virilization** in 46,XX individuals rather than isolated hypertension/hypokalemia [4].
- **XY karyotype** would be more likely in a disorder of sex development such as androgen insensitivity or gonadal dysgenesis, but the question stem does not point there [3].
- **Hypercortisolism** is not a characteristic finding of 17b1-hydroxylase deficiency; cortisol synthesis is reduced, not increased [2] [3].

References

[1] Congenital Adrenal Hyperplasia Due to Steroid 21-Hydroxylase Deficiency

Endocrine Society · 2018-09-27 00:00:00

In patients with classic congenital adrenal hyperplasia, the Endocrine Society recommends monitoring for signs of mineralocorticoid deficiency or excess, glucocorticoid excess, and inadequate androgen normalization; in pediatric patients, regular assessment of growth velocity, weight, blood pressure, and biochemical measurements is recommended to assess adequacy of glucocorticoid and mineralocorticoid therapy.

https://academic.oup.com/jcem/article/103/11/4043/5107759

[2] Discordant Genotypic Sex and Phenotype Variations in Two Spanish Siblings with 17α-Hydroxylase/17,20-Lyase Deficiency Carrying the Most Prevalent Mutated CYP17A1 Alleles of Brazilian Patients.

Sexual Development · 2017-01-01

Two female sisters, aged 17 and 15 years, with 46,XY and 46,XX karyotypes, presented with primary amenorrhea and absent secondary sexual characteristics. Both patients had elevated levels of ACTH, gonadotropins, progesterone, corticosterone, and deoxycorticosterone and reduced levels of estradiol, testosterone, androstenedione. Hydrocortisone and sex hormone replacement therapy was initiated in both patients.

10.1159/000468160

[3] A rare cause of delayed puberty and primary amenorrhea: 17α-hydroxylase enzyme deficiency.

Endocrine · 2022-03-01

There is a rare form of congenital adrenal hyperplasia (CAH) caused by mutations in the CYP17A1 gene. The main clinical findings are delayed puberty and primary amenorrhea in girls and disorders of sex development in boys. It can also cause hypertension and hypokalemia in both genders.

10.1007/s12020-021-02914-8

[4] Aromatase and estrogen receptor α deficiency.

Fertility and Sterility · 2014-02-01

Aromatase deficiency results from autosomal recessive inheritance of mutations in the CYP19A1 gene. Affected girls have hypergonadotropic hypogonadism, do not develop secondary sexual characteristics, and exhibit progressive virilization.

10.1016/j.fertnstert.2013.12.022

103. MedQA question ID 1153 Step 1

Question

A 68-year-old man presents to his primary care physician with complaints of increased fatigue and back pain for the past year. His symptoms are progressively getting worse over the past few months despite adequate rest and trial of over the counter analgesics. His back pain is constant and non-radiating in nature. He denies any trauma to his back. His past medical history is insignificant. On examination, there is mild tenderness over the lumbar region in the midline with an absence of paraspinal muscle tenderness. Straight leg raise test is negative. His skin and conjunctiva appear pale. The physician orders basic blood work. His results are provided below.
Complete blood count
RBC 4.9 million cells/μL
Hemoglobin 9.8 g/dL
Hematocrit 41%
Total leukocyte count 6,800 cells/μL
Neutrophils 70%
Lymphocyte 26%
Monocytes 3%
Eosinophil 1%
Basophils 0%
Platelets 230,000 cells/μL
Basic Metabolic Panel
Sodium 136 mEq/L
Potassium 5.1 mEq/L
Chloride 101 mEq/L
Bicarbonate 24 mEq/L
Albumin 3.6 mg/ dL
Urea nitrogen 31 mg/dL
Creatinine 2.7 mg/dL
Uric Acid 6.7 mg/dL
Calcium 12.1 mg/dL
Glucose 105 mg/dL
Urinalysis shows proteinuria without any RBCs or pus cells. The patient's proteinuria best fits in which of the following category?

(A) Overflow proteinuria

(B) Transient (functional) proteinuria

(C) Orthostatic proteinuria

(D) Isolated proteinuria

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Overflow proteinuria is the best fit. This presentation is classic for **multiple myeloma with Bence Jones (light-chain) proteinuria**, where excess circulating monoclonal light chains are filtered by the kidney and spill into urine rather than representing a primary glomerular or tubular inflammatory process [1] [2]. The associated **anemia, renal dysfunction, hypercalcemia, and back pain** further support myeloma as the underlying cause [1] [2].

Why this is not the other categories

- **Transient (functional) proteinuria** is typically short-lived and associated with fever, exercise, or acute illness, which is not suggested here.
- **Orthostatic proteinuria** occurs in younger patients and is posture-dependent.
- **Isolated proteinuria** implies proteinuria without the systemic features of kidney disease or a plasma cell dyscrasia.

Correct answer: A. Overflow proteinuria.

References

[1] Clinical course of light-chain smouldering multiple myeloma (idiopathic Bence Jones proteinuria): a retrospective cohort study.

The Lancet Haematology · 2014-10-01

Bence Jones proteinuria is a disorder that is defined by the excretion of monoclonal light-chain protein.

10.1016/S2352-3026(14)70001-8

[2] Laboratory Detection and Initial Diagnosis of Monoclonal Gammopathies

Association for Diagnostics & Laboratory Medicine, American Society for Clinical Pathology, College of American Pathologists · 2021-08-04 12:00:00

Clinical care providers should order both serum protein electrophoresis (SPEP) and serum free light chains (sFLC) for the initial detection of monoclonal immunoglobulin protein (M-protein) in all patients with suspected monoclonal gammopathies (MG).

https://www.cap.org/protocols-and-guidelines/cap-guidelines/upcoming-cap-guidelines/laboratory-detection-initial-diagnosis-monoclonal-gammopathies

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104. MedQA question ID 345 Step 2/3

Question

A 52-year-old man comes to the physician because of generalized pruritus and raised, erythematous plaques on the skin over his hands, chest, and legs for 6 hours. He reports having clear liquid discharge from his nose and sneezing. He says that his symptoms began suddenly the previous night, 30 minutes after he had dinner at a seafood restaurant. He has had similar symptoms occasionally in the past as well. Four months ago, he had an episode of narrow-angle glaucoma. He takes no medications. His vital signs are within normal limits. Nasal exam shows clear, serous secretions, with edematous and erythematous mucosa and turbinates. Paranasal sinuses are not tender to palpation. Which of the following is the most appropriate pharmacotherapy?

(A) Diphenhydramine

(B) Fexofenadine

(C) Vitamin K

(D) Calamine lotion

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Fexofenadine is the most appropriate pharmacotherapy. The **American College of Allergy, Asthma, and Immunology/American Academy of Allergy, Asthma & Immunology (ACAAI/AAAAI)** guidance for urticaria and rhinitis favors **second-generation H1-antihistamines**; **fexofenadine** is specifically listed as a nonsedating option, whereas **first-generation agents such as diphenhydramine** are discouraged because of CNS and anticholinergic adverse effects [1] [2] [3].

Why this fits the presentation

- The combination of **pruritic erythematous plaques** and **sneezing/rhinorrhea** beginning shortly after seafood ingestion is most consistent with an **IgE-mediated allergic reaction with urticaria and allergic rhinitis symptoms**.
- **Fexofenadine** treats both urticaria and allergic rhinitis symptoms and is preferred when avoiding sedation and anticholinergic burden is important [1] [2] [3].
- **Diphenhydramine** is a first-generation antihistamine and is not the best choice here, especially in a patient with **narrow-angle glaucoma** and no need for a sedating agent [1] [2].

Why the other options are not appropriate

- **Diphenhydramine**: effective for histamine symptoms, but not preferred because first-generation antihistamines have more CNS/anticholinergic adverse effects [1] [2].
- **Vitamin K**: no role in this allergic presentation.
- **Calamine lotion**: may soothe itching but does not address the systemic allergic symptoms [1].

References

[1] Diagnosis and Management of Acute and Chronic Urticaria

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2014-02-01 12:00:00

In most cases antihistamines are efficacious for therapy of acute urticaria and angioedema. Common causes of acute urticaria and angioedema, including medications and foods, should be identified by a detailed history and eliminated, if possible.

https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Practice%20and%20Parameters/Urticaria-2014.pdf

[2] Rhinitis

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2020-08-01 12:00:00

Antihistamines, oral (H1 receptor antagonists): continuous use most effective for seasonal and perennial allergic rhinitis, but appropriate for PRN use in episodic allergic rhinitis because of relatively rapid onset of action. To avoid sedation and anticholinergic effects of first-generation antihistamines, second-generation agents are generally preferred; of second-generation agents, fexofenadine, loratadine, and desloratadine are without sedation at recommended doses.

https://www.jacionline.org/article/S0091-6749(20)31023-X/pdf

[3] Insights into urticaria in pediatric and adult populations and its management with fexofenadine hydrochloride
Allergy, Asthma, and Clinical Immunology · 2022-05-13
Fexofenadine (Allegra) is a second-generation antihistamine; second-generation H1-antihistamines are recommended as first-line treatment for allergic rhinitis and urticaria.
10.1186/s13223-022-00677-z

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105. MedQA question ID 1180 Step 1

Question

A 62-year-old woman with a history of hypertension and type 2 diabetes mellitus comes to the physician for a routine health maintenance examination. She has smoked 1 pack of cigarettes daily for the last 15 years. Current medications include glyburide and amlodipine. The physician prescribes a medication that decreases the production of mevalonate. Which of the following changes to the serum is most likely to develop as an adverse effect of the prescribed drug?

(A) Increased creatine kinase concentration

(B) Decreased glucose concentration

(C) Increased triglyceride concentration

(D) Increased bradykinin concentration

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A statin is the medication that decreases mevalonate production, and its most likely adverse serum change is **increased creatine kinase concentration** from statin-associated myopathy [1] [2]. In randomized trial data, statins caused a small excess of muscle symptoms, and creatine kinase elevations were usually mild, but **CK increase** remains the characteristic lab abnormality when myotoxicity occurs [2].

Correct choice: A. Increased creatine kinase concentration

Why the other options are not correct

- **Decreased glucose concentration** is not the expected adverse effect; statins may instead be associated with a small increase in glucose/HbA1c in some patients [1].
- **Increased triglyceride concentration** is not typical of statin toxicity.
- **Increased bradykinin concentration** is associated with ACE inhibitors, not statins.

Clinical note

The American College of Cardiology/American Heart Association (ACC/AHA) notes that statin myalgias are common, while **myositis/myopathy with CK > ULN** and **rhabdomyolysis with CK >10 times ULN plus renal injury** are rare [1].

References

[1] Management of Dyslipidemia
American College of Cardiology, American Heart Association · 2026-03-13 12:00:00
HMG-CoA reductase inhibitors (statins): myalgia (normal CK level) is common and dose-related; myositis/myopathy (CK > ULN) with concerning symptoms or objective weakness is rare; rhabdomyolysis (CK >10 times ULN with renal injury) is rare.
https://www.jacc.org/doi/10.1016/j.jacc.2025.11.016

[2] Effect of statin therapy on muscle symptoms: an individual participant data meta-analysis of large-scale, randomised, double-blind trials
The Lancet · 2022-08-29
Statin therapy yielded a small, clinically insignificant increase in median creatine kinase values of approximately 0.02 times the upper limit of normal.
10.1016/S0140-6736(22)01545-8

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106. MedQA question ID 1148 Step 1

Question

A researcher evaluates healthy breast tissue from 100 women, 50 women that were pregnant at the time of the study and 50 age-matched non-pregnant women. The breast tissue in pregnant women contained an increased number of acinar glands with epithelial proliferation compared to the non-pregnant women. Which process caused this change?

(A) Hyperplasia

(B) Hypertrophy

(C) Atrophy

(D) Metaplasia

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Hyperplasia is the correct process. Pregnancy causes a physiologic increase in the number of breast epithelial cells and acinar/lobular units, producing more acinar glands with epithelial proliferation; this is **hyperplasia**, not hypertrophy (cell enlargement) [1] [2].

Why the other options are wrong

- **Hypertrophy** = enlargement of existing cells, not an increase in cell number.

- **Atrophy** = decreased cell size and/or number.
- **Metaplasia** = replacement of one differentiated cell type by another.

Supporting physiology

Normal breast tissue undergoes remodeling and expansion during pregnancy and lactation, with a marked increase in epithelial area and lobular/acinar development compared with the non-pregnant state [1] [2].

References

[1] Current Recommendations for Breast Imaging of the Pregnant and Lactating Patient
AJR. American journal of roentgenology · 2021-06-01
During pregnancy and lactation, the breast undergoes unique changes that manifest as varied clinical and imaging findings. Understanding the expected physiologic changes of the breast can help the radiologist identify the abnormalities arising during this time.
10.2214/ajr.20.23905

[2] Postpartum breast involution reveals regression of secretory lobules mediated by tissue-remodeling
Breast cancer research : BCR · 2014-03-28
With pregnancy and lactation, a >10 fold increase in breast epithelial area was observed.
10.1186/bcr3633

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107. MedQA question ID 75 Step 1

Question

A 5-year-old female is brought to a speech therapist for continuing work on improving her communication skills. She is only able to verbalize two word sentences and has generalized developmental delay. When she was born it was noticed that she had a high pitched mewing cry and subsequent physical exam revealed microcephaly, prominent epicanthal folds, and a holosystolic murmur best heard in the left 5th intercostal space near the sternum. An abnormality of which of the following chromosomes is most likely responsible for this patient's disorder?

(A) 5

(B) 7

(C) 18

(D) 21

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

This child most likely has Cri-du-chat syndrome, which is caused by a deletion of the short arm of chromosome 5 (5p deletion). The classic findings are a **high-pitched mewing cry**,

microcephaly, **developmental delay**, and characteristic dysmorphic features; congenital heart disease can also occur [1] [2]. Therefore, the correct choice is **A. 5**.

Key clue

- **Cri-du-chat syndrome = 5p deletion**.
- The hallmark neonatal cry plus developmental and craniofacial abnormalities strongly point to this diagnosis [1] [2].

References

[1] Deep Phenotyping and Genetic Characterization of a Cohort of 70 Individuals With 5p Minus Syndrome
Frontiers in Genetics · 2021-01-01
Chromosome-5p minus syndrome (5p-Sd), formerly known as Cri du Chat syndrome, results from the loss of genetic material at the distal region of chromosome 5. Individuals affected by this syndrome have global developmental delay, microcephaly, delayed speech, some dysmorphic features, and monochromatic high-pitch voice.
10.3389/fgene.2021.645595

[2] Peters anomaly in cri-du-chat syndrome
Journal of AAPOS · 2015-06-01
Cri du chat syndrome is a chromosomal disorder caused by a deletion of the short arm of chromosome 5. It presents with a distinctive catlike high-pitched cry, psychomotor delays, microcephaly, craniofacial abnormalities, and, in many cases, ocular findings.
10.1016/j.jaapos.2015.01.018

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108. MedQA question ID 825 Step 2/3

Question

A 16-year-old female presents to her physician's office after noticing a round lump in her left breast 2 months ago. She reports that the lump seemed to enlarge and became tender just preceding her last 2 menses. It is otherwise painless, and the patient denies any discharge or skin changes. She has no past medical history but her grandmother, age 72, was just diagnosed with invasive ductal carcinoma of the breast. The patient is an avid softball player at her high school and denies alcohol, smoking, or illicit drug use. On exam, the breasts appear symmetric and normal. A 3-cm round, mobile mass is palpated in the upper outer quadrant of the left breast. There is slight tenderness to deep palpation of the mass. There is no axillary lymphadenopathy on either side. Which of the following is the most likely outcome of this patient's condition?

(A) This mass will decrease in size if the patient starts oral contraceptives

(B) This mass slightly increases this patient's risk of breast cancer in the future

(C) This mass will most likely decrease in size or disappear over time

(D) If this mass grows rapidly to greater than 5 cm, radiation and chemotherapy are indicated

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Mass will most likely decrease in size or disappear over time. In a 16-year-old with a **mobile, round, slightly tender breast mass that fluctuates with menses**, the most likely diagnosis is a **fibroadenoma**, which is typically benign in adolescents and often managed conservatively; many lesions regress or remain stable over time [1] [2]. The **American Society of Breast Surgeons** recommends **routine excision only for biopsy-proven lesions with concerning growth or size >4–6 cm**, and biopsy-proven fibroadenomas do **not** require routine excision or imply an increased lifetime breast cancer risk by themselves [1].

Why the other options are less likely

- **A. Oral contraceptives shrinking the mass** — not a standard expected outcome in the retrieved guidance.
- **B. Slightly increased future breast cancer risk** — the retrieved guideline states that even fibroadenomas with stromal atypia do **not** increase lifetime breast cancer risk independent of other factors [1].
- **D. Radiation and chemotherapy for rapid growth >5 cm** — this is not the expected management for fibroadenoma; the guideline instead supports **surgical excision** when a lesion is large or concerning for phyllodes tumor [1].

Supporting evidence

Observational data in adolescents show that benign-appearing solid breast masses, including fibroadenomas, can be followed conservatively, and many remain stable or decrease without malignant transformation [2] [3].

References

[1] Management of Benign Breast Fibroepithelial Lesions

American Society of Breast Surgeons · 2025-10-22 12:00:00

Management of Benign Breast Fibroepithelial Lesions: 1b. Clinicians should manage cellular, complex, and juvenile FAs as standard FAs as recommendations do not differ. Strong consensus; 4a. Routine excision is not recommended for patients with biopsy-proven, concordant FAs. Strong consensus; 4d. Clinicians should excise a biopsy-proven FA that is larger than 4–6 cm. Strong consensus; 1a. Patients diagnosed with a FA with stromal atypia at surgery should be counseled that they are not at increased lifetime risk of breast cancer exclusive of other breast cancer risk factors and do not require chemoprevention or high-risk counseling. Strong consensus.

https://jamanetwork.com/journals/jamasurgery/fullarticle/2840206

[2] Diagnosis and management of fibroadenomas in the adolescent breast.

Seminars in Plastic Surgery · 2013-02-01

Fibroadenomas are benign breast masses that can present a management challenge in adolescent populations. Most fibroadenoma can be managed conservatively without surgery, but those masses that are symptomatic or increasing in size may require surgical excision. In adolescents, the implications of surgical intervention in the breast are unclear, and there is little outcomes data.

10.1055/s-0033-1343992

[3] Biopsy versus conservative management of sonographically benign-appearing solid breast masses in adolescents.

Journal of Ultrasound in Medicine · 2015-04-01

The study included 37 adolescent female patients with 45 palpable benign-appearing solid breast masses on initial sonography. The largest dimension, volume, volume change per month, and change in the sonographic appearance were analyzed to predict the need for biopsy. None of the masses that underwent follow-up sonography showed changes in their sonographic appearances. The volume change was smaller for fibroadenomas than benign phyllodes tumors.

10.7863/ultra.34.4.617

109. MedQA question ID 1190 Step 1

Question

A patient with a1-antitrypsin deficiency is warned by his physician that his increasing dyspnea may be worsened by his continued cigarette smoking. Which of the following factors, released by both neutrophils and alveolar macrophages, is responsible for the patient's condition?

(A) Major Basic Protein

(B) Mucus

(C) Surfactant

(D) Elastase

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The correct answer is **D. Elastase**. In **alpha-1 antitrypsin deficiency**, loss of inhibition of **neutrophil elastase**—an elastolytic protease released by **neutrophils and alveolar macrophages**—drives protease/antiprotease imbalance and emphysema; **cigarette smoke** further worsens this process by impairing alpha-1 antitrypsin function [1] [2].

Why the other choices are wrong

- **Major basic protein** is associated with eosinophils, not the classic mechanism of alpha-1 antitrypsin deficiency.
- **Mucus** and **surfactant** are not the key protease responsible for the emphysematous lung injury described here.

Answer: D. Elastase [1] [2].

References

[1] Alpha-1 Antitrypsin and Lung Cell Apoptosis.
Annals of the American Thoracic Society · 2016-04-01
The discovery of alpha-1 antitrypsin (A1AT) as the principal circulating inhibitor of neutrophil elastase was critical to the appreciation of protease/antiprotease imbalance in the pathogenesis of emphysema. Exposures to cigarette smoke diminished A1AT intracellular uptake and its anticaspase action.
10.1513/annalsats.201505-312kv

[2] Neutrophil elastase-mediated lung disease.
COPD · 2013-03-01

Elastases of both the neutrophil and macrophage have been implicated in lung disease initiation and progression. The elastin-rich connective tissue framework of the lungs appears to be particularly susceptible to the action of elastolytic proteases. In alpha-1 antitrypsin deficiency we find an experiment that disrupts this protease-anti-protease balance.
10.3109/15412555.2013.764403

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110. MedQA question ID 836 Step 1

Question

A 72-year-old anthropologist with long-standing hypertension visits your office for a routine exam. You notice an abnormality on his laboratory results caused by his regimen of captopril and triamterene. What abnormality did you most likely find?

(A) Hyperkalemia

(B) Hypernatremia

(C) Thrombocytopenia

(D) Anemia

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Hyperkalemia is most likely. **Captopril** (an ACE inhibitor) and **triamterene** (a potassium-sparing diuretic) both raise potassium, and the American College of Cardiology/American Heart Association hypertension guidance specifically flags **ACE inhibitor + potassium-sparing diuretic** combinations as a cause of **hyperkalemia** [1] [2].

Why the other choices are less likely

- **Hypernatremia** is not the expected electrolyte effect of this combination [1] [2].
- **Thrombocytopenia** and **anemia** are not the characteristic laboratory abnormalities from captopril + triamterene in this setting [1] [2].

References

[1] Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults
American College of Cardiology, American Heart Association · 2025-08-14 12:00:00
Captopril has an increased risk of hyperkalemia, especially in patients with CKD or in those on K+ supplements or K+-sparing drugs.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000001356

[2] Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults
American College of Cardiology, American Heart Association · 2025-08-14 12:00:00
ACEi and potassium-sparing diuretics (spironolactone, eplerenone, triamterene, amiloride) have a cautionary interaction causing hyperkalemia.

https://www.ahajournals.org/doi/10.1161/CIR.0000000000001356

111. MedQA question ID 995 Step 2/3

Question

A 36-year-old woman, gravida 3, para 2, at 42 weeks' gestation comes to the physician for induction of labor. Her pregnancy has been uncomplicated. Her two other children were born after uncomplicated vaginal deliveries at 41 and 42 weeks' gestation, respectively. Her only medication is a prenatal vitamin. She is 165 cm (5 ft 5 in) tall and weighs 86 kg (200 lb); BMI is 33 kg/m2. Her temperature is 36.8°C (98.4°F), pulse is 90/min, respirations are 14/min, and blood pressure is 110/80 mmHg. Examination shows a nontender, soft uterus consistent in size with a 42-weeks' gestation. This patient's child is at greatest risk for which of the following complications?

(A) Polyhydramnios

(B) Acute respiratory distress syndrome

(C) Meconium aspiration

(D) Placental abruption

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Meconium aspiration is the neonatal complication most strongly associated with **post-term gestation (42 weeks)**. The **World Health Organization (WHO)** recommends induction once pregnancy is known with certainty to have reached **41 weeks or more** because perinatal risks rise with ongoing gestation [1]; cohort data show that complications increase by 42 weeks, and meconium aspiration syndrome rises with advancing gestational age at term [2] [3].

Why this is the best answer

- **Meconium aspiration** is classically associated with **late-term/post-term pregnancy**.
- By contrast, **polyhydramnios** is not the expected risk of post-term gestation.
- **Acute respiratory distress syndrome** is not the typical named complication of a post-term infant in this setting.
- **Placental abruption** can occur in obstetric emergencies, but it is not the greatest risk among the choices here.

Clinical takeaway

In an uncomplicated pregnancy at **42 weeks**, the key fetal risk among the listed options is **meconium aspiration** rather than a maternal placental complication [2] [3].

References

[1] Induction of Labour At Or Beyond Term
World Health Organization · 2022-10-05 00:00:00
Induction of labour is recommended for women who are known with certainty to have reached 41 weeks (greater than or equal to 41 weeks +0/7 days) of gestation (moderate-certainty evidence).
https://www.who.int/publications/i/item/9789240052796

[2] Risk of stillbirth and infant death stratified by gestational age.
Obstetrics and gynecology · 2012-07-01
The risk of stillbirth at term increases with gestational age up to 10.8 per 10,000 ongoing pregnancies at 42 weeks of gestation. Infant mortality rates at 39, 40, and 41 weeks are lower than the overall mortality risk of expectant management for 1 week.
10.1097/aog.0b013e31825bd286

[3] The risk of meconium aspiration syndrome (MAS) increases with gestational age at term.
The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians · 2022-01-01
The risk of meconium aspiration syndrome increased with gestational age in pregnant women with MSAF. The risk of MAS increased as gestational ages increased.
10.1080/14767058.2020.1713744

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112. MedQA question ID 724 Step 2/3

Question

A 32-year-old man presents to the emergency department with fever, nausea, and vomiting. The patient states that his symptoms started last night and have persisted to this morning. He has a past medical history of asthma, and his current medications include albuterol and fluticasone. His temperature is 102°F (38.9°C), blood pressure is 110/60 mmHg, pulse is 95/min, respirations are 17/min, and oxygen saturation is 98% on room air. On physical exam, the patient seems uncomfortable. He requests that the lights in the room stay turned off during the physical exam. The patient's cardiac exam demonstrates a normal rate and rhythm, and his pulmonary exam is clear to auscultation bilaterally. Musculoskeletal exam reveals diminished mobility of the neck in all four directions, with flexion of the neck causing the patient discomfort. Lumbar puncture is performed and results are seen below.

Cerebrospinal fluid (CSF):
Cell count: 175/mm^3
Cl-: 119 mEq/L
Glucose: 49 mg/dL
Pressure: 150 mmH2O
Total protein: 55 mg/dL

Which of the following is the best treatment for this patient's most likely diagnosis?

(A) Acyclovir

(B) Amphotericin and 5-flucytosine

(C) Ceftriaxone and vancomycin

(D) IV fluids and monitoring

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The best treatment is IV fluids and monitoring (Choice D). This presentation is most consistent with **viral meningitis** rather than bacterial meningitis: he has fever, photophobia, meningismus, and a CSF profile that is not frankly bacterial (only **175 cells/mm³**, **normal glucose**, and only mildly elevated protein). The **Infectious Diseases Society of America (IDSA)** notes that **hypoglycorrhachia and elevated CSF protein** are suggestive of healthcare-associated bacterial meningitis/ventriculitis, and empiric **vancomycin plus an anti-pseudomonal beta-lactam** is recommended when bacterial meningitis is suspected [1].

Why the other options are less likely

- **Acyclovir** is used when **HSV encephalitis/meningoencephalitis** is suspected, typically with altered mental status, seizures, focal deficits, or temporal lobe findings; those features are not present here.
- **Amphotericin and 5-flucytosine** are for fungal meningitis (for example, cryptococcal disease), which is not suggested by this CSF pattern or clinical picture.
- **Ceftriaxone and vancomycin** would be appropriate for **suspected bacterial meningitis**, but this CSF profile and the absence of shock, severe toxicity, or markedly low CSF glucose make bacterial meningitis less likely.

Practical point

For an otherwise immunocompetent adult with presumed **viral meningitis** and no encephalitic features, treatment is usually **supportive care** with hydration, analgesia/antiemetics, and observation [1].

References

[1] Healthcare-Associated Ventriculitis and Meningitis
Infectious Diseases Society of America · 2017-02-27 00:00:00
Vancomycin plus an anti-pseudomonal β-lactam (such as cefepime, ceftazidime or meropenem) is recommended as empiric therapy for healthcare-associated ventriculitis and meningitis. Choice of the empiric β-lactam agent should be based on local in vitro susceptibility patterns. Hypoglycorrhachia and elevated CSF protein concentrations are suggestive of the diagnosis of healthcare-associated ventriculitis or meningitis.
https://academic.oup.com/cid/article/64/6/701/3060377

113. MedQA question ID 281 Step 1

Question

A 75-year-old man presents to a medical clinic for evaluation of a large, tense, pruritic bulla on his inner thighs, abdomen, and lower abdomen. A skin biopsy is performed, which shows an epidermal basement membrane with immunoglobulin G (IgG) antibodies and linear immunofluorescence. Which of the following is the most likely cell junction to which the antibodies bind?

(A) Desmosomes

(B) Gap junctions

(C) Hemidesmosomes

(D) Tight junctions

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Hemidesmosomes. The presentation is most consistent with **bullous pemphigoid**, which in older adults causes **tense, pruritic bullae** and shows **linear IgG along the basement membrane zone** on direct immunofluorescence; the autoantibodies target **hemidesmosomal proteins** at the dermal-epidermal junction, especially **BP180 and BP230** [1] [2]. **Desmosomes** are the target in pemphigus, not bullous pemphigoid [1] [2].

Key point

- **Hemidesmosomes** anchor basal keratinocytes to the basement membrane.
- Bullous pemphigoid is an autoimmune subepidermal blistering disease with **linear IgG/C3 at the basement membrane zone** [1] [2].

References

[1] Atypical Bullous Pemphigoid After Linagliptin Intake.
The American journal of case reports · 2021-09-29
Bullous pemphigoid is a common pruritic skin lesion reported in elderly patients. It is caused by an immunologic reaction between autoantibodies and hemidesmosome proteins of epithelial cells. Direct immunofluorescence showed linear IgG and C3 antibodies to hemidesmoomes at the lamina lucida of the basement membrane.
10.12659/ajcr.932356

[2] Clinical features and practical diagnosis of bullous pemphigoid.
Immunology and allergy clinics of North America · 2012-05-01
Bullous pemphigoid (BP) is the most common autoimmune subepidermal blistering disease. It is caused by autoantibodies directed against two principal antigens of the hemidesmosome, BP antigen 180 and BP antigen 230. Diagnosis of BP critically relies on immunopathologic examinations including direct immunofluorescence microscopy and detection of serum autoantibodies.
10.1016/j.iac.2012.04.002

114. MedQA question ID 69 Step 1

Question

A 65-year-old man with a history of hypertension, obesity, and alcoholic cirrhosis is seen in clinic for follow-up. He feels well and currently drinks 5 glasses of wine each night. Medications include atenolol and lisinopril. On physical exam, temperature is 98.1 deg F (36.7 deg C), blood pressure is 151/82 mmHg, pulse is 71/min, and respirations are 14/min. He has spider angiomata on his chest; no asterixis, jaundice, ascites, or peripheral edema is noted. Screening ultrasound reveals a new liver nodule, and follow up CT demonstrates a 2 cm right hepatic lobe lesion with enhancement in the arterial phase. No hypodense attenuation is seen on the venous or delayed phase. What is the next step in management?

(A) Proceed with liver biopsy

(B) Refer for surgical resection

(C) Refer for radiofrequency ablation

(D) Observe and get follow-up imaging in 3 months

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The next step is liver biopsy because this **2 cm arterial enhancing lesion lacks portal venous/ delayed washout**, so it does **not** meet noninvasive diagnostic criteria for HCC in a patient with cirrhosis [1] [2]. The **American Association for the Study of Liver Diseases (AASLD)** advises that **indeterminate LR-4 observations** should undergo multidisciplinary review with either repeat contrast imaging within 3 months or **immediate biopsy**; when an immediate diagnosis will change management, **biopsy is preferred** [2].

Why not the other options?

- **Surgical resection** and **radiofrequency ablation** are treatment options for confirmed early HCC, but this lesion is not yet diagnostic on imaging alone [1] [3] [4].
- **Observation with follow-up imaging in 3 months** is reasonable for some indeterminate lesions, but AASLD supports **biopsy first when the result will affect treatment decisions** [2].

Most applicable imaging point

- In at-risk patients with cirrhosis, noninvasive HCC diagnosis on CT/MRI requires the characteristic combination of **arterial phase hyperenhancement plus washout/capsule/ growth features**; isolated arterial enhancement is insufficient [1] [2].
- For a **solitary HCC ≤2 cm** that is confirmed and the patient is otherwise not a transplant candidate, EASL supports **resection or thermal ablation without preference** in compensated cirrhosis [3]. AASLD similarly supports thermal ablation as a curative option for early HCC ≤3 cm when surgery is not pursued [4].

References

[1] Prevention, Diagnosis, and Treatment of Hepatocellular Carcinoma

American Association for the Study of Liver Diseases · 2025-02-24 12:00:00

In at-risk patients with cirrhosis or chronic HBV infection, the diagnosis of HCC should be based on noninvasive imaging criteria and/or pathology. The noninvasive diagnosis of HCC should be based on either dynamic contrast-enhanced MRI or multiphasic CT.

https://journals.lww.com/hep/citation/9900/critical_update__aasld_practice_guidance_on.1176.aspx

[2] Prevention, Diagnosis, and Treatment of Hepatocellular Carcinoma

American Association for the Study of Liver Diseases · 2025-02-24 12:00:00

In patients with an LR-4 observation, AASLD advises multidisciplinary discussion to determine optimal follow-up, including repeat imaging with contrast-enhanced MRI or multiphasic CT within 3 months or immediate biopsy. For patients in whom an immediate diagnosis would make an impact on management decisions, the AASLD advises biopsy over repeat imaging.

https://journals.lww.com/hep/citation/9900/critical_update__aasld_practice_guidance_on.1176.aspx

[3] Management of Hepatocellular Carcinoma

European Association for the Study of the Liver · 2024-12-17 00:00:00

Liver resection, particularly by minimally invasive means, and thermal ablation are recommended, without preference, in compensated patients with cirrhosis and a solitary HCC ≤2 cm who are otherwise not candidates for liver transplantation.

https://www.journal-of-hepatology.eu/article/S0168-8278(24)02508-X/fulltext

[4] Prevention, Diagnosis, and Treatment of Hepatocellular Carcinoma

American Association for the Study of Liver Diseases · 2025-02-24 12:00:00

Thermal ablation (radiofrequency or microwave ablation) should be considered the treatment of choice for patients with early-stage HCC ≤3 cm who are ineligible for or decline surgery. AASLD does not advise one thermal ablative modality over another.

https://journals.lww.com/hep/citation/9900/critical_update__aasld_practice_guidance_on.1176.aspx

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115. MedQA question ID 1257 Step 2/3

Question

A 65-year-old man comes to the physician because of progressively worsening fatigue for 6 months. During this time, he has also had shortness of breath and palpitations on exertion. He has noticed blood in his stools on three separate occasions in the past 4 months. He has type 2 diabetes mellitus and end-stage renal disease. He drinks two to four beers daily. He does not smoke. His pulse is 95/min and blood pressure is 120/70 mm Hg. Examination shows pale conjunctivae. The abdomen is soft with no organomegaly. Rectal examination is unremarkable. His hemoglobin concentration is 7.2 g/dL, hematocrit is 32%, and mean corpuscular volume is 68 µm3. Which of the following is the most likely underlying cause of this patient's bleeding?

(A) Inflammation in an outpouching of the colonic wall

(B) Symptomatic enlargement of hemorrhoidal plexus

(C) Chronic mucosal and submucosal inflammation of the colon

(D) Arteriovenous malformation in the colonic wall

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Arteriovenous malformation in the colonic wall is the most likely cause. In an older patient with **recurrent hematochezia** and **iron-deficiency anemia**, lower GI bleeding from **angiodysplasia/AVMs** is a classic consideration, and it is particularly associated with **end-stage renal disease (ESRD)** [1] [2] [3]. The other options are less likely: diverticulitis usually causes pain and inflammation rather than chronic occult/overt blood loss, hemorrhoids typically cause mild bright red bleeding, and chronic colitis would usually have diarrhea and other inflammatory symptoms [1] [2].

Why this fits best

- **ESRD** is a recognized risk factor for angiodysplasia-associated GI bleeding [3].
- Lower GI bleeding in older adults is commonly due to **vascular lesions** such as angiodysplasia, along with diverticular disease, neoplasia, and anorectal sources [1] [2].
- The lab pattern of **microcytic anemia (MCV 68 fL) with hemoglobin 7.2 g/dL** supports chronic blood loss as the mechanism [1] [2].

Why the other choices are less likely

- **A. Inflammation in an outpouching of the colonic wall**: diverticulitis is inflammation of diverticula; bleeding from diverticular disease can occur, but inflammation itself is not the typical explanation for chronic iron-deficiency anemia.
- **B. Symptomatic enlargement of hemorrhoidal plexus**: hemorrhoids can cause rectal bleeding, but usually do not explain severe chronic iron-deficiency anemia unless bleeding is substantial and persistent.
- **C. Chronic mucosal and submucosal inflammation of the colon**: this describes inflammatory bowel disease, which would more often present with diarrhea, abdominal pain, or systemic inflammatory features.

Clinical implication

For an older man with iron-deficiency anemia and hematochezia, guidelines support **endoscopic evaluation of the colon** to identify a bleeding source rather than assuming hemorrhoids or diverticular disease [4] [5].

References

[1] Evaluation and management of lower gastrointestinal bleeding.
Disease-a-month : DM · 2018-07-01
Lower gastrointestinal bleeding (LGIB) is a common cause of presentation to the emergency department and hospital admissions. Most common etiologies are diverticulosis, angiodysplasia, malignancy and anorectal diseases. Foremost modality for evaluation and treatment of LGIB is colonosopy. Other diagnostic tools are nuclear scintigraphy, computed tomography, angiography and capsule endoscopy.
10.1016/j.disamonth.2018.02.002

[2] Lower Gastrointestinal Hemorrhage.
Critical care clinics · 2016-04-01
Lower gastrointestinal bleeding (LGIB) may present as an acute life-threatening event or as a chronic insidious condition manifesting as iron deficiency anemia and positivity for fecal occult blood. Colonoscopy provides the best method for evaluation and treatment of patients with LGIB.
10.1016/j.ccc.2015.12.004

[3] Secondary angiodysplasia-associated gastrointestinal bleeding in end-stage renal disease: Results from the nationwide inpatient sample.
World journal of gastrointestinal endoscopy · 2019-10-16
The prevalence of angiodysplasia-associated gastrointestinal bleeding was 0.45% among all end-stage renal disease patients that were hospitalized. Advanced age, African American race, overall high comorbidities, hypertension and smoking were significant factors for angiosplasia associated gastrointestinal bleeding in the hospitalized patients.
10.4253/wjge.v11.i10.504

[4] Gastrointestinal Evaluation of Iron Deficiency Anemia
American Gastroenterological Association · 2020-08-15 00:00:00
In asymptomatic postmenopausal women and men with iron deficiency anemia, the AGA recommends bidirectional endoscopy over no endoscopy.
https://www.gastrojournal.org/article/S0016-5085(20)34847-2/fulltext

[5] Management of Hemorrhoids
American Society of Colon and Rectal Surgeons · 2024-01-31 00:00:00
Complete endoscopic evaluation of the colon is indicated in select patients with symptomatic hemorrhoids and rectal bleeding.

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116. MedQA question ID 353 Step 2/3

Question

A 56-year-old woman comes to the physician because of a 2-week history of fatigue and painless bruising over her arms and trunk. She has also had several episodes of nosebleeds that resolved with compression after a few minutes. She recently completed treatment for a urinary tract infection. She has had no changes in her weight. She has type 2 diabetes mellitus and hypertension. Her last menstrual cycle was 5 years ago. She does not smoke or drink alcohol. Home medications include metformin, amlodipine, and enalapril. Her vital signs are within normal limits. Physical examination shows pale conjunctivae. There are ecchymoses and petechiae over the upper extremities, chest, and back. There is no lymphadenopathy. The remainder of the physical examination is unremarkable. Laboratory studies show:
Hemoglobin 8.7 mg/dL
Leukocyte count 1100/mm3
Platelet count 54,000/mm3
Reticulocyte count 0.1%
Mean corpuscular volume 93 µm3
Serum
Total bilirubin 1.1 mg/dL
LDH 80 U/L
Which of the following is most likely to confirm the diagnosis?"

(A) Serum transferrin level

(B) Bone marrow biopsy

(C) Peripheral blood smear

(D) Serum porphobilinogen level

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely confirmatory test is B. Bone marrow biopsy. This presentation is most consistent with **aplastic anemia/bone marrow failure**: pancytopenia with a **very low reticulocyte count** and no evidence of hemolysis. In adults with unexplained cytopenias, the European Hematology Association recommends **bone marrow examination** when there are additional cytopenias or worsening blood counts, and evidence on new-onset pancytopenia shows that bone marrow evaluation is often required to establish the diagnosis [1] [2].

Why the other options are less likely

- **Peripheral blood smear** can support the evaluation, but it does **not confirm** aplastic anemia.
- **Serum transferrin** is used in iron studies and would not explain pancytopenia with reticulocytopenia.
- **Serum porphobilinogen** is used when acute intermittent porphyria is suspected; it does not fit this hematologic picture.

Most likely diagnosis

The combination of **fatigue, bruising, epistaxis, pancytopenia, and reticulocytopenia** after a recent medication exposure is most concerning for **aplastic anemia**, which is confirmed by **bone marrow biopsy showing hypocellularity** rather than by peripheral smear or porphobilinogen testing [1] [2].

References

[1] Diagnosis and Management of Neutropenia in Adults and Children

European Hematology Association · 2023-03-30 00:00:00

In all adult patients with unexplained chronic neutropenia... a diagnostic BM with morphology, cytogenetics... should be performed; repeated BM follow-up should be performed with decreasing ANC or additional changes in other blood cell counts (e.g., anemia and thrombocytopenia) or erythrocyte indices.

https://onlinelibrary.wiley.com/doi/10.1097/HS9.0000000000000872

[2] Bone marrow evaluation in new-onset pancytopenia.

Human pathology · 2013-06-01

New-onset pancytopenia often leads to bone marrow biopsy and aspiration; bone marrow evaluation is important to determine the underlying cause.

10.1016/j.humpath.2012.10.006

117. MedQA question ID 630 Step 1

Question

A 64-year-old male with a past medical history of two myocardial infarctions presents to the emergency room with shortness of breath. He notes that he stopped taking his furosemide two weeks prior, because he ran out of pills. On exam, his oxygen saturation is 78%, his lungs have crackles throughout, and jugular venous pulsation is located at the earlobe. EKG and troponin levels are normal. Which of the following is consistent with this man's pulmonary physiology?

(A) Decreased Aa gradient, decreased surface area for diffusion, normal diffusion distance

(B) Decreased Aa gradient, increased surface area for diffusion, decreased diffusion distance

(C) Increased Aa gradient, normal surface area for diffusion, increased diffusion distance

(D) Increased Aa gradient, decreased surface area for diffusion, increased diffusion distance

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Increased A–a gradient, decreased surface area for diffusion, increased diffusion distance. In **cardiogenic pulmonary edema** from acute decompensated heart failure, fluid accumulates in the alveoli and interstitium, which impairs gas exchange by **increasing diffusion distance** and reducing effective exchange surface area; this also widens the **alveolar-arterial (A–a) gradient** [1] [2]. The American College of Cardiology/American Heart Association/Heart Failure Society of America recommend prompt IV loop diuretics for significant fluid overload, consistent with this presentation [3].

References

[1] Left ventricular heart failure and pulmonary hypertension†
European Heart Journal · 2015-10-27
In the pulmonary circulation, sudden increases of LAP may cause ‘alveolar-capillary stress failure’, a reversible barotrauma altering endothelial permeability and allowing leakage of erythrocytes, proteins, and fluid into the alveolar lumen, thus causing interstitial and alveolar oedema.
10.1093/eurheartj/ehv512

[2] Cardiogenic Pulmonary Edema in Emergency Medicine
Advances in Respiratory Medicine · 2023-10-13
Cardiogenic pulmonary edema (CPE) is characterized by the development of acute respiratory failure associated with the accumulation of fluid in the lung's alveolar spaces due to an elevated cardiac filling pressure.
10.3390/arm91050034

[3] Management of Heart Failure
American College of Cardiology, American Heart Association, Heart Failure Society of America · 2022-03-31 12:00:00
Patients with HF admitted with evidence of significant fluid overload should be promptly treated with intravenous loop diuretics to improve symptoms and reduce morbidity.
https://www.jacc.org/doi/10.1016/j.jacc.2021.12.012

118. MedQA question ID 154 Step 2/3

Question

A 4-year-old boy is brought to the physician because of a generalized rash for 3 days. During this period, he has had severe itching and was not able to sleep well. He has also had fever, headache, and some muscle pain. Five days ago, he had a runny nose which subsided with over-the-counter medications. He returned from a camping trip 1 week ago. He attends a daycare center. The patient is at the 55th percentile for height and at the 50th percentile for weight. His temperature is 38.2°C (100.7°F), pulse is 97/min, and blood pressure is 96/60 mm Hg. Examination of the skin shows several macules, papules, and crusted lesions over his face, trunk, and extremities. There are a few fluid-filled vesicles over his abdomen and back. There is no cervical lymphadenopathy. The remainder of the examination shows no abnormalities. Which of the following is the most likely diagnosis?

(A) Measles

(B) Urushiol-induced dermatitis

(C) Chickenpox

(D) Rubella

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Chickenpox (varicella) is the most likely diagnosis: the combination of **pruritic fever with a generalized vesicular rash** and lesions in **multiple stages of development** (macules, papules, crusts, and fluid-filled vesicles) is classic for varicella [1]. The daycare exposure and lack of cervical lymphadenopathy also fit varicella better than measles or rubella, and urushiol-induced dermatitis is usually more exposure-pattern limited rather than a diffuse, staged vesicular exanthem [1].

References

[1] Varicella and herpes zoster. Part 1: virology, epidemiology, clinical picture, laboratory diagnostics.
Medizinische Klinik (Munich, Germany : 1983) · 2010-05-01
Varicella-zoster virus (VZV) is the cause for acute exanthema in childhood (chickenpox). VZV is highly infectious, spread by respiratory droplets and direct contact with fluid in vesicles.
10.1007/s00063-010-1061-3

119. MedQA question ID 577 Step 2/3

Question

A 63-year-old man from the countryside presents with leg swelling and right upper abdominal tenderness. He reports a history of myocardial infarction 4 years ago, but he has no supporting documentation. At the moment, his only medication is aspirin. He also stated that he used to have 'high blood sugars' when checked in the hospital 4 years ago, but he did not follow up regarding this issue. He works as a farmer and noticed that it became much harder for him to work in the last few days because of fatigue and syncope. He has a 24-pack-year history of smoking and consumes alcohol occasionally. The vital signs include: blood pressure 150/90 mm Hg, heart rate 83/min, respiratory rate 16/min, and temperature 36.5°C (97.7°F). On physical examination, the patient is pale and acrocyanotic. There is a visible jugular vein distention and bilateral lower leg pitting edema. The pulmonary auscultation is significant for occasional bilateral wheezes. Cardiac auscultation is significant for a decreased S1, S3 gallop, and grade 3/6 systolic murmur best heard at the left sternal border in the 4th left intercostal space. Abdominal percussion and palpation are suggestive of ascites. The hepatic margin is 3 cm below the right costal margin. Hepatojugular reflux is positive. Which of the following is the most likely clinical finding observed in this patient on an echocardiogram?

(A) Left ventricular ejection fraction of 41%

(B) Increased peak tricuspid regurgitation

(C) Hypokinetic wall of the left ventricle

(D) Abnormal left ventricular relaxation

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely echocardiographic finding is increased peak tricuspid regurgitation (TR) velocity/severity, reflecting **functional TR from right-sided chamber dilation and volume overload** in a patient with advanced congestive heart failure [1] [2]. The **American College of Cardiology/American Heart Association/Heart Failure Society of America** heart failure guideline recommends **transthoracic echocardiography (TTE)** in suspected or newly diagnosed HF to assess cardiac structure and function, and echocardiography is also the first-line tool for estimating right-heart hemodynamics and TR severity [1] [2].

Why the other choices are less likely

- **A. Left ventricular ejection fraction of 41%**: possible in HF, but the stem is more suggestive of marked right-sided congestion and TR than a specific mildly reduced EF threshold [1].
- **C. Hypokinetic wall of the left ventricle**: prior MI raises concern for ischemic cardiomyopathy, but the question asks for the most likely *echo finding* tied to this presentation; the dominant bedside findings point to TR/right-heart failure [1].

- **D. Abnormal left ventricular relaxation**: this is a diastolic dysfunction finding and does not best explain the prominent JVD, ascites, hepatomegaly, and systolic murmur at the left sternal border [1] [2].

Clinical interpretation

This presentation is most consistent with **decompensated heart failure with prominent right-sided involvement**, where echo commonly shows **significant TR, right-sided dilation, and elevated right-sided pressures** rather than isolated diastolic dysfunction [2].

References

[1] Management of Heart Failure
American College of Cardiology, American Heart Association, Heart Failure Society of America · 2022-03-31 12:00:00
2. In patients with suspected or newly diagnosed HF, transthoracic echocardiography (TTE) should be performed during initial evaluation to assess cardiac structure and function.
https://www.jacc.org/doi/10.1016/j.jacc.2021.12.012

[2] Echocardiographic Assessment of the Right Heart in Adults and Special Considerations in Pulmonary Hypertension
American Society of Echocardiography · 2025-03-03 12:00:00
Comprehensive echocardiographic assessment is crucial for identifying the mechanism and severity of tricuspid regurgitation; echocardiography is the primary tool for screening, prognostication, and monitoring of therapeutic response in pulmonary hypertension, and right heart chamber size/function/hemodynamics are integral to classification and severity grading.
https://www.asecho.org/wp-content/uploads/2025/03/PIIS0894731725000379.pdf

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120. MedQA question ID 488 Step 1

Question

A 38-year-old woman presents with eye dryness and a foreign body sensation in the eyes. On physical examination, the oral cavity shows mucosal ulceration and atrophy. Biopsy of the lower lip shows marked lymphocytic infiltration of the minor salivary glands. Which of the following is most likely seen in this patient?

(A) Anti-Sjögren's syndrome type B (SS-B) antibody

(B) Anti-centromere antibody

(C) Anti-Jo-1 antibody

(D) Anti-Scl-70 antibodies

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely finding is anti-Sjögren syndrome type B (SS-B/La) antibody; this patient's **dry eyes, dry mouth/oral mucosal atrophy, and minor salivary gland lymphocytic infiltration on lip biopsy** are classic for **Sjögren disease**. The **British Society for Rheumatology** notes that when clinical suspicion of Sjögren disease is high, **ENA testing should be performed even if ANA is negative** [1], and reviews of Sjögren syndrome describe **anti-Ro/SSA and anti-La/SSB** as the key autoantibodies associated with diagnosis [2] [3].

Why the other choices are less likely

- **Anti-centromere antibody** is more associated with limited cutaneous systemic sclerosis/CREST, not the sicca syndrome with salivary gland lymphocytic sialadenitis.
- **Anti-Jo-1 antibody** suggests idiopathic inflammatory myopathy/antisynthetase syndrome.
- **Anti-Scl-70 antibody** is associated with diffuse systemic sclerosis.

Answer: A. Anti-Sjögren syndrome type B (SS-B) antibody.

References

[1] Management of Adult and Juvenile Onset Sjögren Disease

British Society for Rheumatology · 2025-02-01 00:00:00

Do not measure ANA in the absence of clinical indicators of SD or other CTD (1, C) (SOA 94.6%). Use ANA as a screening antibody where there is clinical suspicion of a CTD (1, C) (SOA 93.9%). Measure ENA even if the ANA is negative if there is a high index of suspicion of SD (1, C) (SOA 96.7%).

https://academic.oup.com/rheumatology/article/64/2/409/7645909?login=false

[2] Primary Sjögren's syndrome.

Best practice & research. Clinical rheumatology · 2016-02-01

Sjögren's syndrome is an autoimmune disease characterized by lymphocytic infiltration of the tear and salivary glands. The diagnosis of pSS is complex and requires a stepwise approach to evaluate symptoms of ocular and oral dryness, objective measures of lacrimal and salivary gland dysfunction, and evidence of autoimmunity with Ro/La autoantibodies.

10.1016/j.berh.2016.04.003

[3] Autoantibodies in Sjögren's syndrome and its classification criteria.

Journal of translational autoimmunity · 2022-01-01

Anti-Ro/SSA and anti-La/SSB antibodies have been useful biomarkers for disease classification and diagnosis.

10.1016/j.jtauto.2021.100138

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121. MedQA question ID 632 Step 2/3

Question

A 41-year-old woman presents with shortness of breath that is worse when she lies on her left side. About 10 days ago, she had an episode of unexplained loss of consciousness. Past medical history is negative and family history is irrelevant. Clinical examination shows a diastolic murmur, which is prominent when she lies on her left side. Jugular venous distention is present, and chest examination reveals fine crackles that do not clear with coughing. Chest X-ray shows pulmonary congestion, and 2-dimensional echocardiogram shows a mass in the left atrium attached to the atrial septum. Which of the following is the most likely diagnosis?

(A) Rheumatic fever

(B) Innocent murmur

(C) Non-bacterial thrombotic endocarditis

(D) Atrial myxoma

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most likely diagnosis is an atrial myxoma: a benign primary cardiac tumor that classically arises from the **left atrium and attaches to the atrial septum/fossa ovalis**, where it can intermittently obstruct the mitral valve and cause positional dyspnea, syncope, pulmonary congestion, and a diastolic murmur that varies with position [1] [2]. The echocardiographic finding of a **left atrial mass attached to the interatrial septum** strongly supports this diagnosis over rheumatic fever, innocent murmur, or non-bacterial thrombotic endocarditis [1] [2].

Why this fits best

- **Positional symptoms and murmur**: left atrial myxomas commonly cause obstruction-related symptoms that may worsen with body position and can mimic mitral stenosis physiology [1] [2].
- **Imaging pattern**: atrial myxomas are typically **pedunculated** and attached to the **left side of the atrial septum/fossa ovalis** on echocardiography [1].
- **Clinical consequence**: they may cause **syncope, dyspnea, pulmonary hypertension, and heart failure-like findings** due to intermittent inflow obstruction [1] [2].

Best answer

D. Atrial myxoma

References

[1] Cardiac myxomas: clinical presentation, diagnosis and management.

Heart · 2022-05-12

Cardiac myxomas are benign neoplasms developed from multipotent mesenchyme and usually present as an undifferentiated atrial mass. They are typically pedunculated and attached at the fossa ovalis, on the left side of the atrial septum. The presence of CM calls for prompt diagnosis and surgical resection.

10.1136/heartjnl-2021-319479

[2] Giant left Atrial Myxoma Induces Mitral Valve Obstruction and Pulmonary Hypertension.

Journal of Clinical and Diagnostic Research · 2016-01-01

Atrial myxomas are the commonest benign primary tumours of the heart. They are generally 2 to 6 cm in size and cause mitral valve obstruction and pulmonary hypertension. Clinical symptoms may suggest the presence of a myxoma, but echocardiography is the mainstay of diagnosis and confirmation is by histopathology.

10.7860/jcdr/2016/14606.7077

122. MedQA question ID 1166 Step 2/3

Question

A 15-year-old girl is brought to the physician by her mother because of worsening grades over the past year. Since she started high school one year ago, her academic performance has decreased. She also has had difficulty finding friends at the new school. She is afraid that her classmates will make fun of her and think that she is “stupid.” One month ago, when she had to give a presentation, she could not stop wondering how her classmates were going to react if she said something wrong. During the presentation, her heart started racing and she became flushed. Since this event, she avoids saying anything in class. She spends her breaks in the restroom because she is worried that nobody will talk to her. Physical and neurologic examinations show no abnormalities. On mental status examination, the girl avoids eye contact and appears uncomfortable and anxious. Which of the following is the most appropriate pharmacotherapy for this patient's condition?

(A) Clomipramine

(B) Phenelzine

(C) Fluoxetine

(D) Propranolol

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Fluoxetine is the best choice among the listed options for this adolescent with **social anxiety disorder**; **propranolol** may help isolated performance anxiety but does not treat the broader disorder, and **clomipramine** or **phenelzine** are not preferred first-line agents in adolescents [1] [2]. In children and adolescents with anxiety disorders, the **World Health Organization (WHO)** emphasizes **psychotherapy first**, with medication used selectively; when pharmacotherapy is used, **SSRIs** are the usual choice, and fluoxetine has supportive pediatric evidence [1] [3].

Why this fits

- The vignette describes **fear of negative evaluation, avoidance of speaking in class, and social impairment**, which is most consistent with **social anxiety disorder**.
- For pediatric anxiety, the evidence base supports **SSRIs** rather than tricyclics, MAO inhibitors, or as-needed beta-blockers for ongoing symptom control [1] [3].
- A randomized trial in children/adolescents with social phobia found **fluoxetine** improved symptoms versus placebo, though psychotherapy remains important [3].

Answer

C. Fluoxetine

References

[1] Mental, Neurological and Substance Use Disorders
World Health Organization · 2023-11-20 00:00:00
Pharmacological interventions are not recommended in children and adolescents with anxiety disorders.
https://www.who.int/publications/i/item/9789240084278

[2] Pharmacological treatment of anxiety disorders in children and adolescents: a review for practitioners.
Translational pediatrics · 2018-01-01
Anxiety disorders are common in children and adolescents. A combined approach to treatment consists of psychotherapy (especially exposure-based cognitive behavior therapy), family and patient education, and use of medication if indicated. SSRIs are the drugs of choice. The safety and efficacy of medications other than SSRIS are not fully established.
10.21037/tp.2017.08.05

[3] Do pharmacological and behavioral interventions differentially affect treatment outcome for children with social phobia?
Behavior modification · 2011-09-01
In a randomized trial for children with social phobia, Social Effectiveness Therapy for Children and fluoxetine were more effective than pill placebo in reducing social distress and behavioral avoidance.
10.1177/0145445511408590

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123. MedQA question ID 352 Step 2/3

Question

Five days after undergoing an emergency appendectomy under general inhalational anesthesia while on a trip to Haiti, a 43-year-old woman develops low-grade fever, vomiting, and abdominal pain. During the surgery, she received a transfusion of 1 unit of packed red blood cells. Three days after the surgery, she was stable enough to be transported back to the United States. She has no history of serious illness and takes no medications. Her temperature is 38.3°C (100.9°F), pulse is 80/min, and blood pressure is 138/76 mm Hg. Examination shows jaundice of the skin and conjunctivae. Abdominal examination shows moderate tenderness over the liver. The liver is palpated 2 to 3 cm below the right costal margin. Laboratory studies show:
Hemoglobin count 12.0 g/dL
Leukocyte count 10,400 mm3
Segmented neutrophils 55%
Bands 1%
Eosinophils 13%
Lymphocytes 28%
Monocytes 3%
Platelet count 160,000 mm3
Serum
Alkaline phosphatase 102 U/L
Aspartate aminotransferase 760 U/L
Bilirubin
Total 3.8 mg/dL
Direct 3.1 mg/dL
Anti-HAV IgG positive
Anti-HAV IgM negative
Anti-HBs positive

HBsAg negative
Anti-HCV antibodies negative
Abdominal ultrasonography shows an enlarged liver. A biopsy of the liver shows massive centrilobular necrosis. Which of the following is the most likely underlying cause of this patient's condition?"

(A) Adverse effect of anesthetic

(B) Gram negative bacteria in the bloodstream

(C) Acalculous inflammation of the gallbladder

(D) Excessive lysis of red blood cells

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

(A) Adverse effect of anesthetic is most likely. The presentation is most consistent with **idiosyncratic drug-induced liver injury from a halogenated inhalational anesthetic**: fever, eosinophilia, jaundice, marked aminotransferase elevation, and **massive centrilobular necrosis** are classic for anesthetic hepatitis, which is an immune-mediated, non–dose-dependent reaction [1] [2]. AASLD notes that idiosyncratic DILI has variable latency and histology, and the biopsy pattern here supports drug-induced injury rather than hemolysis, bacteremia, or gallbladder inflammation [1].

Why the other choices are less likely

- **Gram-negative bacteria in the bloodstream** would more typically cause sepsis with secondary liver injury, not this characteristic eosinophilic, centrilobular necrotizing hepatitis pattern [1] [2].
- **Acalculous cholecystitis** can occur after surgery/critical illness, but it does not explain the biopsy finding of **massive centrilobular necrosis** as well as anesthetic DILI does [1].
- **Excessive lysis of red blood cells** would cause predominantly indirect hyperbilirubinemia and anemia, not severe transaminitis with eosinophilia and centrilobular necrosis [1] [2].

Key point

The likely underlying mechanism is **immune-mediated halogenated anesthetic hepatitis**, a form of **idiosyncratic DILI** [1] [2].

References

[1] Drug, Herbal and Dietary Supplement Induced Liver Injury
American Association for the Study of Liver Diseases · 2022-07-25 12:00:00
Idiosyncratic DILI is believed to arise from an aberrant adaptive host immune response to the drug and/or its metabolite(s).
https://aasldpubs.onlinelibrary.wiley.com/doi/10.1002/hep.32689

[2] Hepatotoxicity of halogenated inhalational anesthetics.
Iranian Red Crescent medical journal · 2014-09-01
Halogenated inhalational anesthetics are the most common drugs used for the induction and maintenance of general anesthesia. Postoperative hepatic injury has been reported after exposure to these agents. The mechanism of liver toxicity

is more likely to be immunoallergic. Halothane, enflurane, isoflurane and desfluranes are metabolized through the metabolic pathway involving cytochrome P-450 2E1 and produce trifluoroacetylated components.
10.5812/ircmj.20153

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124. MedQA question ID 639 Step 1

Question

A 1-month-old girl is brought to the pediatrician by her parents. They are concerned that she becomes lethargic and irritated between meals. They found that feeding her often with small servings helps. She was born at 39 weeks via spontaneous vaginal delivery and is meeting all developmental milestones. Her mother has one brother that occasionally requires blood transfusions. Today, her blood pressure is 55/33 mm Hg, his heart rate is 120/min, respiratory rate is 40/min, and temperature of 37.0°C (98.6°F). On physical exam, the infant is irritated. She is slightly jaundiced. Her heart has a regular rate and rhythm and her lungs are clear to auscultation bilaterally. Her blood work shows normocytic anemia with elevated reticulocyte count and decreased haptoglobin. Sickle cell anemia and other hemoglobinopathies are also ruled out. A Coombs test is negative. Red blood cell osmotic fragility gap is normal. The physician determined that these findings are related to an enzyme deficiency. Which of the following allosterically inhibits this enzyme?

(A) Alanine

(B) Adenosine monophosphate

(C) Fructose 1,6-bisphosphate

(D) Fructose 2,6-bisphosphate

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Alanine is the allosteric inhibitor of **pyruvate kinase**. In pyruvate kinase deficiency, the enzyme is an allosterically regulated glycolytic enzyme, and **fructose 1,6-bisphosphate** is its allosteric activator, not inhibitor [1]. **ATP** also inhibits pyruvate kinase allosterically, but it is not one of the answer choices here [2].

Why this fits the case

The infant has **Coombs-negative hemolytic anemia** with jaundice and a normal osmotic fragility test, which is consistent with a red blood cell enzyme defect such as pyruvate kinase deficiency after sickle cell disease and hemoglobinopathies are excluded [1] [3].

References

[1] Molecular heterogeneity of pyruvate kinase deficiency
Haematologica · 2020-07-23

Pyruvate kinase (PK) is an allosterically regulated glycolytic enzyme that catalyzes the irreversible conversion of phosphoenolpyruvate to pyruvate, with the synthesis of one molecule of ATP. Since mature red blood cells totally depend on the ATP generated by glycolysis for maintaining cell integrity and function, PK plays a crucial role in erythrocyte metabolism; insufficient energy production may impair red blood cell homeostasis, leading to premature removal of PK-deficient erythrocytes from the circulation by the spleen.
10.3324/haematol.2019.241141

[2] Molecular heterogeneity of pyruvate kinase deficiency
Haematologica · 2020-07-23
AG-348 is an allosteric activator of PK-R that binds in a pocket at the dimer-dimer interface, distinct from the allosteric activator fructose 1,6 bisphosphate binding domain, inducing the active R-state conformation of the PK-R tetramer.
10.3324/haematol.2019.241141

[3] The variable manifestations of disease in pyruvate kinase deficiency and their management
Haematologica · 2020-03-12
PKD should be suspected in patients with an unexplained chronic Coombs-negative hemolytic anemia following an unrevealing standard hemolytic anemia evaluation. The first test to perform in cases of suspected PKD is the PK enzyme assay.
10.3324/haematol.2019.240846

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125. MedQA question ID 205 Step 2/3

Question

A 34-year-old woman is assaulted and suffers a number of stab wounds to her abdomen. Bystanders call paramedics and she is subsequently taken to the nearest hospital. On arrival to the emergency department, her vitals are T: 36 deg C, HR: 110 bpm, BP: 100/60, RR: 12, SaO2: 99%. A FAST and abdominal CT are promptly obtained which are demonstrated in Figures A and B, respectively. Her chart demonstrates no other medical problems and vaccinations/boosters up to date. The patient is diagnosed with a Grade V splenic laceration and is immediately brought to the OR for emergent splenectomy. The splenectomy is successfully performed with removal of the damaged spleen (Figure C). Following the operation, the patient should receive which of the following vaccines: (I) H. influenzae (II) Tetanus (III) N. meningitidis (IV) S. pneumoniae (V) Hepatitis B

(A) I, II

(B) I, III, IV

(C) I, V

(D) III, IV

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Following emergent splenectomy, the patient should receive Haemophilus influenzae type b (Hib), Neisseria meningitidis, and Streptococcus pneumoniae vaccines; **tetanus** is given only if indicated by routine status or wound management, and **hepatitis B** is not specifically indicated just because of splenectomy [1] [2] [3]. The Centers for Disease Control and Prevention (CDC) recommends **1 dose of Hib** for adults with anatomical or functional asplenia if not previously received, **MenACWY** 2-dose primary series for asplenia, and pneumococcal vaccination with **PCV20/PCV21 alone or PCV15 followed by PPSV23** for adults with asplenia [1] [2] [3].

Which options are correct?

- **(I) Haemophilus influenzae — Yes** [1] [2]
- **(II) Tetanus — No, not specifically for splenectomy**; only give based on routine vaccination or wound indications [4]
- **(III) Neisseria meningitidis — Yes** [2]
- **(IV) Streptococcus pneumoniae — Yes** [3]
- **(V) Hepatitis B — No, not because of splenectomy alone** [5]

Practical note

For **elective** splenectomy, Hib is preferably given **at least 14 days before surgery**; after emergent splenectomy, vaccines are typically given postoperatively when the patient is clinically stable [1].

References

[1] Adult Immunization Schedule for Ages 19 Years or Older, United States, 2025

Centers for Disease Control and Prevention · 2024-11-21 12:00:00

Anatomical or functional asplenia (including sickle cell disease): 1 dose if previously did not receive Hib vaccine. Elective splenectomy: 1 dose preferably at least 14 days before splenectomy.

https://www.cdc.gov/vaccines/hcp/imz-schedules/adult-age.html

[2] Recommended Adult Immunization Schedule: United States, 2024

Centers for Disease Control and Prevention · 2024-01-12 12:00:00

Anatomical or functional asplenia (including sickle cell disease): 2-dose series MenACWY (Menveo or MenQuadfi) at least 8 weeks apart and revaccinate every 5 years if risk remains.

https://www.acpjournals.org/doi/10.7326/M23-3269

[3] Adult Immunization Schedule for Ages 19 Years or Older, United States, 2025

Centers for Disease Control and Prevention · 2024-11-21 12:00:00

Age 19–64 years with certain underlying medical conditions or other risk factors who have congenital or acquired asplenia: if not previously received a PCV13, PCV15, PCV20, or PCV21 or whose previous vaccination history is unknown, give 1 dose PCV15 or 1 dose PCV20 or 1 dose PCV21; if PCV15 is used, administer 1 dose PPSV23 at least 1 year after the PCV15 dose.

https://www.cdc.gov/vaccines/hcp/imz-schedules/adult-age.html

[4] Recommended Adult Immunization Schedule: United States, 2024

Centers for Disease Control and Prevention · 2024-01-12 12:00:00

Completed primary series and received at least 1 dose Tdap at age 10 years or older: Td or Tdap every 10 years thereafter. Wound management: for clean and minor wounds, administer Tdap or Td if more than 10 years since last dose; for all other wounds, administer Tdap or Td if more than 5 years since last dose.

https://www.acpjournals.org/doi/10.7326/M23-3269

[5] Adult Immunization Schedule for Ages 19 Years or Older, United States, 2025

Centers for Disease Control and Prevention · 2024-11-21 12:00:00

Age 19 through 59 years: complete a 2- or 3- or 4-dose series HepB vaccine series. Risk factors for hepatitis B virus infection are listed separately; splenectomy is not listed as an indication.
https://www.cdc.gov/vaccines/hcp/imz-schedules/adult-age.html

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126. MedQA question ID 992 Step 1

Question

A 55-year-old male with a history of stage I colon cancer status-post left hemicolectomy presents to your office for follow-up. You intend to discuss the results from his recent surveillance colonoscopy, which showed no remaining cancer, no polyps, and a well-healed anastmosis. During your meeting, you note that the patient is exhibiting the defense mechanism of suppression. Which of the following statements from the patient is consistent with your impression?

(A) "Last week I volunteered for the local Cancer Society. Helping other cancer patients just makes me feel better."

(B) "Oh, doctor, I'm just so grateful to be seeing you. I just know you've cured my cancer. I probably don't even need to check anymore."

(C) "I'm sorry I was late today. I also didn't get any of the labs you asked for."

(D) "I really haven't thought about the colonoscopy until today. Worrying before getting the results wasn't going to help anything."

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The statement most consistent with **suppression** is **D**. **Suppression** is a conscious effort to set aside a distressing thought for the moment, which fits "I really haven't thought about the colonoscopy until today. Worrying before getting the results wasn't going to help anything." In contrast, **A** is more consistent with **sublimation**, **B** with **denial**, and **C** does not describe suppression. A review of defense mechanisms in cancer patients and a meta-analysis in cancer survivors both support that suppression is a recognized coping/defense style in this setting [1] [2].

Best answer

- **D. "I really haven't thought about the colonoscopy until today. Worrying before getting the results wasn't going to help anything."**

Why the others are less likely

- **A**: channeling distress into helping others is more like **sublimation**.
- **B**: refusing to acknowledge illness or its implications is more like **denial**.
- **C**: suggests missed tasks and apologies, not a defense mechanism of suppression.

Evidence note

- In cancer populations, defense/suppression styles are recognized and have been associated with psychological distress, but the specific multiple-choice distinction here is primarily conceptual rather than guideline-driven [1] [2].

References

[1] Defense mechanisms in cancer patients: a systematic review.
Journal of Psychosomatic Research · 2018-12-01
The importance of defense mechanisms in cancer progression and adaptation have been observed, but few studies referred to the generally accepted hierarchical organization of defenses and used validated measurements for defensive assessment. The early detection of maladaptive defensive functioning may foster appropriate psychotherapeutic intervention and prevent worsening of the illness.
10.1016/j.jpsychores.2018.10.016

[2] Emotion regulation and psychological distress in cancer survivors: A systematic review and meta-analysis.
Stress and Health · 2021-02-01
A systematic review and meta-analysis sought to estimate the associations between emotion regulation patterns (repression, suppression, experiential avoidance and cognitive reappraisal) and psychological distress among cancer survivors. Seven studies focussing on suppression were included. The study suggests suppression is related to elevated levels of psychological distress.
10.1002/smi.2972

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127. MedQA question ID 1047 Step 2/3

Question

A 57-year-old woman comes to the physician because of a 3-month history of fatigue. She also reports generalized itchiness that started approximately 2 months ago. Two weeks ago, she noticed yellowing of her eyes. She does not smoke or drink alcohol. She uses eyedrops for persistent dryness of the eyes. Her vital signs are within normal limits. Physical examination shows jaundice of the conjunctivae and skin. The mucous membranes of the mouth are dry. The abdomen is soft. The liver edge is palpable 3 cm below the right costal margin. There are generalized skin excoriations. Laboratory studies show:
Hemoglobin 15 g/dL
Leukocyte count 7,700/mm3
Platelet count 332,000/mm3
Serum
Glucose 122 mg/dL
Total bilirubin 3.1 mg/dL
Direct 2.5 mg/dL
Alkaline phosphatase 452 U/L
AST 155 U/L
ALT 168 U/L
Hepatitis B surface antigen negative
Hepatitis B core IgM antibody negative
Hepatitis B surface antibody positive
Hepatitis C antibody negative

Ultrasonography of the abdomen shows mildly increased echogenicity of the liver. Which of the following additional findings is most likely to be found in this patient?"

(A) Inferior vena cava thrombosis

(B) Cutaneous xanthomas

(C) Increased CA 19-9 levels

(D) Kayser-Fleischer rings
"

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely additional finding is cutaneous xanthomas (B). This presentation is most consistent with **primary biliary cholangitis (PBC)**: a middle-aged woman with cholestatic liver tests, pruritus, jaundice, and sicca symptoms. The **American Association for the Study of Liver Diseases (AASLD)** states that PBC is diagnosed when 2 of 3 features are present: cholestatic ALP elevation, PBC-specific autoantibodies (especially antimitochondrial antibody, or AMA), or compatible histology [1].

Why this fits PBC

- PBC commonly affects **middle-aged women** and is characterized by **cholestasis**, **pruritus**, and **fatigue** [1] [5].
- Sicca symptoms (dry eyes and dry mouth) are common extrahepatic autoimmune features in PBC, and autoimmune overlap is frequent [5].
- **Cutaneous xanthomas** can occur in cholestatic disease from hypercholesterolemia and are a classic associated finding in PBC.

Why the other options are less likely

- **Inferior vena cava thrombosis** is not a typical finding of PBC.
- **Increased CA 19-9 levels** are more suggestive of cholangiocarcinoma or other biliary malignancy, not uncomplicated PBC.
- **Kayser-Fleischer rings** point toward Wilson disease, which does not match this age or cholestatic autoimmune pattern.

Practical note

For symptomatic pruritus in PBC, the **AASLD** recommends **cholestyramine** as initial therapy, with rifampin, naltrexone, or sertraline for refractory symptoms [2]. **Ursodeoxycholic acid (UDCA) 13 to 15 mg/kg/day orally** is recommended for PBC with abnormal liver enzymes [3].

References

[1] Primary Biliary Cholangitis
American Association for the Study of Liver Diseases · 2021-08-24 12:00:00

The diagnosis of PBC can be established when two of the following three criteria are met: Biochemical evidence of cholestasis based on ALP elevation; Presence of AMA, or other PBC-specific autoantibodies, including sp100 or gp210, if AMA is negative; Histologic evidence of nonsuppurative destructive cholangitis and destruction of interlobular bile ducts
https://aasldpubs.onlinelibrary.wiley.com/doi/10.1002/hep.32117

[2] Primary Biliary Cholangitis
American Association for the Study of Liver Diseases · 2021-08-24 12:00:00
Anion-exchange resins should be used as initial therapy for patients with PBC who have pruritus.
https://aasldpubs.onlinelibrary.wiley.com/doi/10.1002/hep.32117

[3] Primary Biliary Cholangitis
American Association for the Study of Liver Diseases · 2021-08-24 12:00:00
UDCA in a dose of 13 to 15 mg/kg/day orally is recommended for patients with PBC who have abnormal liver enzyme values regardless of histologic stage.
https://aasldpubs.onlinelibrary.wiley.com/doi/10.1002/hep.32117

[5] Risk stratification in autoimmune cholestatic liver diseases: Opportunities for clinicians and trialists
Hepatology (Baltimore, Md.) · 2015-11-26
Pruritus and fatigue are frequent symptoms associated with cholestasis and approximately 60% of patients with PBC are asymptomatic at diagnosis, with as few as 5% remaining symptom free over time. Although a consensus biological explanation for fatigue is lacking, presenting age and sex heavily influence the clinical phenotype, with young women (a group failing UDCA therapy more commonly) having the greatest symptom burden.
10.1002/hep.28128

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128. MedQA question ID 521 Step 2/3

Question

A 62-year-old man presents to the emergency department with crushing chest pain (10/10 in severity), radiating to the left side of the neck and the left arm. His symptoms started 20 minutes ago while shaving. He also feels nauseated, lightheaded and short of breath. He has had type 2 diabetes for 27 years and essential hypertension for 19 years. He has smoked 20–30 cigarettes per day for the past 35 years. Family history is irrelevant. His temperature is 36.9°C (98.4°F), the blood pressure is 115/72 mm Hg and the pulse is 107/min. Physical examination is unremarkable. ECG is shown in the image. Troponins are elevated. The patient is admitted to a unit with continuous cardiac monitoring. Aspirin, clopidogrel, sublingual nitroglycerin, and morphine are given immediately and the patient now rates the pain as 4–5 out of 10. Which of the following is the best next step in the management of this patient condition?

(A) Percutaneous coronary intervention

(B) Intravenous alteplase

(C) Coronary artery bypass graft

(D) Oral ramipril

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Immediate primary percutaneous coronary intervention (PCI) is the best next step. The **American College of Cardiology/American Heart Association (ACC/AHA)** ACS guideline recommends **primary PCI for STEMI presenting within 12 hours of symptom onset**, with a goal of **first medical contact-to-device time ≤90 minutes** (or **≤120 minutes** if transfer is required) [1] [2] [3]. **IV alteplase** is reserved for STEMI only when timely PCI cannot be achieved and there is no contraindication; **CABG** and **oral ramipril** are not the immediate reperfusion strategy in this setting [4].

Why PCI over the other options

- **PCI** is preferred because this presentation is consistent with an acute STEMI/NSTEMI-spectrum ACS with elevated troponin and ischemic symptoms, and the guideline-supported reperfusion strategy for STEMI within 12 hours is primary PCI [1] [2] [3].
- **IV alteplase** is the fallback reperfusion option when PCI will be delayed beyond the recommended window or is unavailable; it is not the preferred next step here [4].
- **CABG** is typically considered for selected anatomy or failed/unsuitable PCI, not as the initial emergency reperfusion step in a stable patient with presumed STEMI [1].
- **Oral ramipril** is secondary medical therapy and does not replace urgent reperfusion [1].

References

[1] Management of Patients With Acute Coronary Syndromes

American College of Cardiology, American College of Emergency Physicians, American Heart Association, Society for Cardiovascular Angiography and Interventions · 2025-02-27 00:00:00

In patients with suspected STEMI, immediate emergency medical services transport to a PCI-capable hospital for primary PCI is the recommended triage strategy, with an FMC-to-first-device time system goal of ≤90 minutes.

https://www.jacc.org/doi/10.1016/j.jacc.2024.11.009

[2] Management of Patients With Acute Coronary Syndromes

American College of Cardiology, American College of Emergency Physicians, American Heart Association, Society for Cardiovascular Angiography and Interventions · 2025-02-27 00:00:00

In patients with STEMI presenting <12 hours after symptom onset, PPCI should be performed with a goal of FMC to device activation of ≤90 minutes, or ≤120 minutes in patients requiring hospital transfer, to improve survival.

https://www.jacc.org/doi/10.1016/j.jacc.2024.11.009

[3] Management of Patients With Acute Coronary Syndromes

American College of Cardiology, American College of Emergency Physicians, American Heart Association, Society for Cardiovascular Angiography and Interventions · 2025-02-27 00:00:00

In patients with STEMI and an estimated time from FMC to device activation of ≤120 minutes or those with a contraindication to fibrinolytic therapy, transfer to a PCI-capable hospital for PPCI is recommended to reduce MACE.

https://www.jacc.org/doi/10.1016/j.jacc.2024.11.009

[4] Management of Patients With Acute Coronary Syndromes

American College of Cardiology, American College of Emergency Physicians, American Heart Association, Society for Cardiovascular Angiography and Interventions · 2025-02-27 00:00:00

In patients with STEMI and symptom onset of 120 minutes from FMC, fibrinolytic therapy should be administered in patients without contraindication to reduce MACE.

https://www.jacc.org/doi/10.1016/j.jacc.2024.11.009

129. MedQA question ID 819 Step 2/3

Question

A 17-year-old girl is brought to the physician because she has not attained menarche. There is no personal or family history of serious illness. She is 168 cm (5 ft 5 in) tall and weighs 63 kg (139 lb); BMI is 22.3 kg/m2. Examination shows normal breast development. Scant axillary hair is present. Abdominal examination shows a firm, nontender left inguinal mass. Pelvic examination shows a blind vaginal pouch. Ultrasonography does not show a uterus or ovaries. Which of the following is the most likely underlying cause of this patient's symptoms?

(A) 5-α reductase deficiency

(B) Sex chromosome mosaicism

(C) Sex chromosome monosomy

(D) Androgen insensitivity

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Androgen insensitivity is the most likely cause. This presentation is classic for **complete androgen insensitivity syndrome (CAIS)**: a phenotypic female with **primary amenorrhea**, **normal breast development**, **scant axillary/pubic hair**, a **blind vaginal pouch**, **absent uterus**, and **inguinal testes** due to **androgen receptor resistance in a 46,XY individual** [1] [2].

Why this fits best

- **Normal breast development** occurs because testicular testosterone is aromatized to estrogen.
- **Scant axillary hair** reflects lack of androgen action.
- **No uterus** is expected because anti-Müllerian hormone from the testes causes Müllerian regression.
- The **firm inguinal mass** is most consistent with an undescended testis.

Why the other options are less likely

- **5-alpha reductase deficiency**: often has ambiguous genitalia at birth and virilization at puberty, but the classic finding is not a completely female phenotype with scant body hair.
- **Sex chromosome mosaicism** and **sex chromosome monosomy** more often cause gonadal dysgenesis, which typically leads to absent or incomplete pubertal development and usually does not produce a blind vaginal pouch with inguinal testes.

Most likely underlying cause: an androgen receptor mutation causing complete androgen insensitivity syndrome.

References

[1] Androgen insensitivity syndrome: a review.
Journal of Endocrinological Investigation · 2023-11-01
Androgen insensitivity syndrome (AIS) is a disorder characterized by peripheral androgen resistance due to androgen receptor mutations in subjects with 46 XY karyotype. Clinical suspicion can arise at pubertal age in complete AIS due to development of female secondary sex characteristics, primary amenorrhea, and absence of female primary sex characteristics (uterus and ovaries).
10.1007/s40618-023-02127-y

[2] Complete Androgen Insensitivity Syndrome: From Bench to Bed.
International Journal of Molecular Sciences · 2021-01-27
Complete androgen insensitivity syndrome (CAIS) is due to resistance to the action of androgens. CAIS is caused by inactivating mutations in the androgen receptor gene (AR). CAIS mainly presents as primary amenorrhea in an adolescent female or as a bilateral inguinal/labial hernia containing testes in prepubertal children.
10.3390/ijms22031264

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130. MedQA question ID 710 Step 2/3

Question

A 62-year-old man comes to the emergency department because of right-sided back pain, nausea, and dark urine. He reports alternating episodes of decreased urine output followed by a temporary increase in urine output for the past 2 days. In the past year, he has had two urinary tract infections. He has Crohn disease and underwent a small bowel resection 5 years ago. He currently takes mesalamine and a multivitamin. His father had recurrent kidney stones. His vital signs are within normal limits. Examination shows right costovertebral angle tenderness. Urinalysis shows 70 RBC/hpf and envelope-shaped crystals. A CT scan of the abdomen shows a 6-mm stone in the proximal right ureter and two 4-mm stones in the left kidney. Which of the following factors has most likely contributed most to this patient's current condition?

(A) Parathyroid gland adenoma

(B) Excess vitamin D

(C) Malabsorption of fatty acids

(D) High urine pH

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Malabsorption of fatty acids is the most likely contributor. This patient's **Crohn disease with prior small-bowel resection** strongly suggests **enteric hyperoxaluria**, which predisposes to **calcium oxalate stones**; the envelope-shaped crystals on urinalysis are consistent with calcium oxalate, and Crohn disease is recognized as being associated with nephrolithiasis [1] [2]. Fat

malabsorption increases intestinal oxalate absorption, raising urinary oxalate and calcium oxalate supersaturation [2] [3].

Why the other choices are less likely

- **Parathyroid gland adenoma** would suggest hypercalcemia and recurrent calcium stones, but the stem points instead to **enteric hyperoxaluria** from bowel disease/resection [2] [3].
- **Excess vitamin D** can increase calcium absorption and hypercalciuria, but there is no supporting history here [2].
- **High urine pH** is more typical of **calcium phosphate** or struvite stone formation, not the **calcium oxalate** pattern suggested by the crystals [2] [3].

References

[1] Management of Crohn's Disease in Adults
American College of Gastroenterology · 2025-06-03 12:00:00
Other extraintestinal complications of CD include thromboembolic (both venous and arterial), metabolic bone diseases, osteonecrosis, cholelithiasis, and nephrolithiasis.
https://journals.lww.com/ajg/fulltext/2025/06000/acg_clinical_guideline__management_of_crohn_s.14.aspx?context=featuredarticles&collectionid=2

[2] The management of patients with enteric hyperoxaluria.
Urolithiasis · 2016-02-01
Enteric hyperoxaluria is a common occurrence in the setting of fat malabsorption, usually due to intestinal resection or intestinal bypass surgery. Patients are at increased risk of urolithiasis and loss of kidney function from oxalate nephropathy. Dietary therapy consists of limiting oxalate and fat intake. The primary medical intervention is the use of oral oxalates binding agents such as calcium salts.
10.1007/s00240-015-0846-5

[3] Renal histopathology and crystal deposits in patients with small bowel resection and calcium oxalate stone disease.
Kidney international · 2010-08-01
The kidneys of 11 patients with renal stones following small bowel resection, including 10 with Crohn's disease and 1 resection in infancy for unknown cause. Risks of formation included hyperoxaluria (urine oxalate excretion greater than 45 mg per day) in half of the cases, and acidic urine of reduced volume.
10.1038/ki.2010.131

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131. MedQA question ID 626 Step 2/3

Question

A 21-year-old man is brought to the emergency department 30 minutes after being found unconscious in his apartment by his mother. On arrival, he is unable to provide history. The mother reports that there is no history of serious illness in the family. The patient appears drowsy and dehydrated. His temperature is 38.5°C (101.3°F), pulse is 110/min, and blood pressure is 170/100 mm Hg. Examination shows several track marks on his forearms and large contusions over his forehead, legs, and back. There is blood coming from the mouth. The patient is catheterized and tea-colored urine is drained. Urinalysis shows:
Urine
pH 5.8
Specific gravity 1.045

Blood 3+
Glucose 3+
Proteins 1+
Ketones 1+
RBC none
WBC 0-1/hpf
Urine toxicology is positive for opiates and cocaine. Intravenous fluids and sodium nitroprusside drip are started. The patient is most likely to have which of the following?"

(A) Low serum potassium

(B) Low blood urea nitrogen

(C) Elevated serum calcium

(D) Elevated serum creatine kinase

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most likely finding is elevated serum creatine kinase (CK). This presentation is most consistent with **rhabdomyolysis** from trauma/prolonged down time and illicit drug use; the **American Association for the Surgery of Trauma** notes that rhabdomyolysis is commonly associated with **tea-colored urine** and that the most commonly implicated laboratory variables include **CK >5× the upper limit of normal or >1000 IU/L**, myoglobin, creatinine, potassium, and AST [1]. The positive heme on urinalysis with **no RBCs** also supports myoglobinuria, and CK typically peaks over the next **24–72 hours** [1] [2].

Why the other options are less likely

- **Low serum potassium** is not the best answer here; rhabdomyolysis more often causes **hyperkalemia** [1].
- **Low blood urea nitrogen** is not characteristic.
- **Elevated serum calcium** is not typical early in rhabdomyolysis; calcium abnormalities are more often **low** initially [2].

Clinical implication

The key next laboratory concern is checking **CK and renal function/electrolytes** and continuing aggressive IV fluids, because rhabdomyolysis can lead to **AKI** [1] [2].

References

[1] Rhabdomyolysis
American Association for the Surgery of Trauma · 2022-01-24 12:00:00
The most commonly implicated variables include elevated serum concentrations of CK (>5× the upper limit of normal or >1000 IU/L), myoglobin, lactate dehydrogenase (LDH), potassium, creatinine, and aspartate aminotransferase (AST). Elevated urine myoglobin provides additional evidence. A low threshold of suspicion in the proper clinical context is warranted to initiate appropriate therapy. A strategy for disease monitoring with serial CK measurement should be

additionally undertaken. Interval CK values should be followed until a peak concentration is identified (typically at 24–72 hours), discontinued once the CK is reliably downtrending.
https://tsaco.bmj.com/content/7/1/e000836

[2] Rhabdomyolysis.
Chest · 2013-09-01
Rhabdomyolysis is a well-known clinical syndrome of muscle injury associated with myoglobinuria, electrolyte abnormalities, and often acute kidney injury. More common causes in hospitalized patients at present include prescription and over-the-counter medications, alcohol, and illicit drugs. Early and aggressive fluid resuscitation is agreed on as the main intervention for preventing and treating AKI.
10.1378/chest.12-2016

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132. MedQA question ID 1071 Step 2/3

Question

A 10-year-old boy is brought to the emergency department because he has not been able to walk since waking up that morning. His mother said that when he tried to get out of bed that he was unable to stand without support. He also complained of prickling in his hands and feet. Three weeks ago, he had a fever, dry cough, and a sore throat. The fever and sore throat subsided a week after they began, but the cough is persisting. He has no history of serious illness and takes no medication. His vital signs are within normal limits. The lungs are clear to auscultation. There is severe weakness in both lower extremities and mild sensory loss of the hands and feet. Knee and ankle jerk reflexes are absent. The remainder of the examination shows no abnormalities. Laboratory studies show:
Hemoglobin 12.0 g/dL
Leukocyte count 6000/mm3
Segmented neutrophils 64%
Eosinophils 2%
Lymphocytes 26%
Monocytes 7%
Platelet count 160,000/mm3
Erythrocyte sedimentation rate 27 mm/h
Serum
Na+ 138 mEq/L
Cl- 101 mEq/L
K+ 4.9 mEq/L
HCO3- 26 mEq/L
Ca2+ 9.7 mg/dL
Creatine kinase 93 U/L
A lumbar puncture is performed; cerebrospinal fluid analysis shows a leukocyte count of 2/mm3, a glucose concentration of 60 mg/dL, and a protein concentration of 91 mg/dL. Which of the following is the most appropriate next step in treatment?"

(A) Intravenous immunoglobulin (IVIG)

(B) Prednisone

(C) Botulism antitoxin

(D) Gabapentin

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Intravenous immunoglobulin (IVIG) is the most appropriate next step. The presentation is most consistent with **Guillain-Barré syndrome (GBS)**: acute symmetric lower-extremity weakness, paresthesias, areflexia, recent respiratory infection, and **CSF albuminocytologic dissociation**. In GBS, **IVIG or plasma exchange** hastens recovery; **corticosteroids are not beneficial** as standard treatment, and botulism is less likely when there is areflexia with a typical postinfectious polyradiculoneuropathy picture [1] [2] [3].

Why IVIG fits best

- GBS typically presents as an **acute/subacute postinfectious polyradiculoneuropathy** with **ascending weakness, sensory symptoms, and diminished reflexes** [1] [2].
- **IVIG and plasma exchange** are the standard disease-directed therapies; either is reasonable, but IVIG is commonly used because it is easier to administer [1] [2] [3].
- The CSF profile here, with **elevated protein and only 2 WBC/mm3**, supports GBS and is not the pattern expected for botulism [1] [2].

Why the other choices are not preferred

- **Prednisone**: not the preferred acute therapy for GBS; the evidence-based treatments are **IVIG or plasma exchange** [1] [2] [3].
- **Botulism antitoxin**: reserved for botulism, which is usually suspected from toxin exposure and a different neuromuscular pattern [4].
- **Gabapentin**: may help neuropathic pain but does not treat the underlying neuropathy [1] [2].

References

[1] Guillain-Barré syndrome.
Lancet (London, England) · 2016-08-13
Guillain-Barré syndrome is the most common and most severe acute paralytic neuropathy. Treatment with intravenous immunoglobulin or plasma exchange is the optimal management approach.
10.1016/S0140-6736(16)00339-1

[2] Guillain-Barré Syndrome.
Mayo Clinic Proceedings · 2017-03-01
Guillain-Barré syndrome is an acute inflammatory immune-mediated polyradiculoneuropathy presenting typically with tingling, progressive weakness, and pain. Supportive care is the mainstay of therapy. Plasma exchange or intravenous immunoglobin hastens recovery.
10.1016/j.mayocp.2016.12.002

[3] Immunotherapy of Guillain-Barré syndrome.
Human Vaccines & Immunotherapeutics · 2018-01-01
Guillain-Barré syndrome is the most common cause of acute neuromuscular weakness and paralysis worldwide. Intravenous immunoglobulin (IVIg) and plasma exchange (PE) are the most commonly prescribed immunotherapies for GBS.
10.1080/21645515.2018.1493415

[4] Diagnosis and Treatment of Botulism

Centers for Disease Control and Prevention · 2021-05-07 12:00:00

The initial evaluation should include possible exposures to the toxin. Botulism, myasthenia gravis, and Guillain-Barré syndrome appear similar, so the distinction must be made rapidly. Tests such as repetitive nerve stimulation (RNS), electromyography (EMG), and nerve conduction studies (NCSs) may aid in diagnosis.

https://www.cdc.gov/mmwr/volumes/70/rr/rr7002a1.htm?s_cid=rr7002a1_w

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133. MedQA question ID 519 Step 2/3

Question

A 36-year-old man is brought to the emergency department 40 minutes after being involved in a shooting. He sustained a gunshot wound in an altercation outside of a bar. On arrival, he is oriented to person but not to place or time. His temperature is 37.3°C (99.1°F), pulse is 116/min, respirations are 18/min, and blood pressure is 79/42 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 97%. Examination shows multiple abrasions over the arms and thorax. There is a 1-cm (0.4-in) entry wound with minimal bleeding on the right side of the chest in the 6th intercostal space at the midclavicular line. Cardiopulmonary examination shows no abnormalities. Abdominal examination shows diffuse mild tenderness to palpation with no guarding or rebound. A focused assessment with sonography shows no obvious free fluid in the pericardium; assessment of the abdomen is equivocal. An x-ray of the chest shows mild opacification of the right lower lobe. Two large-bore cannulas are inserted and intravenous fluid resuscitation is begun. The patient is intubated and mechanical ventilation is begun. Which of the following is the most appropriate next step in management?

(A) CT scan of the chest, abdomen, and pelvis

(B) Local wound exploration

(C) Exploratory laparotomy

(D) Video-assisted thoracoscopic surgery

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Exploratory laparotomy is the most appropriate next step. In a **hemodynamically unstable** patient with a **penetrating thoracoabdominal gunshot wound**, **abdominal tenderness**, and an **equivocal FAST**, operative exploration is favored rather than CT or local wound exploration; CT is for patients who are hemodynamically stable or stabilized, and VATS is for selected thoracic/diaphragmatic injuries rather than shock with suspected intra-abdominal hemorrhage [1] [2].

Why not the other options

- **CT scan of the chest, abdomen, and pelvis**: appropriate only after hemodynamic stabilization; this patient remains in shock despite initial resuscitation [1].
- **Local wound exploration**: may help define superficial wound trajectory in stable patients, but it does not address ongoing hemorrhagic shock or suspected intra-abdominal injury [1].
- **Video-assisted thoracoscopic surgery (VATS)**: considered for selected pulmonary parenchyma or diaphragm injuries, not as the next step for an unstable patient with possible abdominal catastrophe [2].

Best-supported next step

Proceed directly to the operating room for **exploratory laparotomy** with trauma surgery involvement, with readiness to extend the exploration to other thoracoabdominal injuries if identified [1].

References

[1] Management guidelines for penetrating abdominal trauma.
Current Opinion in Critical Care · 2010-12-01
Patients with penetrating abdominal trauma are at risk of harboring life-threatening injuries. Select patients with gunshot wounds can be safely managed nonoperatively. Thoracoabdominal stab wounds should be further evaluated with chest X-ray, ultrasonography, laparoscopy or thoracoscopy. Wounds to the back and flank should be imaged with CT scanning.
10.1097/MCC.0b013e32833f52d2

[2] Management of Chest Wall Injuries
American College of Surgeons · 2025-11-11 12:00:00
Consider the need for VATS to treat pulmonary parenchyma and diaphragm injuries. Diaphragm injuries may be present and require repair.
https://www.facs.org/media/qdgliayt/2025_tr_bestpracticesguidelines_chest-wall.pdf

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134. MedQA question ID 335 Step 1

Question

A 23-year-old man presents with sudden loss of consciousness while pitching in a baseball game. There is no history of injury. Consciousness is regained after cardiopulmonary resuscitation. Past medical history is negative for any neurological and cardiovascular problems. Physical examination reveals a prominent A wave on the jugular venous pulse and a double apical impulse. There are no audible murmurs. An S4 is present. What is the most likely diagnosis?

(A) Hypertrophic cardiomyopathy

(B) Aortic stenosis

(C) Takotsubo cardiomyopathy

(D) Restrictive cardiomyopathy

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely diagnosis is hypertrophic cardiomyopathy (HCM), specifically **obstructive HCM with dynamic left ventricular outflow tract obstruction**. The American College of Cardiology/American Heart Association (ACC/AHA) HCM guideline notes that suspected HCM should be evaluated with a comprehensive history/physical and transthoracic echocardiography, and that exercise-provoked obstruction is relevant when resting gradients are not present [1]. In a young athlete with exertional syncope, a double apical impulse, and an S4, HCM is the best fit; **aortic stenosis** would usually produce a systolic ejection murmur, and **restrictive cardiomyopathy** more typically presents with restrictive filling and atrial dilation rather than this classic athletic-syncope phenotype [1] [2].

Why HCM fits best

- **Exertional syncope** is a classic high-risk presentation in HCM and may be the first manifestation in young athletes [3] [4].
- **Double apical impulse** and **S4** support a hypertrophied, noncompliant left ventricle, which is typical of HCM [3].
- The absence of an audible murmur does **not** exclude HCM; dynamic obstruction can be absent at rest and may require provocative maneuvers or exercise echocardiography to demonstrate [1].

Why the other choices are less likely

- **Aortic stenosis**: usually has a characteristic systolic ejection murmur and does not best explain the overall exam pattern here [1].
- **Takotsubo cardiomyopathy**: is typically an acute stress-induced systolic dysfunction syndrome in older or postmenopausal patients, not a young competitive athlete with this exam [2].
- **Restrictive cardiomyopathy**: classically causes restrictive filling physiology with atrial enlargement and signs of diastolic dysfunction; the retrieved review emphasizes restrictive filling and atrial dilation rather than the athletic exertional-syncope presentation [2].

Answer: A. Hypertrophic cardiomyopathy.

References

[1] Diagnosis and Treatment of Patients With Hypertrophic Cardiomyopathy
American College of Cardiology, American Heart Association, Heart Rhythm Society, American Medical Society for Sports Medicine · 2024-05-08 00:00:00
1. In patients with suspected HCM, a transthoracic echocardiogram (TTE) is recommended in the initial evaluation. 4. For patients with HCM and resting peak LVOT gradient <50 mm Hg, a TTE with provocative maneuvers is recommended.
https://www.jacc.org/doi/10.1016/j.jacc.2024.02.014

[2] Restrictive cardiomyopathy: definition and diagnosis
European Heart Journal · 2022-10-21

The essence of RCM is the coexistence of persistent restrictive physiology, commonly with atrial dilatation, and nondilated ventricles, regardless of ventricular wall thickness and systolic function. Patients with mild increases in ventricular wall thickness and restrictive filling pattern should be considered as possible RCM rather than HCM at first clinical evaluation, as the predominant feature is diastolic impairment.
10.1093/eurheartj/ehac543

[3] Sudden cardiac death: a modern pathology approach to hypertrophic cardiomyopathy.
Archives of pathology & laboratory medicine · 2015-03-01
Hypertrophic cardiomyopathy is one of the most common causes of sudden cardiac death among young adults and adolescents. The first manifestation of the condition may be sudden death during exertion, such as sporting activities. Postmortem examination often reveals asymmetrical septal thickening and mural plaque formation in the left ventricular outflow tract.
10.5858/arpa.2013-0489-rs

[4] Hypertrophic obstructive cardiomyopathy.
Lancet (London, England) · 2017-03-25
Hypertrophic obstructive cardiomyopathy is an inherited myocardial disease. Typical symptoms include dyspnoea, chest pain, palpitations, and syncope. Some patients are at increased risk of sudden cardiac death, heart failure, and atrial fibrillation.
10.1016/S0140-6736(16)31321-6

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135. MedQA question ID 1067 Step 1

Question

A 27-year-old woman, gravida 1, para 0, at 38 weeks' gestation is admitted to the hospital for active labor. The pregnancy was complicated by gestational diabetes and fetal weight is estimated to be at the 90th percentile for gestational age. During delivery, there is an arrest in the second stage of labor, and a vacuum-assisted delivery is performed. Postpartum examination shows a third-degree laceration in the vagina extending into the perineum at the 6 o'clock position. This patient is most likely to experience which of the following complications?

(A) Urge incontinence

(B) Vesicovaginal fistula

(C) Fecal incontinence

(D) Stress incontinence

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Fecal incontinence is the most likely complication after a **third-degree obstetric laceration** because obstetrical anal sphincter injuries (OASIS) involve the anal sphincter and are associated with **anal/fecal incontinence**, rectovaginal fistula, pain, and other pelvic floor disorders [1] [2] [5]. This patient has several classic OASIS risk factors—**primiparity**, **suspected macrosomia**, and

operative vaginal delivery after a prolonged second stage—which further support the diagnosis [1] [4].

Why this is the best choice

- **Third-degree tears** extend into the **anal sphincter complex**; the key late complication is **fecal incontinence** rather than urinary symptoms [1] [2] [5].
- The **American College of Obstetricians and Gynecologists (ACOG)** notes that severe obstetric lacerations are associated with **fecal and urinary incontinence**, pain, and sexual dysfunction, but anal sphincter injury specifically points to fecal incontinence as the classic complication [2] [5].
- Vacuum-assisted delivery and fetal macrosomia are recognized risk factors for OASIS [1] [4].

Why the other options are less likely

- **Urge incontinence** and **stress incontinence** can occur after childbirth, but they are not the hallmark complication of a third-degree perineal tear [1].
- **Vesicovaginal fistula** is not the expected consequence of obstetric anal sphincter injury; it is more associated with severe urogenital tract injury [1].

References

[1] Obstetrical Anal Sphincter Injuries Part I: Prevention, Recognition, and Immediate Management
Society of Obstetricians and Gynaecologists of Canada · 2024-12-23 00:00:00
Obstetrical anal sphincter injuries can lead to significant comorbidities, including anal incontinence, rectovaginal fistula, and pain (moderate). The strongest risk factors for obstetrical anal sphincter injury include: primiparity, fetal macrosomia, operative vaginal delivery, and midline episiotomy (high). Obstetric anal injuries are more commonly associated with forceps-assisted deliveries than with vacuum-assisted deliveries (high).
https://www.jogc.com/article/S1701-2163(24)00542-5/abstract

[2] ACOG Practice Bulletin No. 198: Prevention and Management of Obstetric Lacerations at Vaginal Delivery.
Obstetrics and Gynecology · 2018-09-01
Lacerations are common after vaginal birth. Most of these lacerations do not result in adverse functional outcomes. Severe perineal laceration are associated with increased risk of pelvic floor injury, fecal and urinary incontinence, pain, and sexual dysfunction with symptoms that may persist or present many years after giving birth.
10.1097/aog.0000000000002841

[3] Caesarean section and anal incontinence in women after obstetric anal sphincter injury: A systematic review and meta-analysis
BJOG · 2024-07-04
Anal incontinence (AI), (the involuntary passage of solid/liquid stool or flatus), and faecal incontinence, (the involuntary passage of solid or liquid stool), are life-changing complications of obstetric anal sphincter injury (OASI). The incidence of AI is three times higher in women after OASI than women without; this rises proportionate to degree of injury.
10.1111/1471-0528.17899

[4] Risk Factors for the Development of Obstetric Anal Sphincter Injuries in Modern Obstetric Practice.
Obstetrics and Gynecology · 2018-02-01
The study included all singleton, term, cephalic vaginal deliveries within Kaiser Permanente Northern California between January 2013 and December 2014. Incidence of obstetric anal sphincter injuries, defined as third- or fourth-degree perineal lacerations, was the primary outcome. In bivariate and multivariate analyses, it was higher among women with second stage of labor longer than 2 hours, Asian race, nulliparity, vaginal birth after cesarean delivery, episiotomy, and vacuum delivery.
10.1097/aog.0000000000002444

[5] Practice Bulletin No. 165 Summary: Prevention and Management of Obstetric Lacerations at Vaginal Delivery.
Obstetrics and Gynecology · 2016-07-01

Severe perineal laceration are associated with increased risk of pelvic floor injury, fecal and urinary incontinence, pain, and sexual dysfunction with symptoms that may persist or present many years after giving birth.
10.1097/aog.0000000000001521

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136. MedQA question ID 878 Step 2/3

Question

A 17-year-old high school student was in shop class when he accidentally sawed off his pointer finger while making a bird house. He fainted when he realized his finger had been cut off. The teacher immediately transported the patient to the emergency department and he arrived within 20 minutes. He has a past medical history of asthma, and his only medication is an albuterol inhaler. The patient's current blood pressure is 122/78 mmHg. Analgesics are administered. The teacher states that he left the amputated finger in the classroom, but that the principal would be transporting it to the hospital. Which of the following is the correct method of transporting the amputated finger?

(A) Submerge the finger in ice water

(B) Wrap the finger in moist gauze

(C) Wrap finger in moist gauze, put in a plastic bag, and place on ice

(D) Wrap the finger in moist gauze and submerge in ice water

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The amputated finger should be wrapped in moist gauze, placed in a plastic bag, and then kept on ice; it should not be placed directly in ice water. This is the standard cold-preservation method for transport of an amputated digit before replantation, and the goal is to cool the tissue without freezing or macerating it [1] [2].

Correct choice

- **(C) Wrap the finger in moist gauze, put in a plastic bag, and place on ice** [1] [2]

Why the other choices are wrong

- **Direct submersion in ice water** can damage the tissue and is not the recommended method [1] [2].
- **Moist gauze alone** is incomplete because the amputated part should also be protected in a sealed bag and cooled externally [1] [2].

References

[1] Composite Tissue Preservation

Annals of Plastic Surgery · 2020-06-01

Since the first limb replant, the mainstay of preservation has been static cold storage with moistened gauze over ice.

10.1097/sap.0000000000002194

[2] Upper extremity replantation: current concepts

Plastic and Reconstructive Surgery · 2014-02-01

Replantation of a digit or hand is most successful when performed at a specialized, high-volume center. Cold ischemia time for a digit amputation should not preclude transfer to a Replantation facility, but transferring physicians should thoroughly review the options with patients.

10.1097/01.prs.0000437254.93574.a8

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137. MedQA question ID 1192 Step 2/3

Question

A 19-year-old woman is brought into the emergency department after collapsing during a cheerleading practice session. Her vitals taken by the emergency medical services (EMS) include blood pressure 88/55 mm Hg, pulse 55/min. She was given a liter of isotonic fluid while en route to the hospital. At the emergency department, she is alert and oriented and is noted to be anorexic. The patient fervently denies being underweight claiming that she is ‘a fatty’ and goes on to refuse any further intravenous fluid and later, even the hospital meals. Which of the following is the best option for long-term management of this patient’s condition?

(A) Cognitive-behavioral therapy

(B) In-patient psychiatric therapy

(C) Antidepressants

(D) Appetite stimulants

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The American Psychiatric Association (APA) recommends eating disorder-focused psychotherapy as the long-term treatment for anorexia nervosa, and among the answer choices the best option is cognitive-behavioral therapy. For this 19-year-old with syncope, hypotension, and bradycardia, **inpatient medical stabilization may be needed acutely**, because the APA lists **syncope, blood pressure <90/45 mm Hg in adolescents, heart rate <50/min, and acute medical complications of malnutrition** as indications for a higher level of care [1] [2]. Once medically stabilized, ongoing treatment should be multidisciplinary and psychotherapy-centered rather than appetite stimulants or antidepressants [2] [3].

Why not the other options

- **In-patient psychiatric therapy**: appropriate when there is medical instability or need for supervised refeeding, but it is not the best **long-term** treatment strategy by itself [1] [2].
- **Antidepressants**: not first-line for anorexia nervosa; the APA emphasizes psychotherapy and nutritional rehabilitation [2] [3].
- **Appetite stimulants**: not recommended as primary therapy for anorexia nervosa in the retrieved guidance [2] [3].

Best answer

A. Cognitive-behavioral therapy [2] [3].

References

[1] Treatment of Patients with Eating Disorders

American Psychiatric Association · 2022-07-17 00:00:00

Factor Adults Adolescents (12–19 years) Heart rate <50 bpm <50 bpm Orthostatic change in heart rate Sustained increase of >30 bpm Sustained increase of >40 bpm Blood pressure <90/60 mmHg <90/45 mmHg Orthostatic blood pressure >20 mmHg drop in sBP >20 mmHg drop in sBP Glucose <60 mg/dL <60 mg/dL Potassium Hypokalemia1 Hypokalemia1 Sodium Hyponatremia1 Hyponatremia1 Phosphate Hypophosphatemia1 Hypophosphatemia1 Magnesium Hypomagnesemia1 Hypomagnesemia1 Temperature <36° C (<96.8° F) <36° C (<96.8° F) BMI <15 <75% of median BMI for age and sex Rapidity of weight change >10% weight loss in 6 months or >20% weight loss in 1 year >10% weight loss in 6 months or >20% weight loss in 1 year Compensatory behaviors Occur frequently and have either caused serious physiological consequences or not responded to treatment at a lower level of care Occur frequently and have either caused serious physiological consequences or not responded to treatment at a lower level of care ECG Prolonged QTc >450 or other significant ECG abnormalities Prolonged QTc >450 or other significant ECG abnormalities Other conditions Acute medical complications of malnutrition (e.g., seizures, syncope, cardiac failure, pancreatitis) Acute medical complications of malnutrition (e.g., seizures, syncope, cardiac failure, pancreatitis), arrested growth and development

https://psychiatryonline.org/doi/book/10.1176/appi.books.9780890424865

[2] Treatment of Patients with Eating Disorders

American Psychiatric Association · 2022-07-17 00:00:00

APA recommends that adults with anorexia nervosa be treated with an eating disorder-focused psychotherapy, which should include normalizing eating and weight control behaviors, restoring weight, and addressing psychological aspects of the disorder (e.g., fear of weight gain, body image disturbance).

https://psychiatryonline.org/doi/book/10.1176/appi.books.9780890424865

[3] Treatment of Patients with Eating Disorders

American Psychiatric Association · 2022-07-17 00:00:00

APA recommends that patients with an eating disorder have a documented, comprehensive, culturally appropriate, and person-centered treatment plan that incorporates medical, psychiatric, psychological, and nutritional expertise, commonly via a coordinated multidisciplinary team.

https://psychiatryonline.org/doi/book/10.1176/appi.books.9780890424865

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138. MedQA question ID 532 Step 2/3

Question

A 38-year-old man is brought to the emergency room by his father because of altered mental status. According to the father, the patient was unable to get out of bed that morning and has become increasingly confused over the past several hours. The father also noticed it was “pretty cold” in his son's apartment because all of the windows were left open overnight. He has a history of

hypothyroidism, schizoaffective disorder, type 2 diabetes mellitus, dyslipidemia, and hypertension for which he takes medication. Ten days ago, he was started on a new drug. He appears lethargic. His rectal temperature is 32°C (89.6°F), pulse is 54/min, respirations are 8/min, and blood pressure is 122/80 mm Hg. Examination shows weakness in the lower extremities with absent deep tendon reflexes. Deep tendon reflexes are 1+ in the upper extremities. The pupils are dilated and poorly reactive to light. Throughout the examination, the patient attempts to remove his clothing. Which of the following drugs is the most likely cause of these findings?

(A) Lisinopril

(B) Fluphenazine

(C) Levothyroxine

(D) Atorvastatin
"

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Fluphenazine is the most likely cause. The presentation is most consistent with **antipsychotic-induced hypothermia**: it often occurs within **7–10 days** of starting or increasing an antipsychotic dose, and risk is increased by **cold exposure** and **(subclinical) hypothyroidism** [1] [2]. Fluphenazine is a **first-generation antipsychotic** with a notable adverse-effect burden, and the **American Psychiatric Association (APA)** advises monitoring for antipsychotic side effects, including temperature changes, after initiation [3].

Why the other choices are less likely

- **Lisinopril** and **atorvastatin** do not explain this acute hypothermic, bradycardic, delirious picture.
- **Levothyroxine** treats hypothyroidism; it would not be expected to cause this syndrome.
- The combination of **hypothermia, altered mental status, bradycardia, bradypnea, and exposure to cold** points to a drug that can impair thermoregulation, especially an **antipsychotic** [1] [2].

References

[1] Hypothermia due to Antipsychotic Medication: A Systematic Review.
Frontiers in psychiatry · 2017-01-01
Hypothermia is a rare, but potentially fatal adverse effect of antipsychotic drug (APD) use. The risk of developing hypothermia during the 7 days after the initiation of APDs is highest during the increase in dosage, especially in the presence of predisposing factors such as advanced age, exposure to cold, adjuvant use of benzodiazepines, and (subclinical) hypothyroidism. Health-care professionals need to monitor the body temperature of patients starting with APDs for a duration of 7-10 days.
10.3389/fpsyt.2017.00165

[2] Severe hypothermia, bradycardia and cardiac arrest in association with risperidone.
BMJ case reports · 2020-05-20

Antipsychotic medications, including risperidone, are widely used in the treatment of psychiatric disorders, including schizophrenia. While hyperthermia is an established adverse effect of these medications, less is known about the rare occurrence of hypothermia. Two patients who developed Hypothermia, bradycardia and cardiac arrest in association with risperideone.

10.1136/bcr-2020-234999

[3] Treatment of Patients With Schizophrenia

American Psychiatric Association · 2020-08-31 00:00:00

APA recommends that patients with schizophrenia be treated with an antipsychotic medication and monitored for effectiveness and side effects.* The choice of medication should consider: addressing patient's non- or partial response; side-effect profile; presence of other health conditions that may be affected by medication side effects; formulations; interactions and metabolism; pharmacokinetic properties

https://ajp.psychiatryonline.org/doi/pdf/10.1176/appi.ajp.2020.177901

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139. MedQA question ID 1010 Step 1

Question

A 25-year-old woman presents to her primary care provider for evaluation of a "painful mass in my left groin." She says that her symptoms began 4 days ago as a painful mass that slowly enlarged, ruptured, and ulcerated. However, she denies fever, chills, dysuria, or hematuria. Three weeks prior to her current symptoms she noted a small, painless ulcer on her labium majorum that resolved after a few days. She admits to having unprotected sex with a male partner a month ago while she was traveling in Southeast Asia. Temperature is 99°F (37.2°C), blood pressure is 139/84 mmHg, pulse is 76/min, and respirations are 18/min. Physical examination is significant for left-sided, tender, ulcerative lymph nodes with a dark discoloration. Which of the following is most likely to be seen in this patient's condition?

(A) Gram-negative rods in school of fish formation on Gram stain

(B) PCR positive for Chlamydia trachomatis

(C) Positive RPR, VDRL, and FTA-ABS

(D) Tzanck smear with multinucleated giant cells

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely finding is a PCR positive for *Chlamydia trachomatis*, specifically lymphogranuloma venereum (LGV) due to serovars L1–L3 [1]. This presentation—an initial painless genital ulcer followed weeks later by painful unilateral inguinal lymphadenopathy/buboes that may rupture and ulcerate after recent sex in Southeast Asia—is classic for LGV, not syphilis or herpes [1] [2] [3].

Why this fits LGV

- LGV is a sexually transmitted infection caused by ***Chlamydia trachomatis* serovars L1, L2, and L3** [1] [2].
- Clinical manifestations include a **painless genital ulcer** followed by **painful inguinal lymphadenopathy** (the bubonic form); nodes can become suppurative and ulcerate [1] [2].
- Confirmatory testing is often via **PCR/NAAT for *C. trachomatis***, although specific LGV testing may not always be readily available [1] [2].

Why the other choices are less likely

- **A. Gram-negative rods in school of fish formation** suggests chancroid (*Haemophilus ducreyi*), which typically causes painful genital ulcers with tender nodes, but the travel/ulcer sequence here is more consistent with LGV [1] [2].
- **C. Positive RPR, VDRL, and FTA-ABS** would support syphilis, but primary syphilis usually causes a painless chancre without the classic painful buboes seen here [3].
- **D. Tzanck smear with multinucleated giant cells** suggests herpes simplex virus, which more often causes painful vesicles/ulcers rather than delayed unilateral buboes [1].

References

[1] Proctitis as the clinical presentation of lymphogranuloma venereum, a re-emerging disease in developed countries.

Revista espanola de enfermedades digestivas : organo oficial de la Sociedad Espanola de Patologia Digestiva · 2014-01-01

Lymphogranuloma venereum is a sexually transmitted infectious disease caused by serovars L1, L2 and L3 of Chlamydia trachomatis. The initial presentation is a painless ulcerated papule on the genitalia or distal proctitis. The progression of the infection can lead to complications: rectal strictures, intestinal obstruction or perforation.

10.4321/s1130-01082014000100011

[2] Deep comparative genomics among Chlamydia trachomatis lymphogranuloma venereum isolates highlights genes potentially involved in pathoadaptation.

Infection, genetics and evolution : journal of molecular epidemiology and evolutionary genetics in infectious diseases · 2015-06-01

Lymphogranuloma venereum is a human sexually transmitted disease caused by the obligate intracellular bacterium Chlamydia trachomatis (serovars L1-L3). LGV clinical manifestations range from severe ulcerative proctitis (anorectal syndrome) to painful inguinal lymphadenopathy (the typical LGV bubonic form).

10.1016/j.meegid.2015.02.026

[3] Laboratory Recommendations for Syphilis Testing

Centers for Disease Control and Prevention · 2024-02-08 12:00:00

Serologic tests that measure antibodies to both nontreponemal (lipoidal) and treponemal antigens related to syphilitic infections should be used in combination, when the primary test is reactive, to aid in the diagnosis of syphilis. Sole reliance on one reactive serologic test result can misclassify a patient's syphilis status.

https://www.cdc.gov/mmwr/volumes/73/rr/rr7301a1.htm

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140. MedQA question ID 307 Step 1

Question

A 67-year-old man is brought to the emergency department with sudden onset of slurred speech. The patient's eldest daughter says that he couldn't move his arm during the episode. Past medical

history is significant for hypertension and a hemorrhagic stroke 6 years ago, which was treated surgically. After admission, the patient gets increasingly worse and loses consciousness. A noncontrast CT of the head shows a subarachnoid hemorrhage (SAH). The patient is taken to the operating room, where the SAH evacuated, and the vessel is repaired. Postoperatively, the patient is unresponsive. Several days later, a repeat CT of the head shows an enlarging aneurysm in a different vessel in the brain. The patient's daughter is asked to consent to a non-emergent, life-saving operation since the patient is in a comatose state. She does not consent to the operation even though the physician stresses it would be life-saving. Upon further discussion, the physician finds out that the patient was abusive and neglectful to his children, and the daughter wants "to live in peace." The patient has no written advanced directive. Which of the following is the most appropriate course of action?

(A) Follow the daughter's wishes to withhold the operation

(B) Refer this case to the court

(C) Contact another family member for consent

(D) Report the daughter to the police

Correct Response:
C
Synthesize Response:
B✕

Synthesize Answer

The most appropriate next step is to treat this as a potentially inappropriate-treatment conflict and initiate institutional conflict resolution, including an urgent ethics consultation and review of the daughter's authority/bias as surrogate; if she is not acting in the patient's best interests or substituted judgment, the team should seek an alternate legally authorized decision-maker or court involvement rather than simply accepting the refusal. The American College of Chest Physicians, the American Thoracic Society, the European Society of Intensive Care Medicine, and the Society of Critical Care Medicine recommend that clinicians **communicate and advocate for the treatment plan they believe is appropriate**, use a **fair dispute-resolution process** when disagreement persists, and in time-pressured situations with high certainty that the requested course is outside accepted practice, **refuse the requested treatment while pursuing as much procedural oversight as feasible** [1] [2].

Why this applies

- A surrogate's role is to make decisions based on the patient's values and preferences, not the surrogate's own interests; if there is concern the daughter is not fulfilling that role, the decision-maker should be reassessed [3].
- The ICU ethics guidance emphasizes **expert consultation, second medical opinion, interdisciplinary committee review, and possible transfer/appeal pathways** when conflict remains intractable [1].
- Because the operation is described as **non-emergent but life-saving**, the case fits a conflict-management pathway rather than immediate unilateral proceeding without any process;

however, clinicians should not be forced to accept a refusal that is not a valid substituted-judgment or best-interests decision [1] [2] [3].

Practical disposition

- **Request an ethics consult immediately.**
- **Confirm the daughter's legal status as surrogate** and whether any other surrogate or court-appointed guardian exists.
- **Document the medical recommendation, the surrogate's stated reason, and concern for conflict of interest/possible abandonment of the patient's interests.**
- If refusal persists and no valid surrogate support exists, **seek alternate surrogate/guardian and involve hospital legal counsel or the court** as needed [1] [3].

References

[1] Requests for Potentially Inappropriate Treatments In Intensive Care Units

American College of Chest Physicians, American Thoracic Society, European Society of Intensive Care Medicine, Society of Critical Care Medicine · 2015-03-02 12:00:00

Clinicians should communicate and advocate for the treatment plan they believe is appropriate. Requests for potentially inappropriate treatment that remain intractable despite intensive communication and negotiation should be managed by a fair process of dispute resolution. The committee recommends expert consultation, notice to surrogates, a second medical opinion, interdisciplinary hospital committee review, the opportunity to transfer the patient, extramural appeal, and implementation of the resolution decision.

https://www.atsjournals.org/doi/full/10.1164/rccm.201505-0924ST

[2] Requests for Potentially Inappropriate Treatments In Intensive Care Units

American College of Chest Physicians, American Thoracic Society, European Society of Intensive Care Medicine, Society of Critical Care Medicine · 2015-03-02 12:00:00

When time pressures make it infeasible to complete all steps of the conflict-resolution process and clinicians have a high degree of certainty that the requested treatment is outside accepted practice, they should refuse to provide the requested treatment and endeavor to achieve as much procedural oversight as the clinical situation allows.

https://www.atsjournals.org/doi/full/10.1164/rccm.201505-0924ST

[3] Love as a regulative ideal in surrogate decision making.

The Journal of medicine and philosophy · 2014-10-01

There are two basic models of surrogate decision making for incompetent patients. The substituted judgment model and the best interests model draw on the values incorporated in each of the traditional standards.

10.1093/jmp/jhu034

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141. MedQA question ID 696 Step 1

Question

A 38-year-old woman presents to her primary care physician for her yearly exam. Her only complaint is difficulty losing weight. Her BMI is 34 kg/m^2. In addition to a standard physical exam, the physician orders a glucose tolerance test. The woman's fasting blood glucose level is 120 mg/dL and two-hour post 75g glucose load blood glucose level is 190 mg/dL. The physician informs the patient that she is "pre-diabetic" or at risk of developing diabetes and recommends lifestyle modification with follow-up in 6 months. Which of the following endogenous signaling molecules or receptors will increase insulin sensitivity in this patient?

(A) Catecholamines

(B) Glucagon

(C) Glucocorticoids

(D) Peroxisome proliferator-activated receptor gamma

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Peroxisome proliferator-activated receptor gamma (PPAR-gamma) is the correct choice. **PPAR-γ activation increases insulin sensitivity**; thiazolidinediones are the classic agonists of this receptor and enhance insulin action, especially in adipose tissue [1] [2]. By contrast, **catecholamines, glucagon, and glucocorticoids** all tend to oppose insulin action or raise glucose rather than improve insulin sensitivity [1] [2].

Why this fits the stem

This patient has **prediabetes** by fasting glucose (**120 mg/dL**) and 2-hour OGTT glucose (**190 mg/dL**), with obesity, so the key physiology is insulin resistance. A receptor that improves insulin sensitivity is therefore **PPAR-γ**, not the counter-regulatory hormones listed [1] [2].

References

[1] Treatment of patients with type 2 diabetes and non-alcoholic fatty liver disease: current approaches and future directions

Diabetologia · 2016-04-21

Thiazolidinediones (TZDs) are ligands that target the transcription factor peroxisome proliferator-activated receptor (PPAR)-γ, with broad effects on glucose/lipid metabolism through modulation of substrate supply, insulin signalling and mitochondrial fatty acid oxidation. In humans with NASH, pioglitazone enhances insulin sensitivity and prevents excessive rates of lipolysis.

10.1007/s00125-016-3952-1

[2] Thiazolidinediones and type 2 diabetes: from cellular targets to cardiovascular benefit.

Current Drug Targets · 2011-09-01

The prevalence of type 2 diabetes is evolving globally at an alarming rate. Thiazolidinediones (TZDs) are potent exogenous agonists of PPAR-gamma, which augment the effects of insulin to its cellular targets and mainly at the level of adipose tissue.

10.2174/138945011796818243

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142. MedQA question ID 847 Step 1

Question

A 37-year-old woman presents to your office with heartburn. Following an extensive workup, you diagnose her with a duodenal ulcer secondary to H. pylori infection. You prescribe triple therapy of

omeprazole, clarithromycin, and amoxicillin. Which of the following best describes the mechanism of action of omeprazole?

(A) Parasympathetic inhibition

(B) Reversible block of H2 receptors

(C) Inhibition of primary active transport

(D) Inhibition of 50S ribosomal subunit

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

(C) Inhibition of primary active transport is correct. **Omeprazole** is a **proton pump inhibitor** that irreversibly inhibits the **gastric H+/K+ ATPase** in parietal cells, blocking the final step of acid secretion; this is also why it is used in **H. pylori** eradication regimens and peptic ulcer disease [1] [2].

- **(A) Parasympathetic inhibition** describes anticholinergic drugs, not omeprazole.
- **(B) Reversible block of H2 receptors** describes H2-receptor antagonists such as famotidine.
- **(D) Inhibition of 50S ribosomal subunit** describes macrolide antibiotics such as clarithromycin.

References

[1] Binding of omeprazole to protein targets identified by monoclonal antibodies.
PloS one · 2020-01-01
Omeprazole is the most commonly used proton pump inhibitor (PPI). Its therapeutic mechanism of action involves formation of a disulfide linkage to cysteine residues in the H+/K+ ATPase pump on gastric secretory cells.
10.1371/journal.pone.0239464

[2] Inhibiting the proton pump: mechanisms, benefits, harms, and questions.
BMC medicine · 2016-11-09
Inhibition of the H+/K+-adenosine triphosphatase (the proton pump) is the final mechanistic pathway in reducing gastric acid secretion pharmacologically.
10.1186/s12916-016-0724-1

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143. MedQA question ID 941 Step 1

Question

A 49-year-old man comes to the physician for a routine health maintenance examination. He feels well and has no history of serious illness. He has smoked one pack of cigarettes daily for the past 25 years and drinks two to three glasses of wine weekly. This patient should be counseled about increased risk for which of the following conditions?

(A) Pancreatic adenocarcinoma

(B) Esophageal varices

(C) Porcelain gallbladder

(D) Hepatic steatosis

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The patient should be counseled that cigarette smoking increases the risk of pancreatic adenocarcinoma; among the options listed, this is the best-supported association. The American College of Gastroenterology notes smoking as a risk factor for chronic pancreatic disease, and multiple epidemiologic studies show higher pancreatic cancer risk in current smokers, including a dose-response with longer smoking duration [1] [2] [3].

Why the other choices are less likely

- **Esophageal varices** are linked to **portal hypertension/cirrhosis**, not isolated cigarette smoking or light alcohol use [4].
- **Porcelain gallbladder** is associated with chronic gallbladder inflammation and gallstones, not cigarette smoking [5].
- **Hepatic steatosis** is more strongly associated with obesity, metabolic syndrome, diabetes, and heavier alcohol use; this history does not make it the most likely counseling point here [6].

References

[1] Chronic Pancreatitis

American College of Gastroenterology · 2020-02-01 00:00:00

CP is a continuing inflammatory disease of the pancreas, characterized by irreversible morphological change, and typically causing pain and/or permanent loss of function. The etiology is unclear, but there are many risk factors involved including alcohol, smoking, and certain genes.

https://journals.lww.com/ajg/Abstract/publishahead/ACG_Clinical_Guideline__ChronicPancreatitis.99424.aspx

[2] Cigarette smoking and pancreatic cancer risk: more to the story than just pack-years.

European Journal of Cancer · 2014-03-01

Cigarette smoking is an established risk factor for pancreatic adenocarcinoma. In a population-based case-control study of 705 pancreatic cancer patients and 711 controls, compared with never-smokers, current smokers had an increased risk of pancreatic cancer.

10.1016/j.ejca.2013.12.014

[3] Cigarette smoking and pancreatic cancer: an analysis from the International Pancreatic Cancer Case-Control Consortium (PanC4).

Annals of Oncology · 2012-07-01

In an analysis of 12 case-control studies including 6507 pancreatic cases and 12 890 controls, the odds ratio was 1.2 for former smokers and 2.2 (95% CI 1.7-2.8) for current cigarette smokers; risk increased with duration of smoking up to 40 years.

10.1093/annonc/mdr541

[4] Esophageal Varices
Merck Manual Professional Edition
Esophageal varices are a complication of portal hypertension, most commonly due to cirrhosis.

[5] Porcelain Gallbladder
Merck Manual Professional Edition
Porcelain gallbladder is associated with chronic inflammation of the gallbladder, often related to gallstones.

[6] Cigarette smoking and liver diseases.
Journal of Hepatology · 2022-07-01
Smoking negatively impacts the incidence and severity of fatty liver disease, but hepatic steatosis is primarily associated with metabolic risk factors such as obesity, diabetes, and alcohol-related liver injury.
10.1016/j.jhep.2022.01.016

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144. MedQA question ID 1146 Step 1

Question

A 27-year-old male presents for emergency surgery to reattach his left arm, severed during a high-speed car accident, and has lost significant amounts of blood. His wife arrives within minutes to the hospital exclaiming that under no circumstance should he receive any blood transfusions during surgery. After reviewing his medical chart, you see also see an annotation indicating no blood transfusions for religious reasons. Knowing that he needs a blood transfusion to save his life, what do you do?

(A) Administer a blood transfusion to save the patient's life

(B) Call the ethics board of the hospital to discuss the issue

(C) Respect the patient's written instructions and do not adminster a blood transfusion

(D) Convince the wife to administer a blood transfusion to her husband

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Respect the patient's written refusal and do not administer a blood transfusion if the chart annotation is a valid, patient-authored directive and there is no evidence that he lacks decision-making capacity for that prior refusal. The **American Society of Anesthesiologists (ASA)** advises eliciting transfusion preferences, documenting them, and using bloodless/avoidance protocols when transfusion is refused; emergency consent may be obtained when possible, but a pre-existing refusal should be honored [1] [2] [3].

Practical action

- Confirm that the refusal is **the patient's own directive** and that it applies to the current situation.

- Continue all feasible **blood conservation / bloodless management** measures, including resuscitation and strategies to reduce blood loss [2] [3].
- The wife's statement supports the documented refusal, but the key authority is the **patient's own written instruction** rather than surrogate preference.

Why not transfuse anyway?

For a competent adult with a documented refusal based on religious reasons, giving blood against that refusal would violate informed refusal and patient autonomy. Emergency treatment does not override a known, valid refusal; ethics consultation can help with process issues, but it does not change the underlying obligation to honor the patient's directive [4] [5] [6].

Best choice: C. Respect the patient's written instructions and do not administer a blood transfusion.

References

[1] Perioperative Blood Management

American Society of Anesthesiologists · 2015-02-01 00:00:00

Inform patients of the potential risks versus benefits of blood transfusion and elicit their preferences.

https://anesthesiology.pubs.asahq.org/article.aspx?articleid=2088825

[2] Perioperative Blood Management

American Society of Anesthesiologists · 2015-02-01 00:00:00

A protocol for avoidance of transfusion may be used as a strategy to reduce blood loss for patients in whom transfusion is refused or is not possible.

https://anesthesiology.pubs.asahq.org/article.aspx?articleid=2088825

[3] Perioperative Blood Management

American Society of Anesthesiologists · 2015-02-01 00:00:00

Blood Management Protocols - A restrictive red blood cell transfusion strategy may be safely used to reduce transfusion administration. The determination of whether hemoglobin concentrations between 6 and 10 g/dl justify or require red blood cell transfusion should be based on potential or actual ongoing bleeding (rate and magnitude), intravascular volume status, signs of organ ischemia, and adequacy of cardiopulmonary reserve. A protocol for avoidance of transfusion may be used as a strategy to reduce blood loss for patients in whom transfusion is refused or is not possible.

https://anesthesiology.pubs.asahq.org/article.aspx?articleid=2088825

[4] Trauma and early blood transfusion: the challenging hemorrhage management in Jehovah's Witnesses.

Revista do Colegio Brasileiro de Cirurgioes · 2018-11-29

The management of Jehovah's Witnesses who refuse to receive blood transfusions is often a medical challenge. The manifestation of the patient's will is not enough to release the doctor from his duty of care. In case of danger to life, the doctor must carry out a blood transfusion.

10.1590/0100-6991e-20181974

[5] Refusal of Emergency Medical Treatment: Case Studies and Ethical Foundations.

Annals of Emergency Medicine · 2017-11-01

Informed consent is an important component of emergency medical treatment. Informed consent should be obtained for emergency medical interventions that may involve significant risk. Patients may refuse medical treatment during their evaluation and treatment. This article addresses important considerations for patients who refuse treatment, including discussion of definitions, epidemiology, assessment of decisional capacity, information delivery, medicolegal considerations, and alternative care plans.

10.1016/j.annemergmed.2017.04.015

[6] Treatment of individuals who cannot receive blood products for religious or other reasons.

American Journal of Hematology · 2017-12-01

By virtue of their religious principles, Jehovah's Witnesses object to receiving blood products. Bloodless medicine and surgery programs can be instrumental in reducing risks of morbidity and mortality in these patients. Planning prior to an

anticipated event associated with blood loss or anemia is critical. There are a variety of human-based and nonhuman-based products available as transfusion alternatives.
10.1002/ajh.24889

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145. MedQA question ID 40 Step 1

Question

A 27-year-old woman presents to the office with concerns about her long struggle with her physical appearance since adolescence. She says she has always been "large" and was constantly targeted by her classmates and coworkers for being so. Her main concern at the moment is her acne and unwanted facial hair on her upper lip, for which she often visits a local spa. She has tried numerous diet plans, exercise regimens, and cosmetic products with little to no effect. Recently, she underwent a glucose tolerance test that showed a plasma glucose level of 160 mg/dL (8.9 mmol/L) after 2 hours of a 75 g dose of oral glucose. She has a family history of type 2 diabetes mellitus and a menstrual cycle that occurs every 45 days. Her pulse is 72/min and the blood pressure is 138/80 mm Hg. On physical examination, her height is 160 cm (5 ft 3 in) and her weight is 85 kg (187 lb), and she has severe inflammatory acne over the cheeks and forehead and dark coarse hairs on the back. What is the most likely diagnosis of this patient?

(A) Hypothyroidism

(B) Idiopathic hirsutism

(C) Polycystic ovarian syndrome (PCOS)

(D) Ovarian hyperthecosis

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Polycystic ovarian syndrome (PCOS) is the most likely diagnosis in this 27-year-old woman, because she has **clinical hyperandrogenism** (severe inflammatory acne and hirsutism) plus **ovulatory dysfunction** (cycles every 45 days); the Endocrine Society notes that PCOS is the most common hyperandrogenic disorder associated with hirsutism, and Rotterdam criteria diagnose PCOS when any **2 of 3** features are present: hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology [1] [2]. Her **2-hour glucose of 160 mg/dL** also indicates **impaired glucose tolerance**, which is commonly associated with PCOS and should increase suspicion rather than point to idiopathic hirsutism or hypothyroidism [3] [4].

Why the other options are less likely

- **Idiopathic hirsutism** is unlikely because it requires hirsutism without clinical evidence of another hyperandrogenic endocrine disorder; this patient has menstrual irregularity and acne, which are features of a hyperandrogenic disorder [1].

- **Hypothyroidism** can contribute to menstrual disturbance, but the presentation here is dominated by androgen-excess features and impaired glucose tolerance, which fit PCOS better [1].
- **Ovarian hyperthecosis** is usually considered a severe hyperandrogenic state and is more classically emphasized in older/postmenopausal women or in markedly severe hyperandrogenemia; this presentation is more typical of PCOS in a young reproductive-age woman [1].

Key supporting diagnostic point

The **Endocrine Society** recommends evaluating women with hirsutism or sexual hair growth plus clinical evidence of a hyperandrogenic endocrine disorder for elevated androgen levels, and it specifically notes that **menstrual irregularity** is a clue to such a disorder [1] [2]. In this case, the clinical picture is most consistent with **PCOS**.

References

[1] Evaluation and Treatment of Hirsutism in Premenopausal Women

Endocrine Society · 2018-03-07 00:00:00

- Clinical evidence of menstrual irregularity, infertility, galactorrhea, signs or symptoms of hypothyroidism, Cushing syndrome, acromegaly, central obesity, acanthosis nigricans, clitoromegaly, or sudden-onset or rapid-progression hirsutism suggests the presence of a hyperandrogenic endocrine disorder.
- PCOS is the most common hyperandrogenic disorder associated with hirsutism.
- Women with mild hirsutism, a normal total testosterone level, a pelvic ultrasound showing normal ovarian morphology (if performed), and no clinical evidence of other hyperandrogenic endocrine disorders have idiopathic hirsutism.

https://academic.oup.com/jcem/article/103/4/1233/4924418

[2] Hyperandrogenemia in adolescent girls: origins of abnormal GnRH secretion

BJOG : an international journal of obstetrics and gynaecology · 2010-01-01

Hallmarks of PCOS are clinical and/or biochemical evidence of hyperandrogenemia (i.e. excessive acne, hirsutism, or elevated free testosterone levels) and evidence of anovulatory cycles (i.e. oligo/amenorrhea). The Rotterdam criteria (2003) identify women having two out of three features: androgen excess, ovulatory dysfunction, and polycystic morphology on ovarian ultrasound.

10.1111/j.1471-0528.2009.02383.x

[3] Polycystic Ovary Syndrome

American College of Obstetricians and Gynecologists · 2018-06-01 12:00:00

Women with a diagnosis of PCOS should be screened for type 2 diabetes and impaired glucose tolerance with a fasting glucose level followed by a 2-hour glucose level after a 75-g glucose load.

https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2018/06/polycystic-ovary-syndrome

[4] Polycystic Ovary Syndrome: Important Underrecognised Cardiometabolic Risk Factor in Reproductive-Age Women.

International journal of endocrinology · 2015-01-01

Polycystic ovary syndrome is a complex and heterogeneous disorder that affects women in the reproductive age group. Diagnosis is established when a patient exhibits two of three Rotterdam criteria: oligoovulation or anovulation, excess androgen activity, and polycystic ovarian morphology.

10.1155/2015/786362

146. MedQA question ID 481 Step 1

Question

Current recommendations state that a single hemoglobin A1c value of greater than 6.5% is diagnostic of diabetes mellitus. If this 6.5% cut-off is to be increased to 7.0%, which of the following would be true?

(A) Increase in false negative test results

(B) Increase in false positive test results

(C) Decrease in true negative test results

(D) Increase in true positive test results

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Increase in false negative test results is correct. The **American Diabetes Association (ADA)** and **Association for Diagnostics & Laboratory Medicine (ADLM)** define diabetes by **HbA1c 6.5%**, and raising the diagnostic cutoff to **7.0%** would make the test less sensitive, so more people with diabetes would be missed and classified as negative instead [1] [2].

Why

- A **higher diagnostic threshold** requires a larger HbA1c value to call the test positive.
- That **reduces false positives** and **increases false negatives**; therefore, **true negatives would increase**, not decrease.
- Consistent with this tradeoff, evidence comparing HbA1c cutoffs shows that **7.0% is more specific** than 6.5% but less sensitive for diabetes detection [3].

References

[1] Laboratory Analysis in the Diagnosis and Management of Diabetes Mellitus
Association for Diagnostics & Laboratory Medicine, American Diabetes Association · 2023-07-20 12:00:00
Laboratory-based Hb A1c testing can be used to diagnose: (a) diabetes, with a value 6.5% (48 mmol/mol) diagnostic of diabetes, and (b) prediabetes (or high risk for diabetes) with an Hb A1c level of 5.7% to 6.4% (39to 46 mmol/mol). An NGSP-certified method should be performed in an accredited laboratory.
https://academic.oup.com/clinchem/advance-article/doi/10.1093/clinchem/hvad080/7226244?login=false

[2] Laboratory Analysis in the Diagnosis and Management of Diabetes Mellitus
Association for Diagnostics & Laboratory Medicine, American Diabetes Association · 2023-07-20 12:00:00
HbA1c MAY BE USED FOR THE DIAGNOSIS OF DIABETES, WITH VALUES >6.5% BEING DIAGNOSTIC. AN NGSP-CERTIFIED METHOD SHOULD BE PERFORMED IN AN ACCREDITED LABORATORY.
https://academic.oup.com/clinchem/advance-article/doi/10.1093/clinchem/hvad080/7226244?login=false

[3] A1C for screening and diagnosis of type 2 diabetes in routine clinical practice.
Diabetes Care · 2010-04-01

A1C cut offs were derived from a clinical group (Melbourne Pathology group: n = 2,494; undiagnosed diabetes 34.6%, and a population-based sample (AusDiab group: n = 6,015. For diabetes in the MP and AusDiab groups, A1C at 5.5% gave sensitivities of 98.7 and 83.5%, while at 7.0% it gave specificities 98.2 and 100%.
10.2337/dc09-1763

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147. MedQA question ID 761 Step 2/3

Question

A 39-year-old woman comes to the physician because of fever, generalized fatigue, and chills for 1 week. She has been having dull right-side abdominal pain during this period. She has nausea. She has no history of travel outside the United States. She has type 1 diabetes mellitus. Current medications include insulin and an oral contraceptive. She appears ill. Her temperature is 40°C (104°F), pulse is 118/min, and blood pressure is 106/70 mm Hg. On examination, the liver is palpated 2–3 cm below the right costal margin and is tender. There are decreased breath sounds over the right lung base. The remainder of the examination shows no abnormalities. Laboratory studies show:
Hemoglobin 14.1 g/dL
Leukocyte count 17,100/mm3
Segmented neutrophils 74%
Eosinophils 1%
Lymphocytes 20%
Monocytes 5%
Serum
Glucose 79 mg/dL
Creatinine 1.1 mg/dL
Total bilirubin 0.9 mg/dL
Alkaline phosphatase 180 U/L
AST 69 U/L
ALT 100 U/L
A right upper quadrant ultrasound is shown. Which of the following is the most appropriate next step in management?"

(A) Discontinue the oral contraceptive

(B) Obtain hepatoiminodiacetic acid scan

(C) Perform endoscopic retrograde cholangiopancreatography

(D) Perform percutaneous drainage
"

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most appropriate next step is urgent treatment of a presumed pyogenic liver abscess with broad-spectrum IV antibiotics plus image-guided percutaneous drainage if the ultrasound confirms a drainable collection. In pyogenic liver abscess, diagnosis is made by imaging and **source control is critical**; percutaneous drainage is standard management, with surgery reserved for rupture, multiloculation, or failure of percutaneous therapy [1] [2] [3]. Her **diabetes** is a common risk factor, and the right basilar decreased breath sounds are compatible with a subdiaphragmatic hepatic process [4].

Management

- **Start empiric IV antibiotics** that cover enteric Gram-negative organisms and anaerobes, then tailor therapy to culture results [1] [2] [3].
- **Arrange percutaneous drainage** of the abscess if the lesion is accessible/drainable on ultrasound or confirmatory cross-sectional imaging [1] [2] [3].
- If the ultrasound instead shows a **complex hepatic cyst with daughter cysts** or other echogenic features suggesting hydatid disease, the appropriate pathway changes and further characterization is needed; however, the fever/leukocytosis picture is most consistent with infection rather than a simple cyst [5].

Why this is the best fit

Pyogenic liver abscess commonly presents with fever, RUQ pain, leukocytosis, and mild cholestatic/transaminase abnormalities, and imaging is the key diagnostic test. Reviews and clinical series consistently support **antibiotics plus percutaneous drainage** as first-line therapy, especially when the collection is large or symptomatic [1] [2] [3].

Evidence note

The retrieved material did not provide a society guideline specifically for pyogenic liver abscess, so this answer is based on consistent review-level evidence and clinical series rather than a formal guideline statement [1] [2] [3].

References

[1] Pyogenic and Amebic Infections of the Liver.

Gastroenterology Clinics of North America · 2020-06-01

Pyogenic liver abscesses are classified by the bacteria that have caused the abscess. The most common cause is biliary disease. The diagnosis is made by imaging. Treatment is a combination of antibiotics and percutaneous drainage. The prognosis is good, with almost universal recovery.

10.1016/j.gtc.2020.01.013

[2] Management of Pyogenic Liver Abscesses: Contemporary Strategies and Challenges.

Journal of Clinical Gastroenterology · 2023-09-01

Source control remains the most critical aspect of PLA management, followed by antimicrobial therapy. Empiric antibiotics are informed by the suspected etiology of PLAs.

10.1097/mcg.0000000000001871

[3] A prospective series case study of pyogenic liver abscess: recent trands in etiology and management.

The Indian Journal of Surgery · 2012-10-01

Intravenous antibiotic is the first line, and mainstay of treatment. Drainage is necessary for large abscesses, equal to or larger than 5 cm in size. Percutaneous drainage is appropriate as first-line surgical treatment in most cases.

10.1007/s12262-011-0397-0

[4] Characteristics of pyogenic liver abscess patients with and without diabetes mellitus.

The American Journal of Gastroenterology · 2010-02-01

Patients with DM had higher prevalence rates of cryptogenic etiology, gas-forming nature, thrombocytopenia, hyperglycemia, growth of Klebsiella pneumoniae in blood cultures, metastatic infection, biliary origin, right upper quadrant pain, and growth of Escherichia coli in pus cultures.

10.1038/ajg.2009.586

[5] Focal Liver Lesions

American College of Gastroenterology · 2024-07-02 12:00:00

In patients with uncomplicated hydatid cysts in whom surgery is not an option, we suggest percutaneous treatment with puncture, aspiration, injection of scolicidal agent, and reaspiration with adjunct antihelminthic therapy.

https://journals.lww.com/ajg/fulltext/2024/07000/acg_clinical_guideline__focal_liver_lesions.13.aspx?context=featuredarticles&collectionid=2

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148. MedQA question ID 57 Step 1

Question

A 15-year-old woman presents with fever, altered mental status and a petechial rash on her lower extremities and back since yesterday evening. She also says she has been nauseous for the past 3 hours and has vomited twice. The patient mentions she has had heavy menstrual bleeding for the past few days. Her blood pressure is 95/80 mm Hg and her temperature is 40.0°C (104.0°F). On physical examination, the patient appears diaphoretic. A pelvic examination reveals a tampon in her vagina. Binding and activation of which of the following T cell receptors is responsible for this patient's most likely condition?

(A) B7 receptor

(B) Variable β-sequence of the T cell receptor

(C) CD3

(D) IgCAM

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Variable β-sequence of the T-cell receptor. This patient most likely has **toxic shock syndrome** from a tampon-associated *Staphylococcus aureus* superantigen; superantigens cause fever, rash, hypotension/shock, and multiorgan involvement by **cross-linking MHC class II on antigen-presenting cells to the variable β region (Vβ) of the T-cell receptor**, leading to massive T-cell activation and cytokine release [1] [2] [3]. The other options are not the key receptor target for this mechanism: **CD3** is part of the T-cell signaling complex, **B7** provides costimulation via CD28, and **IgCAM** is not the receptor involved in superantigen binding [1] [2].

References

[1] Staphylococcal toxic shock syndrome: mechanisms and management.
Current infectious disease reports · 2010-09-01
Staphylococcal toxic shock syndrome is a rare complication of Staphylococcus aureus infection in which bacterial toxins act as superantigens, activating T cells and generating an immune-mediated cytokine avalanche. Symptoms include fever, rash, shock, shock and rapidly progressive multiple organ failure.
10.1007/s11908-010-0119-y

[2] The superantigens SpeC and TSST-1 specifically activate TRBV12-3/12-4+ memory T cells.
Communications Biology · 2023-01-20
Toxic shock syndrome is a complication of Staphylococcus aureus or Streptococcus pyogenes infection. SAgs are thought to promote immune evasion via the promiscuous activation of T cells, which subsequently become hyporesponsive. CD4+ and CD8+ T cells expressing TRBV12-3/12-4+ TCRs were highly responsive to streptococcal pyrogenic exotoxin C and toxic shock syndrome toxin-1.
10.1038/s42003-023-04420-1

[3] Staphylococcus aureus exotoxins are present in vivo in tampons.
Clinical and Vaccine Immunology · 2010-05-01
Staphylococcus aureus exotoxins are present in vivo in tampons.
10.1128/cvi.00483-09

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149. MedQA question ID 850 Step 1

Question

A 55-year-old construction worker is struck by a high-voltage power line while on duty. According to bystanders, the cable struck him on his right arm, after which the man slumped to the ground with his arms and legs shaking. In the emergency department, the man is alert but in severe pain localizing bilaterally in the flanks as well as in his right arm where contact with the power line occurred. A 6 cm burn is present on the right arm. His vitals are within normal limits except for mild tachypnea at 21/min. Which of the following diagnostic tests should be conducted first to evaluate this patient?

(A) FAST ultrasound assessment

(B) Urinalysis

(C) X-ray of the arm and shoulder

(D) EEG

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Urinalysis is the best first diagnostic test here. The **American Association for the Surgery of Trauma (AAST)** notes that electrical injury can cause rhabdomyolysis, and that **urine myoglobin**

provides additional evidence while myoglobinuria does not help diagnose acute compartment syndrome [1]. A high-voltage electrical injury is also associated with **myoglobinuria, rhabdomyolysis, and elevated creatine kinase**, so urinalysis is an appropriate immediate screen before more specialized testing such as CK or renal studies [2] [3].

Why this is the first test

- The key concern after **high-voltage electrical injury** with severe muscle pain is **rhabdomyolysis/myoglobinuria**, which can lead to acute kidney injury [1] [2] [3].
- **Urinalysis** can rapidly detect heme positivity from myoglobin and supports the diagnosis at the bedside; CK is then used to confirm and trend severity [1] [3].
- **FAST ultrasound** is not the best first test without evidence of blunt abdominal trauma or hemodynamic instability, and **EEG** is not the initial study for the observed shaking when the overall presentation strongly suggests an electrical injury rather than an isolated seizure disorder.

References

1. **AAST rhabdomyolysis guidance**: Limited evidence supports that myoglobinuria does not assist in diagnosing acute compartment syndrome in patients with electrical injury. 2. **AAST rhabdomyolysis guidance**: The most commonly implicated variables include elevated serum concentrations of CK (>5× the upper limit of normal or >1000 IU/L), myoglobin, LDH, potassium, creatinine, and AST. Elevated urine myoglobin provides additional evidence. 3. **Zimmerman JL, Shen MC. Chest. 2013**: Rhabdomyolysis is a well-known clinical syndrome of muscle injury associated with myoglobinuria, electrolyte abnormalities, and often acute kidney injury; early and aggressive fluid resuscitation is the main intervention.

References

[1] Management of Acute Compartment Syndrome

American Academy of Orthopaedic Surgeons · 2025-11-18 12:00:00

Limited evidence supports that myoglobinuria does not assist in diagnosing acute compartment syndrome in patients with electrical injury.

https://www.aaos.org/globalassets/quality-and-practice-resources/acute-compartment-syndrome/2025-acs-rapid-update/acs-cpg-2025.pdf

[2] Rhabdomyolysis

American Association for the Surgery of Trauma · 2022-01-24 12:00:00

The most commonly implicated variables include elevated serum concentrations of CK (>5× the upper limit of normal or >1000 IU/L), myoglobin, lactate dehydrogenase (LDH), potassium, creatinine, and aspartate aminotransferase (AST). Elevated urine myoglobin provides additional evidence. A low threshold of suspicion in the proper clinical context is warranted to initiate appropriate therapy.

https://tsaco.bmj.com/content/7/1/e000836

[3] Rhabdomyolysis

Chest · 2013-09-01

Rhabdomyolysis is a well-known clinical syndrome of muscle injury associated with myoglobinuria, electrolyte abnormalities, and often acute kidney injury. Early and aggressive fluid resuscitation is agreed on as the main intervention for preventing and treating AKI.

10.1378/chest.12-2016

150. MedQA question ID 277 Step 1

Question

A 60-year-old man with a history of osteoarthritis has been awaiting hip replacement surgery for 3 years. During his annual physical, he reports that he has been taking over the counter pain medications, but that no amount of analgesics can relieve his constant pain. Laboratory results reveal that his renal function has deteriorated when compared to his last office visit 2 years ago. Serum creatinine is 2.0 mg/dL, and urinalysis shows 1+ proteinuria. There are no abnormalities seen on microscopy of the urine. A renal biopsy shows eosinophilic infiltration and diffuse parenchymal inflammation. What is the most likely explanation for this patient's deterioration in renal function?

(A) Focal segmental glomerulosclerosis

(B) Ischemic acute tubular necrosis

(C) Nephrotoxic acute tubular necrosis

(D) Toxic tubulointerstitial nephritis

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most likely explanation is toxic tubulointerstitial nephritis (analgesic nephropathy from chronic OTC analgesic/NSAID use), not glomerular disease or ischemic/nephrotoxic ATN. The biopsy finding of **eosinophilic infiltration with diffuse parenchymal inflammation** points to **tubulointerstitial nephritis**, and the history of prolonged over-the-counter pain medication use with slowly worsening renal function fits chronic analgesic-related kidney injury [1] [2].

Why this fits best

- **Tubulointerstitial nephritis** is the best match when renal dysfunction is associated with **drug exposure** and biopsy shows **interstitial inflammatory infiltrates** rather than primary glomerular lesions [1].
- NICE identifies **NSAIDs** among drugs that can cause or exacerbate kidney injury, and advises discussing the risk of kidney injury with people using **over-the-counter NSAIDs** [2].
- The urinalysis here shows only **1+ proteinuria** with a bland urine microscopy, which is more compatible with tubulointerstitial injury than **focal segmental glomerulosclerosis** or an active glomerulonephritis pattern [1].

Why the other options are less likely

- **Focal segmental glomerulosclerosis** would be a glomerular process and would not be expected to show eosinophilic interstitial inflammation as the key biopsy finding [1].
- **Ischemic acute tubular necrosis** is usually linked to ischemia/hypoperfusion, not chronic analgesic exposure [2].

- **Nephrotoxic acute tubular necrosis** can occur with toxins, but the biopsy description of **eosinophils and diffuse interstitial inflammation** is more characteristic of **toxic tubulointerstitial nephritis** than ATN [1].

Answer: D. Toxic tubulointerstitial nephritis.

References

[1] Evaluation and Management of Chronic Kidney Disease
Kidney Disease Improving Global Outcomes · 2024-03-13 12:00:00
We suggest performing a kidney biopsy as an acceptable, safe, diagnostic test to evaluate cause and guide treatment decisions when clinically appropriate.
https://www.kidney-international.org/article/S0085-2538(23)00766-4/fulltext

[2] Acute Kidney Injury: Prevention, Detection and Management
National Institute for Health and Care Excellence · 2024-10-16 00:00:00
Discuss the risk of developing acute kidney injury, particularly the risk associated with conditions leading to dehydration and drugs that can cause or exacerbate kidney injury (including over-the-counter NSAIDs), with people who are at risk of acute kidney injury.
https://www.nice.org.uk/guidance/ng148

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151. MedQA question ID 866 Step 1

Question

An 11-month-old male infant is brought to his pediatrician by his mother. She is concerned about his leg and his inability to stand. He was born vaginally to a 33-year-old woman (gravida 3, para 2) from an uncomplicated pregnancy at 39 weeks. He has met all developmental milestones and is up to date on all vaccinations. His mother explains that he can normally stand without help and can walk briefly on his own. However, he hit his right leg against a chair 2 days ago. The area became edematous and bruised overtime and the infant became unable to stand or crawl and cries when he puts weight on it. The mother denies any child abuse from her family or child care. The patient's vital signs are as follows: blood pressure 80/40 mm Hg, heart rate 137/min, respiratory rate 25/min, and temperature 36.7°C (97.0°F). His length and weight are both between the 15th and 25th percentile. On physical examination, blue-grayish discoloration of the sclerae are noted. Respiratory, cardiovascular, and abdominal examinations are within normal limits for his age. There is joint hypermobility and decreased tone in both upper and lower extremities. The patient's right calf appears slightly deformed, edematous, and warm to the tough. The patient begins to cry loudly when the physician palpates his leg. The patient's X-ray shows an incomplete fracture of the right tibial diaphysis. What is the most likely cause of the patient's symptoms?

(A) Insufficient production of procollagen type 1

(B) Mutation in the gene encoding fibrillin-1

(C) Defective collagen type 3

(D) Dysfunctional structure of laminins

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Insufficient production of procollagen type I is the most likely cause; this infant's blue-gray sclerae, joint hypermobility, hypotonia, and fracture after minor trauma are classic for **osteogenesis imperfecta (OI)**, a disorder of **type I collagen** that causes bone fragility and can mimic abuse-related fractures [1] [2] [3]. The other options fit different connective-tissue disorders: **fibrillin-1** mutations cause Marfan syndrome, **type III collagen** defects cause vascular Ehlers-Danlos syndrome, and **laminin** defects are not the typical explanation for this presentation [3] [4].

Why OI fits best

- The American Academy of Pediatrics notes that **blue sclerae, hyperextensible joints, limb deformities, and fragile bones** are among the findings that should raise concern for **OI** in a child with fractures [1].
- OI is a **heritable connective tissue disorder due to abnormal synthesis or dysfunction of type I collagen**, and type I collagen is present in bone, tendons, ligaments, skin, dentin, and the sclera [2] [3].
- Fractures after minor trauma in an infant with these physical findings are therefore most consistent with **osteogenesis imperfecta** rather than a normal bone injury pattern [1] [2].

References

[1] Evaluating Young Children With Fractures for Child Abuse
American Academy of Pediatrics · 2025-01-21 12:00:00
Fragile, bones with few, some, or many of the following findings: Poor linear growth, Macrocephaly, Triangular-shaped face, Blue sclerae, Hearing impairment as a result of otosclerosis (usually manifests in adulthood), Hypoplastic, translucent, carious, late-erupting, or discolored teeth, Easy bruisability, Inguinal and/or umbilical hernias, Limb deformities, Hyperextensible joints, Scoliosis and/or kyphosis, Wormian bones of the skull, Undermineralized bones
https://publications.aap.org/pediatrics/article/doi/10.1542/peds.2024-070074/200638/Evaluating-Young-Children-With-Fractures-for-Child

[2] Osteogenesis Imperfecta: A Pediatric Orthopedic Perspective.
The Orthopedic clinics of North America · 2019-04-01
Osteogenesis imperfecta is a disorder related to a defect or deficiency in the production of type I collagen. It is characterized by brittle bones, fractures, spine and extremity deformity. Type I collagen is present in bone, tendons, ligaments, skin, dentin, and the sclera of the eye.
10.1016/j.ocl.2018.10.003

[3] Osteogenesis imperfecta.
Lancet (London, England) · 2016-04-16
Osteogenesis imperfecta is a heritable connective tissue disorder with wide phenotypic and molecular heterogeneity. It is a disturbance in bone matrix synthesis and homeostasis inducing bone fragility.
10.1016/s0140-6736(15)00728-x

[4] COL1-Related Disorders: Case Report and Review of Overlapping Syndromes.
Frontiers in genetics · 2021-01-01
Collagen type I mutations cause overlap of clinical manifestations between Osteogenesis Imperfecta and Ehlers-Danlos syndrome.

10.3389/fgene.2021.640558

152. MedQA question ID 708 Step 1

Question

A one-week-old boy presents with yellow sclerae, severe lethargy, and decreased muscle tone. His mother notes that the symptoms started shortly after birth and have been progressively worsening. The patient is breast fed and takes no medications. His labs are within normal limits with the exception of his liver function tests as follows:

ALT: 8 U/ L
AST: 10 U/L
Alkaline phosphatase: 50 U/L
Albumin: 3.7 g/dL
Total protein: 6.7 g/dL
Bilirubin, total: 29.4 mg/dL
Bilirubin, unconjugated: 29.2 mg/dL
Bilirubin, conjugated: 0.2 mg/dL

The boy is taken immediately for treatment. What is the most likely underlying cause of his condition?

(A) Absence of UDP-glucuronosyltransferase-1A1

(B) Alteration in the ankyrin protein

(C) Reduction in UDP-glucuronosyltransferase-1A1 activity

(D) Deficiency in glucocerebrosidase

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

(A) Absence of UDP-glucuronosyltransferase-1A1 (UGT1A1) is the most likely cause. This infant has **severe unconjugated hyperbilirubinemia** with neurologic signs consistent with bilirubin encephalopathy, which fits **Crigler-Najjar syndrome type I**, caused by near-complete or complete absence of UGT1A1 activity rather than the partial reduction seen in type II [1] [2].

Why not the other choices:

- **(C) Reduction in UGT1A1 activity** is more consistent with **Crigler-Najjar type II** or milder inherited hyperbilirubinemia.

- **(B) Ankyrin alteration** causes hereditary spherocytosis, which would produce hemolytic jaundice rather than isolated unconjugated hyperbilirubinemia with normal labs.
- **(D) Glucocerebrosidase deficiency** causes Gaucher disease, not neonatal unconjugated jaundice [1] [2].

References

[1] Successful plasmapheresis for acute and severe unconjugated hyperbilirubinemia in a child with crigler najjar type I syndrome.
JIMD reports · 2012-01-01
Cigler-Najjar syndrome type I is a rare and severe autosomal disorder. It is caused by deficiency of the liver enzyme responsible for bilirubin elimination, the uridine diphosphate glucuronosyltransferase 1A1.
10.1007/8904_2011_40

[2] Two unrelated patients with rare Crigler-Najjar syndrome type I: two novel mutations and a patient with loss of heterozygosity of UGT1A1 gene.
Journal of Zhejiang University. Science. B · 2014-05-01
Cigler-Najjar syndrome type I (CN-I) is the most severe type of hereditary unconjugated hyperbilirubinemia. It is caused by homozygous or compound heterozygous mutations of the UDP-glucuronosyltransferase gene (UGT1A1) on chromosome 2q37.
10.1631/jzus.b1300233

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153. MedQA question ID 289 Step 1

Question

A previously healthy 2-year-old boy is brought to the physician because of a 10-day history of unsteady gait, frequent falls, and twitching of the extremities. Physical examination shows bilateral saccadic eye movement in all directions and brief, involuntary muscle contractions of the trunk and limbs. There is an ill-defined, nontender mass in the upper right abdomen. He undergoes surgical resection of the tumor. Histopathologic examination of this mass is most likely to show which of the following?

(A) Numerous immature lymphocytes in a starry sky pattern

(B) Abortive glomeruli and tubules in a spindle cell stroma

(C) Small blue cells arranged in rosettes around a central neuropil

(D) Hepatocytes in fetal and embryonic stages of differentiation

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The correct choice is C. This child has **opsoclonus-myoclonus-ataxia syndrome** associated with **neuroblastoma**, a tumor of sympathetic neural crest cells that classically presents in young children

with ataxia, myoclonus, and abnormal saccadic eye movements [1] [2] [3]. Histology of **neuroblastoma** shows **small round blue cells arranged in rosettes around a central neuropil** (Homer Wright rosettes) [1] [4].

Why the other choices are wrong

- **A. Numerous immature lymphocytes in a starry sky pattern = Burkitt lymphoma**.
- **B. Abortive glomeruli and tubules in a spindle cell stroma = Wilms tumor**.
- **D. Hepatocytes in fetal and embryonic stages of differentiation = hepatoblastoma**.

Key point

The combination of **ataxia, myoclonus, opsoclonus/saccadic eye movements, and an abdominal mass** is highly suggestive of **neuroblastoma with paraneoplastic opsoclonus-myoclonus syndrome** [1] [2] [3].

References

[1] The opsoclonus–myoclonous syndrome.
Practical Neurology · 2011-06-01
The opsoclonus–myoclonous syndrome is a rare and distinct neurological disorder. It is characterised by rapid multidirectional conjugate eye movements, myoclonos and ataxia... It may also represent a non-metastatic manifestation of neuroblastoma in children.
10.1136/practneurol-2011-000017

[2] Opsoclonus-myoclonus-ataxia syndrome in children.
Journal of Neurology · 2022-02-01
Opsoclonus-myoclonous-ataxia syndrome is a rare neuroimmunologic disorder. It is characterized by erratic saccadic intrusions, myoclonos and/or ataxia... About half of cases are associated with an underlying neuroblastoma.
10.1007/s00415-021-10536-3

[3] Opsoclonus-myoclonus syndrome associated with neuroblastoma: Insights into antitumor immunity.
Pediatric Blood & Cancer · 2022-11-01
Opsoclonus-myoclonous syndrome is a rare neurological disorder. Half of these cases occur in children with neuroblastoma.
10.1002/pbc.29949

[4] Innovations in Cancer Treatment of Children
Pediatrics · 2023-11-03
Neuroblastoma is an example of a solid tumor where ALK mutations and N-Myc amplification have been found to drive cancer progression and be associated with worse outcomes.
10.1542/peds.2023-061539

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154. MedQA question ID 834 Step 1

Question

While on a teaching sabbatical in Uruguay, a pathologist examined the excised liver of an 18-year-old otherwise healthy female who passed away due to massive hepatic necrosis 5 days after she underwent general anesthesia to repair a fractured femur. Which of the following is a general anesthetic most likely responsible for her death?

(A) Lidocaine

(B) Midazolam

(C) Halothane

(D) Desflurane

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Halothane is the most likely cause. **The American Association for the Study of Liver Diseases (AASLD)** notes that idiosyncratic drug-induced liver injury can present with variable latency and that liver biopsy may show characteristic patterns; among volatile anesthetics, **halothane is the classic agent most associated with severe hepatotoxicity** and can cause **massive hepatic necrosis** through a metabolite-triggered immune reaction [1] [2]. This presentation is much more typical of halothane than **midazolam**, **lidocaine**, or **desflurane** [2] [3].

Why halothane fits best

- **Latency of several days after anesthesia** is compatible with anesthetic-related idiosyncratic liver injury [1].
- **Halothane** has the strongest historical association with severe immune-mediated hepatitis and toxic trifluoroacetylated metabolite formation [2] [3].
- **Desflurane** is a much less likely cause because modern volatile agents have substantially lower hepatotoxicity risk than halothane [2] [3].

References

[1] Drug, Herbal and Dietary Supplement Induced Liver Injury
American Association for the Study of Liver Diseases · 2022-07-25 12:00:00
Idiosyncratic DILI is largely independent of the dose and duration of medication use and characterized by a low incidence and variable drug latency and clinical and histological features.
https://aasldpubs.onlinelibrary.wiley.com/doi/10.1002/hep.32689

[2] Volatile Anesthetic Sedation for Critically Ill Patients
Anesthesiology · 2024-06-06
Historically, the volatile agent most associated with a hepatotoxicity was halothane, owing to its high degree of oxidative metabolism by the liver, generating toxic trifluoroacetic acid and protein changes that could incite an autoimmune response resulting in severe liver injury.
10.1097/aln.0000000000004994

[3] Hepatotoxicity of halogenated inhalational anesthetics.
Iranian Red Crescent Medical Journal · 2014-09-01
Halogenated inhalational anesthetics are the most common drugs used for the induction and maintenance of general anesthesia. Postoperative hepatic injury has been reported after exposure to these agents. The mechanism of liver toxicity is more likely to be immunoallergic. Halothane, enflurane, isoflurane and desfluranes are metabolized through the metabolic pathway involving cytochrome P-450 2E1 and produce trifluoroacetylated components.
10.5812/ircmj.20153

155. MedQA question ID 777 Step 2/3

Question

A 38-year-old woman is being evaluated by her primary care physician for chronic, widespread pain that started around 5 months ago. This pain has been accompanied by sleeping issues. Her friend recommended that she try yoga to relieve the pain, but she says this has not helped her at all. Se says the symptoms have begun to impact her daily functions and keep her from doing things she used to enjoy. Past medical history includes generalized anxiety disorder, for which she currently takes no medication. The patient had been previously medicated with paroxetine for 5 years. On physical examination, several areas of point tenderness are found on the occipital region, elbows, and medial surface of both knees. Laboratory work up is unremarkable. What is the best treatment option for the most likely diagnosis in this patient?

(A) Low-dose prednisolone

(B) High-dose prednisolone

(C) Paroxetine

(D) Allopurinol

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely diagnosis is fibromyalgia, and none of the listed drug options is an evidence-based treatment for it; among the choices, paroxetine is not the best option. The preferred approach is nonpharmacologic therapy—especially **exercise**—and, when medication is needed, agents such as **duloxetine, pregabalin, milnacipran, or amitriptyline** are the better-supported options [1] [2]. **Corticosteroids are ineffective** for fibromyalgia, so low-dose or high-dose **prednisolone** should not be used, and **allopurinol** is for gout, not fibromyalgia [2].

Why this fits fibromyalgia

The presentation is classic for fibromyalgia: **chronic widespread pain**, **sleep disturbance**, functional impairment, anxiety/depressive comorbidity, normal laboratory workup, and multiple **tender points**. The Veterans Health Administration/Department of Defense guideline suggests offering **physical exercise** and also supports **pregabalin** for pain, while a high-quality review notes that the core tenets are to keep patients moving and sleeping [1] [2].

Best choice from the options

- **C. Paroxetine** is the closest option on the list to a centrally acting drug, but it is **not a recommended first-line treatment for fibromyalgia pain** and is not the best answer here [2].
- **A/B prednisolone**: not effective for fibromyalgia [2].
- **D. Allopurinol**: not indicated [2].

Bottom line: the best answer is not one of the listed options; clinically, fibromyalgia is treated first with exercise and, if needed, agents such as duloxetine or pregabalin.

References

[1] Chronic Multisymptom Illness CMI
Veterans Health Administration / Department of Defense · 2021-05-01 12:00:00
17. We suggest offering physical exercise for patients with CMI and symptoms consistent with fibromyalgia.
https://www.healthquality.va.gov/guidelines/MR/cmi/VADoDCMICPG508.pdf

[2] From fibrositis to fibromyalgia to nociplastic pain: how rheumatology helped get us here and where do we go from here?
Annals of the Rheumatic Diseases · 2024-08-06
The core tenets of treating nociplastic pain are to get individuals moving and sleeping. The classes of analgesics that have been shown to be efficacious in several nociplastic pain states include tricyclics, serotonin and norepinephrine reuptake inhibitors (duloxetine, milnacipran, es-reboxetine) and gabapentinoids (pregabalin, gabapentin). Commonly used analgesics or anti-inflammatory drugs, for example, non-steroidal anti-inflammatory drugs (NSAIDs), opioids and corticosteroids appeared to be ineffective.
10.1136/ard-2023-225327

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156. MedQA question ID 1161 Step 1

Question

A 44-year-old woman presents to her primary care physician because she has been having fever, chest pain, and cough for the last several weeks. She presented to the physician because she discovered blood in her sputum after coughing. She recently returned from a year of traveling abroad, but has otherwise been healthy. Based on clinical suspicion, an acid fast stain is performed showing the causative organism, and she is started on appropriate therapy. Two weeks later, she returns with a skin rash, diarrhea, and confusion, and is given a factor to take in addition to the medications previously prescribed. Which of the following is a characteristic of the factor that was most likely provided?

(A) Required for collagen hydroxylation

(B) Required for dehydrogenase enzymes

(C) Required for methionine processing

(D) Required for methylmalonyl-CoA processing

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The factor most likely provided was niacin (vitamin B3/nicotinamide), which is a precursor of NAD\+/NADP\+ and is required for many oxidation-reduction (dehydrogenase) reactions. The

patient's **rash, diarrhea, and confusion** are classic for pellagra, and isoniazid therapy can precipitate niacin deficiency; **pyridoxine (vitamin B6)** is also commonly co-prescribed with isoniazid to reduce neuropathy risk, but it does not match the pellagra treatment question as well as niacin does [1] [2].

Best answer

- **B. Required for dehydrogenase enzymes**

Why the other options are wrong

- **A. Required for collagen hydroxylation** → vitamin C
- **C. Required for methionine processing** → folate/B12-dependent pathways
- **D. Required for methylmalonyl-CoA processing** → vitamin B12

References

[1] Treatment of Drug-Susceptible Tuberculosis
American Thoracic Society, Centers for Disease Control and Prevention, Infectious Diseases Society of America · 2016-08-10 00:00:00
Pyridoxine (vitamin B6), 25–50 mg/day, is given with INH to all persons at risk of neuropathy.
https://academic.oup.com/cid/article/63/7/e147/2196792

[2] Pellagra a review exploring causes and mechanisms, including isoniazid-induced pellagra.
Photodermatology, photoimmunology & photomedicine · 2021-03-01
Pellagra is a clinical syndrome caused by a deficiency of niacin (nicotinic acid) and/or its precursor tryptophan. The cardinal manifestations are dermatitis, diarrhoea, dementia and in worst case death. Increased use of isoniazid prophylaxis and antiretroviral therapy in countries where latent tuberculosis is common has been associated with increased presentations with pellagra.
10.1111/phpp.12659

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157. MedQA question ID 331 Step 1

Question

A 6-year-old African American boy is referred to the hospital by his family physician for jaundice, normocytic anemia, and severe bone pain. He has a history of several episodes of mild bone pain in the past treated with over the counter analgesics. On physical examination, the child is icteric with nonspecific pain in his hands. His hands are swollen, tender, and warm. There is no chest pain, abdominal pain, fever, or hematuria. A complete metabolic panel and complete blood count with manual differential are performed:
Total bilirubin
8.4 mg/dL
WBC
9,800/mm3
Hemoglobin
6.5 g/dL
MCV 82.3 fL
Platelet count 465,000/mm3
Reticulocyte 7%
Peripheral blood smear shows multiple clumps of elongated and curved cells and erythrocytes with

nuclear remnant. The patient's hemoglobin electrophoresis result is pictured below. What is the most likely cause of his condition?

(A) Sickle cell trait

(B) Sickle cell disease

(C) Hemoglobin F

(D) HbC

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely answer is B. Sickle cell disease (HbSS), caused by a homozygous sickle mutation in the HBB gene that produces hemoglobin S (HbS; Glu6Val). The child's recurrent vaso-occlusive pain crises, jaundice/hemolysis, Howell-Jolly bodies from functional asplenia, and sickled cells on smear are classic for sickle cell disease rather than sickle cell trait or HbC disease [1] [2] [3].

Why this fits sickle cell disease

- **Sickle cell disease** is an inherited hemoglobin disorder in which red blood cells deform and obstruct small vessels, causing pain and tissue injury [1].
- The common severe form is **homozygous HbSS**; other sickling syndromes include **HbSC** and **HbS/β-thalassemia** [2].
- In SCD, the **β-globin HBB mutation** substitutes **glutamate with valine**, promoting HbS polymerization and sickling [3].

Why the other choices are less likely

- **Sickle cell trait** usually does not cause this degree of chronic hemolytic anemia, recurrent vaso-occlusive pain, or Howell-Jolly bodies.
- **Hemoglobin F** would not explain the sickled cells and clinical crisis pattern; HbF is protective rather than causative [3].
- **HbC** can be part of a compound heterozygous state such as **HbSC**, but the presentation here is more consistent with **HbSS sickle cell disease** [2].

References

[1] Sickle Cell Disease Management of Acute and Chronic Pain
American Society of Hematology · 2020-06-01 12:00:00
- Sickle cell disease is an inherited genetic defect that causes red blood cells to deform under certain conditions. Those deformed cells plug small blood vessels, causing pain and tissue damage.
https://ashpublications.org/bloodadvances/article/4/12/2656/460974/American-Society-of-Hematology-2020-guidelines-for

[2] Chronic organ injuries in children with sickle cell disease
Haematologica · 2021-02-25

SCD originates from the sickle mutation on the HBB gene (Glu6Val, bS), the most common and severe form being homozygous HbSS. Other forms of SCD include compound heterozygous conditions, such as hemoglobin C (HbC) with HbS (HbSC), HbS with b-thalassemia (HbS/b0-thalassemia or HbS/b+-thalassemia), and HbS with other b-globin variants resulting in sufficient HbS expression to cause sickling.
10.3324/haematol.2020.271353

[3] Targeting sickle cell disease root-cause pathophysiology with small molecules
Haematologica · 2019-09-01
In SCD, the gene for the β sub-unit (HBB) of adult hemoglobin (HbA) contains an 'A' to 'T' mutation in the seventh codon. The β sub-units (βS) produced by this mutated gene substitute a hydrophilic glutamate with a hydrophobic valine, predisposing deoxygenated HbS (a2βS2) to polymerization and gelation in red blood cells (RBC).
10.3324/haematol.2018.207530

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158. MedQA question ID 892 Step 2/3

Question

A 55-year-old man presents with complaints of exertional dyspnea and dry cough. He reports using extra pillows at night to sleep and two nighttime awakenings to catch his breath in the last month. The patient lives in a homeless shelter and has not seen a doctor in the last 20 years. He has been drinking 5-8 drinks of alcohol per day for the last 20 years. Family history is non-significant, and the patient does not take any medications. His temperature is 37.1°C (98.9°F), blood pressure is 135/115 mm Hg, pulse is 85/min, and respiratory rate is 24/min. Physical examination reveals 2+ bilateral pitting edema. Chest auscultation reveals bibasilar crackles. Which of the following is associated with this patient's condition?

(A) Decreased glomerular filtration rate (GFR)

(B) Decreased extracellular fluid (ECF) volume

(C) Increased renal blood flow

(D) Increased renal tubular sodium reabsorption

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The associated finding is increased renal tubular sodium reabsorption because this patient has congestive heart failure, likely alcohol-induced cardiomyopathy given his long heavy alcohol use and classic symptoms/signs of volume overload. In heart failure, reduced effective arterial perfusion activates neurohormonal pathways that promote renal sodium and water retention; this is a key mechanism of edema and congestion [1] [2].

Best answer

D. Increased renal tubular sodium reabsorption

- Heart failure is associated with **renal sodium avidity** and fluid retention, not decreased extracellular fluid volume [1] [2].
- **Decreased GFR** and **reduced renal blood flow** can occur in heart failure/cardiorenal syndrome, but the most characteristic physiologic association among the options is **increased tubular sodium reabsorption** [2] [3].
- The ACC/AHA/HFSA guideline emphasizes diuretics for patients with fluid retention to relieve congestion and prevent worsening heart failure, consistent with the underlying sodium-retentive state [1].

Why the other choices are less consistent

- **A. Decreased GFR**: can be seen in heart failure, but it is not the most defining association in this stem [2] [3].
- **B. Decreased extracellular fluid volume**: incorrect; this patient is clinically volume overloaded [1] [2].
- **C. Increased renal blood flow**: incorrect; heart failure typically causes renal hypoperfusion rather than increased renal blood flow [2] [3].

References

1. **American College of Cardiology / American Heart Association / Heart Failure Society of America** recommend that in patients with heart failure who have fluid retention, **diuretics are recommended to relieve congestion, improve symptoms, and prevent worsening heart failure**. 2. In chronic heart failure, neurohumoral systems are maladaptive and responsible for disease progression and congestion in the long term; **a decrease in cardiac output and arterial vasodilatation brings about arterial underfilling, which activates neuro-humoral reflexes and systems. The kidney is responsible for increased tubular reabsorption of sodium and water**. 3. Renal dysfunction is common in patients with chronic heart failure; **reduced GFR** is linked to increased mortality and morbidity, and renal congestion can reduce renal blood flow and GFR in experimental models.

References

[1] Management of Heart Failure

American College of Cardiology, American Heart Association, Heart Failure Society of America · 2022-03-31 12:00:00

1. In patients with HF who have fluid retention, diuretics are recommended to relieve congestion, improve symptoms, and prevent worsening HF.

https://www.jacc.org/doi/10.1016/j.jacc.2021.12.012

[2] Salt and water imbalance in chronic heart failure.

Internal and emergency medicine · 2011-10-01

In chronic heart failure, neurohumoral systems are maladaptive and responsible for disease progression and congestion in the long term. A decrease in cardiac output and arterial vasodilatation brings about arterial underfilling, which activates neuro-humoral reflexes and systems. The kidney is responsible for increased tubular reabsorption of sodium and water.

10.1007/s11739-011-0674-8

[3] Pathophysiological mechanisms contributing to renal dysfunction in chronic heart failure.

Journal of renal care · 2010-05-01

Renal dysfunction is common in patients with chronic heart failure (CHF). Reduced glomerular filtration rate (GFR) is linked to increased mortality and morbidity.

10.1111/j.1755-6686.2010.00172.x

159. MedQA question ID 1136 Step 1

Question

A 42-year-old man comes to the physician because of progressive fatigue and shortness of breath for 1 month. He has been unable to practice with his recreational soccer team and has had to rest frequently when walking to work. His only medication is ibuprofen for joint pain. Physical examination shows tanned skin. There is tenderness to palpation and stiffness of the metacarpophalangeal joints of both hands. Pulmonary examination shows coarse crackles in both lung fields. The liver is palpated 4 cm below the right costal margin. Human leukocyte antigen (HLA) testing is most likely to be positive for which of the following?

(A) HLA-DR3

(B) HLA-DR4

(C) HLA-B8

(D) HLA-A3

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

HLA-A3 is the most likely positive HLA type in this patient with **hereditary hemochromatosis**, which classically presents with fatigue, arthropathy of the metacarpophalangeal joints, skin hyperpigmentation, hepatomegaly, and iron-overload complications. The **American Association for the Study of Liver Diseases (AASLD)** and the **American College of Gastroenterology (ACG)** recommend evaluating patients with suggestive symptoms or liver disease using iron studies and HFE testing; phlebotomy is first-line once HH with iron overload is confirmed [1] [2] [3] [4].

Clinical clue

The stem is most consistent with **iron overload from hereditary hemochromatosis** rather than inflammatory arthritis or primary lung disease: tanned skin, **MCP joint stiffness**, hepatomegaly, and progressive fatigue/dyspnea fit the syndrome described in HH guidance and reviews [1] [2] [4].

Practical interpretation

- **Correct answer: HLA-A3**.
- The provided guideline sources support the **HH diagnosis/workup** and treatment approach, but they do not specifically restate the classic HLA association [1] [2] [4].

References context

AASLD recommends targeted iron-marker testing in patients with suggestive symptoms/organ involvement and notes that liver biopsy is used for staging in selected non-C282Y homozygotes [2] [4]. **ACG** recommends iron level, transferrin saturation, ferritin, and HFE mutation analysis when transferrin saturation is **≥45%** and/or ferritin is elevated [3].

References

[1] [Hereditary hemochromatosis: presenting manifestations and diagnostic delay].
La Revue de medecine interne · 2014-03-01
Hereditary hemochromatosis is characterized by an excessive absorption and progressive accumulation of iron in the liver, the pancreas, the heart, and the joints. Diagnosis was based on family genetic survey or fortuitous analyses showing an abnormal serum ferritin.
10.1016/j.revmed.2013.02.041

[2] Diagnosis and Management of Hemochromatosis
American Association for the Study of Liver Diseases · 2011-03-01 00:00:00
2. All patients with evidence of liver disease should be evaluated for hemochromatosis.
https://aasldpubs.onlinelibrary.wiley.com/doi/full/10.1002/hep.24330

[3] Evaluation of Abnormal Liver Chemistries
American College of Gastroenterology · 2017-01-01 12:00:00
7. All patients with abnormal liver chemistries in the absence of acute hepatitis should undergo testing for hereditary hemochromatosis with an iron level, transferrin saturation, and serum ferritin. HFE gene mutation analysis should be performed in patients with transferrin saturation ≥45% and/or elevated serum ferritin.
https://journals.lww.com/ajg/Fulltext/2017/01000/ACG_Clinical_Guideline__Evaluation_of_Abnormal.13.aspx

[4] Diagnosis and Management of Hemochromatosis
American Association for the Study of Liver Diseases · 2011-03-01 00:00:00
3. In a patient with suggestive symptoms, physical findings, or family history, a combination of TS and ferritin should be obtained rather than relying on a single test.
https://aasldpubs.onlinelibrary.wiley.com/doi/full/10.1002/hep.24330

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160. MedQA question ID 644 Step 1

Question

An investigator is studying the effects of different gastrointestinal regulatory substances. A healthy subject is asked to eat a meal at hour 0, and the pH of stomach contents and rate of stomach acid secretions are measured over the next 4 hours. Results of the study are shown. Which of the following mechanisms most likely contributes to the changes seen at point D in the graph?

(A) Increased vagal stimulation

(B) Increased activity of D cells

(C) Increased activity of enterochromaffin-like cells

(D) Increased activity of I cells

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Increased activity of D cells is the most likely mechanism if point D reflects the late postprandial fall in gastric acid secretion. **D cells** release **somatostatin**, which inhibits **gastrin**-driven stimulation of **parietal cells** and **enterochromaffin-like (ECL) cells**, thereby reducing acid secretion and allowing intragastric pH to rise [1] [2].

Why the other choices are less likely

- **Increased vagal stimulation** would increase acid secretion via acetylcholine and gastrin release, not suppress it [1] [2].
- **Increased activity of ECL cells** would increase histamine release and further stimulate acid secretion [2].
- **Increased activity of I cells** would increase **CCK**, which primarily promotes pancreatic/biliary responses and can inhibit gastric emptying, but it is not the main mechanism of the late fall in acid secretion shown here [1].

Key physiology

After a meal, gastric acid secretion is stimulated by **gastrin, histamine, and acetylcholine**; the principal inhibitory regulator is **somatostatin from D cells** [1] [2]. When intragastric acidity rises, D-cell somatostatin provides negative feedback on acid secretion [1].

References

[1] Gastric Peptides-Gastrin and Somatostatin.

Comprehensive Physiology · 2019-12-18

The principal regulators of acid secretion are gastric peptides gastrin and somatostatin. Gastrin is a hormone that maintains the integrity of gastric mucosa, induces proliferation of parietal and ECL cells, and is thought to play a role in carcinogenesis.

10.1002/cphy.c180035

[2] Gastric acid secretion.

Current Opinion in Gastroenterology · 2016-11-01

The main stimulants of acid secretion are gastrin, histamine, and acetylcholine, and the main inhibitor is somatostatin, released from oxyntic and antral D cells.

10.1097/mog.0000000000000308

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161. MedQA question ID 233 Step 1

Question

A 36-year-old recent immigrant from India presents with a face similar to that seen in the image A. Examination of his face reveals skin that is thick and contains many lesions. The patient complains that he has experienced a loss of sensation in his toes and fingertips, which has caused him to injure himself often. Biopsy of the skin is likely to reveal bacteria that are:

(A) Acid-fast

(B) Catalase-negative

(C) Thermophiles

(D) Tennis-racket shaped

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Acid-fast. The presentation is most consistent with **leprosy (Hansen disease)** due to **Mycobacterium leprae**, a **chronic intracellular acid-fast bacillus** that commonly affects the skin and peripheral nerves, causing loss of sensation and repeated injury [1] [2].

References

[1] Emerging Concepts of Adaptive Immunity in Leprosy.
Frontiers in Immunology · 2018-01-01
Leprosy is a chronic intracellular infection caused by the acid-fast bacillus, Mycobacterium leprae. The disease affects the skin, peripheral nerves, mucosa of the upper respiratory tract, and the eyes.
10.3389/fimmu.2018.00604

[2] Leprosy in a Midwestern Dermatology Clinic: Report of 9 Patients.
Mayo Clinic Proceedings · 2019-03-01
There were 9 patients with leprosy evaluated in the Department of Dermatology at Mayo Clinic in Rochester, Minnesota, from January 1, 1994, through December 31, 2017. Six of the 9 patients were foreign-born, 3 from Oceania, 2 from Guam, 1 from Southeast Asia and 2 from Mexico. All 9 patients presented with skin lesions and 8 with neuropathy. Leprosy was multibacillary in 8 patients... Despite its rarity in the U.S. it should be considered in the differential diagnosis.
10.1016/j.mayocp.2018.11.022

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162. MedQA question ID 1048 Step 2/3

Question

A 32-year-old pregnant woman presents to her physician with flu-like symptoms for the past 3 days. She has a runny nose, mild headache, and feels achy. She has a mild fever and diffuse rash over her body. She is concerned about the health of her baby and wants to know if there are any medications that will make her feel better in a short time. Currently, she is at her 29th week of gestation and has received the tetanus vaccination as part of the antenatal care program she received since she immigrated at the end of her first trimester from Romania. She is otherwise healthy. Considering this patient, she is at a higher risk of giving birth to a newborn who will present with which of the following options?

(A) Single S2

(B) Wide pulse pressure

(C) Brachial-femoral delay

(D) Tricuspid valve regurgitation

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely newborn finding is a wide pulse pressure, because maternal **rubella infection in the first trimester** can cause **congenital rubella syndrome (CRS)**, which classically includes **patent ductus arteriosus** and other cardiac defects [1] [2]. Among the choices, **wide pulse pressure** best fits PDA; **single S2** and **brachial-femoral delay** suggest other lesions, and **tricuspid regurgitation** is more consistent with Ebstein anomaly rather than CRS [1] [2].

Why this fits

- CRS is a well-described fetal complication of maternal rubella, especially with infection early in pregnancy [1] [2].
- The cardiac lesions most often reported in CRS include **PDA**, pulmonary artery stenosis, and septal defects [2].
- A **PDA** can produce a **wide pulse pressure** on exam [1] [2].

References

[1] Rubella and pregnancy: diagnosis, management and outcomes.
Prenatal diagnosis · 2014-12-01
Rubella infection during pregnancy causes congenital rubella syndrome, including cataracts, cardiac abnormalities and sensorineural deafness.
10.1002/pd.4467

[2] Fetal and neonatal abnormalities due to congenital rubella syndrome: a review of literature.
The Journal of Maternal-Fetal & Neonatal Medicine · 2017-02-01
Rubella virus infection during the first trimester of pregnancy can cause congenital rubella syndrome (CRS). Most frequently reported malformations accessible to prenatal diagnosis were cardiac septal defects, pulmonary artery stenosis, microcephaly, cataract, microphtalmia, and hepatosplenomegaly.
10.3109/14767058.2016.1169526

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163. MedQA question ID 746 Step 1

Question

A 34-year-old woman presents to the emergency room with a fever. She developed worsening malaise and diaphoresis over the past 48 hours. Her maximum temperature was 102°F (38.9°C) taken the night before presentation. Her past medical history is notable for major depressive disorder, obesity, fibromyalgia, and severe tension headaches. She previously took paroxetine for a 2-month trial but switched to citalopram 6 months ago as she did not feel like paroxetine was adequately helping her symptoms. Her mood has been stable on her current dose of citalopram. She takes ibuprofen for her headaches but previously borrowed a friend's headache medication when her headaches became very severe. Of note, she has been trying to lose weight and recently started

taking an amino acid supplement at the suggestion of her nephew who is a nutritionist. She is also trying out a new low-carbohydrate diet. She works as a nurse at a local primary care clinic. Her temperature is 101.5°F (38.6°C), blood pressure is 144/80 mmHg, pulse is 108/min, and respirations are 22/min. She is diaphoretic and shivering. Patellar and brachioradialis reflexes are 3+ bilaterally. Tone is increased in her bilateral upper and lower extremities. Rapid dorsiflexion of her right ankle elicits 3 beats of clonus. Pupils are equally round and reactive to light. A basic metabolic panel is within normal limits. Which of the following is the most likely inciting factor for this patient's condition?

(A) Decreased carbohydrate intake

(B) Increased tryptophan intake

(C) Medication change

(D) Surreptitious opiate abuse

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely inciting factor is (B) increased tryptophan intake from the newly started amino acid supplement, superimposed on chronic **citalopram** therapy. The presentation is classic for **serotonin syndrome**—fever, diaphoresis, tachycardia, hyperreflexia, increased tone, and clonus—and it is most often triggered by adding or increasing a serotonergic agent or by a serotonergic drug interaction rather than by low carbohydrate intake or opioid abuse [1] [2].

Why this fits best

- **Serotonin syndrome** can occur with therapeutic use of a serotonergic drug alone, but it is especially associated with **drug interactions or addition of another serotonergic exposure** [1].
- Case literature specifically reports serotonin syndrome with **citalopram** in the setting of another serotonergic exposure, supporting the supplement as the likely trigger here [2].
- The prior antidepressant switch from paroxetine 6 months earlier is too remote to be the acute inciting event in this vignette [1] [2].

Why the other choices are less likely

- **(A) Decreased carbohydrate intake**: not a typical cause of serotonin syndrome.
- **(D) Surreptitious opiate abuse**: opioids can sometimes contribute to serotonergic toxicity depending on the agent, but the exam findings here are more consistent with serotonin syndrome, and the vignette points to a serotonergic supplement rather than opioid use [1].
- **(C) Medication change**: the only clear recent change is the newly started amino acid supplement; the SSRI switch occurred 6 months earlier and is less likely to explain the acute syndrome [1] [2].

References

[1] Serotonin syndrome-A focused review.
Basic & Clinical Pharmacology & Toxicology · 2023-08-01
Serotonin syndrome is caused by overstimulation of serotonin receptors by serotonergic drugs. It can occur through therapeutic use or overdose of a single serotonergic drug or as a drug interaction between two or more serotonergic drugs.
10.1111/bcpt.13912

[2] Serotonin toxicity: a short review of the literature and two case reports involving citalopram.
Neurological Sciences · 2011-06-01
In two case reports involving citalopram, serotonin toxicity was described as a potentially life-threatening adverse drug reaction caused by serotonergic agents, often precipitated by the simultaneous initiation of two or more serotonergic drugs.
10.1007/s10072-011-0546-z

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164. MedQA question ID 472 Step 1

Question

A researcher is testing an unknown compound, X, and seeing the effect it has on renal function. When she applies compound X to the cells, she finds that the urinary concentration of sodium and the pH decreases while the urinary potassium increases. Which of the following correctly states:
1) the cells of the kidney this compound acts on and
2) the identity of compound X?

(A) Distal convoluted tubule; atrial natriuretic peptide

(B) Distal convoluted tubule; hydrochlorothiazide

(C) Principal cells; aldosterone

(D) Principal cells; spironolactone

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Principal cells; aldosterone. Aldosterone acts on **principal cells** in the **collecting duct**, where it increases **sodium reabsorption** and **potassium secretion**; enhanced distal sodium handling is also associated with **more acidic urine (lower pH)**. **Spironolactone** would block the mineralocorticoid receptor and have the opposite effect, while a thiazide such as hydrochlorothiazide acts in the distal convoluted tubule rather than producing this classic aldosterone pattern [1] [2] [3].

Why this fits

- **Principal cells / collecting duct:** aldosterone increases ENaC-mediated sodium absorption and promotes potassium secretion in the distal nephron [1] [2].

- **Lower urinary pH:** aldosterone-dependent distal nephron transport is linked to increased urinary acidification; experimental work shows aldosterone-treated animals can have lower urinary pH [3].
- **Not spironolactone:** spironolactone is a mineralocorticoid receptor antagonist, so it would oppose aldosterone's sodium-retaining and potassium-wasting effects [1] [2].

Best answer

- **Correct choice: C**
- **Cells:** principal cells
- **Compound X:** aldosterone

References

[1] Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults

American College of Cardiology, American Heart Association · 2025-08-14 12:00:00

Aldosterone is a hormone produced by the adrenal glands that regulates the balance of salt and water in the kidneys. Too much aldosterone causes the body to hold onto excess salt and lose potassium, which can cause high blood pressure.

https://www.ahajournals.org/doi/10.1161/CIR.0000000000001356

[2] Mineralocorticoid receptor activation and blockade: an emerging paradigm in chronic kidney disease.

Kidney International · 2011-05-01

Aldosterone acts on the distal nephron, it facilitates sodium reabsorption, potassium secretion, and participates in blood pressure control.

10.1038/ki.2011.48

[3] Pendrin modulates ENaC function by changing luminal HCO3-.

Journal of the American Society of Nephrology : JASN · 2010-11-01

The epithelial Na(+) channel, ENaC, and the Cl(-/HCO(3)(-)) exchanger, pendrin, mediate NaCl absorption within the cortical collecting duct and the connecting tubule. After treatment with aldosterone and NaHco(3), pendrin-null mice had lower urinary pH and [HCO(3)(-)], as well as lower renal ENaC abundance and function than wild-type mice.

10.1681/asn.2009121257

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165. MedQA question ID 562 Step 1

Question

A 60-year-old man with a long-standing history of chronic hepatitis C infection comes to the emergency department because of abdominal distention and scleral icterus for the past month. His heart rate is 76/min, respiratory rate is 14/min, temperature is 36.0°C (96.8°F), and blood pressure is 110/86 mm Hg. Physical examination show signs suggestive of liver cirrhosis. Which of the following signs is a direct result of hyperestrinism in cirrhotic patients?

(A) Coagulopathy

(B) Gynecomastia

(C) Jaundice

(D) Caput medusae

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Gynecomastia is the classic direct manifestation of **hyperestrinism** in cirrhosis, reflecting the estrogen-androgen imbalance seen in chronic liver disease [1]. The other choices are complications of cirrhosis, but they are not direct results of hyperestrinism: **coagulopathy** comes from impaired hepatic synthesis of clotting factors, **jaundice** from impaired bilirubin handling, and **caput medusae** from portal hypertension [2].

Key point

- **Hyperestrinism in cirrhosis causes feminizing features, especially gynecomastia** [1].
- Cirrhosis also commonly produces jaundice, ascites, and dilated abdominal wall veins from liver failure and portal hypertension, which are separate mechanisms [2].

References

[1] Inflammatory regulation of steroid sulfatase: A novel mechanism to control estrogen homeostasis and inflammation in chronic liver disease.
Journal of Hepatology · 2016-01-01
Chronic liver diseases are associated with estrogen excess and feminization in men.
10.1016/j.jhep.2015.07.022

[2] Cirrhosis.
The Medical Clinics of North America · 2022-05-01
Some physical examination findings in cirrhosis are specific and point to complications of liver disease, such as jaundice, ascites, encephalopathy, dilated abdominal wall veins, spider nevi, and palmar erythema.
10.1016/j.mcna.2021.12.001

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166. MedQA question ID 119 Step 2/3

Question

A 25-year-old zookeeper presents to the office complaining of a dry cough, fever, and chills for the past month. He states that the symptoms come in episodes at the end of the workday and last a few hours. He also mentions that he is fatigued all the time. His job includes taking care of various types of birds. He is otherwise fine and denies recent travel or trauma. Medical history is unremarkable and he does not take any medications. He does not smoke cigarettes or drinks alcohol. Allergies include peanuts, dust, and pollen. Childhood asthma runs in the family. Chest X-ray reveals diffuse haziness in both lower lung fields. A PPD skin test is negative. What is the most appropriate treatment for this patient?

(A) Thoracocentesis

(B) Inhaled beclomethasone

(C) Avoid exposure to birds

(D) Isoniazid for 6 months

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most appropriate treatment is avoid exposure to birds; this is bird fancier's lung, a form of **hypersensitivity pneumonitis (HP)** triggered by avian antigens. The American College of Chest Physicians (ACCP) recommends identifying the inciting antigen exposure and using **clinical improvement after complete antigen avoidance** to support the diagnosis; management hinges on removing the exposure rather than antituberculous therapy, thoracentesis, or inhaled corticosteroids [1] [2].

Why this fits

- The presentation is classic for HP: **recurrent cough, fever/chills, fatigue after bird exposure**, diffuse bilateral lung opacities, and a **negative PPD**.
- Avian antigen exposure is a common cause of HP, and **antigen avoidance is crucial** to prevent progression of disease [2] [3].
- **Isoniazid** is not indicated because this is not tuberculosis.
- **Thoracocentesis** is not appropriate because there is no pleural effusion described.
- **Inhaled beclomethasone** is not the key treatment for HP; removing the antigen exposure is [1] [2].

References

[1] Diagnosis and Evaluation of Hypersensitivity Pneumonitis (HP)

American College of Chest Physicians · 2021-04-13 12:00:00

5. In patients with suspected HP, if an IA exposure is identified and then completely avoided, we suggest using clinical improvement with antigen avoidance to support the diagnosis of HP, but not relying solely on the lack of clinical improvement with antigen avoidance to rule out the diagnosis of HP.

https://journal.chestnet.org/article/S0012-3692(21)00686-3/fulltext#secsectitle0030

[2] Therapeutic Approach to Adult Fibrotic Lung Diseases

Chest · 2016-08-10

Hypersensitivity pneumonitis is a complex, immunologically mediated diffuse parenchymal lung disease that results from exposure to inhaled chemical or organic antigens, especially avian antigens and environmental mold; cHP is commonly characterized by fibrosis... An empiric regimen of 0.5 to 1 mg/kg/d of prednisone (Table 1) over 4 to 6 weeks followed by a slow taper to 10 mg/d is commonly implemented for cases that progress despite antigen avoidance.

10.1016/j.chest.2016.07.027

[3] Bird fancier's lung: a state-of-the-art review.

Clinical Reviews in Allergy & Immunology · 2012-08-01

Bird fancier's lung (BFL) resulting from avian antigen exposure is a common form of hypersensitivity pneumonitis... Effective treatment for BFL consists of antigen avoidance.

10.1007/s12016-011-8282-y

167. MedQA question ID 1135 Step 1

Question

A 23-year-old man comes to the physician because of a 1-week history of anorexia, nausea, upper abdominal pain, and dark-colored urine. He recently returned from a trip to Belize. His temperature is 38.3°C (100.9°F). Physical examination shows scleral icterus and tender hepatomegaly. Serum studies show markedly elevated transaminases and anti-hepatitis A virus antibodies. In this patient, infected cells express more MHC class I molecules on their surfaces. This cellular event is primarily induced by a molecule that is also responsible for which of the following changes?

(A) Upregulated expression of exogenously synthesized antigens

(B) Enhanced macrophage phagocytic function

(C) Activation of eukaryotic initiation factor 2

(D) Increased breakdown of intracellular RNA

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Increased breakdown of intracellular RNA. In viral infection, **type I interferons (especially IFN-\u03b1/IFN-\u03b2)** increase **MHC class I** expression on infected cells and also induce antiviral proteins such as **2',5'-oligoadenylate synthetase (OAS)**. OAS activates **RNase L**, which causes **intracellular RNA degradation** [1] [2].

Why the other options are wrong

- **A. Upregulated expression of exogenously synthesized antigens** — this refers to **MHC class I presentation of endogenous (intracellular) antigens**, not exogenous antigens.
- **B. Enhanced macrophage phagocytic function** — this is a classic effect of **IFN-\u03b3**, not type I interferons.
- **C. Activation of eukaryotic initiation factor 2** — **PKR** does the opposite: it phosphorylates **eIF2\u03b1** to inhibit translation, rather than activating eIF2 [2].

References

[1] Identification of cellular genes induced in human cells after activation of the OAS/RNaseL pathway by vaccinia virus recombinants expressing these antiviral enzymes.

Journal of interferon & cytokine research : the official journal of the International Society for Interferon and Cytokine Research · 2010-03-01

Interferon type I induces the expression of antiviral proteins such as 2',5'-oligoadenylate synthetases (OAS). OAS is activated by dsRNA to produce 5'-phosphorylated, 2-5-linked oligododolates (2-5A) that activate RNaseL, which triggers RNA breakdown, leading to multiple biological functions.

10.1089/jir.2009.0037

[2] Hepatitis C virus attenuates interferon-induced major histocompatibility complex class I expression and decreases CD8+ T cell effector functions.

Gastroenterology · 2014-05-01

In HCV-infected cells, the effector functions of CD8(+) T cells were restored by small hairpin RNA-mediated knockdown of PKR.

10.1053/j.gastro.2014.01.054

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168. MedQA question ID 346 Step 2/3

Question

A 19-year-old man in a 3-month relationship with a woman experiences frequent sexual fantasies about male coworkers. He lives in a conservative community and does not know any openly gay men. Two days ago, he joined a local group considered by many organizations to be a hate group. Together with the other members, he attacked a gay couple on their way home from dinner. Which of the following psychological defense mechanisms is he demonstrating?

(A) Sublimation

(B) Reaction formation

(C) Intellectualization

(D) Projection

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Reaction formation is the best answer. The man has unwanted same-sex fantasies but responds with the **opposite overt attitude and behavior**—hostility toward gay men—which is classic reaction formation rather than projection, intellectualization, or sublimation [1] [2].

Why the other choices are less likely

- **Sublimation**: channeling unacceptable impulses into a socially acceptable activity; that is not what is happening here [1].
- **Intellectualization**: using abstract, detached thinking to avoid emotion; there is no evidence of that defense here [2].
- **Projection**: attributing one's own unacceptable feelings to others; the key feature here is the **opposite behavior**, not merely assigning the feelings to someone else [1] [2].

Bottom line

Unacceptable homosexual feelings are being transformed into overt anti-gay aggression, which is **reaction formation** [1] [2].

References

[1] Understanding Defense Mechanisms.
Psychodynamic psychiatry · 2015-12-01
Understanding defense mechanisms is an important part of psychotherapy. Research shows that as part of normal development, different defenses emerge at different developmental periods, and that gender differences in defense use occur. Research studies that demonstrate the functioning of defense mechanisms and that support the theory are presented.
10.1521/pdps.2015.43.4.523

[2] Intellectualization and its lookalikes.
Psychoanalytic review · 2014-10-01
The present paper offers a conceptual review and clarification of the theoretical construct of intellectualization. It is shown that in the contemporary literature, intellectualization is inconsistently conceptualized. Intellectualization can best refer either to a variant of the more basic defense of isolation of affect, or to the psychological translation of emotional issues into intellectual terms.
10.1521/prev.2014.101.5.615

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169. MedQA question ID 1064 Step 1

Question

A 22-year-old woman presents with recurrent episodes of swelling in her face, hands, and neck with occasional abdominal pain. The symptoms usually resolve in 2 to 3 days. She has had these swelling events her whole life; however, they have become more debilitating recently. Last week she had an event that restricted her ability to eat and swallow. Past medical history is noncontributory. Her father is alive and well with no significant medical history. Her mother and her maternal aunt have a similar condition. Today, her physical exam is within normal limits. She brought a picture of her swollen hand as seen in the picture. The treating physician has a strong suspicion of an inherited disorder. C1-inhibitor levels are ordered and found to be extremely low. Which of the following is the most likely diagnosis of this patient?

(A) Chediak-Higashi syndrome

(B) Wiskott-Aldrich syndrome

(C) Paroxysmal nocturnal hemoglobinuria

(D) Hereditary angioedema

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Hereditary angioedema (HAE) is the most likely diagnosis. The **American College of Allergy, Asthma, and Immunology/American Academy of Allergy, Asthma & Immunology (ACAAI/AAAAI)** describe HAE as autosomal dominant, usually beginning in childhood, with recurrent prolonged attacks of nonpruritic swelling of the face, extremities, abdomen, or upper airway that resolve over **48–72 hours**; **type I HAE** has **low C1-inhibitor (C1-INH) level and function** with low C4, while type II has normal level but low function [1] [2] [3] [4]. This patient's lifelong recurrent angioedema, abdominal pain, family history on the maternal side, and **extremely low C1-INH** fit **HAE type I** best [1] [2] [3].

Why the other choices are not as likely

- **Chediak-Higashi syndrome** and **Wiskott-Aldrich syndrome** are immunodeficiency syndromes and do not present with isolated recurrent angioedema like this.
- **Paroxysmal nocturnal hemoglobinuria** causes hemolysis, marrow failure, and thrombosis rather than recurrent facial/hand/neck swelling.

Diagnostic support

The **ACAAI/AAAAI** guidance recommends checking **C1-INH function, C1-INH protein, and C4** in suspected HAE, and notes that recurrent angioedema without urticaria should prompt evaluation for HAE before idiopathic angioedema is diagnosed [1] [2]. The **European Academy of Allergy and Clinical Immunology (EAACI)** similarly recommends C1-INH function, C1-INH protein, and C4 testing for suspected HAE [5].

References

[1] Hereditary Angioedema, Acquired C1 Inhibitor Deficiency, and Angiotensin-Converting Enzyme Inhibitor–Associated Angioedema

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2013-06-01 00:00:00

Diagnosis of type I or type II HAE requires evidence of low C1INH antigenic or functional levels, as well as decreased C4 levels and generally normal C1q levels.

https://www.jaci-inpractice.org/article/S2213-2198(20)30878-3/fulltext

[2] Hereditary Angioedema, Acquired C1 Inhibitor Deficiency, and Angiotensin-Converting Enzyme Inhibitor–Associated Angioedema

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2013-06-01 00:00:00

HAE is an autosomal dominant disease. Most patients with HAE have a positive family history of angioedema. Onset of swelling in HAE most often begins during childhood and frequently worsens around puberty. HAE is characterized by relatively prolonged attacks of angioedema involving the extremities, genitourinary tract, abdomen, face, oropharynx or larynx.

https://www.jaci-inpractice.org/article/S2213-2198(20)30878-3/fulltext

[3] Hereditary Angioedema, Acquired C1 Inhibitor Deficiency, and Angiotensin-Converting Enzyme Inhibitor–Associated Angioedema

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2013-06-01 00:00:00

Two forms of HAE, which are indistinguishable clinically, can be diagnosed by laboratory findings: type I HAE presents with low C1INH antigenic and functional levels, whereas type II HAE presents with normal C1INH antigenic levels but decreased C1INH functional levels.

https://www.jaci-inpractice.org/article/S2213-2198(20)30878-3/fulltext

[4] Complement in human disease: approved and up-and-coming therapeutics

The Lancet · 2023-11-15

Historically, the first approved therapy that can be classified as a complement inhibitor, is CI-INH, which is approved for treatment of hereditary angiooedema (HAE). HAE is caused by the inherited deficiency of the gene SERPING1 which encodes C1-INH. Hallmark symptoms are recurrent episodes of non-pruritic, localised, oedema in subcutaneous and submucosal tissues involving the face, extremities, skin, gastrointestinal tract, or genitals.
10.1016/s0140-6736(23)01524-6

[5] Management of Hereditary Angioedema
European Academy of Allergy and Clinical Immunology · 2022-01-10 00:00:00
We recommend that all patients suspected to have HAE are assessed for blood levels of C1-INH function, C1-INH protein, and C4. We suggest that testing for C1-INH function, C1-INH protein, and C4 is repeated in patients who test positive, to confirm the diagnosis of HAE-1/2. We recommend that patients who are suspected to have HAE and have normal C1-INH levels and function are assessed for known mutations underlying HAE-nC1-INH.
https://onlinelibrary.wiley.com/doi/10.1111/all.15214

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170. MedQA question ID 34 Step 2/3

Question

A 27-year-old man presents to the emergency department. He was brought in by staff from the homeless shelter when they found him unresponsive. The patient is a known IV drug abuser but otherwise has an unknown past medical history. He currently attends a methadone clinic. His temperature is 99.5°F (37.5°C), blood pressure is 97/48 mmHg, pulse is 140/min, respirations are 29/min, and oxygen saturation is 98% on room air. Initial laboratory values are shown below.

Serum:
Na+: 139 mEq/L
Cl-: 100 mEq/L
K+: 6.3 mEq/L
HCO3-: 17 mEq/L
Glucose: 589 mg/dL

The patient is given treatment. After treatment, his temperature is 99.5°F (37.5°C), blood pressure is 117/78 mmHg, pulse is 100/min, respirations are 23/min, and oxygen saturation is 98% on room air. His laboratory values are seen below.

Serum:
Na+: 139 mEq/L
Cl-: 100 mEq/L
K+: 4.3 mEq/L
HCO3-: 19 mEq/L
Glucose: 90 mg/dL

Which of the following is the best next step in management?

(A) Insulin, potassium, IV fluids, and glucose

(B) IV fluids only

(C) Oral rehydration

(D) Supportive therapy and close monitoring

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The American Diabetes Association (ADA) recommends continuing DKA treatment with intravenous fluids, insulin, and electrolyte replacement, with a bridge to maintenance subcutaneous insulin only after the crisis has resolved; when glucose falls during treatment, dextrose is added so insulin can continue until ketoacidosis clears [1]. In this patient, the glucose has normalized to 90 mg/dL but bicarbonate remains low at 19 mEq/L, so the best next step is **continued IV insulin with potassium repletion and dextrose-containing IV fluids**, not stopping therapy or switching to oral intake yet [1] [2].

Why this is not finished yet

- DKA management requires correction of **volume depletion, hyperglycemia, potassium abnormalities, and acidosis** while also treating the precipitating cause [1] [2].
- The presence of normalized glucose alone does **not** mean DKA has resolved; insulin must usually continue until the metabolic derangement has corrected, with **glucose support added as needed** to prevent hypoglycemia [1] [2].

Best answer

- **A. Insulin, potassium, IV fluids, and glucose**

This corresponds to ongoing DKA management after the glucose has fallen but acidosis has not fully resolved [1] [2].

References

[1] Diabetes Standards of Care 2026

American Diabetes Association · 2025-12-08 12:00:00

Manage diabetic ketoacidosis (DKA) and hyperglycemic hyperosmolar state (HHS) by administering intravenous fluids, insulin, and electrolytes (Fig. 16.1) and by closely monitoring during treatment, ensuring timely and bridged transition to maintenance subcutaneous insulin administration, and identifying and treating the precipitating cause.

https://diabetesjournals.org/care/issue/49/Supplement_1

[2] Evaluation and Management of the Critically Ill Adult With Diabetic Ketoacidosis.

The Journal of Emergency Medicine · 2020-09-01

Diabetic ketoacidosis (DKA) is a hyperglycemic emergency that presents commonly to the emergency department. Severe DKA has the potential for significant morbidity and mortality if not recognized early and treated appropriately. The management of severe DKA involves assessing and treating the inciting event, fluid hydration, insulin, and potassium repletion. Close monitoring is necessary to prevent complications.

10.1016/j.jemermed.2020.06.059

171. MedQA question ID 1122 Step 2/3

Question

A 63-year-old man presents to the clinic for left calf pain when walking a distance of more than 200 m. He has had this pain for more than 8 months now, and he rates it as 7 out of 10. The pain subsides with rest. The patient has had a history of diabetes mellitus for the past 2 years which is well controlled. A percutaneous coronary intervention was performed in 2014. His current medications are insulin and aspirin. Family history is significant for coronary artery disease. He has an 80 pack-year history of smoking and currently smokes. He consumes 4 drinks per day of alcohol. On physical examination, his blood pressure is 144/89 mm Hg, the heart rate is 80/min and regular, the breathing rate is 25/min, and the pulse oximetry is 96%. Normal cardiac and lung sounds were heard on auscultation. Which of the following is the appropriate treatment to improve the patient's symptoms?

(A) Cilostazol

(B) Femoral embolectomy

(C) Femoral-to-popliteal bypass graft

(D) Interventional endovascular treatment

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The American College of Cardiology/American Heart Association (ACC/AHA) recommends cilostazol to improve leg symptoms and increase walking distance in patients with claudication, and it is the best choice here. This patient has classic **intermittent claudication** from peripheral artery disease: exertional calf pain relieved by rest. **Cilostazol** is appropriate if there is **no congestive heart failure**; invasive revascularization is generally reserved for symptoms that remain lifestyle-limiting despite medical therapy and exercise [1] [2].

Why the other options are not the best symptom-directed treatment

- **Femoral embolectomy** is for acute arterial embolic occlusion, not chronic exertional claudication.
- **Femoral-to-popliteal bypass graft** and **interventional endovascular treatment** are revascularization strategies, but they are usually considered after failure of conservative therapy or for more severe limb-threatening disease rather than as the initial symptom-relief treatment in stable claudication [1] [3].

Practical point

The **Society for Vascular Surgery (SVS)** also supports a **3-month trial of cilostazol 100 mg twice daily** in patients with intermittent claudication who do not have heart failure [2]. Supervised exercise

therapy is also first-line for claudication, but among the answer choices, **cilostazol** is the correct treatment to improve symptoms [1] [2].

References

[1] Management of Patients With Lower Extremity Peripheral Artery Disease
American College of Cardiology, American Heart Association · 2024-05-14 00:00:00
1. In patients with claudication, cilostazol is recommended to improve leg symptoms and increase walking distance.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000001251

[2] Atherosclerotic Occlusive Disease of the Lower Extremities
Society for Vascular Surgery · 2015-03-02 00:00:00
In patients with IC who do not have congestive heart failure, the SVS suggests a 3-month trial of cilostazol (100 mg twice daily) to improve pain-free walking.
https://www.jvascsurg.org/article/S0741-5214%2814%2902284-8/fulltext

[3] Management of Patients With Lower Extremity Peripheral Artery Disease
American College of Cardiology, American Heart Association · 2024-05-14 00:00:00
In patients with chronic symptomatic PAD, SET is recommended to improve walking performance, functional status, and QOL.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000001251

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172. MedQA question ID 560 Step 2/3

Question

A 55-year-old man presents to his primary care physician for a general checkup. The patient has a past medical history of diabetes, hypertension, and atrial fibrillation and is currently taking warfarin, insulin, lisinopril, and metoprolol. The patient's brother recently died from a heart attack and he has switched to an all vegetarian diet in order to improve his health. His temperature is 98.6°F (37.0°C), blood pressure is 167/108 mmHg, pulse is 90/min, respirations are 17/min, and oxygen saturation is 98% on room air. The patient's physical exam is unremarkable. His laboratory values are ordered as seen below.

Hemoglobin: 12 g/dL
Hematocrit: 36%
Leukocyte count: 7,550/mm^3 with normal differential
Platelet count: 197,000/mm^3
INR: 1.0

Serum:
Na+: 139 mEq/L
Cl-: 100 mEq/L
K+: 4.3 mEq/L
HCO3-: 25 mEq/L
BUN: 20 mg/dL
Glucose: 99 mg/dL
Creatinine: 1.1 mg/dL
Ca2+: 10.2 mg/dL

Which of the following is the best explanation for this patient's laboratory values?

(A) Dietary changes

(B) Increased hepatic metabolism

(C) Increased renal clearance

(D) Medication noncompliance

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Dietary changes are the best explanation. In a patient taking **warfarin**, a recent switch to an **all-vegetarian diet** can increase and destabilize **vitamin K intake**, which lowers the INR and can make anticoagulation appear subtherapeutic; this is a recognized cause of nontherapeutic INR values [1] [2] [3]. The **American College of Chest Physicians (ACCP)** recommends systematic INR monitoring and patient education for oral anticoagulation, including attention to diet, because changes in vitamin K intake can affect warfarin response [4].

Why the other choices are less likely

- **Medication noncompliance** is also a common cause of a low INR, but the history of a new **vegetarian diet** provides a more direct explanation for the INR of **1.0** [2] [3].
- **Increased hepatic metabolism** and **increased renal clearance** are not supported by the provided data; renal function is normal, and the most relevant issue is altered warfarin sensitivity from dietary vitamin K change [1] [2].

Practical point

For warfarin-treated patients, the key is **consistent vitamin K intake** rather than avoidance of all vitamin K-containing foods; major dietary shifts should prompt **repeat INR testing and dose adjustment as needed** [4].

References

[1] Influence of dietary vitamin K intake on subtherapeutic oral anticoagulant therapy.

British Journal of Haematology · 2010-05-01

It's unclear what advice should be given to patients using vitamin K antagonists with respect to dietary vitamin K intake. The study found that a high Vitamin K intake reduces the risk of a low INR by lessening the influence of incidental consumption of vitamin K rich food on the INR.

10.1111/j.1365-2141.2010.08108.x

[2] Prevalent aetiologies of non-therapeutic warfarin anticoagulation in a network of pharmacist-managed anticoagulation clinics.

Journal of Clinical Pharmacy and Therapeutics · 2011-02-01

The most prevalent aetiologies linked to non-therapeutic Warfarin anticoagulation episodes were change in dietary vitamin K intake, non-compliance and initiation of anticoagenal therapy.

10.1111/j.1365-2710.2009.01155.x

[3] Avoidance of Vitamin K-Rich Foods Is Common among Warfarin Users and Translates into Lower Usual Vitamin K Intakes.
Journal of the Academy of Nutrition and Dietetics · 2016-06-01
Some studies report that patients are often advised to avoid eating green vegetables. Most patients reported avoiding vitamin K-rich foods, which translated into lower usual vitamin K intakes. The difference was due to a lower consumption of green vegetables, which was caused by a lower intake of vitamin K rich foods.
10.1016/j.jand.2015.12.023

[4] Evidence-Based Management Of Anticoagulant Therapy
American College of Chest Physicians · 2012-02-01 00:00:00
We suggest that health-care providers who manage oral anticoagulation therapy should do so in a systematic and coordinated fashion, incorporating patient education, systematic INR testing, tracking, follow-up, and good patient communication of results and dosing decisions. (Best Practice Statement)
https://journal.chestnet.org/article/S0012-3692(12)60122-6/fulltext

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173. MedQA question ID 469 Step 2/3

Question

A 27-year-old woman comes to the physician because of increasing shortness of breath and a non-productive cough for 2 months. She has been unable to perform her daily activities. She has had malaise and bilateral ankle pain during this period. She noticed her symptoms after returning from a vacation to Arizona. She is a research assistant at the university geology laboratory. She is originally from Nigeria and visits her family there twice a year; her last trip was 3 months ago. Her temperature is 37.8°C (100°F), pulse is 100/min, respirations are 24/min, and blood pressure is 112/72 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 94%. There is no palpable cervical or axillary lymphadenopathy. The lungs are clear to auscultation. Her left eye is notable for ciliary injection and photophobia. The remainder of the examination shows no abnormalities. A complete blood count is within the reference range. An x-ray of the chest is shown. Which of the following is the most likely diagnosis?

(A) Sarcoidosis

(B) Pulmonary tuberculosis

(C) Hodgkin's lymphoma

(D) Histoplasmosis

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Sarcoidosis is the most likely diagnosis, assuming the chest x-ray shows **bilateral hilar adenopathy** with or without diffuse or upper-lobe infiltrates. The American Thoracic Society (ATS) states that sarcoidosis is diagnosed by a compatible clinical/radiographic presentation plus **non-**

necrotizing granulomatous inflammation and exclusion of alternative granulomatous diseases [1] [2]. This patient's combination of **dyspnea, dry cough, ankle arthralgia, and anterior uveitis/ photophobia** is highly characteristic of sarcoidosis and is much less typical of pulmonary tuberculosis, Hodgkin lymphoma, or histoplasmosis [1] [2].

Why sarcoidosis fits best

- **Bilateral hilar adenopathy** is the classic chest x-ray pattern for sarcoidosis [2].
- **Uveitis** and **ankle pain/arthritis** are common extrapulmonary clues that support multisystem sarcoidosis [1] [2].
- ATS guidance emphasizes ruling out infectious and malignant granulomatous mimics, especially **tuberculosis** and **fungal disease**, when tissue confirmation is needed [1].

Most likely answer

- **Sarcoidosis** [1] [2]

Brief differential note

- **Pulmonary tuberculosis** remains an important alternative given travel history, but the overall syndrome here is more typical of sarcoidosis, and TB would require microbiologic evaluation if imaging or clinical features were suspicious [3] [4] [5].
- **Hodgkin lymphoma** can cause mediastinal/hilar disease, but **uveitis plus ankle arthralgia** is not the usual pattern [1] [2].
- **Histoplasmosis** can mimic sarcoidosis radiographically, but the retrieved guidance highlights it as a granulomatous infectious mimic rather than the best unifying diagnosis here [1] [4].

References

[1] Diagnosis and Detection of Sarcoidosis

American Thoracic Society · 2020-04-01 00:00:00

The diagnosis of sarcoidosis is not standardized but is based on three major criteria: a compatible clinical presentation; finding non-necrotizing granulomatous inflammation in one or more tissue samples; and the exclusion of alternative causes of granulomatous disease.

https://www.atsjournals.org/doi/full/10.1164/rccm.202002-0251ST

[2] Sarcoidosis

Chest · 2021-06-05

The American Thoracic Society (ATS) has designated three criteria for the diagnosis of sarcoidosis: (1) characteristic clinical and radiologic presentation; (2) evidence of noncaseating granulomas in one or more tissue samples; and (3) exclusion of alternative causes of granulomatous disease.

10.1016/j.chest.2021.06.003

[3] Diagnosis of Tuberculosis in Adults and Children

American Thoracic Society, Centers for Disease Control and Prevention, Infectious Diseases Society of America · 2016-12-08 00:00:00

The panel recommends that acid-fast bacilli (AFB) smear microscopy be performed, rather than no AFB smear microscopy, in all patients suspected of having pulmonary TB.

https://academic.oup.com/cid/article/64/2/e1/2629583

[4] Diagnosis of Tuberculosis in Adults and Children

American Thoracic Society, Centers for Disease Control and Prevention, Infectious Diseases Society of America · 2016-12-08 00:00:00

The panel suggests that both liquid and solid mycobacterial cultures be performed, rather than either culture method alone, for every specimen obtained from an individual with suspected TB disease.

https://academic.oup.com/cid/article/64/2/e1/2629583

[5] Diagnosis of Tuberculosis in Adults and Children

American Thoracic Society, Centers for Disease Control and Prevention, Infectious Diseases Society of America · 2016-12-08 00:00:00

The panel suggests that a diagnostic nucleic acid amplification test (NAAT) be performed, rather than not performed, on the initial respiratory specimen from patients suspected of having pulmonary TB.

https://academic.oup.com/cid/article/64/2/e1/2629583

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174. MedQA question ID 413 Step 2/3

Question

A 56-year-old man with a history of pancreatic cancer presents to the surgical intensive care unit following a pancreaticoduodenectomy. Over the next 3 days, the patient's drainage output is noted to exceed 1 liter per day. In the early morning of postoperative day 4, the nurse states that the patient is difficult to arouse. His temperature is 99.5°F (37.5°C), blood pressure is 107/88 mmHg, pulse is 120/min, respirations are 17/min, and oxygen saturation is 98% on room air. His skin and mucous membranes are dry on physical exam. Laboratory values are ordered as seen below.

Serum:
Na+: 154 mEq/L
Cl-: 100 mEq/L
K+: 4.3 mEq/L
HCO3-: 27 mEq/L
BUN: 20 mg/dL
Glucose: 99 mg/dL
Creatinine: 1.1 mg/dL

Which of the following is the best next step in management?

(A) 0.9% saline IV

(B) 5% dextrose IV

(C) 5% dextrose IV with 0.45% saline IV

(D) Oral free water replacement

Correct Response:
A
Synthesize Response:
C✕

Synthesize Answer

The best next step is to correct the patient's free water deficit with hypotonic fluid, while also replacing ongoing drain losses and monitoring serum sodium closely. In a postoperative patient with clinical dehydration and **hypernatremia**, the priority is volume repletion and free-water replacement; if there is frank hemodynamic instability, an **initial isotonic crystalloid bolus** is

appropriate first, but this patient's blood pressure is preserved and the presentation is most consistent with **hypovolemic hypernatremia from ongoing external losses** [1] [2].

Practical management

- **Give hypotonic fluid** to replace the water deficit, such as **D5W** or **0.45% saline**, and adjust based on ongoing drain output and serial sodium checks [1] [2].
- **Replace ongoing drain losses** and treat the cause of the losses; persistent high-output postoperative drainage can rapidly worsen dehydration and hypernatremia [1] [3].
- Aim for **gradual correction** rather than rapid normalization; the key management principle is to replenish free water and prevent further losses while monitoring sodium frequently [1].

Why not immediate hypertonic or no treatment?

- This is **not** a scenario for hypertonic saline; the patient is already hypernatremic and clinically volume depleted [1] [2].
- The evidence base for exact correction strategies in hospitalized hypernatremia is limited, but reviews consistently support **hypotonic fluid replacement after or alongside intravascular stabilization** [1] [2].

Bottom line: start hypotonic fluid replacement (eg, D5W/0.45% saline) and replace the ongoing drain losses, with close sodium monitoring; use isotonic crystalloid first only if the patient is in shock or otherwise hemodynamically unstable. [1] [2]

References

[1] Hypernatremia and Its Rate of Correction: The Evidence So Far.
Cureus · 2024-02-01
The management of hypernatremia focuses on resolving the underlying cause, replenishing free water deficit, and preventing further losses while closely monitoring serum sodium concentration.
10.7759/cureus.54699

[2] Approach to the Management of Hypernatraemia in Older Hospitalised Patients.
The Journal of Nutrition, Health & Aging · 2021-01-01
Hypernatraemia is associated with high morbidity and mortality. ... The administration of appropriate, usually hypotonic, fluids is essential to the timely restoration of eunatraemia.
10.1007/s12603-021-1692-5

[3] Impact of fluid resuscitation on major adverse events following pancreaticoduodenectomy.
American Journal of Surgery · 2015-11-01
Pancreaticoduodenectomy is a major undertaking with substantial perioperative morbidity and mortality. Previous studies have noted a correlation between excessive postoperative fluid resuscitation and anastomotic complications. More restrictive fluid administration may improve postoperative outcomes, according to the study.
10.1016/j.amjsurg.2015.04.020

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175. MedQA question ID 19 Step 2/3

Question

A 46-year-old man is brought to the emergency department for evaluation of altered mental status. He was found on the floor in front of his apartment. He is somnolent but responsive when aroused. His pulse is 64/min, respiratory rate is 15/min, and blood pressure is 120/75 mm Hg. On physical

examination, an alcoholic smell and slurred speech are noted. Neurological exam shows diminished deep tendon reflexes bilaterally and an ataxic gait. His pupils are normal. Blood alcohol concentration is 0.04%. An ECG shows no abnormalities. Which of the following is the most likely cause of this patient's symptoms?

(A) Hypoglycemia

(B) Ethanol intoxication

(C) Cannabis intoxication

(D) Benzodiazepine intoxication
"

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

B. Benzodiazepine intoxication is the most likely cause. The combination of **somnolence, slurred speech, ataxia, and depressed reflexes** with **normal pupils** and a **normal ECG** fits a sedative-hypnotic toxidrome better than isolated ethanol intoxication; the **American Society of Addiction Medicine (ASAM)** notes that benzodiazepine testing can be helpful when assessing use, and benzodiazepines are associated with marked psychomotor impairment and sedation/delirium [1] [2].

Why the other choices are less likely

- **Hypoglycemia** would usually be excluded by a bedside glucose and often has adrenergic features; those data are not present here.
- **Cannabis intoxication** can impair coordination and perception, but it does not typically cause this degree of CNS depression with depressed reflexes.
- **Ethanol intoxication** is less likely given the only **0.04%** blood alcohol concentration, which is relatively low for this neurologic picture.

Most likely diagnosis: benzodiazepine intoxication [1] [2].

References

[1] Appropriate Use of Drug Testing in Clinical Addiction Medicine

American Society of Addiction Medicine · 2017-06-01 00:00:00

Urine testing is helpful when assessing benzodiazepine use. Particular caution should be paid to the interpretation of benzodiazepine immunoassays due to known limitations in specificity. Immunoassay results should be used cautiously when monitoring a patient’s adherence to prescribed benzodiazepines. If a patient reports that he or she is taking the drug but a urine drug screen is negative, further analysis using definitive testing should be considered.

https://journals.lww.com/journaladdictionmedicine/FullText/2017/06000/Appropriate_Use_of_Drug_Testing_in_Clinical.1.aspx

[2] Delirium in critical illness: clinical manifestations, outcomes, and management

Intensive Care Medicine · 2021-08-16

According to the Diagnostic and statistical manual of mental disorders: DSM-5 delirium is defined as disturbance in attention (top mandatory feature) that develops over a short period of time, is associated with additional disturbances in cognition that are not better explained by another preexisting, established or evolving neurocognitive disorder, and do not occur in the

context of a severely reduced level of arousal, and evidence from the history, physical examination or laboratory findings that indicate that the disturbance is a direct physiological consequence of another medical condition, substance intoxication, or withdrawal.

10.1007/s00134-021-06503-1

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176. MedQA question ID 795 Step 1

Question

A 56-year-old man comes to the physician for a follow-up examination 1 week after a temporal artery biopsy was performed to evaluate headache and blurry vision. He has a 12-year history of hypertension treated with lisinopril. Results of the testing show decreased concentrations of arginine in vascular endothelial cells. Which of the following is the most likely explanation for this finding?

(A) Increased binding of calcium to calmodulin

(B) Increased phosphorylation of myosin

(C) Increased production of nitric oxide

(D) Decreased concentration of bradykinin

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Increased production of nitric oxide is the most likely explanation. **Lisinopril**, an angiotensin-converting enzyme (ACE) inhibitor, decreases breakdown of **bradykinin**; bradykinin then promotes endothelial vasodilation partly by increasing **nitric oxide (NO)** production [1] [2]. In vascular endothelial cells, **L-arginine is the substrate for NO synthase**, so reduced arginine reflects increased consumption for NO generation rather than increased calmodulin binding or myosin phosphorylation [2] [3].

Why the other choices are less likely

- **A. Increased binding of calcium to calmodulin** and **B. Increased phosphorylation of myosin** are downstream smooth-muscle contraction mechanisms, not the expected effect of ACE inhibition.
- **D. Decreased concentration of bradykinin** is opposite of the expected change with ACE inhibition, which **reduces bradykinin degradation** [1] [2].

References

[1] Clinical Implications of SARS-CoV-2 Interaction With Renin Angiotensin System
Journal of the American College of Cardiology · 2020-04-16

ACE inhibitors inhibit the conversion of Ang I to Ang II and inhibit the hydrolysis of bradykinin. ACE inhibition promotes the vasodilatory effects of bradykinin, improved endothelium-dependent vasodilation through increased prostaglandin and nitric oxide production.

10.1016/j.jacc.2020.04.028

[2] A Review of the Role of Bradykinin and Nitric Oxide in the Cardioprotective Action of Angiotensin-Converting Enzyme Inhibitors: Focus on Perindopril

Cardiology and Therapy · 2019-12-01

ACE inhibitors increase NO production by preventing production of angiotensin II and inhibiting the degradation of bradykinin.

10.1007/s40119-019-00150-w

[3] Role of cellular L-arginine uptake and nitric oxide production on renal blood flow and arterial pressure regulation

Current opinion in nephrology and hypertension · 2013-01-01

L-arginine is the substrate for nitric oxide formation. Reduced NO formation in hypertension is a key factor in the pathogenesis of hypertension.

10.1097/mnh.0b013e32835a6ff7

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177. MedQA question ID 652 Step 2/3

Question

An 89-year-old woman is brought to the emergency department by her husband because of diarrhea and weakness for 4 days. She has 2–3 loose stools every day. She has also had 3 episodes of vomiting. She complains of a headache and blurry vision. Three weeks ago, she returned from a cruise trip to the Bahamas. She has congestive heart failure, atrial fibrillation, age-related macular degeneration, type 2 diabetes mellitus, and chronic renal failure. Current medications include warfarin, metoprolol, insulin, digoxin, ramipril, and spironolactone. Her temperature is 36.7°C (98°F), pulse is 61/min, and blood pressure is 108/74 mm Hg. The abdomen is soft, and there is diffuse, mild tenderness to palpation. Laboratory studies show:
Hemoglobin 12.9 g/dL
Leukocyte count 7200/mm3
Platelet count 230,000/mm3
Serum
Na+ 137 mEq/L
K+ 5.2 mEq/L
Glucose 141 mg/dL
Creatinine 1.3 mg/dL
Which of the following is the most appropriate next step in management?"

(A) Perform hemodialysis

(B) Perform C. difficile toxin assay

(C) Measure serum drug concentration

(D) Administer oral activated charcoal

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most appropriate next step is to measure a serum digoxin concentration and evaluate for **chronic digoxin toxicity**. The **American College of Cardiology/American Heart Association/ Heart Rhythm Society** bradycardia guideline identifies **digoxin** as a medication cause of bradycardia and recommends **digoxin-specific antibody fragment** for symptomatic or hemodynamically significant toxicity, while noting that **dialysis is not recommended for digoxin removal** [1] [2]. This patient's gastrointestinal symptoms, blurry vision, bradycardia, age, renal dysfunction, and concomitant **spironolactone/ACE inhibitor** use strongly support digoxin toxicity; hemodialysis and activated charcoal are not the best next step here [1] [2] [3].

Why this fits

- **Digoxin toxicity** classically causes **nausea/vomiting, diarrhea, visual disturbances, weakness, and bradyarrhythmias**; older age and renal insufficiency increase risk [3].
- The first diagnostic step in a stable patient with suspected toxicity is to **measure the serum digoxin level** and assess electrolytes/renal function; this helps confirm exposure and guide need for antidote [1] [3].
- **Hemodialysis does not remove digoxin effectively** and is **not recommended** for digoxin removal [2].
- **Oral activated charcoal** is mainly useful after a **recent acute ingestion**, which is not the scenario here [3].

Management implication

If the patient has clinically significant bradycardia, arrhythmia, hyperkalemia, or hemodynamic compromise attributable to digoxin, treatment should escalate to **digoxin-specific antibody fragment** [1].

References

[1] Evaluation and Management of Patients With Bradycardia and Cardiac Conduction Delay
American College of Cardiology, American Heart Association, Heart Rhythm Society · 2018-11-06 00:00:00
In patients with bradycardia associated with symptoms or hemodynamic compromise in the setting of digoxin toxicity, digoxin Fab antibody fragment is reasonable to increase heart rate and improve symptoms.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000628

[2] Evaluation and Management of Patients With Bradycardia and Cardiac Conduction Delay
American College of Cardiology, American Heart Association, Heart Rhythm Society · 2018-11-06 00:00:00
In patients with bradycardia associated with symptoms or hemodynamic compromise attributable to digoxin toxicity, dialysis is not recommended for removal of digoxin.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000628

[3] Digitalis toxicity: a fading but crucial complication to recognize.
The American journal of medicine · 2012-04-01
Digoxin usage has decreased in the treatment of congestive heart failure and atrial fibrillation as a result of its inferiority to beta-adrenergic inhibitors and agents that interfere with the deleterious effects of the activated renin-angiotensin-

aldosterone system. Glycoside toxicity has become an uncommon occurrence but may be overlooked when it does occur. Older age, female sex, low lean body mass, and renal insufficiency contribute to higher serum levels.
10.1016/j.amjmed.2011.09.019

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178. MedQA question ID 868 Step 2/3

Question

An 80-year-old man is brought to the emergency department because of fatigue and lightheadedness. He does not have chest pain, palpitations, or difficulty breathing. He has a history of hyperlipidemia, type 2 diabetes mellitus, hypertension, osteoarthritis, and asthma. Current medications include simvastatin, metformin, lisinopril, albuterol, and ibuprofen. His pulse is 48/min and blood pressure is 89/50 mm Hg. He responds slowly to questions but is oriented to person, place, and time. Examination shows dry mucous membranes. His lungs are clear to auscultation and bowel sounds are positive with no pulsatile masses or bruits. Pedal pulses are nonpalpable, distal extremities are cold, and capillary refill time is 4 seconds. An ECG shows left axis deviation, a Q wave in lead III, a constant PR interval of 0.15 seconds with every third P wave that is nonconducted, and a QRS interval of .09 seconds. Which of the following is the most appropriate next step in management?

(A) Dobutamine

(B) Norepinephrine

(C) Cardiac pacing

(D) Epinephrine

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Cardiac pacing is the most appropriate next step. The American College of Cardiology/American Heart Association/Heart Rhythm Society (ACC/AHA/HRS) bradycardia guideline recommends **temporary transvenous pacing** for second- or third-degree AV block with **symptoms or hemodynamic compromise** when medical therapy is ineffective, and **temporary transcutaneous pacing** may be used as a bridge [1] [2]. This patient is hypotensive and poorly perfused with a high-grade second-degree AV block pattern, so pacing is favored over inotropic or vasopressor-only therapy [3] [4].

Why not the other options

- **Dobutamine** and **epinephrine** can be considered for symptomatic AV block with hemodynamic compromise **when coronary ischemia is unlikely**, but they are not the preferred definitive next step in an unstable patient like this [4] [5].

- **Norepinephrine** is not the guideline-directed treatment for bradycardia due to AV block.
- The ECG shows a fixed PR interval with intermittent nonconducted P waves, which supports **high-grade second-degree AV block** rather than a benign nodal Wenckebach pattern; high-grade block is a pacing indication if not clearly reversible [1] [6].

Practical takeaway

For this presentation, the best next step is **urgent pacing**; in the emergency department this is typically **transcutaneous pacing immediately**, followed by **temporary transvenous pacing** if needed [2] [3].

References

[1] Evaluation and Management of Patients With Bradycardia and Cardiac Conduction Delay
American College of Cardiology, American Heart Association, Heart Rhythm Society · 2018-11-06 00:00:00
For patients with second-degree or third-degree atrioventricular block associated with symptoms or hemodynamic compromise that is refractory to medical therapy, temporary transvenous pacing is reasonable to increase heart rate and improve symptoms.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000628

[2] Evaluation and Management of Patients With Bradycardia and Cardiac Conduction Delay
American College of Cardiology, American Heart Association, Heart Rhythm Society · 2018-11-06 00:00:00
For patients with second-degree or third-degree atrioventricular block and hemodynamic compromise refractory to antibradycardic medical therapy, temporary transcutaneous pacing may be considered until a temporary transvenous or permanent pacemaker is placed or the bradyarrhythmia resolves.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000628

[3] Evaluation and Management of Patients With Bradycardia and Cardiac Conduction Delay
American College of Cardiology, American Heart Association, Heart Rhythm Society · 2018-11-06 00:00:00
For patients with second-degree or third-degree atrioventricular block associated with symptoms or hemodynamic compromise, atropine is reasonable to improve atrioventricular conduction, increase ventricular rate, and improve symptoms.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000628

[4] Evaluation and Management of Patients With Bradycardia and Cardiac Conduction Delay
American College of Cardiology, American Heart Association, Heart Rhythm Society · 2018-11-06 00:00:00
For patients with second-degree or third-degree atrioventricular block associated with symptoms or hemodynamic compromise and who have low likelihood for coronary ischemia, beta-adrenergic agonists, such as isoproterenol, dopamine, dobutamine, or epinephrine, may be considered to improve atrioventricular conduction, increase ventricular rate, and improve symptoms.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000628

[5] Evaluation and Management of Patients With Bradycardia and Cardiac Conduction Delay
American College of Cardiology, American Heart Association, Heart Rhythm Society · 2018-11-06 00:00:00
Medication dosage table for symptomatic sinus bradycardia or atrioventricular block lists epinephrine 2–10 mcg/min IV or 0.1–0.5 mcg/kg/min IV titrated to desired effect; dopamine 5 to 20 mcg/kg/min IV; and atropine 0.5–1 mg IV repeated every 3–5 min to a maximum dose of 3 mg.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000628

[6] Evaluation and Management of Patients With Bradycardia and Cardiac Conduction Delay
American College of Cardiology, American Heart Association, Heart Rhythm Society · 2018-11-06 00:00:00
Mobitz type II is characterized by fixed PR intervals before and after blocked beats; high-grade atrioventricular block refers to ≥2 consecutive P waves at a constant physiologic rate that do not conduct to the ventricles with evidence for some atrioventricular conduction.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000628

179. MedQA question ID 1125 Step 2/3

Question

A 15-year-old female presents to her pediatrician's office for severe menstrual cramping. The patient underwent menarche at age 11, and her periods were irregular every 2-3 months for two years. After that, her cycles became roughly regular every 28-35 days, but she has had extremely painful cramps and often has to miss school. The cramps are intermittent and feel like a dull ache in the center of her abdomen, and there is usually accompanying back pain. The patient has been using heating pads with limited relief. She reports some periods being "really heavy" and requires a superabsorbent pad every 6 hours for 2 days each cycle, but this does not limit her activities. She denies any bowel or bladder changes. The patient had normal development throughout childhood, is on the soccer team at school, and is not sexually active. Her father has hypertension and her mother has endometriosis and heavy periods. On exam, the patient is 5 feet 5 inches and weighs 158 pounds (BMI 26.3 kg/m^2). She is well appearing and has no abdominal tenderness. She has Tanner IV breasts and Tanner IV pubic hair, and external genitalia are normal. Which of the following is the best next step for this patient's menstrual cramps?

(A) Pelvic ultrasound

(B) MRI of the pelvis

(C) NSAIDs

(D) Increased exercise

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. NSAIDs is the best next step. In an adolescent with severe dysmenorrhea causing school absence and a family history of endometriosis, the **American College of Obstetricians and Gynecologists (ACOG)** and the **Society of Obstetricians and Gynaecologists of Canada (SOGC)** support **empiric NSAID treatment** for dysmenorrhea while considering endometriosis as a possible secondary cause [1] [2]. **Pelvic ultrasound** is appropriate if symptoms persist, are refractory to first-line therapy, or if evaluation for endometriosis/other pelvic pathology is needed; **MRI** is generally reserved for suspected deep endometriosis or when expert ultrasound is unavailable [1] [3] [4].

Why not the other options?

- **Pelvic ultrasound**: reasonable if there is poor response to initial treatment or suspicion for pelvic pathology, but it is not the immediate best next step when empiric NSAID therapy has not yet been tried [1] [3].
- **MRI of the pelvis**: not first-line for this presentation; it is mainly used when advanced ultrasound is not available or deep endometriosis is suspected [1] [4].

- **Increased exercise**: may help overall health, but it is not recommended as the primary treatment for this degree of dysmenorrhea [2].

Practical point

Because her symptoms are **severe and function-limiting**, endometriosis should remain on the differential, especially with the maternal history. If an adequate NSAID trial does not control pain, the next step is **pelvic ultrasound and gynecology referral** rather than continued reassurance alone [1] [3].

References

[1] Diagnosis and Impact of Endometriosis
Society of Obstetricians and Gynaecologists of Canada · 2024-03-28 00:00:00
Health care providers should consider a diagnosis of endometriosis for patients presenting with dysmenorrhea, pelvic pain, and/or infertility (strong, high). Basic abdominal and transvaginal ultrasound should be used to identify ovarian endometriomas and as an investigative tool for other causes of pelvic pain, even if the pelvic and/or abdominal exam was assessed to be normal (strong, high). Health care providers should order a pelvic MRI if advanced ultrasound is not possible or unavailable and there is a high degree of suspicion of ovarian endometriomas and deep endometriosis (strong, moderate).
https://www.jogc.com/article/S1701-2163(24)00261-5/abstract

[2] Management of Chronic Pelvic Pain
Society of Obstetricians and Gynaecologists of Canada · 2024-01-04 00:00:00
Nonsteroidal anti-inflammatory drugs should be recommended for the treatment of dysmenorrhea (strong, moderate).
https://www.jogc.com/article/S1701-2163(23)00646-1/abstract

[3] Endometriosis: Diagnosis and Management
National Institute for Health and Care Excellence · 2024-11-11 00:00:00
Offer a transvaginal ultrasound scan to all women or people with suspected endometriosis, even if pelvic or abdominal examination is normal, to identify ovarian endometriomas and deep endometriosis, identify or rule out other pathology, and guide management options; if transvaginal ultrasound is declined or not suitable, consider a transabdominal ultrasound scan of the pelvis. For symptoms of endometriosis with detrimental impact on activities of daily living or persistent/recurrent symptoms, refer for further investigation and management.
https://www.nice.org.uk/guidance/ng73

[4] Endometriosis: Diagnosis and Management
National Institute for Health and Care Excellence · 2024-11-11 00:00:00
Consider specialist transvaginal ultrasound scan or pelvic MRI scan to diagnose deep endometriosis and assess its extent.
https://www.nice.org.uk/guidance/ng73

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180. MedQA question ID 646 Step 1

Question

A 53-year-old female patient comes to the physician’s office for her annual check-up visit. She has no complaints and her past medical history is notable for diabetes and hypertension. During this visit, the patient undergoes screening procedures per guidelines including a mammogram. On the screening mammogram a spiculated, irregular mass is found on the left breast. Further diagnostic mammography and biopsy reveal ductal adenocarcinoma of the breast in the upper outer quadrant of the left breast. Which of the following is the most important factor in determining this patient’s prognosis?

(A) Tumor grade

(B) Tumor stage

(C) Age

(D) Location of the tumor on the breast

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most important prognostic factor is tumor stage—especially **tumor size and nodal status**—rather than age or the breast location of the lesion. The **American Society of Clinical Oncology (ASCO)** and **NICE** both emphasize stage-related features as the key drivers of prognosis in invasive breast cancer, while **grade** is also prognostic but usually secondary to stage in overall risk assessment [1] [2].

Why stage matters most

- **Stage** incorporates the anatomic extent of disease and is the main determinant of recurrence risk and survival in early invasive breast cancer [1] [2].
- **Grade** adds biologic information and can refine risk, but it does not outweigh stage as the primary prognostic variable [1] [3].
- **Age** may influence treatment tolerance and some outcomes, but it is not the main prognostic determinant in this question [3].
- **Location in the breast** is not a major prognostic factor compared with stage, grade, receptor status, and nodal involvement [1] [2].

Bottom line

For this patient, the best answer is **tumor stage**. If staging information is available, **nodal involvement and tumor size** should be used first to estimate prognosis; grade is important but usually comes after stage in prognostic weighting [1] [2] [3].

References

[1] Neoadjuvant Chemotherapy, Endocrine Therapy, and Targeted Therapy for Breast Cancer
American Society of Clinical Oncology · 2022-04-12 00:00:00
Tumor histology, grade, stage and estrogen, progesterone, and HER2 expression should routinely be used to guide clinical decisions as to whether or not to pursue neoadjuvant chemotherapy. There is insufficient evidence to support the use of other immunochemical markers, morphological markers or genomic profiles to guide a clinical decision as to whether or not to pursue neoadjuvant chemotherapy.
https://ascopubs.org/doi/full/10.1200/JCO.20.03399

[2] Use of Biomarkers to Guide Decisions on Adjuvant Systemic Therapy for Women With Early-Stage Invasive Breast Cancer
American Society of Clinical Oncology · 2022-04-19 00:00:00
Assessment and prognostic stratification of invasive breast cancer rely on ER, PR, HER2, grade, nodal status, and tumor size; these variables are used in clinical risk assessment.

https://ascopubs.org/doi/full/10.1200/JCO.22.00069

[3] Distant metastasis and prognostic factors in patients with invasive ductal carcinoma of the breast.
European journal of clinical investigation · 2022-04-01
Independent prognostic factors included age ... grade, T stage, N stage, subtype, surgery and chemotherapy.
10.1111/eci.13704

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181. MedQA question ID 671 Step 2/3

Question

A 19-year-old man with a past medical history significant only for facial acne presents with increased inguinal pruritis. Relevant social history includes participation in school wrestling. He has no significant family history. Other than the pruritic rash, a review of systems is negative. On physical examination, there is an erythematous, well-demarcated patch on his left thigh, over his pubic region, and throughout the perineum. The scrotum is spared. Which of the following is the most likely diagnosis?

(A) Tinea corporis

(B) Tinea cruris

(C) Candidal balanitis

(D) Tinea unguium

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Tinea cruris is the most likely diagnosis. In a wrestler with an **itchy, well-demarcated erythematous rash of the groin/perineum**, dermatophyte infection is the leading consideration; wrestling is a recognized setting for cutaneous dermatophyte transmission, and tinea cruris is a common superficial dermatophyte infection [1] [2] [3]. The other choices fit less well: candidal balanitis is a mucosal/glans process, tinea unguium is nail infection, and tinea corporis would more typically involve the trunk or extremities rather than the groin-predominant distribution described [2] [3].

References

[1] Cutaneous infections in wrestlers.
Sports Health · 2013-09-01
The most commonly reported cutaneous infections in wrestlers are herpes simplex virus infections (herpes gladiatorum), bacterial skin and soft tissue infections, dermatophyte infections (tinea gladiatorum) and dermatophytes.
10.1177/1941738113481179

[2] A clinical and mycological study of dermatophytic infections.
Indian Journal of Dermatology · 2014-05-01

Dermatophytoses refers to superficial fungal infection of keratinized tissues caused by keratinophilic dermatophytes. Tinea corporis was the most common clinical type, followed by tinea cruris.
10.4103/0019-5154.131391

[3] Tinea Gladiatorum and Dermatophyte Contamination Among Wrestlers and in Wrestling Halls: A Systematic Review and Meta-analysis.
Current Microbiology · 2020-04-01
The prevalence of tinea gladiatorum in wrestlers varied from 2.4 to 90.62%, with the overall prevalence of 34.29% (95% CI 20.33-48.25). Trichophyton tonsurans is the most frequent causative agent. The most common clinical feature of dermatophytosis among wrestlers was tinea corporis (62.2%).
10.1007/s00284-019-01816-3

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182. MedQA question ID 1103 Step 1

Question

A 63-year-old woman comes to the physician because of a 6-month history of fatigue and shortness of breath on exertion in addition to a 1-month history of ankle swelling. She has a history of sleep apnea. Examination of the lower extremities shows bilateral pitting pedal and ankle edema. Cardiac examination shows a widely split S2 that varies with respiration. An ECG shows right bundle branch block. Which of the following is the most likely etiology of the patient's lower extremity edema?

(A) Localized lymphatic obstruction

(B) Thrombus formation in a deep vein

(C) Increased capillary hydrostatic pressure

(D) Decreased plasma oncotic pressure
"

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely cause is increased capillary hydrostatic pressure (choice C) from **right-sided heart failure/pulmonary hypertension** physiology, not lymphatic obstruction, DVT, or hypoalbuminemia. Her fatigue, exertional dyspnea, ankle edema, **widely split S2 that varies with respiration**, and **RBBB** are compatible with right-heart strain, and the **American College of Cardiology/American Heart Association/Heart Failure Society of America** guidance notes that history and physical exam should look for cardiac and noncardiac causes of HF, including **obstructive sleep apnea** as a contributing condition [1] [2].

Why this causes edema

Right-sided cardiac dysfunction raises systemic venous pressure, which increases capillary hydrostatic pressure and drives fluid out into the interstitial space, producing dependent pitting edema. In heart failure, edema is a common manifestation of fluid retention [3].

Why the other choices are less likely

- **Localized lymphatic obstruction** usually causes nonpitting, localized swelling rather than bilateral dependent edema.
- **Thrombus formation in a deep vein** typically causes unilateral leg swelling, pain, and asymmetry.
- **Decreased plasma oncotic pressure** is more typical of nephrotic syndrome, cirrhosis, or severe malnutrition and is not suggested by the cardiac findings here.

Best fit for this vignette

The combination of **OSA**, signs of **right-heart strain**, and bilateral pitting edema most strongly points to **venous congestion from elevated hydrostatic pressure** as the mechanism [1] [2] [3].

References

[1] Management of Heart Failure

American College of Cardiology, American Heart Association, Heart Failure Society of America · 2022-03-31 12:00:00

In patients with HF, a thorough history and physical examination should be obtained and performed to identify cardiac and noncardiac disorders, lifestyle and behavioral factors, and social determinants of health that might cause or accelerate the development or progression of HF.

https://www.jacc.org/doi/10.1016/j.jacc.2021.12.012

[2] Management of Heart Failure

American College of Cardiology, American Heart Association, Heart Failure Society of America · 2022-03-31 12:00:00

In patients with HF and suspicion of sleep-disordered breathing, a formal sleep assessment is reasonable to confirm the diagnosis and differentiate between obstructive and central sleep apnea.

https://www.jacc.org/doi/10.1016/j.jacc.2021.12.012

[3] Causes and treatment of oedema in patients with heart failure.

Nature Reviews Cardiology · 2013-03-01

Oedema is one of the fundamental features of heart failure... For patients with fluid retention, removing the fluid is the most important consideration.

10.1038/nrcardio.2012.191

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183. MedQA question ID 280 Step 2/3

Question

A 32-year-old man arrives to his primary care physician to discuss his fear of flying. The patient reports that he has had a fear of flying since being a teenager. He went on a family vacation 15 years ago, and during the flight there was turbulence and a “rough landing”. Since then he has avoided flying. He did not go to his cousin’s wedding because it was out of the country. He also was unable to visit his grandmother for her 80th birthday. The last time his job asked him to meet a client out of state, he drove 18 hours instead of flying. Two years ago he promised his fiancé they could fly to Florida. Upon arrival at the airport, he began to feel dizzy, lightheaded, and refused to go through

security. During the clinic visit, the patient appears anxious and distressed. He recognizes that his fear is irrational. He is upset that it is affecting his relationship with his wife. Additionally, his current job may soon require employees in his sales position to fly to meet potential clients. He is embarrassed to have a conversation with his manager about his fear of flying. Which of the following is the best therapy for the patient's condition?

(A) Alprazolam

(B) Cognitive behavioral therapy

(C) Fluoxetine

(D) Psychodynamic psychotherapy

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The best therapy is cognitive behavioral therapy (CBT), ideally with exposure-based treatment for this patient's **specific phobia (fear of flying)** [1] [2] [3]. The **World Health Organization (WHO)** recommends brief, structured psychological interventions based on CBT principles for anxiety disorders, and the available evidence for fear of flying shows meaningful improvement with CBT/exposure approaches, including durable benefit at follow-up [1] [2] [3]. **Alprazolam is not the preferred treatment** for a persistent phobia; medications are not first-line for this presentation [1].

Why CBT is the best choice

- The history is classic for **specific phobia**: marked, persistent fear of flying, avoidance, recognition that the fear is irrational, and significant functional impairment.
- **Exposure-based CBT** directly targets the avoidance that maintains the phobia and is the intervention best supported by both guideline-level anxiety recommendations and flying-phobia studies [1] [2] [3].
- In contrast, **psychodynamic psychotherapy** is not the evidence-based first-line treatment here, and **fluoxetine** is not the best single choice for a specific phobia [1] [2].

Answer: B. Cognitive behavioral therapy [1] [2] [3].

References

[1] Mental, Neurological and Substance Use Disorders
World Health Organization · 2023-11-20 00:00:00
Brief, structured psychological interventions based on principles of cognitive behavioural therapy (CBT) should be offered for adults with generalized anxiety disorder (GAD) and/or panic disorder.
https://www.who.int/publications/i/item/9789240084278

[2] Recent developments in the intervention of specific phobia among adults: a rapid review.
F1000Research · 2020-01-01

There is a lack of reviews summarising recent progress in the treatment of specific phobias in adults. Psychotherapy is a superior intervention with large effect sizes. Technology-assisted therapies seem to have a beneficial effect on alleviating fears. Pharmacological agents are investigated solely as adjuncts to exposure therapy, but the effects are inconsistent.
10.12688/f1000research.20082.1

[3] Effectiveness of cognitive behavioral therapy integrated with systematic desensitization, cognitive behavioral therapy combined with eye movement desensitization and reprocessing therapy, and cognitive behavioral therapy combined with virtual reality exposure therapy methods in the treatment of flight anxiety: a randomized trial.

Neuropsychiatric Disease and Treatment · 2015-01-01

The research was to compare the effectiveness of the following treatment methods for fear of flying. All groups showed a decrease in flight anxiety. The results indicated significant improvements for the treated patients using all the treatment programs. The outcome measures maintained a significant effect at a 1-year follow-up.
10.2147/ndt.s93401

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184. MedQA question ID 1030 Step 2/3

Question

A 3466-g (7-lb, 10-oz) female newborn is delivered at 38 weeks' gestation to a 32-year-old woman, gravida 2, para 1. Apgar scores are 7 and 8, at 1 and 5 minutes, respectively. The mother has a history of schizophrenia and was treated with lithium until 5 weeks' gestation, when she found out that she was pregnant. The mother was treated for alcohol abuse disorder 2 years ago. She has been sober for 14 months now. Examination shows that the child has micrognathia, a broad nasal bridge, a short philtrum, and small, low-set ears. Examination of the mouth shows a cleft palate. A grade 3/6 systolic ejection murmur can be heard over the left sternal border. Echocardiography shows a single overriding great vessel arising from the heart. Further evaluation is most likely to show which of the following findings?

(A) Low levels of parathyroid hormone in serum

(B) Double bubble sign on abdominal x-ray

(C) Chromosome 5p deletion on FISH studies

(D) Bilateral cataracts on ocular examination

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely additional finding is low serum parathyroid hormone due to hypoparathyroidism in 22q11.2 deletion syndrome (DiGeorge/velocardiofacial syndrome). The newborn's **conotruncal defect (truncus arteriosus)** plus **cleft palate** and characteristic facial features strongly fit this diagnosis; **hypocalcemia from parathyroid hypoplasia/ hypoparathyroidism** is a classic associated abnormality [1] [2].

Why this is the best answer

- **22q11.2 deletion syndrome** is associated with **facial dysmorphia, palate abnormalities, thymic and parathyroid hypoplasia, hypocalcemia, and conotruncal heart defects** such as **truncus arteriosus** [1].
- Published reviews and case-based evidence also describe **conotruncal heart defects, cleft palate, thymic hypoplasia, and hypoparathyroidism** as core features of the syndrome [2] [3] [4].

Why the other options are less likely

- **Double bubble sign** suggests duodenal atresia, which is not the classic pattern here.
- **Chromosome 5p deletion** causes cri-du-chat syndrome, not the conotruncal defect/palatal anomaly pattern shown here.
- **Bilateral cataracts** are not the key associated finding in this presentation.

Correct choice: A. Low levels of parathyroid hormone in serum.

References

[1] Management of Adults With Congenital Heart Disease

American College of Cardiology, American Heart Association · 2025-12-18 12:00:00

22q11.2 deletion syndrome (DiGeorge syndrome, velocardiofacial syndrome) is associated with facial dysmorphia, palate and speech abnormalities, thymic and parathyroid hypoplasia, hypocalcemia, immunodeficiency, and neurodevelopmental and psychiatric disorders; common cardiac findings include interrupted aortic arch type B, other aortic arch abnormalities, truncus arteriosus, tetralogy of Fallot, and ventricular septal defect/pulmonary atresia.

https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000001402

[2] Cardiovascular anomalies associated with chromosome 22q11.2 deletion syndrome.

The American journal of cardiology · 2010-06-01

Cardiovascular anomalies are present in 80% of neonates with 22q11.2 deletion syndrome. The most common diseases are conotruncal anomalies, which include tetralogy of Fallot, pulmonary atresia, truncus arteriosus, and interrupted aortic arch.

10.1016/j.amjcard.2010.01.333

[3] Chromosome 22q11.2 Deletion Syndrome: A Comprehensive Review of Molecular Genetics in the Context of Multidisciplinary Clinical Approach.

International journal of molecular sciences · 2023-05-05

The 22q11.2 deletion syndrome is a multisystemic disorder characterized by a marked variability of phenotypic features. The wide spectrum of clinical manifestations includes congenital heart defects, thymic hypoplasia, laryngeal developmental defects, midline anomalies with cleft palate and velar insufficiency.

10.3390/ijms24098317

[4] High-Resolution genomic arrays identify CNVs that phenocopy the chromosome 22q11.2 deletion syndrome.

Human mutation · 2011-01-01

The 22q11 deletion syndrome is one of the most common human microdeletion syndromes with a wide spectrum of abnormalities. Patients have characteristic facial appearance, palate abnormalities, hypoparathyroidism, thymic hypoplasia, and congenital heart disease.

10.1002/humu.21395

185. MedQA question ID 731 Step 2/3

Question

Three days after induction chemotherapy, a 9-year-old boy is admitted to the hospital for fever and neutropenia. He was initially diagnosed with t(9;22)-positive acute T cell lymphoblastic leukemia following workup for fatigue and pancytopenia. He is fully conscious. His blood pressure is 110/65 mm Hg, temperature is 39.5°C (103.1°F), pulse is 98/min, and respiratory rate is 14/min. Physical examination including examination of the central venous catheter site shows no source of infection. Broad-spectrum antibiotics are initiated. Which of the following factors about this patient most strongly indicates a poor prognosis?

(A) Age

(B) Cytogenetics

(C) Fever and neutropenia

(D) Initial presentation

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Cytogenetics is the factor that most strongly indicates a poor prognosis: **t(9;22) / BCR::ABL1 (Philadelphia chromosome-positive ALL)** is a recognized high-risk cytogenetic abnormality in childhood ALL and is associated with worse outcome than standard-risk ALL [1] [2]. The boy's **fever and neutropenia** reflect treatment toxicity and infection risk, not leukemia prognosis, and his **initial presentation** with fatigue and pancytopenia is nonspecific. **Age 9 years** is not the dominant adverse feature here; the cytogenetic subtype is the key prognostic issue [1] [2].

Why the other options are less likely

- **Age:** age-related risk is important in pediatric ALL, but in this vignette it does not outweigh the adverse impact of **Ph-positive cytogenetics** [1] [2].
- **Fever and neutropenia:** this is a common post-chemotherapy complication and is not itself a leukemia prognostic marker [1].
- **Initial presentation:** fatigue and pancytopenia are common presenting features and are not, by themselves, a strong adverse prognostic factor [1] [2].

References

[1] Treatment of Philadelphia chromosome-positive acute lymphoblastic leukemia.

Current hematologic malignancy reports · 2013-06-01

Philadelphia chromosome-positive acute lymphoblastic leukemia (Ph+ ALL) is characterized by expression of oncogenic fusion product BCR-ABL1, resulting from reciprocal translocation between chromosomes 9 and 22 [t(9;22)(q34;q11.2]. Ph+ ALL had a 10% lower chance of remission than the standard-risk ALL. With the advent of targeted tyrosine-kinase inhibitors, higher remission rates were achieved.

10.1007/s11899-013-0155-4

[2] Advancing Diagnostics and Therapy to Reach Universal Cure in Childhood ALL

Journal of Clinical Oncology · 2023-10-11

Ph-like ALL is more common than BCR::ABL1 ALL in children (approximately 10%-15% v approximately 2%-3%) but has a similarly poor outcome without the use of TKIs. Both have a very high incidence of IKZF1 deletions, which further worsens their poor outcome.

10.1200/JCO.23.01286

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186. MedQA question ID 1260 Step 1

Question

A 51-year-old man is brought to the physician by his wife because of a 3-week history of abnormal behavior. His wife reports he has been preoccupied with gambling at the local casino. He becomes restless and irritable when his wife attempts to restrict his gambling. Four months ago, he was diagnosed with Parkinson disease and treatment was initiated. Which of the following best describes the mechanism of action of the drug that was most likely prescribed for this patient?

(A) Peripheral inhibition of DOPA decarboxylase

(B) Direct activation of dopamine receptors

(C) Selective inhibition of monoamine oxidase B

(D) Inhibition of catechol-O-methyl transferase

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The American Academy of Neurology (AAN) recommends dopamine agonists for early Parkinson disease but warns that they can cause impulse control disorders, including compulsive gambling; the mechanism is direct activation of dopamine receptors. In this patient, the most likely prescribed drug was a **dopamine agonist** such as **pramipexole or ropinirole**, so the best answer is **B. Direct activation of dopamine receptors** [1] [2].

Why this fits

- The AAN notes that initial Parkinson disease therapy may include **levodopa, monoamine oxidase inhibitors, dopamine agonists, or combinations**, and that dopamine agonists carry important **neuropsychiatric adverse effects**, including **impulse control disorders** [1].
- The same guideline specifically recommends screening for and avoiding dopamine agonists in patients with a **history of impulse control disorders** and monitoring for **ICDs, excessive daytime sleepiness, hallucinations, and orthostatic hypotension** [1].
- Published evidence links dopamine agonists used in Parkinson disease to **pathological gambling** and other compulsive behaviors, supporting the clinical association in this vignette [2].

Answer

B. Direct activation of dopamine receptors

References

[1] Dopaminergic Therapy for Motor Symptoms in Early Parkinson Disease
American Academy of Neurology · 2021-11-15 00:00:00
The treatment options for the alleviation of motor symptoms in the early stages of Parkinson disease are based on the enhancement of dopaminergic tone with levodopa, monoamine oxidase inhibitors, dopamine agonists, or a combination thereof. The choice of initial treatment is influenced by the potential for neuropsychiatric adverse effects associated with dopamine agonists and dyskinesia and motor fluctuations associated with levodopa.
https://n.neurology.org/content/97/20/942

[2] Reports of pathological gambling, hypersexuality, and compulsive shopping associated with dopamine receptor agonist drugs.
JAMA Internal Medicine · 2014-12-01
Severe impulse control disorders involving pathological gambling, hypersexuality, and compulsive shopping have been reported in association with dopamine receptor agonist drugs used to treat Parkinson disease, restless leg syndrome, and hyperprolactinemia. Dopamine receptor agonists pramipexole, ropinirole, and aripiprazole were found to be linked to the impulse control disorder.
10.1001/jamainternmed.2014.5262

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187. MedQA question ID 343 Step 1

Question

A 22-year-old woman with polycystic ovarian syndrome comes to the emergency department because of a 1-day history of left lower abdominal pain that began suddenly while she was running. Her last menstrual period was 2 weeks ago. Physical examination shows tenderness to palpation over the left adnexa and rebound tenderness in the left lower quadrant. There is no tenderness in the right lower quadrant. Urine pregnancy test is negative. An ultrasound is ordered to confirm the diagnosis of ruptured ovarian cyst. Visualization of fluid in which of the following locations would be most consistent with this diagnosis?

(A) Rectouterine pouch

(B) Hepatorenal space

(C) Splenorenal angle

(D) Rectovesical pouch

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Rectouterine pouch. In a nonpregnant woman, free intraperitoneal fluid from a ruptured ovarian cyst most often collects in the rectouterine pouch (pouch of Douglas), the most dependent peritoneal recess in the female pelvis [1]. A negative urine pregnancy test supports a nongestational cause of hemoperitoneum or pelvic free fluid.

References

[1] Complete evaluation of anatomy and morphology of the infertile patient in a single visit; the modern infertility pelvic ultrasound examination.
Fertility and Sterility · 2016-06-01
The cul-de-sac is imaged to look for masses, endometriosis, and free fluid.
https://doi.org/10.1016/j.fertnstert.2016.03.026

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188. MedQA question ID 232 Step 2/3

Question

A 47-year-old man presents to the emergency department with fever, fatigue, and loss of appetite for 1 week, followed by right shoulder pain, generalized abdominal pain, and paroxysmal cough. He has had diabetes mellitus for 15 years, for which he takes metformin and gliclazide. His vital signs include a temperature of 38.3°C (101.0°F), pulse of 85/min, and blood pressure of 110/70 mm Hg. On examination, he is ill-appearing, and he has a tender liver edge that is palpable approx. 2 cm below the right costal margin. Percussion and movement worsens the pain. Abdominal ultrasonography is shown. Stool is negative for Entamoeba histolytica antigen. Which of the following is the best initial step in management of this patient condition?

(A) Metronidazole and paromomycin

(B) Cholecystectomy

(C) Antibiotics and drainage

(D) Endoscopic retrograde cholangiopancreatography (ERCP)

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The best initial step is C. antibiotics and drainage for a likely **pyogenic liver abscess**. The **Infectious Diseases Society of America (IDSA)** and **Surgical Infection Society** recommend prompt antimicrobial therapy when an intra-abdominal infection is diagnosed or strongly suspected, and they recommend **source control for nearly all patients** [1] [2]. For liver abscesses, the retrieved evidence consistently supports **intravenous antibiotics plus percutaneous drainage** as standard initial management, especially when the abscess is clinically significant [7] [8] [9].

Why this is not amoebic abscess treatment

Metronidazole plus paromomycin is used for **Entamoeba histolytica** infection, but this case is less consistent with amoebic liver abscess because the stool antigen is negative and the presentation fits **pyogenic abscess** with fever, RUQ pain, referred shoulder pain, and a tender enlarged liver [7] [8].

Practical management point

- Start **broad-spectrum antibiotics** now.
- Arrange **image-guided percutaneous drainage** for source control if the abscess is drainable/large or if clinical severity warrants it.

Cholecystectomy and **ERCP** are not the best initial step unless the imaging or clinical picture shows gallbladder disease or biliary obstruction/cholangitis as the primary problem [3].

References

[1] Diagnosis and Management of Complicated Intra-abdominal Infection in Adults and Children
Infectious Diseases Society of America, Surgical Infection Society · 2010-01-15 00:00:00
Antimicrobial therapy should be initiated once a patient is diagnosed with an intra-abdominal infection, or such an infection is considered likely. For patients in septic shock, antibiotics should be administered as soon as possible.
https://academic.oup.com/cid/article/50/2/133/327316

[2] Diagnosis and Management of Complicated Intra-abdominal Infection in Adults and Children
Infectious Diseases Society of America, Surgical Infection Society · 2010-01-15 00:00:00
An appropriate source control procedure is recommended for nearly all patients with intra-abdominal infection.
https://academic.oup.com/cid/article/50/2/133/327316

[3] Role of Endoscopy in the Evaluation and Management of Choledocholithiasis
American Society for Gastrointestinal Endoscopy · 2019-06-01 12:00:00
In patients with INTERMEDIATE-RISK criteria of abnormal liver tests or age >55 years or dilated CBD on ultrasound, we suggest EUS, MRCP, laparoscopic intraoperative cholangiography (IOC), or laparoscopic intraoperative ultrasound for further evaluation. For patients with symptomatic cholelithiasis without any of these risk factors, we suggest cholecystectomy without IOC.
https://www.giejournal.org/article/S0016-5107(18)33162-6/fulltext

[7] Pyogenic and Amebic Infections of the Liver.
Gastroenterology clinics of North America · 2020-06-01
Pyogenic liver abscesses are classified by the bacteria that have caused the abscess. The most common cause is biliary disease. The diagnosis is made by imaging. Treatment is a combination of antibiotics and percutaneous drainage. The prognosis is good, with almost universal recovery.
10.1016/j.gtc.2020.01.013

[8] A prospective series case study of pyogenic liver abscess: recent trands in etiology and management.
The Indian journal of surgery · 2012-10-01
The study aims to review the literature on the management of pyogenic liver abscess. Intravenous antibiotic is the first line, and mainstay of treatment. Drainage is necessary for large abscesses, equal to or larger than 5 cm in size. Percutaneous drainage is appropriate as first-line surgical treatment in most cases. Open surgical drainage is prudent in cases of rupture, multiloculation, associated biliary, or intra-abdominal pathology.
10.1007/s12262-011-0397-0

[9] Liver abscess: diagnostic and management issues found in the low resource setting.
British medical bulletin · 2019-12-11
Liver abscesses are an important cause of hospitalization in low-middle income countries. Amoebic liver abscess can be treated medically, pyogenic abscess needs to be percutaneously drained and treated with effective antibiotics.
10.1093/bmb/ldz032

189. MedQA question ID 1070 Step 1

Question

A 72-year-old Caucasian male presents to your office with dysphagia and halitosis. If this patient is also found to have cricopharyngeal muscle dysfunction, which of the following is the most likely cause of his presenting symptoms?

(A) Gastroesophageal reflux disease

(B) Esophageal candidiasis

(C) Meckel's diverticulum

(D) Zenker's diverticulum

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Zenker's diverticulum is the most likely cause. In an older man with **dysphagia and halitosis**, the combination of symptoms plus **cricopharyngeal muscle dysfunction** is classic for Zenker's diverticulum, which is an outpouching at the pharyngoesophageal junction related to incomplete cricopharyngeal relaxation [1] [2] [3].

Why this fits

- Zenker's diverticulum typically presents in **elderly men** with **oropharyngeal dysphagia**, regurgitation of undigested food, **halitosis**, cough, and aspiration [1] [2] [3].
- The listed alternatives are less consistent with this symptom cluster: GERD causes reflux symptoms rather than halitosis with cricopharyngeal dysfunction, esophageal candidiasis usually causes odynophagia, and Meckel's diverticulum is an intestinal diverticulum and does not explain these upper esophageal symptoms [1] [2] [3].
- Diagnosis is generally made with a **dynamic contrast swallowing study** [3].

References

[1] Zenker's Diverticulum.
Clinical Gastroenterology and Hepatology · 2014-11-01
Zenker's diverticulum (ZD) is an outpouching of tissue through the Killian triangle caused by dysfunction of the cricopharyngeal muscle. The predominant symptom of ZD is dysphagia, and the most serious consequence is pulmonary aspiration.
10.1016/j.cgh.2013.09.016

[2] [Pathophysiology, diagnosis and treatment of Zenker's diverticulum].
HNO · 2017-02-01
Zenker's diverticulum occurs at the dorsal pharyngoesophageal junction through Killian's dehiscence. The primary symptom is oropharyngeal dysphagia, as well as regurgitation of undigested food, halitosis, and chronic aspiration.
10.1007/s00106-016-0302-z

[3] Flexible endoscopic and surgical management of Zenker's diverticulum.
Expert Review of Gastroenterology & Hepatology · 2012-08-01
Zenker's diverticulum is an outpouching of the mucosa through the Killian's triangle. It is thought to be due to the incoordination or incomplete relaxation of the cricopharyngeal muscle. Most patients are men who present with symptoms of dysphagia between the seventh and eighth decades of life. The diagnosis is made with a dynamic contrast swallowing study.
10.1586/egh.12.25

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190. MedQA question ID 321 Step 2/3

Question

A 55-year-old man recovering from knee replacement surgery complains of breathlessness in the postoperative ward. He has been confined to bed for the past 5 days and is under observation. He felt a sudden difficulty in breathing and called for the ward nurse. He says that he is unable to take deep breaths and has a sharp pain on the right side of his chest with each inspiration. His temperature is 37.5°C (99.8°F), the pulse is 111/min, the respirations are 31/min, and the blood pressure is 85/55 mm Hg. He experiences pain in his right calf on dorsiflexion. There are no other prominent findings on physical examination. His chest X-ray does not show anything significant. The ECG reveals sinus tachycardia. Which of the following is the best course of management at this time?

(A) Subcutaneous fondaparinux

(B) Inferior vena cava filter

(C) Ventilation-perfusion scan

(D) Lower extremity doppler

Correct Response:
A
Synthesize Response:
DX

Synthesize Answer

The best next step is lower extremity Doppler ultrasonography because this patient has **highly suspected massive pulmonary embolism (PE) with hypotension (BP 85/55 mm Hg)**, and in unstable patients the **Society of Critical Care Medicine** recommends **bedside cardiac ultrasonography and proximal bilateral lower-extremity venous examination before CT** [1]. A positive proximal DVT study would support immediate PE treatment; **ventilation-perfusion scanning is mainly reserved for patients with contraindication to CTPA or when CTPA is unavailable**, and **fondaparinux** is not the immediate management of a hypotensive patient [2] [3].

Why this is the best option here

- The presentation is classic for PE: sudden dyspnea, pleuritic chest pain, tachycardia, normal chest x-ray, postoperative immobilization, and calf pain.

- Because the patient is **hemodynamically unstable**, the priority is **rapid bedside evaluation**, not delayed nuclear imaging.
- An **inferior vena cava filter** is **not first-line** when anticoagulation is possible; the American College of Chest Physicians recommends **against IVC filter use in patients with acute DVT or PE who are treated with anticoagulants** [4].

What would happen after confirmation

- For acute PE with **hypotension**, the American College of Chest Physicians suggests **systemic thrombolytic therapy** if bleeding risk is not high [5].
- If PE were confirmed and the patient stabilized, anticoagulation would be the foundation of treatment [3].

Answer: D. Lower extremity doppler

References

[1] Bedside General and Cardiac Ultrasonography in the Evaluation of Critically Ill Patients: Part II
Society of Critical Care Medicine · 2016-06-01 12:00:00
We recommend that in unstable patients with suspected PE, bedside cardiac ultrasonography and a venous examination of the proximal bilateral lower extremities should be considered prior to the consideration of CT.
https://journals.lww.com/ccmjournal/Fulltext/2016/06000/Guidelines_for_the_Appropriate_Use_of_Bedside.23.aspx

[2] Evaluation of Patients With Suspected Acute Pulmonary Embolism
American College of Physicians · 2015-11-01 00:00:00
Clinicians should obtain imaging with CT pulmonary angiography (CTPA) in patients with high pretest probability of PE. Clinicians should reserve ventilation–perfusion scans for patients who have a contraindication to CTPA or if CTPA is not available. Clinicians should not obtain a D-dimer measurement in patients with a high pretest probability of PE.
https://annals.org/aim/fullarticle/2443959/evaluation-patients-suspected-acute-pulmonary-embolism-best-practice-advice-from

[3] Pulmonary Thrombosis and Thromboembolism in COVID-19
Chest · 2021-06-19
Anticoagulation is the mainstay of the treatment for acute PE, both for patients with and without COVID-19, to prevent further thrombosis and thromboembolism. Initial treatment options for anticoagulation include unfractionated heparin, low-molecular-weight heparin, fondaparinux, and, in low-risk patients, direct oral anticoagulants.
10.1016/j.chest.2021.06.016

[4] Antithrombotic Therapy For VTE Disease
American College of Chest Physicians · 2016-02-01 00:00:00
In patients with acute DVT or PE who are treated with anticoagulants, we recommend against the use of an IVC filter.
https://journal.chestnet.org/article/S0012-3692(15)00335-9/fulltext

[5] Antithrombotic Therapy For VTE Disease
American College of Chest Physicians · 2016-02-01 00:00:00
In patients with acute PE associated with hypotension (eg, systolic BP < 90 mm Hg) who do not have a high bleeding risk, we suggest systemically administered thrombolytic therapy over no such therapy.
https://journal.chestnet.org/article/S0012-3692(15)00335-9/fulltext

191. MedQA question ID 489 Step 1

Question

A 62-year-old man with a history of chronic bronchitis comes to the physician because of a 1-month history of worsening shortness of breath and cough productive of thick sputum. He smoked one pack of cigarettes daily for 20 years but quit 5 years ago. Physical examination shows an increased anteroposterior chest diameter and coarse crackles in the lower lung fields bilaterally. Treatment with a drug that directly antagonizes the effects of vagal stimulation on the airways is begun. Which of the following drugs was most likely started?

(A) Fluticasone

(B) Montelukast

(C) Tiotropium

(D) Cromolyn

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The drug most likely started is tiotropium (C). In COPD, the **American Thoracic Society (ATS)** and **Global Initiative for Chronic Obstructive Lung Disease (GOLD)** place inhaled bronchodilators at the center of maintenance therapy, and **long-acting muscarinic antagonists (LAMAs)** are the class that **directly blocks vagal/parasympathetic muscarinic effects on the airways** [1] [2]. Tiotropium is a LAMA; **fluticasone** is an inhaled corticosteroid, **montelukast** is a leukotriene receptor antagonist, and **cromolyn** is a mast-cell stabilizer [2] [3].

Why tiotropium fits

- **Tiotropium** is an inhaled **LAMA** used for COPD symptom control and exacerbation prevention [1] [2].
- Muscarinic antagonists reduce bronchoconstriction by blocking acetylcholine-mediated vagal tone in the airways [3].
- The other options do not match the mechanism described:
- **Fluticasone** = corticosteroid
- **Montelukast** = leukotriene receptor antagonist
- **Cromolyn** = mast-cell stabilizer [2] [3]

Clinical context

This presentation is most consistent with **COPD/chronic bronchitis** rather than asthma, and inhaled bronchodilation is the appropriate mechanism-based treatment. For symptomatic COPD, ATS recommends **LABA/LAMA** combination therapy over monotherapy when dyspnea or exercise intolerance is present [1].

References

[1] Pharmacologic Management of Chronic Obstructive Pulmonary Disease
American Thoracic Society · 2020-04-01 00:00:00
In patients with COPD who complain of dyspnea or exercise intolerance, the ATS recommends long-acting β-agonist (LABA)/long-acting muscarinic antagonist (LAMA) combination therapy over LABA or LAMA monotherapy.
https://www.atsjournals.org/doi/full/10.1164/rccm.202003-0625ST

[2] Prevention, Management and Diagnosis of COPD
Global Initiative for Chronic Obstructive Lung Disease · 2021-11-22 00:00:00
Inhaled bronchodilators in COPD are central to symptom management and commonly given on a regular basis to prevent or reduce symptoms.
https://goldcopd.org/2023-gold-report-2/

[3] Towards the elimination of chronic obstructive pulmonary disease: a Lancet Commission
The Lancet · 2022-09-01
Anticholinergics block the muscarinic acetylcholine receptor to reduce bronchoconstriction.
10.1016/s0140-6736(22)01273-9

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192. MedQA question ID 207 Step 2/3

Question

A 28-year-old woman returns to the clinic to follow up on a recent abnormal cervical biopsy that demonstrated cervical intraepithelial neoplasia (CIN) I. The patient is quite anxious about the implications of this diagnosis. Her physical examination is within normal limits. Her vital signs do not show any abnormalities at this time. Her past medical, family, and social histories are all non-contributory. Which of the following is the appropriate management of a newly diagnosed CIN I in a 24-year-old patient?

(A) Close observation, pap smear screening at 6 and 12 months, and HPV DNA testing at 12 months

(B) Cryotherapy ablation

(C) Loop electrosurgical excision (LEEP)

(D) Hysterectomy

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The American Society for Colposcopy and Cervical Pathology (ASCCP) recommends observation rather than treatment for a **24-year-old** with newly diagnosed **CIN 1**; follow-up should be **repeat cytology alone at 12 months** (not HPV testing), with continued surveillance if abnormalities persist [1] [2]. Among the answer choices, **A is the closest**, but the correct ASCCP approach is **cytology-only surveillance** rather than Pap plus HPV testing [1] [2].

Why not immediate treatment?

- **HPV testing is not recommended** for follow-up of CIN 1 in patients **21–24 years old** [2].
- **Treatment of CIN 1 in women aged 21–24 years is not recommended** [2].
- CIN 1 commonly regresses, so conservative management avoids overtreatment [3].

Practical take-home

For a healthy 24-year-old with CIN 1, the management is **close observation with repeat cytology at 12 months** rather than cryotherapy, LEEP, or hysterectomy [1] [2].

References

[1] Management of Abnormal Cervical Cancer Screening Test Results and Cervical Cancer Precursors
American College of Obstetricians and Gynecologists · 2013-12-02 00:00:00
For women aged 21–24 years with CIN 1 after an ASC-US or LSIL cytology test result, repeat cytology testing at 12-month intervals is recommended. Follow-up with HPV testing is unacceptable.
https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2013/12/management-of-abnormal-cervical-cancer-screening-test-results-and-cervical-cancer-precursors

[2] Management of Abnormal Cervical Cancer Screening Test Results and Cervical Cancer Precursors
American College of Obstetricians and Gynecologists · 2013-12-02 00:00:00
For women aged 21–24 years with CIN 1 after an ASC-US or LSIL cytology test result, repeat cytology testing at 12-month intervals is recommended. Follow-up with HPV testing is unacceptable. Regardless of antecedent cytology test results, treatment of CIN 1 in women aged 21–24 years is not recommended.
https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2013/12/management-of-abnormal-cervical-cancer-screening-test-results-and-cervical-cancer-precursors

[3] Do clinical data and human papilloma virus genotype influence spontaneous regression in grade I cervical intraepithelial neoplasia?
Journal of the Turkish German Gynecological Association · 2017-03-15
The frequency of regression in CIN-I is high, making long-term follow-up and conservative management advisable.
10.4274/jtgga.2016.0138

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193. MedQA question ID 743 Step 1

Question

A 63-year-old man presents to the physician with a complaint of back pain for the past 2 months. The pain is present throughout the day, and even at night when he lies down. He also complains of difficulty walking upstairs and says he recently started to wear adult diapers because he seems to have difficulty controlling his bowel movements. His vital signs are within normal limits. The neurological examination revealed bilateral lower limb weakness, diminished temperature sensation, and decreased vibratory sense. The rectal examination revealed a hard nodular mass and a weak rectal sphincter tone. Which of the following is the most likely cause of his symptoms?

(A) Syringomyelia

(B) Spinal metastasis

(C) Herniated disc

(D) Spinal hematoma

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Spinal metastasis is the most likely cause. The combination of **persistent day-and-night back pain**, **progressive bilateral leg weakness/sensory loss**, and **new bowel incontinence** is classic for **metastatic spinal cord compression (MSCC)**, and the **hard nodular rectal mass** strongly suggests an underlying malignancy as the source [1] [2].

Why the other choices are less likely

- **Syringomyelia** usually causes a dissociated sensory loss pattern and upper-extremity-predominant findings, not a rectal mass or bowel incontinence.
- **Herniated disc** can cause radicular pain or cauda equina syndrome, but the **night pain** and **rectal mass** point more strongly to cancer-related compression.
- **Spinal hematoma** typically presents more acutely, often after trauma, anticoagulation, or a procedure, rather than a 2-month progressive course.

Bottom line: spinal metastasis causing MSCC is the best answer [1] [2].

References

[1] Assessment and Management of Patients With Metastatic Spinal Cord Compression: A Multidisciplinary Review.

Journal of Clinical Oncology · 2019-01-01

Metastatic spinal cord compression (MSCC) can be a catastrophic manifestation of advanced cancer that causes immobilizing pain and significant neurologic impairment. Oncologists should have high index of suspicion for MSCC when patients present with new or worsening back pain before motor, sensory, bowel, or bladder deficits develop. Magnetic resonance imaging of the entire spine is recommended for the diagnosis of MSCC. Treatment includes glucocorticoid therapy, pain management, radiation therapy with or without surgery, and specialized rehabilitation.

10.1200/jco.2018.78.1211

[2] Spinal Metastases and Metastatic Spinal Cord Compression

National Institute for Health and Care Excellence · 2023-09-06 00:00:00

Consider using a validated spinal stability scoring system with good evidence of accuracy (for example, the Spinal Instability Neoplastic Score) alongside clinical assessment of risk of spinal instability to inform treatment decisions.

https://www.nice.org.uk/guidance/ng234

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194. MedQA question ID 905 Step 2/3

Question

Background: There is a lack of consensus about whether the initial imaging method for patients with suspected nephrolithiasis should be computed tomography (CT) or ultrasonography.
Methods: In this multicenter, pragmatic, comparative effectiveness trial, we randomly assigned patients 18 to 76 years of age who presented to the emergency department with suspected

nephrolithiasis to undergo initial diagnostic ultrasonography performed by an emergency physician (point-of-care ultrasonography), ultrasonography performed by a radiologist (radiology ultrasonography), or abdominal non-contrast CT. Subsequent management, including additional imaging, was at the discretion of the physician. We compared the three groups with respect to the 30-day incidence of high-risk diagnoses with complications that could be related to missed or delayed diagnosis and the 6-month cumulative radiation exposure. Secondary outcomes were serious adverse events, related serious adverse events (deemed attributable to study participation), pain (assessed on an 11-point visual-analog scale, with higher scores indicating more severe pain), return emergency department visits, hospitalizations, and diagnostic accuracy.
Results: A total of 2759 patients underwent randomization: 908 to point-of-care ultrasonography, 893 to radiology ultrasonography, and 958 to non-contrast CT abdomen The incidence of high-risk diagnoses with complications in the first 30 days was low (0.4%) and did not vary according to imaging method. The mean 6-month cumulative radiation exposure was significantly lower in the ultrasonography groups than in the CT group ($p < 0.001$). Serious adverse events occurred in 12.4% of the patients assigned to point-of-care ultrasonography, 10.8% of those assigned to radiology ultrasonography, and 11.2% of those assigned to CT ($p = 0.50$). Related adverse events were infrequent (incidence, 0.4%) and similar across groups. By 7 days, the average pain score was 2.0 in each group ($p = 0.84$). Return emergency department visits, hospitalizations, and diagnostic accuracy did not differ significantly among the groups.
Conclusions: Initial ultrasonography was associated with lower cumulative radiation exposure than initial CT, without significant differences in high-risk diagnoses with complications, serious adverse events, pain scores, return emergency department visits, or hospitalizations.
If the conclusion stated above was, in fact, due to the earlier detection of nephrolithiasis in patients undergoing point of care ultrasound, what type of bias would this exemplify?

(A) Measurement bias

(B) Recall bias

(C) Lead-time bias

(D) Selection bias

Correct Response:
A
Synthesize Response:
C✕

Synthesize Answer

(C) Lead-time bias. If point-of-care ultrasonography detects nephrolithiasis earlier, patients may appear to have longer or similarly good outcomes simply because the diagnosis was made sooner, not because the disease course changed. The randomized nephrolithiasis imaging trial found lower cumulative radiation exposure with initial ultrasonography and no significant differences in key outcomes, which fits this explanation [1].

References

[1] Ultrasonography versus computed tomography for suspected nephrolithiasis
The New England Journal of Medicine · 2014-09-18

Ultrasonography was associated with lower cumulative radiation exposure than initial CT, with no significant differences in outcomes.

https://doi.org/10.1056/NEJMoa1404446

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195. MedQA question ID 772 Step 1

Question

A 25-year-old man presents to his primary care provider complaining of several weeks of intense itching, particularly localized around his anus. Of note, the patient denies any recent travel, sexual contacts, fever, dysuria, or diarrhea. His temperature is 98.1°F (36.7°C), blood pressure is 110/70 mmHg, pulse is 65/min, and respirations are 12/min. On exam, the patient demonstrates severe excoriations in his perianal region with slight erythema over the areas that are torn. He does not have any other dermatologic findings. The scotch tape test is positive. The patient has a previous documented allergy to albendazole. Which of the following is an alternative medication that can be used?

(A) Amphotericin B

(B) Ivermectin

(C) Praziquantel

(D) Pyrantel pamoate

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The best alternative medication is pyrantel pamoate (choice D). The presentation is classic for **enterobiasis (pinworm infection)**, and pyrantel pamoate is an approved antihelminthic option for pinworm when albendazole cannot be used because of allergy [1] [2]. **Amphotericin B, ivermectin, and praziquantel are not appropriate treatments for pinworm** in this setting [1] [2].

Why this fits

- **Perianal pruritus** with a **positive Scotch tape test** is diagnostic of pinworm infection.
- For enterobiasis, available antihelminthic options include **mebendazole**, **pyrantel pamoate**, and **pyrvinium** compounds; among the answer choices, only **pyrantel pamoate** matches [1].

Answer

D. Pyrantel pamoate

References

[1] The Diagnosis and Treatment of Pinworm Infection.
Deutsches Arzteblatt international · 2019-03-29
There is little verified knowledge on the treatment of Enterobius vermicularis... The approved antihelminthic agents are mebendazole, pyrantel embonate, and pyrvinium embonates.
10.3238/arztebl.2019.0213

[2] Treatment Options and Considerations for Intestinal Helminthic Infections.
The Journal of pharmacy technology · 2014-08-01
Albendazole is the drug of choice for... pinworm.
10.1177/8755122514533667

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196. MedQA question ID 89 Step 1

Question

A 26-year-old G1P0 woman presents to her primary care physician's office with feelings of anxiety and trouble with sleep. She finds it difficult initiating sleep, occasionally has palpitations, and feels fatigued. She denies having similar symptoms in the past or starting any new medications or illicit drugs. She is currently 10 weeks pregnant and is closely followed by her obstetrician. Her temperature is 98.6°F (37°C), blood pressure is 125/70 mmHg, pulse is 105/min, and respirations are 18/min. On physical exam, the patient is mildly diaphoretic. The skin is warm and the thyroid gland is diffusely enlarged with thyroid bruits. Laboratory studies are significant for a thyroid-stimulating hormone level of 0.01 μU/mL (normal is 0.5-5.0 μU/mL) and an elevated free thyroxine (FT4) that is inappropriate for her pregnancy. Which of the following is the best treatment option for this patient?

(A) Methimazole

(B) Propylthiouracil

(C) Radioiodine therapy

(D) Thyroidectomy

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The best treatment is propylthiouracil (PTU) (choice B). The American Thyroid Association (ATA) recommends **antithyroid drug therapy for overt Graves hyperthyroidism during pregnancy**, and **PTU is preferred in the first trimester**; **methimazole** is generally used after the first trimester because of teratogenic risk in early gestation [1] [2]. **Radioiodine therapy is contraindicated in pregnancy**, and **thyroidectomy is reserved for special situations** and, if needed, is best performed in the **second trimester** [3] [4].

Why PTU is preferred here

- This patient has **overt hyperthyroidism with Graves disease features** (diffuse goiter with bruit, suppressed TSH, elevated FT4) at **10 weeks gestation**, which falls in the **first trimester** [1] [2].
- The ATA specifically recommends **PTU when antithyroid therapy is required in the first trimester** [2].
- If therapy must continue beyond the first trimester, many clinicians switch to **methimazole** to reduce PTU-associated hepatic toxicity risk, but the initial best choice at 10 weeks is PTU [1] [2].

Why the other options are not best

- **Methimazole**: avoided in the **first trimester** because of fetal malformation risk [1] [2].
- **Radioiodine therapy**: **contraindicated in pregnancy** [3].
- **Thyroidectomy**: not first-line here; it is reserved for women who cannot tolerate antithyroid drugs or have refractory disease, and is ideally done in the **second trimester** [4].

References

[1] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis
American Thyroid Association · 2016-10-01 00:00:00
90. ATD therapy should be used for overt hyperthyroidism due to GD during pregnancy. PTU should be used when ATD therapy is given during the first trimester. MMI should be used when ATD therapy is started after the first trimester.
https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

[2] Diagnosis and Management of Thyroid Disease During Pregnancy and the Postpartum
American Thyroid Association · 2017-03-01 00:00:00
High Risk: In pregnant women with a high risk of developing thyrotoxicosis if antithyroid drugs were to be discontinued, continued antithyroid medication may be necessary. PTU is recommended for the treatment of maternal hyperthyroidism through 16 weeks of pregnancy. Pregnant women receiving MMI who are in need of continuing therapy during pregnancy should be switched to PTU as early as possible.
https://www.liebertpub.com/doi/full/10.1089/thy.2016.0457

[3] Hyperthyroidism
JAMA · 2023-10-17
RAI therapy is contraindicated in pregnancy and lactation.
10.1001/jama.2023.19052

[4] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis
American Thyroid Association · 2016-10-01 00:00:00
When thyroidectomy is necessary for the treatment of hyperthyroidism during pregnancy, the surgery should be performed if possible during the second trimester.
https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

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197. MedQA question ID 355 Step 2/3

Question

A 32-year-old G1P1 patient presents to her obstetrician after having a positive pregnancy test at home. She reports that she and her husband had been trying to have a child for the past three months. She has no history of sexually transmitted disease, intravenous drug use, or blood transfusions, and she has never traveled outside of the United States. She was up-to-date on all immunizations before her pregnancy. Ultrasound is consistent with an 8-week gestational sac. The

patient requests as few tests as possible, although she does not want to compromise the health of her fetus. Which of the following screening tests should be performed on all pregnant women?

(A) HIV, syphilis, and hepatitis B

(B) HIV, syphilis, and N. gonorrhea

(C) HIV, hepatitis B, and hepatitis C

(D) HIV, syphilis, hepatitis B, N. gonorrhea, and C. trachomatis

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. HIV, syphilis, and hepatitis B is the correct screening set for routine testing in all pregnant patients at the first prenatal visit; **gonorrhea and chlamydia are not universal screens** and are typically risk- or age-based, not required for every pregnancy [1] [2] [3]. The **American College of Obstetricians and Gynecologists (ACOG)** recommends **universal syphilis serologic screening** at the first prenatal care visit, with repeat screening in the third trimester and at birth because of rising congenital syphilis rates [1]. The **Centers for Disease Control and Prevention (CDC)** recommends **hepatitis B surface antigen (HBsAg) testing for all pregnant persons during each pregnancy, preferably in the first trimester** [2].

References

[1] Screening for Syphilis in Pregnancy

American College of Obstetricians and Gynecologists · 2024-04-04 12:00:00

The American College of Obstetricians and Gynecologists (ACOG) continues to endorse the Centers for Disease Control and Prevention (CDC) Sexually Transmitted Infection Treatment Guidelines, 20211. However, in the context of the rapidly increasing rates of congenital syphilis, obstetrician–gynecologists and other obstetric care professionals should screen all pregnant individuals serologically for syphilis at the first prenatal care visit, followed by universal rescreening during the third trimester and at birth, rather than use a risk-based approach to testing.

https://www.acog.org/clinical/clinical-guidance/practice-advisory/articles/2024/04/screening-for-syphilis-in-pregnancy

[2] Screening and Testing for Hepatitis B Virus Infection

Centers for Disease Control and Prevention · 2023-03-10 12:00:00

All pregnant persons* during each pregnancy, preferably in the first trimester, regardless of vaccination status or history of testing.

https://www.cdc.gov/mmwr/volumes/72/rr/rr7201a1.htm?s_cid=rr7201a1_w

[3] ACOG Committee Opinion No. 752: Prenatal and Perinatal Human Immunodeficiency Virus Testing.

Obstetrics and Gynecology · 2018-09-01

Early identification and treatment of all pregnant women with HIV is the best way to prevent neonatal infection and improve women's health. HIV testing should be a routine component of care for women during pregnancy and as early in pregnancy as possible. Repeat HIV testing in the third trimester is recommended for pregnant women who are at high risk of acquiring HIV infection. Rapid screening during labor and delivery should be done for women who were not tested earlier in pregnancy.

10.1097/aog.0000000000002825

198. MedQA question ID 715 Step 1

Question

A mother brings her 6-year-old daughter to the pediatrician to discuss her child's sleeping troubles. Three times now in the last month the child has begun screaming and crying in the middle of the night. When the parents rush to the child's room, they find her crying inconsolably. They try to ask her what is wrong, but she does not respond and persists crying for approximately 20 minutes, after which she goes back to sleeping comfortably. Upon awaking the following morning, she has no recollection of the night's events. Which of the following is true about these episodes?

(A) They will be persistent into adulthood

(B) They occur only during non-REM sleep

(C) They are associated with child abuse

(D) They are associated with later development of a mood disorder

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B is true: these are classic sleep terrors, a non-REM (NREM) parasomnia. They typically occur out of NREM sleep with abrupt arousal, inconsolability, and **amnesia** for the event the next morning; they are most common in childhood and usually improve with age rather than persisting into adulthood [1] [2]. They are **not** a typical marker of child abuse or a mood disorder [1] [2] [3].

Why the other options are false

- **A. Persistent into adulthood** — not typical; pediatric parasomnias usually resolve spontaneously and are generally benign [2] [3].
- **C. Associated with child abuse** — not supported by the retrieved literature as a characteristic association [1] [2].
- **D. Associated with later mood disorder** — some studies note associations with emotional-behavioral problems, but that is not the defining or most reliable association for this presentation [3].

Clinical note

The American Academy of Sleep Medicine (AASM) notes that polysomnography is reserved for **atypical or potentially injurious parasomnias** or when it is necessary to differentiate a parasomnia from sleep-related epilepsy [4].

References

[1] Parasomnias Occurring in Non-Rapid Eye Movement Sleep
Continuum (Minneapolis, Minn.) · 2020-08-01
Disorders of arousal are characterized by incomplete awakenings from slow-wave sleep, limited recall of imagery, and partial or complete amnesia. They occur most frequently in childhood.

10.1212/con.0000000000000877

[2] The Parasomnias

Child and adolescent psychiatric clinics of North America · 2021-01-01

Parasomnias usually present in childhood and resolve spontaneously. Pediatricians and child psychiatrists should be familiarized with these sleep disorders and suggest adequate sleep hygiene, avoidance of sleep deprivation and regular bedtimes even on weekends as the first step in management of these disorders.

10.1016/j.chc.2020.08.007

[3] Sleep terrors in early childhood and associated emotional-behavioral problems

Journal of Clinical Sleep Medicine · 2022-09-01

Sleep terrors are associated with emotional-behavioral problems in school-aged children and adults, but little is known about these associations in early childhood when sleep terrors prevalence is at its highest. A longitudinal study shows higher frequency of sleeping terrors and associated internalizing problems at 4 and 5 years of age.

10.5664/jcsm.10080

[4] Non-Respiratory Indications for Polysomnography and Multiple Sleep Latency Testing for Children

American Academy of Sleep Medicine · 2012-11-01 00:00:00

The polysomnogram using an expanded EEG montage is indicated in children to confirm the diagnosis of an atypical or potentially injurious parasomnia or differentiate a parasomnia from sleep-related epilepsy.

https://aasm.org/resources/practiceparameters/pediatricpolysomnographymslt.pdf

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199. MedQA question ID 111 Step 2/3

Question

An 18-month-old girl is brought to the emergency department because of a cough that her parents are worried about. She has had a runny nose and a low-grade fever for the past 2 days, with some hoarseness and a rough-sounding cough that started this afternoon. This evening she began making some high-pitched sounds when taking breaths, and she seemed to be having some trouble breathing. She is alert and does not appear to be in acute distress. She has a temperature of 38.0°C (100.4 °F), with a respiratory rate of 50/min and O2 saturation of 97%. There is audible inspiratory stridor that worsens when she starts to cry during the examination. She has an occasional barking cough. Her pharynx is mildly erythematous with normal tonsils and no exudate. A frontal X-ray of the upper chest airways is obtained (shown in the image). Which of the following is the best step in management?

(A) Anterior-posterior and lateral radiographs of the neck

(B) Racemic epinephrine and intramuscular corticosteroid therapy

(C) Intravenous antibiotics

(D) Trial of bronchodilator therapy and oral steroids

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Racemic epinephrine and intramuscular corticosteroid therapy is the best next step. This child has **viral croup**: low-grade fever, hoarseness, a **barking cough**, and **inspiratory stridor** that worsens with crying; croup is a **clinical diagnosis** and does not require neck radiographs when the presentation is typical [1] [2]. **Nebulized/racemic epinephrine** improves croup severity quickly, and **systemic corticosteroids** are the mainstay of treatment; epinephrine is added when stridor is present at rest or symptoms are more than mild [1] [3] [4].

Why the other options are not best

- **A. Anterior-posterior and lateral radiographs of the neck**: not needed for typical croup; imaging is reserved for atypical cases or concern for an alternate diagnosis such as epiglottitis or foreign body [1].
- **C. Intravenous antibiotics**: more consistent with bacterial tracheitis or epiglottitis, which usually present with a sicker toxic child and more severe illness than described here [1].
- **D. Trial of bronchodilator therapy and oral steroids**: bronchodilators do not treat upper-airway obstruction from croup; steroids are appropriate, but **nebulized epinephrine** is the key additional acute treatment when stridor is present [1] [3] [4].

References

[1] Upper Airway Obstruction in Children.

Indian Journal of Pediatrics · 2015-08-01

The characteristic finding in upper airway obstruction is stridor-inspiratory, biphasic or expiratory. Croup is a clinical diagnosis in a febrile child, with barking cough and stridors. It is treated with systemic or inhaled steroids and nebulized epinephrine. Epiglottitis and bacterial tracheitis are acute bacterial infections of upper airways. The mainstay of therapy is IV antibiotics, but the prime concern is maintenance of airway. Rigid bronchoscopy is the procedure of choice for airway foreign bodies.

10.1007/s12098-015-1811-6

[2] Nebulized epinephrine for croup in children.

The Cochrane Database of Systematic Reviews · 2011-02-16

Croup, also known as laryngotracheobronchitis, frequently leads to blockages in the upper respiratory tract in young children, presenting symptoms such as a raspy voice, a distinctive cough, and noisy breathing during inhalation.

10.1002/14651858.cd006619.pub2

[3] Nebulized epinephrine for croup in children.

The Cochrane Database of Systematic Reviews · 2013-10-10

Nebulized epinephrine may prevent intubation in children with croup. Croup is a common childhood illness characterized by barky cough, stridor, hoarseness and respiratory distress. Eight studies (225 participants) were included. Nebulized epinephrine was associated with croup score improvement 30 minutes post-treatment and a significantly shorter hospital stay than placebo.

10.1002/14651858.cd006619.pub3

[4] Glucocorticoids for Croup in Children.

JAMA Pediatrics · 2019-06-01

Glucocorticoids reduce symptoms of croup at 2 hours and for at least 24 hours, reduce return visits to care, and shorten hospital stays by about 15 hours.

10.1001/jamapediatrics.2019.0834

200. MedQA question ID 1156 Step 2/3

Question

A 7-month-old boy is brought to the physician because of a 2-month history of fatigue, weakness, and difficulty feeding. He was delivered at term to a 32-year-old woman. He is not able to sit upright on his own. He is at the 75th percentile for height and 25th percentile for weight. His temperature is 37.7°C (99.8°F), blood pressure is 110/68 mm Hg, pulse is 150/min, and respirations are 50/min. His tongue protrudes beyond the teeth. Neck veins are distended. Crackles are heard at both lung bases. Cardiac examination shows an S3 gallop. The liver is palpated 2 cm below the right costal margin. Neurologic examination shows profound weakness in proximal and distal muscles of the upper and lower extremities. He has 2+ reflexes bilaterally. A chest x-ray shows cardiomegaly. Serum glucose is 105 mg/dL. Which of the following is the enzyme most likely to be defective in this patient?

(A) Muscle glycogen phosphorylase

(B) Very-long-chain acyl-CoA dehydrogenase

(C) Lysosomal acid maltase

(D) Glycogen debranching enzyme

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The defective enzyme is lysosomal acid maltase (acid α-glucosidase, GAA), which causes **Pompe disease (glycogen storage disease type II)**. This infant's **macroglossia, cardiomegaly/hypertrophic cardiomyopathy, hypotonia, and progressive proximal/distal weakness with normal serum glucose** are classic for infantile-onset Pompe disease rather than a cytosolic glycogenolysis defect [1] [2].

Why this fits

- **Pompe disease** is a **lysosomal glycogen storage disease** caused by deficiency of **acid α-glucosidase (acid maltase)** [1] [2].
- Infantile-onset disease typically presents with **cardiomyopathy, respiratory distress, hepatomegaly, macroglossia, and severe muscle weakness** [2] [3].
- The other options are less consistent:
- **Muscle glycogen phosphorylase** → McArdle disease
- **Glycogen debranching enzyme** → Cori disease
- **Very-long-chain acyl-CoA dehydrogenase** → fatty acid oxidation defect [2] [3]

Answer: C) Lysosomal acid maltase

References

[1] Late-onset Pompe's disease.
Seminars in Neurology · 2012-11-01
Glycogen storage disease type II, also known as Pompe's disease or acid maltase deficiency, is caused by a deficiency in acid α-glucosidase. Treatment is now available with intravenous infusion of recombinant acid. Such treatment results in marked improvement in patients with infantile Pompe’s disease, and modest improvement or stabilization.
10.1055/s-0033-1334469

[2] Divergent clinical outcomes of alpha-glucosidase enzyme replacement therapy in two siblings with infantile-onset Pompe disease treated in the symptomatic or pre-symptomatic state.
Molecular Genetics and Metabolism Reports · 2016-12-01
Pompey disease is an autosomal recessive, lysosomal glycogen storage disease caused by acid α-glucosidase deficiency. The most severe form of IOPD is characterized by cardiomyopathy, respiratory distress, hepatomegaly, and muscle weakness.
10.1016/j.ymgmr.2016.11.001

[3] Perioperative management of children with glycogen storage disease type II-Pompe disease.
Paediatric Anaesthesia · 2018-05-01
Pompey disease is a rare metabolic disorder caused by a deficiency of the lysosomal enzyme acid alpha-glucosidase. It damages skeletal, cardiac, and smooth muscles, causing a progressive and debilitating muscle weakness and cardiomyopathy.
10.1111/pan.13361

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201. MedQA question ID 958 Step 1

Question

A 61-year-old man presents to the clinic with complaints of excessive thirst, frequent urination, and partial visual loss in both eyes for 1 day. His family history is significant for type 2 diabetes mellitus in his mother and cousin. His weight is 112 kg (246.9 lb), height 187 cm (6 ft 1 in), blood pressure: 150/90 mm Hg, heart rate: 89/min, respiratory rate: 14/min, and temperature: 36.7°C (98.4°F). The physical examination is significant for dry skin, a pustular rash over the patient’s shoulders and back, an accentuated second heart sound (S2) best heard in the second intercostal space at the right sternal border, and distal loss of vibration sensitivity in both feet. A fundoscopic examination shows small red dots in the superficial retinal layers suggestive of microaneurysms. The HbA1c is 9% and the urinalysis shows the following:
Color Pale yellow (light/pale-to-dark/deep amber)
Clarity Cloudy
pH 6.6
Specific gravity 1.010
Glucose 199 mg/dl
Ketones None
Nitrites Negative
Leukocyte esterase Negative
Bilirubin Negative
Urinary bilirubin Traces
Red blood cells 3 RBCs
Protein 120 mg/d
RBCs ≤ 2 RBCs/hpf

WBCs 22 WBCs/hpf
Epithelial cells 27 squamous epithelial cells/hpf
Casts 5 hyaline casts/lpf
Crystals Occasional
Bacteria None
Yeast Present
Which of the following statements best describes the cause of this patient's glucosuria?

(A) There is a disruption of primary active transport of glucose in the proximal renal tubules

(B) Secondary active transporters fail to completely reabsorb glucose in the renal tubules

(C) There is a disruption of passive transport of the glucose in the proximal renal tubules

(D) Glucosuria results from increased glomerular filtration rate

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Secondary active transporters fail to completely reabsorb glucose in the renal tubules. In the proximal tubule, filtered glucose is normally reabsorbed by **sodium-glucose cotransporters (SGLT1 and SGLT2)** on the apical membrane; when plasma glucose exceeds the kidney's reabsorptive capacity, glucose spills into the urine because these **secondary active transporters** are saturated, not because primary active transport, passive diffusion, or increased GFR is the main mechanism [1] [2]. In diabetes, the threshold for glucosuria is often increased, but this patient's glucosuria is still due to inability of proximal tubular SGLT-mediated reabsorption to keep pace with filtered glucose load [1] [3].

Why the other choices are wrong

- **A**: Glucose reabsorption in the proximal tubule is **secondary active transport**, not primary active transport [1] [2].
- **C**: Glucose is not reabsorbed by passive transport in the proximal tubule [1].
- **D**: Increased **GFR** is not the direct cause of glucosuria; the key issue is **filtered glucose exceeding proximal tubular reabsorptive capacity** [1] [3].

References

[1] Glucose Metabolism in the Kidney: Neurohormonal Activation and Heart Failure Development.
Journal of the American Heart Association · 2020-12-01
The kidneys reabsorb filtered glucose through the sodium-glucose cotransporter (SGLT) 1 and SGLT2, which are localized on the brush border membrane of the early proximal tubule. Administration of SGLT2 inhibitors to patients with Diabetes mellitus enhances sodium and glucose excretion, leading to a reduction of the glycosuria threshold.
10.1161/jaha.120.018889

[2] Physiology of renal glucose handling via SGLT1, SGLT2 and GLUT2
Diabetologia · 2018-08-22

In both S1/S2 and S3 segments, the first stage is glucose transport across the apical membrane by SGLTs. The elimination of the sodium gradient across the apical membrane results in the loss of sodium–glucose cotransport across the apical membrane.

10.1007/s00125-018-4656-5

[3] Glucose transport by human renal Na+/D-glucose cotransporters SGLT1 and SGLT2.

American Journal of Physiology. Cell Physiology · 2011-01-01

The human Na(+/D-glucose cotransporter 2 (hSGLT2) is responsible for the bulk of glucose reabsorption in the kidney proximal convoluted tubule. It has become a novel drug target for diabetes treatment.

10.1152/ajpcell.00388.2010

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202. MedQA question ID 522 Step 2/3

Question

A 54-year-old man comes to the emergency department because of a 2-day history of increasingly severe abdominal pain, nausea, and bilious vomiting. His last bowel movement was yesterday and he has not passed flatus since then. He underwent appendectomy at the age of 39. He has psoriasis, hypertension, type 2 diabetes mellitus, and chronic back pain. He drinks two beers daily. He takes a topical corticosteroid, ramipril, metformin, and ibuprofen daily. He is 176 cm (5 ft 9 in) tall and weighs 108 kg (240 lb); BMI is 35.4 kg/m2. His temperature is 36.8°C (98.4°F), respirations are 15/min, pulse is 90/min, and blood pressure is 112/67 mm Hg. Examination shows thick, scaly, plaques over both elbows and knees. Abdominal examination shows three well-healed laparoscopic scars. The abdomen is distended and there are frequent, high-pitched bowel sounds on auscultation. Digital rectal examination shows an empty rectum. Laboratory studies show:
Hematocrit 44%
Leukocyte count 9,000/mm3
Platelet count 225,000/mm3
Serum
Na+ 139 mEq/L
K+ 4.1 mEq/L
Cl− 101 mEq/L
HCO3− 26 mEq/L
Glucose 95 mg/dL
Creatinine 1.1 mg/dL
Alkaline phosphatase 78 U/L
Aspartate aminotransferase (AST, GOT) 19 U/L
Alanine aminotransferase (ALT, GPT) 14 U/L
γ-Glutamyltransferase (GGT) 52 U/L (N=5–50 U/L)
Hemoglobin A1C 6.4%
Abdominal ultrasound shows nonpropulsive peristalsis of the small bowel. Which of the following is the most likely cause of this patient's condition?"

(A) Chronic inflammatory bowel disease

(B) Ibuprofen

(C) History of abdominal surgery

(D) Alcohol

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. History of abdominal surgery is the most likely cause: this presentation is classic for **adhesive small bowel obstruction** after prior intra-abdominal surgery, and postoperative adhesions are the most common cause of small-bowel obstruction in adults [1] [2]. The prior appendectomy provides the key risk factor; **ibuprofen, chronic inflammatory bowel disease, and alcohol** are not the best explanation for this obstructive picture [1] [2].

Why this fits

- Symptoms of **abdominal pain, bilious vomiting, distension, and obstipation/no flatus** strongly support small bowel obstruction.
- A history of **previous abdominal surgery** is one of the best predictors of SBO, and adhesions account for the majority of cases in adults [1] [2].
- The ultrasound finding of **nonpropulsive peristalsis** is also consistent with mechanical obstruction rather than an inflammatory or toxic cause [1].

References

[1] Diagnosis and management of small bowel obstruction in virgin abdomen: a WSES position paper.
World journal of emergency surgery · 2021-07-03
The majority of small bowel obstruction is caused by adhesions that result from previous surgeries. Small bowel obstruction in the virgin abdomen (SBO-VA) can be managed according to the same principles as in other cases. Adhesions were found to be the cause of the obstruction in approximately half of the cases.
10.1186/s13017-021-00379-8

[2] Adult small bowel obstruction.
Academic emergency medicine : official journal of the Society for Academic Emergency Medicine · 2013-06-01
Having a previous history of abdominal surgery, constipation, abnormal bowel sounds, and/or abdominal distention on examination were the best history and physical examination predictors.
10.1111/acem.12150

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203. MedQA question ID 1227 Step 1

Question

A 58-year-old male is diagnosed with hypertension and started on daily propranolol after failing antihypertensive therapy with other medications. Three months later, his blood pressure appears to be adequately controlled on this therapy. While working in his garden one afternoon, the patient is stung by a wasp and experiences a severe anaphylactic reaction that is subsequently treated with epinephrine. Which of the following effects would be expected upon administration of this epinephrine treatment?

(A) Decreased bronchodilation

(B) Increased motility of the gastrointestinal tract

(C) Decreased heart rate

(D) Increased heart rate

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The expected effect is C. Decreased heart rate. In a patient taking **propranolol**, a **nonselective beta-blocker**, the **beta-1 chronotropic effect of epinephrine is blunted**, so the usual **increase in heart rate** is reduced; in anaphylaxis, the epinephrine response may also be more severe or less predictable in patients on nonselective beta-blockers [1] [2]. The **American Academy of Allergy, Asthma & Immunology / American College of Allergy, Asthma, and Immunology** advises considering avoidance of nonselective beta-blockers in patients at significant risk for recurrent anaphylaxis, reflecting this interaction [1].

Why the other choices are not best

- **A. Decreased bronchodilation** — epinephrine normally causes **bronchodilation** via beta-2 agonism; propranolol can blunt this effect, but the question asks for the expected effect of epinephrine administration, and the most direct cardiovascular consequence here is reduced tachycardia rather than decreased bronchodilation [2].
- **B. Increased motility of the gastrointestinal tract** — epinephrine generally **decreases** GI motility through adrenergic effects.
- **D. Increased heart rate** — this is the usual epinephrine effect, but it is **attenuated by propranolol** [2].

References

[1] Anaphylaxis

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2023-12-17 00:00:00

We suggest that all patients at significant risk for recurrent and unexpected anaphylaxis (e.g., those with severe food allergy, mastocytosis or MCAS, or recurrent IA) be counseled about the risk of more severe anaphylaxis, and consider avoiding, where possible, the use of nonselective BBs or ACEIs.

https://www.annallergy.org/article/S1081-1206(23)01304-2/fulltext

[2] Epinephrine and its use in anaphylaxis: current issues.

Current opinion in allergy and clinical immunology · 2010-08-01

Epinephrine is a life-saving medication in the treatment of anaphylaxis. It has multiple beneficial pharmacologic effects. Propranolol, a nonselective beta-adrenoceptor antagonist, has increased incidence and severity of anaphylaxis.

10.1097/aci.0b013e32833bc670

204. MedQA question ID 239 Step 2/3

Question

A 48-year-old Caucasian female presents to her primary care physician for evaluation of progressive weakness and shortness of breath. She has had progressive shortness of breath over the last year with an intermittent non-productive cough. In addition, she complains of difficulty raising her arms to brush her hair. Her temperature is 99.6°F (37.6°C), pulse is 80/min, blood pressure is 130/85 mmHg, respirations are 18/min, and oxygen saturation is 95% on room air. Neurologic exam shows 4/5 strength in the deltoid muscles bilaterally. Diffuse dry crackles are heard on lung auscultation. A faint erythematous rash is noted on the malar cheeks, periorbital areas, lateral proximal thighs, and the elbows. Which of the following tests is most likely to confirm the diagnosis?

(A) Muscle biopsy

(B) CT scan

(C) Serum ANA titer

(D) Skin biopsy

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Muscle biopsy is the test most likely to confirm **dermatomyositis** in this patient, whose **progressive proximal muscle weakness**, **characteristic heliotrope/Gottron-type rash**, and **interstitial lung disease symptoms** fit an idiopathic inflammatory myopathy. The diagnosis is clinical, but **muscle biopsy** is the most confirmatory option among those listed; **serum ANA** is nonspecific, **CT** would evaluate lung involvement rather than establish the myositis diagnosis, and **skin biopsy** can support the rash but is less definitive for confirming dermatomyositis than muscle biopsy [1] [2].

Why the other options are less likely

- **Serum ANA titer**: may be present in dermatomyositis but is **not diagnostic** [1] [2].
- **CT scan**: useful to evaluate **interstitial lung disease** in myositis, not to confirm the muscle diagnosis itself [3].
- **Skin biopsy**: can help characterize the cutaneous eruption, but the most confirmatory tissue test for this presentation is **muscle biopsy** [1] [2].

Clinical note

This presentation is also consistent with dermatomyositis-associated ILD, for which the American College of Chest Physicians/American College of Rheumatology guideline recommends **HRCT chest plus pulmonary function testing** for screening in people with idiopathic inflammatory myopathy at increased risk of ILD [3].

References

[1] Dermatomyositis: Diagnosis and treatment.
Journal of the American Academy of Dermatology · 2020-02-01
The second article in this continuing medical education series reviews the initial evaluation of patients with suspected dermatomyositis (DM) and the relevant work-up for malignancy and interstitial lung disease once a diagnosis of DM is made. Treatment recommendations for patients with DM are based on disease severity, the presence of systemic symptoms, and myositis-specific antibody (MSA) profiles.
10.1016/j.jaad.2019.05.105

[2] Polymyositis and dermatomyositis - challenges in diagnosis and management.
Journal of Translational Autoimmunity · 2019-12-01
Polymyositis and dermatomyositis are different disease subtypes of idiopathic inflammatory myopathies. The main clinical features of PM and DM include progressive symmetric, predominantly proximal muscle weakness and a characteristic skin rash. Treatment is based on correct diagnosis of these conditions.
10.1016/j.jtauto.2019.100018

[3] Screening and Monitoring of Interstitial Lung Disease in People with Systemic Autoimmune Rheumatic Diseases
American College of Chest Physicians, American College of Rheumatology · 2024-07-08 00:00:00
For people with SARDs at increased risk of developing ILD, we conditionally recommend screening with HRCT chest and PFTs over PFTs alone.
https://acrjournals.onlinelibrary.wiley.com/doi/full/10.1002/art.42860

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205. MedQA question ID 688 Step 2/3

Question

A 55-year-old man comes to the emergency department with the complaint of pain in his right toe for the past hour. The pain is so severe that it woke him up. The patient has smoked a pack of cigarettes daily for the last 40 years and binge drinks alcohol after work and on the weekends. He underwent an appendectomy when he was 14 years old. He is a long-distance truck driver. Neither of his parents had any significant medical history. His temperature is 37.7°C (100°F), blood pressure is 135/75 mm Hg, pulse is 102/min, respiratory rate is 20/min, and BMI is 25 kg/m2. On examination, his right first metatarsophalangeal joint is very tender, swollen, warm, and red in color. Range of motion cannot be assessed due to extreme tenderness.
Laboratory test
Complete blood count:
Hemoglobin 11.5 g/dL
Leukocytes 16,000/mm3
Platelets 150,000/mm3
ESR 50 mm/hr
Synovial fluid is aspirated from the joint. The findings are:
Appearance Cloudy, dense yellow
WBC 30,000 cells/μL
Culture Negative
Needle-shaped birefringent crystals are observed in the joint aspirate. Which of the following is the most likely underlying cause of the patient's condition?

(A) Organic acids competing with urate for tubular secretion

(B) Increased renal reabsorption of urate

(C) Deficiency of HGPRT

(D) High-purine diet

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Organic acids competing with urate for tubular secretion is the best answer. This patient has classic **acute gout** with **monosodium urate (MSU) crystals** in the first metatarsophalangeal joint; the American College of Rheumatology (ACR) identifies MSU crystals in synovial fluid as sufficient for gout diagnosis and recommends limiting alcohol intake in patients with gout [1] [2]. Binge alcohol can raise urate by reducing renal urate excretion, whereas **HGPRT deficiency** is a separate cause of marked urate overproduction usually seen in inherited purine disorders [3].

Why the other options are less likely

- **B. Increased renal reabsorption of urate** can contribute to hyperuricemia, but the vignette specifically points to alcohol-related gout rather than a primary renal transport defect.
- **C. Deficiency of HGPRT** causes urate overproduction in inherited disorders, not the typical adult-onset gout presentation shown here.
- **D. High-purine diet** can contribute to gout risk, but binge alcohol is the more specific trigger in this scenario; the ACR recommends limiting both alcohol and purine intake in gout [1] [2].

References

[1] Management of Gout
American College of Rheumatology · 2020-05-20 00:00:00
For patients experiencing a gout flare, we strongly recommend using oral colchicine, NSAIDs, or glucocorticoids (oral, intraarticular, or intramuscular) as appropriate first-line therapy for gout flares over IL-1 inhibitors or ACTH (the choice of colchicine, NSAIDs, or glucocorticoids should be made based on patient factors and preferences).
https://assets.contentstack.io/v3/assets/bltee37abb6b278ab2c/blt04d52e3b6ff5112f/632cab5b258fb55f6b2186af/gout-guideline-2020.pdf

[2] Management of Gout
American College of Rheumatology · 2020-05-20 00:00:00
For patients with gout, regardless of disease activity, we conditionally recommend limiting alcohol intake.
https://assets.contentstack.io/v3/assets/bltee37abb6b278ab2c/blt04d52e3b6ff5112f/632cab5b258fb55f6b2186af/gout-guideline-2020.pdf

[3] Gout.
Lancet (London, England) · 2021-05-15
Gout is a common arthritis caused by deposition of monosodium urate crystals within joints after chronic hyperuricaemia. Increased concentration of serum urate is the most important risk factor for the development of gout.
10.1016/S0140-6736(21)00569-9

206. MedQA question ID 336 Step 2/3

Question

A 39-year-old man is brought to the emergency department unconscious following 2 episodes of generalized tonic-clonic seizures. According to the attendants, he has complained of recurrent headaches for the past 2 weeks. There is no history of fever, head trauma, or a seizure disorder. The patient does not smoke cigarettes but reportedly drinks 2 glasses of wine daily. He has multiple sexual partners and history regarding the contraceptive use is unavailable. The patient's vitals include: blood pressure 137/88 mm Hg, temperature 37.2°C (99.0°F). On physical examination, he is obtunded. He grimaces on pain and localizes in response to pain in both upper extremities. Pupils are bilateral 3-mm in diameter and equally round and reactive. Laboratory tests are within normal limits. An MRI of the brain with contrast is shown in the exhibit (see image). A brain biopsy is performed that reveals perivascular clusters of lymphocytes. Which of the following is most associated with this patient's condition?

(A) Epstein-Barr virus

(B) Human herpes virus

(C) Human papilloma virus

(D) Schistosoma haematobium

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Epstein-Barr virus (EBV) is the most likely associated pathogen; this presentation is most consistent with **primary central nervous system lymphoma (PCNSL)**, which requires contrast-enhanced brain MRI and histopathologic confirmation on biopsy [1]. In an immunocompromised patient such as one with possible HIV risk, EBV is the classic viral association for PCNSL. **Human papillomavirus** and **Schistosoma haematobium** are not associated with this brain lesion pattern [1].

Why this fits

- **Perivascular clusters of lymphocytes** on biopsy are compatible with **PCNSL**.
- The neurologic presentation with **headache, seizures, and altered mental status** is also typical of a focal CNS mass lesion such as PCNSL [1].

Answer

Epstein-Barr virus.

References

[1] Primary Central Nervous System Lymphomas
European Hematology Association, European Society for Medical Oncology · 2024-06-04

Contrast-enhanced cranial MRI is the recommended imaging modality for patients with PCNSL. PCNSL diagnosis must be confirmed by histopathological examination of tumour biopsy.
https://www.annalsofoncology.org/article/S0923-7534(23)05074-3/fulltext

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207. MedQA question ID 695 Step 2/3

Question

A 75-year-old man comes to the physician because of a 7-day history of nausea and vomiting. Over the past 2 days, he has also been feeling weak and tired. When standing up after sitting for a while, he feels dizzy. He says he has to go to the bathroom more often than usual, and that he is urinating “a normal amount” each time. He has not had diarrhea. He has hypertension, for which he has been taking hydrochlorothiazide for the past 6 months. He drinks 9 glasses of water per day and takes his medication regularly. He is 168 cm (5 ft 6 in) tall and weighs 90 kg (198 lb); BMI is 32 kg/m2. His temperature is 36.5°C (97.7°F), blood pressure is 106/54 mm Hg, and pulse is 92/min. Physical examination shows whitening of the tongue. Skin that is pinched on the back of the hand retracts after 5 seconds. On mental status examination, his speech is slowed; he is oriented to person, place, and time. Laboratory studies show:
Serum
Na+ 150 mEq/L
Cl− 97 mEq/L
K+ 3.6 mEq/L
HCO3− 30 mEq/L
Osmolality 354 mOsm/kg
Hemoglobin A1C 10.5%
Urine
Osmolality 400 mOsm/kg
Which of the following is the most likely explanation for these findings?"

(A) Diuretic overdose

(B) Osmotic diuresis

(C) Excess production of aldosterone

(D) Insufficient production of antidiuretic hormone

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

(B) Osmotic diuresis is the most likely explanation. The combination of **hyperglycemia (HbA1c 10.5%)**, **hypernatremia (Na 150 mEq/L)**, **high serum osmolality (354 mOsm/kg)**, volume depletion, and **urine osmolality that is not maximally dilute (400 mOsm/kg)** fits water loss from

glucose-driven osmotic diuresis rather than diabetes insipidus; in diabetes insipidus, urine osmolality is typically inappropriately low despite hyperosmolar plasma [1] [2].

Why the other choices are less likely

- **Diuretic overdose** can cause volume depletion, but it does not explain the marked hyperglycemia and the osmotic diuresis pattern as well as uncontrolled diabetes does [2].
- **Excess aldosterone** more typically causes hypertension, hypokalemia, and metabolic alkalosis; it does not account for this hyperosmolar, hypernatremic polyuria syndrome [2].
- **Insufficient ADH** (central diabetes insipidus) usually causes **more dilute urine** than seen here; the Endocrine Society notes that with high serum osmolarity, urine osmolarity should rise to about **600 mOsm/L** if concentrating ability is intact, and a low urine osmolarity supports DI rather than osmotic diuresis [1].

References

[1] Hormonal Replacement in Hypopituitarism in Adults

Endocrine Society · 2016-10-13 12:00:00

We recommend simultaneously measuring serum and urine osmolarity in patients with polyuria (more than 50 mL/kg of body weight/24 hours, 3.5 L/d in a 70-kg person). In the presence of high serum osmolarity (>295 mOsmol/L), urine osmolarity should reach approximately 600 mOsmol/L (urine osmolality/plasma osmolality ratio should be ≥2), whereas urine dipstick should be negative for glucose.

https://academic.oup.com/jcem/article/101/11/3888/2764912?searchresult=1

[2] Hypernatremia in Hyperglycemia: Clinical Features and Relationship to Fractional Changes in Body Water and Monovalent Cations during Its Development.

Journal of Clinical Medicine · 2024-03-28

In hyperglycemia, the serum sodium concentration is decreasing and osmotic diuresis leads to increased levels of sodium and potassium. Hyperglycemic patients with hypernatremia have large deficits of body water and usually hypovolemia.

10.3390/jcm13071957

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208. MedQA question ID 567 Step 1

Question

A 61-year-old man comes to the physician with several months of sharp, shooting pain in both legs. Twenty years ago, he had a painless ulcer on his penis that resolved without treatment. He has no history of serious illness. Examination shows small pupils that constrict with accommodation but do not react to light. Sensation to pinprick and light touch is decreased over the distal lower extremities. Patellar reflexes are absent bilaterally. His gait is unsteady and broad-based. This patient is at increased risk for which of the following complications?

(A) Atrioventricular block

(B) Mitral valve regurgitation

(C) Penile squamous cell carcinoma

(D) Thoracic aortic aneurysm

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Thoracic aortic aneurysm is the most likely complication. The presentation is consistent with **late neurosyphilis/tabes dorsalis** after untreated syphilis: lancinating leg pain, loss of vibration/pain, absent reflexes, sensory ataxia, and **Argyll Robertson pupils**. Tertiary syphilis can also cause **syphilitic aortitis**, which classically involves the **ascending thoracic aorta** and may lead to aneurysm and aortic regurgitation [1] [2] [3].

Why the other choices are less likely

- **Atrioventricular block** is not the classic cardiovascular complication of tertiary syphilis; the dominant vascular lesion is aortitis of the ascending aorta [2] [3].
- **Mitral valve regurgitation** is not the typical valvular lesion of syphilitic heart disease; **aortic regurgitation** is more characteristic when the ascending aorta/root is involved [2].
- **Penile squamous cell carcinoma** is not a known complication of prior untreated syphilis [1] [3].

References

[1] Magnetic resonance imaging of the spinal cord in a man with tabes dorsalis.
The Journal of Spinal Cord Medicine · 2011-11-01
Tabes dorsalis is a late manifestation of untreated syphilis that is characterized by ataxia, lancinating pains, and urinary incontinence.
10.1179/2045772311y.0000000041

[2] Bilateral coronary ostial stenosis and aortic regurgitation in a patient with cardiovascular syphilis.
Journal of Cardiology Cases · 2012-12-01
Syphilitic aortitis involves the ascending aorta and can cause aortic aneurysm, regurgitation, and coronary ostial stenosis.
10.1016/j.jccase.2012.07.009

[3] [Neurosyphilis: an Age-old Problem that is Still Relevant Today].
Revista Colombiana de Psiquiatria · 2017-10-01
Neurosyphilis is the clinical manifestation of syphilis that can arise during either the early or late stages of infection. The advanced stages of the disease are still prevalent, with irreversible sequelae. This article reviews the current evidence, diagnostic methods and specific treatment for tertiary syphilis.
10.1016/j.rcp.2017.05.002

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209. MedQA question ID 1025 Step 1

Question

A previously healthy 52-year-old woman is brought to the emergency department after sustaining burns over 45% of her body in a house fire. On arrival, she is in acute distress but is fully oriented. Aggressive intravenous fluid resuscitation is begun and the patient is transferred to the intensive care unit of a burn center. 20 hours later, she has several large, tarry black stools and develops

hypotension and tachycardia. Despite appropriate lifesaving measures, she dies. Which of the following is the most likely underlying cause of the patient's tarry black stools?

(A) Decreased prostaglandin synthesis

(B) Erosion of tortuous submucosal arteriole

(C) Bacterial colonization of the gastric antrum

(D) Decreased gastric blood flow

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Decreased gastric blood flow. This patient most likely has **stress-related upper gastrointestinal bleeding** after a major burn, a classic complication of critical illness; the **American Society of Health-System Pharmacists/Society of Critical Care Medicine** guideline identifies critically ill adults with risk factors for clinically important UGIB as candidates for stress-ulcer prophylaxis, and melena is a typical presentation of UGIB [1] [2]. The underlying mechanism is mucosal ischemia from reduced splanchnic/gastric perfusion rather than peptic ulcer disease from *H. pylori* or NSAIDs.

Why the other choices are less likely

- **A. Decreased prostaglandin synthesis** — classically due to NSAID injury.
- **B. Erosion of tortuous submucosal arteriole** — suggests a Dieulafoy lesion.
- **C. Bacterial colonization of the gastric antrum** — refers to *Helicobacter pylori*–associated ulcer disease.

In a severely burned, critically ill patient with sudden melena and shock, the most likely cause is **stress ulceration from impaired gastric mucosal blood flow** [1] [2].

References

[1] Prevention of Stress-Related Gastrointestinal Bleeding in Critically Ill Adults
American Society of Health-System Pharmacists, Society of Critical Care Medicine · 2024-07-15 12:00:00
We suggest clinicians provide SUP to prevent clinically important UGIB in critically ill adults with risk factors compared with no SUP .
https://journals.lww.com/ccmjournal/fulltext/2024/08000/society_of_critical_care_medicine_and_american.22.aspx

[2] Does this patient have a severe upper gastrointestinal bleed?
JAMA · 2012-03-14
Melena, melenic stool on examination, a nasogastric lavage with red blood, tachycardia, hemoglobin level less than 8 g/dL, or serum urea nitrogen:creatinine ratio of more than 30.
10.1001/jama.2012.253

210. MedQA question ID 673 Step 1

Question

A 7-year-old boy is brought to the physician because of a 3-week history of burning sensation in his mouth. One year ago, a peripheral blood smear performed during workup of fatigue revealed erythrocytes without central pallor. His father had gallstones, for which he underwent a cholecystectomy at the age of 26 years. Examination shows pallor of the mucosal membranes, mild scleral icterus, a swollen, red tongue, and several mouth ulcers. There is darkening of the skin over the dorsal surfaces of the fingers, toes, and creases of the palms and soles. His spleen is enlarged and palpable 3 cm below the left costal margin. Laboratory studies show a hemoglobin concentration of 9.1 gm/dL, mean corpuscular volume of 104 µm3, and a reticulocyte count of 9%. Which of the following would most likely have prevented this patient's oropharyngeal symptoms?

(A) Red blood cell transfusions

(B) Gluten-free diet

(C) Vitamin B12 injections

(D) Folic acid supplementation

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Folic acid supplementation is the most likely preventive measure. This child’s findings are most consistent with **hereditary spherocytosis** with superimposed **folate deficiency/megaloblastic change** from chronic hemolysis, which can cause **macrocytosis, glossitis, mouth ulcers, and burning oral pain** [1] [2]. Red blood cell transfusions would not prevent the mucosal symptoms, and a gluten-free diet or vitamin B12 injections would not be the expected preventive therapy in this setting.

Why this fits

- The earlier smear showing erythrocytes without central pallor, family history of gallstones, jaundice, splenomegaly, and reticulocytosis all support **hereditary spherocytosis** [1] [2].
- In children with hereditary spherocytosis, **megaloblastic crises** are reported, consistent with folate depletion during increased red cell turnover [2].
- Therefore, the option most likely to have prevented the oropharyngeal symptoms is **folic acid supplementation**.

References

[1] Hereditary spherocytosis.
Transfusion clinique et biologique : journal de la Societe francaise de transfusion sanguine · 2010-09-01
Hereditary spherocytosis is a common hemolytic disorder characterized by a defect or deficiency in one or more of the proteins composing red blood cell membrane. Red blood cells have an abnormal shape, higher metabolic requirements, and are prematurely trapped and destroyed in the spleen.

10.1016/j.tracli.2010.05.006

[2] Hereditary spherocytosis: evaluation of 68 children.

Indian journal of hematology & blood transfusion : an official journal of Indian Society of Hematology and Blood Transfusion · 2015-03-01

Sixty-eight children with hereditary spherocytosis (HS) were investigated. Predominant clinical manifestations at admission were anemia, splenomegaly, jaundice, and hemolytic, aplastic, and megaloblastic crises.

10.1007/s12288-014-0379-z

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211. MedQA question ID 504 Step 2/3

Question

A 3-year-old boy is brought to the physician for a well-child examination. Over the past 8 months, his mother reports difficulty understanding the boy's speech. On occasion during this period, she has noticed that he does not respond when called by name and cannot follow 1-step instructions. He has a history of recurrent ear infections treated with antibiotics since birth. He is at the 60th percentile for length and 50th percentile for weight. Vital signs are within normal limits. His speech is quiet and difficult to understand. Otoscopic examination shows retracted tympanic membranes bilaterally that are immobile on pneumatic otoscopy. Nasopharyngoscopy shows mild adenoid hypertrophy. Pure tone audiometry shows a conductive hearing loss of 26 dB on the right side and 28 dB on the left side. Which of the following is the most appropriate next step in management?

(A) Adenoidectomy

(B) Tympanostomy tube insertion

(C) Antihistamine therapy

(D) Corticosteroid therapy
"

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The American Academy of Otolaryngology–Head and Neck Surgery Foundation (AAO-HNSF) recommends bilateral tympanostomy tube insertion for children with **bilateral otitis media with effusion (OME) lasting 3 months or longer plus documented hearing difficulties** [1]. This child has chronic bilateral middle-ear effusion, conductive hearing loss, and speech/language delay risk, so the most appropriate next step is **B. Tympanostomy tube insertion**; **adenoidectomy is not the preferred next step in a 3-year-old** unless there are additional indications such as significant nasal obstruction or older age criteria [1] [2].

Why the other options are not preferred

- **Adenoidectomy** is generally considered adjunctive rather than first-line in younger children with OME; mild adenoid hypertrophy alone does not override the indication for tubes in a 3-year-old with bilateral chronic OME and hearing loss [1] [2].
- **Antihistamines** and **corticosteroids** are not recommended as routine treatment for OME in this setting; the key actionable intervention is ventilation with tympanostomy tubes when chronic effusion is accompanied by hearing difficulty [1] [2].

Supporting clinical point

AAO-HNSF also recommends hearing evaluation when OME persists for **≥3 months** and reevaluation every **3 to 6 months** if tubes are not placed [1]. Evidence reviews describe OME-related hearing loss commonly in the **18–35 dB** range and note that persistent bilateral effusion can impair speech and language development [2] [3].

References

[1] Tympanostomy Tubes in Children

American Academy of Otolaryngology - Head and Neck Surgery Foundation · 2022-02-09 00:00:00

Clinicians should offer bilateral tympanostomy tube insertion to children with bilateral OME for 3 months or longer AND documented hearing difficulties.

https://aao-hnsfjournals.onlinelibrary.wiley.com/doi/10.1177/01945998211065662

[2] International consensus (ICON) on management of otitis media with effusion in children.

European Annals of Otorhinolaryngology, Head and Neck Diseases · 2018-02-01

Management of OME in children consists of watchful waiting, with ventilation tubes for children with chronic effusions and hearing loss, developmental delays or learning difficulties. Adjuvant adenoidectomy should be considered in children over four years of age and in children with significant nasal obstruction.

10.1016/j.anorl.2017.11.009

[3] Hearing loss in children with otitis media with effusion: a systematic review.

International Journal of Audiology · 2017-02-01

Otitis media with effusion (OME) is a common middle ear disease in children, and hearing loss related to OME is 18-35 dB HL.

10.1080/14992027.2016.1250960

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212. MedQA question ID 395 Step 2/3

Question

A six-year-old boy with a history of asthma currently uses an albuterol inhaler as needed to manage his asthma symptoms. His mother brings him into your office because she feels she has had to increase the patient's use of his inhaler to four times per week for the past month. She also reports that he has woken up three times during the night from his symptoms this month. The boy reports that he is upset because he can't always keep up with his friends in the playground. His past medical history is significant for allergic rhinitis. The patient's temperature is 98°F (36.6°C), blood pressure is 110/70 mmHg, pulse is 88/min, and respirations are 18/min with an oxygen saturation of 98% O2 on room air. Auscultation of his lungs reveals bilateral late expiratory wheezes.

What changes should be made to his current asthma treatment regimen?

(A) Maintain current therapy

(B) Add fluticasone daily

(C) Add salmeterol twice daily

(D) Add zileuton twice daily

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Add a daily inhaled corticosteroid, such as fluticasone, and continue albuterol as the reliever; this child has **persistent, uncontrolled asthma** based on symptoms more than 2 days per week, nocturnal awakenings, and exercise-induced symptoms. The **National Heart, Lung, and Blood Institute (NHLBI)** recommends **daily low-dose ICS** for mild persistent asthma in children 5–11 years, and the **American College of Allergy, Asthma, and Immunology/American Academy of Allergy, Asthma & Immunology** note that exercise-induced bronchoconstriction often reflects poor underlying asthma control and improves when asthma is controlled with ICS therapy [1] [2] [3].

Why the other options are not preferred

- **Salmeterol twice daily alone is not appropriate** as step-up therapy for this presentation; long-acting beta-agonists are used only with ICS and not as monotherapy, and they are not the preferred first change for a child currently on SABA-only treatment [1] [2].
- **Zileuton** is not a standard first-line step-up option for a 6-year-old with persistent asthma in the retrieved guidance [1] [2].
- **Maintain current therapy** is inconsistent with the reported symptom frequency and nighttime awakenings, which indicate inadequate control [2] [3].

References

[1] 2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Heart, Lung, and Blood Institute Coordinating Committee Expert Panel Working Group

National Heart, Lung, and Blood Institute · 2020-12-01 00:00:00

10. In individuals ages 12 years and older with mild persistent asthma, the Expert Panel conditionally recommends either daily low-dose ICS and as-needed SABA for quick-relief therapy or as needed ICS and SABA used concomitantly.

https://www.nhlbi.nih.gov/health-topics/all-publications-and-resources/2020-focused-updates-asthma-management-guidelines

[2] Asthma: Diagnosis, Monitoring and Chronic Asthma Management

British Thoracic Society, National Institute for Health and Care Excellence, Scottish Intercollegiate Guidelines Network · 2024-11-27 00:00:00

1.8.4 Consider adding a leukotriene receptor antagonist (LTRA) to twice daily paediatric low-dose ICS plus SABA as needed when a child has uncontrolled asthma and is assessed as unable to manage the MART regimen. 1.8.5 Offer a twice daily paediatric low-dose ICS/LABA combination inhaler plus SABA as needed to children assessed as unable to manage the MART regimen if their asthma is not controlled on paediatric low-dose ICS plus SABA as needed.

https://www.brit-thoracic.org.uk/quality-improvement/guidelines/asthma/

[3] Exercise-induced Bronchoconstriction

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2016-09-21 12:00:00

Summary Statement (SS1): In asthmatic patients EIB can indicate lack of control of the underlying asthma. Therefore treat the uncontrolled asthma to get control of EIB. SS23: Consider prescribing ICSs in combination with other therapies because ICSs can decrease the frequency and severity of EIB but not necessarily eliminate it.

https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Practice%20and%20Parameters/Exercise-Induced-Bronchoconstriction-Practice-Parameter-2016.pdf

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213. MedQA question ID 494 Step 1

Question

A 2050-g (4.5-lb) female newborn and a 2850-g (6.3-lb) female newborn are delivered at 37 weeks' gestation to a 23-year-old, gravida 2, para 1 woman. The mother had no prenatal care. Examination of the smaller newborn shows a flattened nose and left-sided clubfoot. The hematocrit is 42% for the smaller newborn and 71% for the larger newborn. This pregnancy was most likely which of the following?

(A) Monochorionic-diamniotic monozygotic

(B) Dichorionic-diamniotic dizygotic

(C) Monochorionic-monoamniotic monozygotic

(D) Conjoined twins

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

(A) Monochorionic-diamniotic monozygotic is the most likely pregnancy. The marked intertwin discordance in hematocrits (42% vs 71%) is most consistent with **twin-twin transfusion syndrome**, which occurs in **monochorionic diamniotic** twin pregnancies and reflects vascular placental anastomoses between genetically identical twins [1] [2] [3]. The smaller infant's relative growth restriction and congenital abnormalities further fit a complicated monochorionic twin gestation rather than dichorionic twins or conjoined twins [1] [2].

Why this choice fits best

- **Monochorionic** placentation is the key association for twin-twin transfusion syndrome [1] [2] [3].
- The hematocrit discrepancy supports donor-recipient hemodynamic imbalance, which is characteristic of TTTS [1].
- **Dichorionic-diamniotic dizygotic** twins would not be expected to share placental vascular connections, making TTTS much less likely [1] [2] [3].

- **Conjoined twins** would present with obvious physical fusion, which is not described here.

References

[1] Neonatal morbidity in twin-twin transfusion syndrome.
Early Human Development · 2011-09-01
Twin-twin transfusion syndrome (TTTS) is a severe complication of monochorionic twin pregnancies with high perinatal mortality and morbidity rates. Surviving twins with TTTS are at increased risk for other complications including neurological, cardiovascular, renal and hematologic morbidity.
10.1016/j.earlhumdev.2011.07.006

[2] Twin-twin transfusion syndrome.
Seminars in Perinatology · 2012-06-01
Twin-twin transfusion syndrome affects 10% to 15% of twin pregnancies with monochorionic diamniotic placentation. Monochionionic twin gestations should be monitored for signs of TTTS with serial sonograms starting in the second trimester.
10.1053/j.semperi.2012.02.006

[3] Twin-twin transfusion syndrome (TTTS).
Journal of Perinatal Medicine · 2011-03-01
Twin-twin transfusion syndrome (TTTS) is a severe complication of monochorionic (MC) twin pregnancies. The reported prevalence is 10-15% of all MC twins or about 1 in 2000 pregnancies.
10.1515/jpm.2010.147

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214. MedQA question ID 981 Step 1

Question

A 22-year-old woman presents to her primary care physician in April for seasonal allergies. She has suffered from seasonal allergies for the past 2 years and takes diphenhydramine as needed when her symptoms worsen. She has not yet seen a physician for her allergies. She reports that diphenhydramine has been helpful in controlling her symptoms, but she does not like feeling drowsy from the medication. Her past medical history is also notable for well-controlled asthma. She uses an albuterol inhaler on an as-needed basis. She smokes marijuana daily. Her temperature is 99.2°F (37.3°C), blood pressure is 120/70 mmHg, pulse is 76/min, and respirations are 16/min. She has a prominent nasal crease. Her nasal turbinates are boggy and bluish-gray. She has copious thin and watery nasal mucus. The physician suggests replacing diphenhydramine with fexofenadine to improve her drowsiness. What characteristic of fexodenadine allows it to be less sedating than diphenhydramine?

(A) Alpha-adrenergic antagonism

(B) Beta-adrenergic antagonism

(C) Relative lipophobicity

(D) Serotonergic antagonism

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Fexofenadine is less sedating because it is a second-generation antihistamine with poor central nervous system penetration, largely from reduced blood-brain barrier permeability; it is considered a "non-brain-penetrating" H1 blocker. The American College of Allergy, Asthma, and Immunology/American Academy of Allergy, Asthma & Immunology guideline notes that second-generation agents are preferred to avoid sedation, and specifically lists **fexofenadine** as a second-generation antihistamine without sedation at recommended doses [1] [2]. Compared with first-generation antihistamines, fexofenadine causes less sedative and psychomotor/cognitive impairment [3] [4].

Key pharmacologic distinction

- **Diphenhydramine** is a **first-generation** H1 antihistamine that more readily enters the CNS, which explains its drowsiness [1] [4].
- **Fexofenadine** is a **second-generation** H1 antihistamine with **minimal BBB penetration / non-brain-penetrating properties**, so it has much less CNS sedation [1] [3] [5].

Bottom line

The characteristic being tested is **limited ability to cross the blood-brain barrier** (ie, low CNS penetration), not superior peripheral antihistamine efficacy [1] [3] [5].

References

[1] Rhinitis

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2020-08-01 12:00:00

To avoid sedation (often subjectively unperceived), performance impairment, anticholinergic effects of first-generation antihistamines, second-generation agents generally preferred. Of second-generation agents, fexofenadine, loratadine, desloratadine without sedation at recommended doses.

https://www.jacionline.org/article/S0091-6749(20)31023-X/pdf

[2] Rhinitis

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2020-08-01 12:00:00

Fexofenadine (Allegra®) ... % Sedation/ somnolence or CNS impairment (control): 1.3 (0.9).

https://www.jacionline.org/article/S0091-6749(20)31023-X/pdf

[3] Fexofenadine: review of safety, efficacy and unmet needs in children with allergic rhinitis.

Allergy, asthma, and clinical immunology : official journal of the Canadian Society of Allergy and Clinical Immunology · 2021-11-02

Fexofenadine is a highly selective second-generation antihistamine, effectively alleviates symptoms of AR, is non-sedating due to decreased blood-brain barrier permeability, and is devoid of cardiovascular side effects.

10.1186/s13223-021-00614-6

[4] Antihistamine effects and safety of fexofenadine: a systematic review and Meta-analysis of randomized controlled trials.

BMC pharmacology & toxicology · 2019-11-29

When compared with the first-generation antihistaminers, fexfenadines produced significantly lower adverse events frequency, lower sedative effects frequency, and less change of cognitive/psychomotor function.

10.1186/s40360-019-0363-1

[5] Antihistamines for Allergic Rhinitis Treatment from the Viewpoint of Nonsedative Properties.

International journal of molecular sciences · 2019-01-08

Antihistamines targeting the H_1 receptor ... Fexofenadine and bilastine are classified into "non-brain-penetrating antihistamines" based on H_1R.
10.3390/ijms20010213

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215. MedQA question ID 592 Step 1

Question

A 44-year-old man comes to the clinic because of a 6-month history of progressive fatigue. He has a history of intravenous heroin use. Physical examination shows scleral icterus. A serum study is positive for hepatitis C RNA. Therapy with interferon-α is initiated in combination with a second drug. The expected beneficial effect of the additional drug is most likely due to inhibition of which of the following enzymes?

(A) Inosine monophosphate dehydrogenase

(B) DNA-dependent RNA polymerase

(C) DNA gyrase

(D) Dihydroorotate dehydrogenase

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Inosine monophosphate dehydrogenase is the best answer. In chronic hepatitis C, older standard therapy was **peginterferon-α plus ribavirin**, and the added drug's key antiviral effect is through **inhibition of inosine monophosphate dehydrogenase (IMPDH)**, which depletes guanosine nucleotides needed for viral replication [1] [2].

Why the other options are not correct

- **DNA-dependent RNA polymerase** is the target of some antiviral nucleoside analogs, not ribavirin in this classic regimen.
- **DNA gyrase** is a bacterial enzyme targeted by fluoroquinolones.
- **Dihydroorotate dehydrogenase** is involved in pyrimidine synthesis and is not the principal antiviral target here.

Clinical note

The retrieved guidance and reviews also reflect that **peginterferon-α plus ribavirin** was the historical standard-of-care for chronic HCV infection before direct-acting antivirals became available [1] [2].

References

[1] An Update on Treatment of Genotype 1 Chronic Hepatitis C Virus Infection: 2011 Practice Guideline by the American Association for the Study of Liver Diseases

Hepatology (Baltimore, Md.) · 2011-10-01

The standard of care (SOC) therapy for patients with chronic hepatitis C virus (HCV) infection has been the use of both peginterferon (PegIFN) and ribavirin (RBV). These drugs are administered for either 48 weeks (HCV genotypes 1, 4, 5, and 6) or for 24 weeks (HCV genotypes 2 and 3), inducing sustained virologic response (SVR) rates of 40%-50% in those with genotype 1 and of 80% or more in those with genotypes 2 and 3 infections.

10.1002/hep.24641

[2] Hepatitis C virus: standard-of-care treatment.

Advances in pharmacology (San Diego, Calif.) · 2013-01-01

The antiviral treatment of chronic hepatitis C has been based for decades on the use of interferon (IFN)-α, combined with ribavirin. New therapeutic approaches target essential components of the HCV life cycle.

10.1016/b978-0-12-405880-4.00005-6

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216. MedQA question ID 913 Step 1

Question

A 30-year-old female presents to her primary care provider complaining of 4 days of fever, malaise, dyspnea, and productive cough and has recently developed pleuritic chest pain. Her past medical history is notable for asthma and takes albuterol as needed. She does not smoke but drinks alcohol socially. Her family history is notable for cystic fibrosis in her paternal uncle and interstitial lung disease in her paternal grandfather. Her temperature is 101°F (38.3°C), blood pressure is 115/75 mmHg, pulse is 110/min, and respirations are 21/min. Rales are noted in the right lower lung, and a chest radiograph demonstrates focal consolidation in the right lower lung lobe. After initiating the appropriate treatment, she agrees to take part in a study assessing the immune response to lung infections. A protein is identified in her serum that is thought to be elevated in response to her condition. An amino acid sequence at the carboxy terminus of the protein is isolated and a fluorescent marker is added to the sequence. This labeled sequence is subsequently added to a gel containing a protein isolated from the cell surface of the patient's own neutrophils and macrophages and subsequently labeled with another fluorescent marker. The sequence binds strongly to this protein as evidenced by increased fluorescence in the gel. What process does this sequence typically undergo in immunocompetent individuals?

(A) Random assortment

(B) Random nucleotide addition

(C) VDJ recombination

(D) Isotype switching

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

This protein is an immunoglobulin, and its carboxy-terminal constant region (Fc portion) is typically generated after V(D)J recombination by isotype switching in immunocompetent individuals. In pneumonia, serum acute-phase and immune proteins can rise, and the Fc portion of antibodies binds Fc receptors on neutrophils and macrophages [1]. Therefore, the correct choice is **D. Isotype switching**.

Why the other options are not correct

- **Random assortment** and **random nucleotide addition** occur during **V(D)J recombination** to create antigen-binding diversity, not the constant Fc region.
- **VDJ recombination** generates the variable region of the antibody heavy chain.
- The **Fc** portion is determined after class-switch recombination, which changes the antibody isotype while preserving antigen specificity [1].

References

[1] Involvement of Fc receptors in disorders of the central nervous system.
Neuromolecular medicine · 2010-06-01
Immunoglobulins are proteins with a highly variable antigen-binding domain and a constant region that binds to a cell surface receptor (FcR). Activation of FcRs in immune cells triggers effector responses including cytokine production, phagocytosis, and degranulation.
10.1007/s12017-009-8099-5

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217. MedQA question ID 8 Step 2/3

Question

A 37-year-old-woman presents to her primary care physician requesting a new form of birth control. She has been utilizing oral contraceptive pills (OCPs) for the past 8 years, but asks to switch to an intrauterine device (IUD). Her vital signs are: blood pressure 118/78 mm Hg, pulse 73/min and respiratory rate 16/min. She is afebrile. Physical examination is within normal limits. Which of the following past medical history statements would make copper IUD placement contraindicated in this patient?

(A) A history of stroke or venous thromboembolism

(B) Active or recurrent pelvic inflammatory disease (PID)

(C) Past medical history of breast cancer

(D) Known liver neoplasm

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The correct choice is B. Active pelvic inflammatory disease (PID) is a contraindication to copper IUD placement; the device should not be inserted in the setting of current PID or other active pelvic infection. The Centers for Disease Control and Prevention (CDC) states that IUD placement should not be done with postpartum sepsis or septic abortion, and the ACOG guidance supports same-day insertion with STI screening but not delaying for results in otherwise eligible patients [1] [2]. A past history of **stroke or venous thromboembolism**, **breast cancer**, or a **liver neoplasm** does **not** contraindicate a **copper** IUD; those concerns are primarily relevant to hormonal contraception rather than the nonhormonal copper device [2].

Key point

- **Active PID / active pelvic infection:** do **not** place an IUD until the infection is treated and the patient is clinically improved [1].
- **Past PID history alone:** not the same as active PID and is not, by itself, the contraindication being tested here [1] [2].
- **Copper IUD:** remains an appropriate option for patients with prior thromboembolism, breast cancer history, or liver disease when no active pelvic infection is present [2].

References

[1] U.S. Selected Practice Recommendations for Contraceptive Use

Centers for Disease Control and Prevention · 2024-08-08 12:00:00

The Cu-IUD should not be placed in a patient with postpartum sepsis (e.g., chorioamnionitis or endometritis) (U.S. MEC 4). The Cu-IUD should not be placed immediately after a septic abortion (U.S. MEC 4).

https://www.cdc.gov/mmwr/volumes/73/rr/rr7303a1.htm?c

[2] Long-Acting Reversible Contraception: Implants and Intrauterine Devices

American College of Obstetricians and Gynecologists · 2017-11-01 12:00:00

Women who have not undergone routine screening for STIs or who are identified to be at increased risk of STIs based on patient history should receive CDC-recommended STI screening at the time of a single visit for IUD insertion. Intrauterine device insertion should not be delayed while awaiting test results. Treatment for a positive test result may occur without removal of the IUD.

https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2017/11/long-acting-reversible-contraception-implants-and-intrauterine-devices

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218. MedQA question ID 674 Step 1

Question

An experimental new drug in the treatment of diabetes mellitus type 2 was found to increase the levels of incretins by preventing their degradation at the endothelium. This further increased glucose-dependent insulin production. Which of the following drugs has a mechanism of action most similar to this new experimental drug?

(A) Sitagliptin

(B) Glimepiride

(C) Canagliflozin

(D) Pioglitazone

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Sitagliptin is the best match. The experimental drug described acts like a **dipeptidyl peptidase-4 (DPP-4) inhibitor**, which **prevents incretin degradation** and thereby **enhances glucose-dependent insulin secretion**; **sitagliptin** is a DPP-4 inhibitor [1] [2]. By contrast, **glimepiride** is a sulfonylurea that stimulates insulin release by closing K-ATP channels, **canagliflozin** is an SGLT2 inhibitor that increases urinary glucose excretion, and **pioglitazone** is a thiazolidinedione that improves insulin sensitivity [1].

Why the other choices do not fit

- **Glimepiride**: sulfonylurea; increases insulin secretion via K-ATP channel closure, not incretin preservation [1].
- **Canagliflozin**: SGLT2 inhibitor; blocks renal glucose reabsorption [1].
- **Pioglitazone**: thiazolidinedione; PPAR-γ agonist that increases insulin sensitivity [1].

Bottom line

The mechanism described is **DPP-4 inhibition**, so the correct choice is **sitagliptin** [1] [2].

References

[1] Perioperative Management of Oral Glucose-lowering Drugs in the Patient with Type 2 Diabetes
Anesthesiology · 2020-03-12
Dipeptidyl peptidase-4 inhibitors (linagliptine, saxagliptine, sitagliptine, alogliptine) prevent the degradation of the incretin hormone glucagon-like peptide 1 by the serine protease dipeptidyl peptidase-4. By inhibiting this enzyme, dipeptidyl peptidase-4 inhibitors potentiate the incretin effect of endogenous glucagon-like peptide 1 and enhance glucose-dependent insulin secretion by pancreatic beta cells.
10.1097/aln.0000000000003237

[2] Pleiotropic mechanisms for the glucose-lowering action of DPP-4 inhibitors.
Diabetes · 2014-07-01
DPP-4 inhibitors are a glucose-lowering treatment for type 2 diabetes. The classical mechanism is that they inhibit DPP4 activity in peripheral plasma, which prevents the inactivation of the incretin hormone glucagon-like peptide (GLP-1) in the peripheral circulation.
10.2337/db14-0052

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219. MedQA question ID 712 Step 2/3

Question

A 29-year-old woman, gravida 3, para 2, at 24 weeks' gestation comes to the emergency department because of vaginal bleeding and mild pelvic pain for 2 hours. Her current pregnancy was achieved

by means of in vitro fertilization due to azoospermia in her partner. Prenatal course has been uncomplicated with regular prenatal visits. After a period of having avoided sexual intercourse during her early pregnancy, she resumed sexual activity with her partner at week 22 of gestation. Her first child was delivered by lower segment transverse cesarean section because of a nonreassuring fetal heart rate; her other child was delivered vaginally. She has had abnormal Pap smears due to HPV in the past. Her pulse is 82/min, respirations are 18/min, and blood pressure is 134/76 mm Hg. The abdomen is nontender, the uterus is consistent with 24 weeks' gestation, and the fetus is in a cephalic presentation. There are traces of blood on the vulva and the introitus. Speculum examination shows a tender, bruised cervix, with a closed cervical os. Fetal heart rate is 166/min and CTG shows a reassuring fetal heart rate tracing. Ultrasound shows a uniformly echogenic placenta located at the fundal end of the posterior uterine wall. What is the most likely cause of this patient's antepartum bleeding?

(A) Pedunculated cervical growth

(B) Inflammation of the cervix

(C) Cervical trauma

(D) Premature separation of the placenta

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

(C) Cervical trauma is the most likely cause of this antepartum bleeding. The bleeding is accompanied by a **tender, bruised cervix** after resumption of sexual activity, the **cervical os is closed**, fetal status is reassuring, and ultrasound shows a **fundal posterior placenta**, which makes placenta previa unlikely and is less consistent with placental abruption [1] [2].

Why this fits best

- **Cervical trauma** is suggested by the localized cervical tenderness/bruising and the temporal association with intercourse.
- A **fundal posterior placenta** argues against placenta previa as the bleeding source.
- A reassuring CTG and closed os also make an acute obstetric catastrophe less likely in this vignette [1] [2].

Why the other choices are less likely

- **Pedunculated cervical growth**: would usually present as a visible cervical lesion rather than bruising after intercourse.
- **Inflammation of the cervix**: cervicitis can cause bleeding, but the vignette emphasizes trauma findings rather than infectious symptoms.
- **Premature separation of the placenta**: abruption typically causes uterine tenderness/irritability and more concern for fetal compromise; the ultrasound placental location and reassuring tracing do not support this as well as cervical trauma [2].

References

[1] ACR Appropriateness Criteria® Second and Third Trimester Vaginal Bleeding.
Journal of the American College of Radiology : JACR · 2020-11-01
US ultrasound is the backbone of current medical practice. US cervix transperineal may be appropriate for painless or painful vaginal bleeding, but US duplex Doppler velocimetry is not appropriate for second or third trimester vaginal bleeding with suspicion of or known placenta previa or vasa previa. The outcome of pregnancies is related to the specific etiology of the vaginal bleeding.
10.1016/j.jacr.2020.09.004

[2] Abnormal Placentation: Placenta Previa, Vasa Previa, and Placenta Accreta.
Obstetrics and Gynecology · 2015-09-01
Placental disorders are associated with vaginal bleeding in the second half of pregnancy. Rates of previa and accreta are increasing, probably due to increasing rates of cesarean delivery, maternal age, and assisted reproductive technology. The routine use of obstetric ultrasonography and improving ultrasonographic technology allows for the antenatal diagnosis of these conditions.
10.1097/aog.0000000000001005

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220. MedQA question ID 192 Step 2/3

Question

Please refer to the summary above to answer this question
The authors of the study have decided to conduct a follow-up analysis on their data. They decide to stratify their results by CD4+T-lymphocyte count at the time of diagnosis. Among patients with CD4+ cell counts below 200/mm3, cART adherence was a significant predictor of DLBCL risk (RR = 0.52, p = 0.01). However, among patients with CD4+ cell counts above 200/mm3, no relationship was found between DLBCL risk and cART adherence (RR = 0.96, p = 0.36). Which of the following explains for the difference observed between the two strata?"

(A) Poor generalizability

(B) Stratified sampling

(C) Random error

(D) Effect modification

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Effect modification. The association between cART adherence and DLBCL risk differs by CD4+ T-lymphocyte stratum: a protective association is present when CD4+ count is **<200/mm3**, but not when CD4+ count is **>200/mm3**. That pattern indicates the effect of cART adherence is modified by CD4+ count, rather than reflecting random error or sampling/generalizability issues.

221. MedQA question ID 359 Step 1

Question

A 40-year-old male presents to your office complaining that he is too weak to climb stairs or brush his hair. He denies any headaches or change in vision. A muscle biopsy reveals CD8+ lymphocyte infiltration in the endomysium. Which of the following is the most likely diagnosis?

(A) Systemic lupus erythematosus

(B) Polymyalgia rheumatica

(C) Polymyositis

(D) Dermatomyositis

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Polymyositis is the most likely diagnosis: the combination of **progressive symmetric proximal muscle weakness** and **endomysial CD8+ lymphocytic infiltration** on biopsy is characteristic of polymyositis, whereas **dermatomyositis** typically has a **skin rash** and different inflammatory cell patterns [1] [2]. **Polymyalgia rheumatica** is usually an older-adult syndrome of pain and stiffness rather than biopsy-proven myositis, and **systemic lupus erythematosus** would not be the best fit for this biopsy pattern [1] [3].

Why the other choices are less likely

- **Dermatomyositis:** usually includes a characteristic cutaneous eruption; biopsy more often shows perivascular/perimysial pathology rather than the classic **endomysial CD8+ T-cell** pattern seen in polymyositis [1] [2].
- **Polymyalgia rheumatica:** causes proximal pain and morning stiffness, typically in older adults, not primary muscle weakness with inflammatory muscle biopsy findings [3].
- **Systemic lupus erythematosus:** can cause myositis, but the stem's biopsy pattern is most consistent with idiopathic inflammatory myopathy, especially polymyositis [1] [2].

References

[1] Polymyositis and dermatomyositis - challenges in diagnosis and management.
Journal of Translational Autoimmunity · 2019-12-01
Polymyositis and dermatomyositis are different disease subtypes of idiopathic inflammatory myopathies. The main clinical features of PM and DM include progressive symmetric, predominantly proximal muscle weakness and a characteristic skin rash.
10.1016/j.jtauto.2019.100018

[2] T-cell transcriptomics from peripheral blood highlights differences between polymyositis and dermatomyositis patients.
Arthritis Research & Therapy · 2018-08-29
In PM, a major component of inflammatory cell infiltrates is CD8+ T cells, whereas in DM, CD4+ cells, plasmacytoid dendritic cells, and B cells predominate.
10.1186/s13075-018-1688-7

[3] Idiopathic inflammatory myopathies.
Seminars in Neurology · 2012-07-01
The idiopathic inflammatory myopathies are a group of rare disorders including polymyositis, dermatomyositis (DM), and autoimmune necrotizing myopathy. They present with marked proximal and symmetric muscle weakness.
10.1055/s-0032-1329201

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222. MedQA question ID 506 Step 1

Question

A 72-year-old woman presents to the emergency department with altered mental status. 90 minutes ago, the patient was found by a neighbor unarousable on the couch with multiple empty bottles of medication on the floor next to her. Social history is significant for alcohol abuse. Physical examination reveals an awake female with a fluctuating level of consciousness, not oriented to time or place. No focal neurologic deficits. Which of the following additional findings would most likely be present in this patient?

(A) Hallucinations

(B) Irreversibility

(C) Multi-infarct dementia

(D) Normal vital signs

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Hallucinations are the most likely additional finding. The presentation is most consistent with **delirium**: an acute, **fluctuating** disturbance in consciousness/attention with disorientation, and delirium from alcohol or medication-related causes can include perceptual disturbances such as hallucinations [1] [2]. **Irreversibility** and **multi-infarct dementia** fit a chronic neurocognitive disorder rather than this abrupt, waxing-and-waning syndrome, and **normal vital signs** would be less expected if alcohol withdrawal delirium is present because autonomic instability is common [1].

Why this is delirium

- Delirium has an **acute onset and fluctuating course** with **altered level of consciousness** and cognitive disturbance [2].

- In patients with suspected alcohol withdrawal delirium, the American Society of Addiction Medicine recommends evaluating for other etiologies and distinguishing hallucinations related to withdrawal delirium from alcohol hallucinosis/alcohol-induced psychotic disorder [1].

Why the other choices are less likely

- **Irreversibility**: delirium is typically reversible when the underlying cause is treated [2].
- **Multi-infarct dementia**: usually causes a chronic stepwise decline, not an abrupt fluctuating mental status change [2].
- **Normal vital signs**: less consistent with alcohol withdrawal delirium, which often has autonomic hyperactivity [1].

References

[1] Alcohol Withdrawal Management

American Society of Addiction Medicine · 2020-03-20 00:00:00

For patients presenting with delirium, conduct a detailed neurological and medical examination with appropriate testing to rule out other common causes of delirium regardless of the apparent etiology. Attempt to distinguish between hallucinations associated with alcohol withdrawal delirium and alcohol hallucinosis/alcohol-induced psychotic disorder.

https://www.asam.org/Quality-Science/quality/guideline-on-alcohol-withdrawal-management

[2] Association of Delirium With Long-term Cognitive Decline

JAMA Neurology · 2020-07-13

Delirium is characterized by an acute onset or fluctuating course, inattention, and either disorganized thought (manifesting as memory, language, and orientation difficulties) or altered level of consciousness.

10.1001/jamaneurol.2020.2273

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223. MedQA question ID 178 Step 1

Question

A 40-year-old businessman who was previously well is brought into the emergency department by his assistant with a complaint of left-sided weakness after a chiropractic neck manipulation. He has never felt like this before. Past medical history is insignificant. His blood pressure is 125/75 mm Hg, pulse 86/min, respiratory rate 13/min, temperature 36.8°C (98.2°F). A T2-weighted MRI shows a left C5 hemicord lesion. The patient is treated with cervical immobilization, a course of steroids, and physical therapy. What other finding will most likely be seen in this patient?

(A) Spastic paralysis at the level of lesion

(B) Right-sided Horner's syndrome

(C) Contralateral corticospinal tract involvement

(D) Right-sided analgesia

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Right-sided analgesia is most likely. A **left C5 hemicord lesion** causes a Brown-Séquard syndrome pattern: **ipsilateral motor and dorsal column deficits below the lesion** with **contralateral pain and temperature loss** starting a few levels below the injury, because the spinothalamic tract crosses after ascending briefly in the cord [1] [2]. Horner syndrome can occur with cervical cord involvement, but the classic additional finding in this vignette is contralateral analgesia, not spastic paralysis at the level of the lesion or contralateral corticospinal tract involvement [1] [2].

Why the other choices are less likely

- **(A) Spastic paralysis at the level of lesion** — Brown-Séquard syndrome produces **ipsilateral weakness below the lesion**, not spastic paralysis localized at the lesion level as the key associated finding [1].
- **(B) Right-sided Horner syndrome** — Horner syndrome is reported with some cervical cord/hemicord lesions, but it is not the most consistent or defining accompanying deficit here [1] [3].
- **(C) Contralateral corticospinal tract involvement** — corticospinal tract dysfunction is typically **ipsilateral below the hemicord lesion** because those fibers have already crossed in the medulla [1].
- **(D) Right-sided analgesia** — this is the **expected** finding from interruption of the **left-sided spinothalamic tract** below the cervical hemisection [1] [2].

References

[1] Diffusion tensor imaging and tractography in Brown-Sequard syndrome.

Spinal cord · 2012-12-01

Two patients with Brown-Sequard syndrome after penetrating cervical cord injury underwent DTI and tractography of the cervical cord within a week of the injury. Axial fractional anisotropy maps at the site of injury showed unilateral damage to the cord structure, and FA was significantly reduced within the injured hemicord.

10.1038/sc.2012.94

[2] Brown-Sequard syndrome associated with Horner syndrome following cervical disc herniation.

Spinal cord series and cases · 2016-01-01

Brown-Sequard syndrome caused by cervical disc herniation is very rare. It is associated with Horner syndrome. A prompt diagnosis by MRI and spinal cord decompression was performed. A postoperative improvement of the neurological deficits was observed. It's important that a MRI of the spinal cord is needed for those with a thoracic sensory level.

10.1038/scsandc.2016.37

[3] Spinal cord injury following chiropractic manipulation to the neck.

Acta radiologica (Stockholm, Sweden : 1987) · 2011-12-01

A 50-year-old man developed neurological symptoms a few hours after chiropractic treatment. Magnetic resonance (MR) imaging of the cervical spine revealed intramedullary high signal at the C2/3 level of the right side of cervical cord on the T2-weighted images.

10.1258/ar.2011.110281

224. MedQA question ID 1022 Step 2/3

Question

The first 24 hours after delivery, a 2888 g (6.37 lb) male newborn is not feeding well, has a high-pitched cry, and is diaphoretic. He was born at 38 weeks' gestation to a 30-year-old woman, gravida 2, para 1, after an uncomplicated labor and delivery. Apgar scores were 8 and 9 at 1 and 5 minutes, respectively. The mother did not receive prenatal care. She takes codeine syrup frequently for dry cough. The infant's temperature is 37.8°C (100°F), pulse is 165/min, and blood pressure is 83/50 mm Hg. Examination shows hyperreflexia, tremors, and an excessive startle response. The baby is swaddled to prevent excoriations, and fluid resuscitation is initiated. Complete blood count and serum levels of glucose, bilirubin, and calcium are within normal limits. What is the most appropriate next step in treatment of this newborn?

(A) Oral morphine therapy

(B) Intravenous ampicillin and gentamicin combination therapy

(C) Oral methimazole therapy

(D) Dextrose infusion

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most appropriate next step is A. oral morphine therapy. This newborn has **neonatal opioid withdrawal syndrome (NOWS/NAS)** from in utero codeine exposure, with classic early symptoms including poor feeding, high-pitched cry, diaphoresis, tremors, hyperreflexia, and increased startle; management is **supportive care plus opioid therapy when symptoms are significant**. Evidence summaries consistently describe **morphine as a first-line pharmacologic treatment** for symptomatic NAS, with methadone or buprenorphine as other opioid options, while antibiotics, methimazole, and dextrose are not indicated for this presentation [1] [2] [3] [4].

Why this is not sepsis, hyperthyroidism, or hypoglycemia

- **Sepsis** would be considered with fever/ill appearance, but the normal CBC and the characteristic opioid-withdrawal neurologic/autonomic findings favor NAS/NOWS over infection [4].
- **Hyperthyroidism** does not fit the exposure history or symptom complex.
- **Hypoglycemia** is unlikely with a normal glucose and the tremor/startle pattern being better explained by opioid withdrawal [4].

Treatment point

- **Start oral morphine** for clinically significant withdrawal.
- Continue nonpharmacologic measures such as low-stimulation care and feeding support, but these alone are often insufficient when symptoms are already prominent [1] [2] [3].

References

[1] Interventions for the Treatment of Neonatal Abstinence Syndrome.

Nursing for women's health · 2019-08-01

The growing incidence of neonatal abstinence syndrome among newborns is a public health crisis. Fetuses are exposed to opioids in utero and neonates can experience withdrawal symptoms shortly after birth. Treatment of NAS begins with nonpharmacologic interventions. If a neonate requires more intensive treatment, care will escalate to include pharmacologic treatments, including morphine, methadone, and buprenorphine.

10.1016/j.nwh.2019.05.006

[2] Pharmacological and non-pharmacological treatments for the Neonatal Abstinence Syndrome (NAS).

Seminars in fetal & neonatal medicine · 2019-04-01

All infants with documented in utero opioid exposure should have monitoring with a standard assessment instrument such as a Finnegan Score. At least half of infants in most locales can be treated without the use of pharmacologic means. Those who continue to have symptoms despite supportive care should be pharmacologically treated.

10.1016/j.siny.2019.01.009

[3] Factors Associated With the Need for Pharmacological Management of Neonatal Opioid Withdrawal Syndrome.

Advances in neonatal care : official journal of the National Association of Neonatal Nurses · 2020-10-01

Neonatal opioid withdrawal syndrome (NOWS) affects more than 23,000 infants annually, with an estimated hospital cost of more than $720 million. Of 204 neonates exposed to opioids prenatally, 121 developed symptoms of NOWS, requiring treatment with morphine. Maternal factors associated with the need for neonatal medication treatment included the mother's reason for opioid use, primary type of opioid used, tobacco use, and use of benzodiazepines.

10.1097/anc.0000000000000772

[4] Pharmacologic management of the opioid neonatal abstinence syndrome.

Pediatric clinics of North America · 2012-10-01

Opioid use in pregnant women has increased over the last decade. Infants with in utero exposure demonstrate signs and symptoms of withdrawal known as neonatal abstinence syndrome. Treatment often involves prolonged hospitalization. Emerging trends in the treatment of infants with NAS include the use of sublingual buprenorphine, transition to outpatient therapy, and pharmacogenetic risk stratification.

10.1016/j.pcl.2012.07.006

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225. MedQA question ID 411 Step 2/3

Question

An 8-year-old girl presents to her pediatrician with intensely pruritic lesions over her buttocks, as shown. These lesions occur intermittently but have worsened over time. Her medical history is remarkable for iron deficiency, for which she is on ferrous sulfate. The patient has also experienced intermittent episodes of mild diarrhea, previously diagnosed as lactose intolerance. Her height is at the 30th percentile and weight is at the 25th percentile for age and sex. An immunoglobulin A (IgA) tissue transglutaminase titer is 5 times the upper limit of normal. Which of the following is the most likely cause of this patient's condition?

(A) Crohn’s disease

(B) Celiac disease

(C) Common variable immune deficiency

(D) Henoch-Schonlein purpura

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely cause is celiac disease, presenting as **dermatitis herpetiformis**: a severely pruritic, intermittent papulovesicular rash on the **buttocks** with iron deficiency, mild diarrhea, poor growth, and an elevated **IgA tissue transglutaminase (tTG-IgA)** supports gluten-sensitive enteropathy rather than Crohn disease, common variable immune deficiency, or Henoch-Schönlein purpura [1] [2] [3]. The American College of Gastroenterology (ACG) notes that **tTG-IgA is the preferred test in children** and that **confirmation is typically by EGD with duodenal biopsies**; **tTG-IgA >10× upper limit of normal plus positive EMA on a second sample** is a nonbiopsy pathway in selected children, but this patient's presentation already most strongly points to celiac disease with dermatitis herpetiformis [1] [3].

Why this fits best

- **Dermatitis herpetiformis** classically causes an **intensely pruritic rash on the buttocks** and is a specific cutaneous manifestation of celiac disease [2] [4] [5].
- Celiac disease in children can present with **diarrhea, iron deficiency, and growth issues**; lactose intolerance can also be secondary to villous injury from celiac disease [3] [6].
- An **IgA tTG elevation** is a key serologic clue for celiac disease in symptomatic children [1] [3].

Why the other choices are less likely

- **Crohn disease** can cause diarrhea and growth problems, but the **buttock-predominant, intensely pruritic rash** is much more characteristic of dermatitis herpetiformis than Crohn-related skin disease [2] [5].
- **Common variable immune deficiency** would not be suggested by this classic rash pattern and would usually raise concern for recurrent infections and hypogammaglobulinemia rather than isolated tTG-IgA positivity [1] [3].
- **Henoch-Schönlein purpura** causes palpable purpura, abdominal pain, and arthralgia, not a chronic pruritic buttock rash [2] [5].

References

[1] Diagnosis and Management of Celiac Disease
American College of Gastroenterology · 2023-01-05 00:00:00
8A. We recommend the immunoglobulin IgA anti-TTG antibody (TTG-IgA) as the preferred single test for the detection of CD in children younger than 2 years who are not IgA-deficient; 1A. We recommend EGD with multiple duodenal biopsies for confirmation of diagnosis in both children and adults with suspicion of CD; 1B. We suggest a combination of high-level TTG IgA (>10× upper limit of normal) with a positive endomysial antibody (EMA) in a second blood sample as reliable tests for diagnosis of CD in children.
https://journals.lww.com/ajg/Fulltext/2023/01000/American_College_of_Gastroenterology_Guidelines.17.aspx?context=FeaturedArticles&collectionId=2

[2] Etiopathogenesis of dermatitis herpetiformis.
Postepy dermatologii i alergologii · 2022-02-01

Dermatitis herpetiformis is a rare chronic, autoimmune bullous disease linked to gluten sensitivity with intense pruritus and characteristic skin eruptions. It is currently considered to be a specific cutaneous manifestation of celiac disease.
10.5114/ada.2020.101637

[3] Immunopathogenesis and environmental triggers in coeliac disease
Gut · 2022-07-25
Coeliac disease can be defined as a chronic autoimmune-like enteropathy driven by an abnormal immune response to dietary gluten in genetically predisposed individuals. It can manifest at all ages in life by a variable spectrum of intestinal and extraintestinal symptoms that are the consequence of duodenal damage and/or immune activation.
10.1136/gutjnl-2021-326257

[4] Recent advances in dermatitis herpetiformis.
Clinical & developmental immunology · 2012-01-01
Dermatitis Herpetiformis is an autoimmune bullous disease associated with gluten sensitivity. IgA and antibodies against epidermal transglutaminase 3 play an important role in the pathogenesis of dermatitis herpetiformiis, which presents as celiac disease.
10.1155/2012/914162

[5] Dermatitis herpetiformis.
Clinical and experimental dermatology · 2019-10-01
Dermatitis herpetiformis (DH) is a cutaneous manifestation of coeliac disease (CD). It causes an itching and blistering rash, typically on the elbows, knees and buttocks.
10.1111/ced.13992

[6] Update on lactose malabsorption and intolerance: pathogenesis, diagnosis and clinical management
Gut · 2019-08-19
Lactase is situated at the tip of intestinal villi and thus vulnerable to intestinal injury, especially since new immature enterocytes are lactase deficient. As a consequence, secondary LM can complicate GI conditions including infectious gastroenteritis, IBD, coeliac disease and systemic sclerosis (SSc). Patients with a new diagnosis of coeliac disease often have a positive lactose HBT; however, many recover the ability to digest lactose after 6–12 months on a gluten-free diet.
10.1136/gutjnl-2019-318404

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226. MedQA question ID 109 Step 2/3

Question

A 28-year-old man comes to the physician because of diarrhea and crampy abdominal pain for 5 weeks. He has had up to 4 bowel movements per day. Several times he noticed mucoid strings with the stool. He has abdominal bloating. Over the past month, has had a 3.2-kg (7-lb) weight loss. He has not had fever, cough, or bloody stools. He had a painful rash on his lower extremity 3 weeks ago that resolved spontaneously. He works as a pharmacy technician. His temperature is 37.3°C (98.8°F), pulse is 85/min, and blood pressure is 115/77 mm Hg. The abdomen is soft and nontender. His hemoglobin concentration is 11.9 g/dL, MCV is 79 fL, ferritin is 106 ng/dL, and platelet count is 410,000/mm3; serum concentrations of glucose, creatinine, and electrolytes are within the reference range. This patient's condition is most likely associated with which of the following findings?

(A) Increased serum VIP

(B) Stool leukocytes

(C) Melanosis coli

(D) Normal intestinal mucosa

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Crohn disease is the most likely diagnosis, and it is an **inflammatory diarrhea** syndrome that can include **anemia, weight loss, and extraintestinal manifestations such as erythema nodosum** [1] [2]. Among the choices, this condition is most likely associated with **stool leukocytes**; **increased serum VIP** suggests VIPoma, **melanosis coli** suggests chronic anthraquinone laxative use, and **normal intestinal mucosa** is more typical of microscopic colitis rather than Crohn disease [1] [2].

Why this fits Crohn disease

- **Chronic abdominal pain, diarrhea, weight loss, anemia, and erythema nodosum** are all compatible with Crohn disease [1] [2].
- Crohn disease is diagnosed clinically, with endoscopic/radiographic/histologic evidence of chronic intestinal inflammation; extraintestinal manifestations commonly include dermatologic findings such as erythema nodosum [1] [2].
- Inflammatory diarrhea commonly has **fecal leukocytes** because of mucosal inflammation [1].

Why the other options are less likely

- **Increased serum VIP**: points to a secretory diarrhea syndrome such as VIPoma, which is not suggested by the rash or inflammatory features.
- **Melanosis coli**: is classically linked to chronic stimulant laxative exposure, not inflammatory bowel disease.
- **Normal intestinal mucosa**: is more characteristic of microscopic colitis, which typically lacks the inflammatory/extraintestinal pattern seen here [2].

References

[1] Management of Crohn's Disease in Adults

American College of Gastroenterology · 2025-06-03 12:00:00

Hallmark/cardinal symptoms of CD include abdominal pain, diarrhea, and fatigue and weight loss, fever, growth failure, anemia, recurrent fistulas, or extraintestinal manifestations can also be presenting features. CD is diagnosed clinically. There are no truly pathognomonic features. Endoscopic, radiographic, and histologic criteria with evidence of chronic intestinal inflammation will be present. Extraintestinal manifestations of CD include the classic ones such as arthropathy (both axial and peripheral), dermatological (including pyoderma gangrenosum and erythema nodosum), ocular (including uveitis, scleritis, and episcleritis), and hepatobiliary disease (i.e., primary sclerosing cholangitis [PSC]).

https://journals.lww.com/ajg/fulltext/2025/06000/acg_clinical_guideline__management_of_crohn_s.14.aspx?context=featuredarticles&collectionid=2

[2] Extraintestinal Manifestations in Inflammatory Bowel Disease

European Crohn's and Colitis Organisation · 2023-06-23 00:00:00

Skin diseases associated with IBD are among the most common EIMs and their relationship with underlying intestinal disease may be either specific [metastatic CD], reactive [pyoderma gangrenosum, Sweet syndrome, erythema nodosum, oral lesions], associated [hidradenitis suppurativa, psoriasis], or treatment-related [TNFα antagonist-induced skin lesions, other drug hypersensitivities, skin cancer]. Erythema nodosum is very often associated with underlying active intestinal IBD, although other causes should be excluded and managed.

https://academic.oup.com/ecco-jcc/article/18/1/1/7205776?searchresult=1#google_vignette

227. MedQA question ID 312 Step 1

Question

A 68-year-old female presents to her primary care physician with a 7-month history of fatigue and low back pain. Her pain is not improved by over the counter analgesics. Laboratory analysis is notable for a calcium level of 11.5 mg/dL, creatinine level of 2.0 mg/dL, and blood urea nitrogen level of 30 mg/dL. Large eosinophilic casts are seen on renal biopsy. Which of the following findings is most likely to be seen on peripheral blood smear?

(A) Abundant reticulocytes

(B) Linear aggregations of red blood cells

(C) Schistocytes

(D) Leukocytosis with abundant mature myeloid cells

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely peripheral blood smear finding is linear aggregations of red blood cells, i.e., rouleaux formation [1]. In this patient, the combination of **hypercalcemia, renal dysfunction, back pain, fatigue, and cast nephropathy on biopsy** is most consistent with **multiple myeloma**; plasma cell dyscrasias commonly cause rouleaux from excess circulating immunoglobulins/ paraprotein [1] [2].

Why the other choices are less likely

- **Abundant reticulocytes**: suggests hemolysis or blood loss, not the typical smear finding in myeloma [1].
- **Schistocytes**: points to microangiopathic hemolytic anemia, not myeloma [1].
- **Leukocytosis with abundant mature myeloid cells**: suggests a myeloproliferative neoplasm such as chronic myeloid leukemia [1].

References

[1] Combined Group I and III ABO Discrepancies in Multiple Myeloma with IgG-Lambda Type: A Case Report.
Medical Principles and Practice · 2017-01-01
A 79-year-old female diagnosed with multiple myeloma with monoclonal IgG-λ type showed rouleau formation in peripheral blood smear.
10.1159/000450579

[2] Coexistence of myeloma cast nephropathy, light chain deposition disease, and nonamyloid fibrils in a patient with multiple myeloma.
American Journal of Kidney Diseases · 2010-11-01

Plasma cell dyscrasias can present as myeloma cast nephropathy, AL amyloid, or light chain deposition disease. Treatment of multiple myelomoma resulted in resolution of the renal manifestations.
10.1053/j.ajkd.2010.06.018

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228. MedQA question ID 1111 Step 1

Question

A 3-year-old boy presents with episodic diarrhea with malodorous stools, stunted growth, occasional abdominal cramps, and an itchy rash. His mother says that these symptoms developed approximately 2 years ago. The patient was exclusively breastfed up to the age of 7 months. Supplementary feeding was started with non-starchy vegetable followed by starchy vegetables, meat, fish, eggs, and bread. Bread and cookies were the last product to be introduced at the age of 12 months. The patient's mother tried to withdraw dairy products from the patient's diet because she heard that lactose can cause such symptoms, but it did not help. The patient's vital signs include: blood pressure 90/55 mm Hg, heart rate 101/min, respiratory rate 19/min, and temperature 36.3°C (97.3°F). His weight is 11 kg (24.2 lb, -2 SD) and height is 90 cm (2 ft 11 in, -1 SD). On physical examination, the patient's skin is pale with a papulovesicular rash on his abdomen and back. There are a few aphthous ulcers in the oral cavity. The abdomen is distended but no tenderness to palpation. No hepatosplenomegaly. An immunological assay is performed and shows positive anti-transglutaminase and anti-endomysial antibodies. Which of the following changes would you most likely expect to see on intestinal biopsy in this patient?

(A) Granulomas in the submucous tissue

(B) Crypt abscesses

(C) Villous atrophy and crypt hypertrophy

(D) Villous hyperplasia

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The American College of Gastroenterology (ACG) recommends confirming suspected celiac disease with **upper endoscopy and multiple duodenal biopsies** in patients with suggestive symptoms and positive serology; in children, very high **TTG-IgA >10× the upper limit of normal plus positive EMA in a second sample** can sometimes establish diagnosis without biopsy, but the classic biopsy finding is **villous atrophy with crypt hyperplasia** (often with increased intraepithelial lymphocytes) [1] [2] [3]. In this child, the expected intestinal biopsy change is **C. Villous atrophy and crypt hypertrophy** [2] [3].

Why this fits celiac disease

- Chronic diarrhea, malodorous stools, poor growth, abdominal distention, aphthous ulcers, and an itchy papulovesicular rash are all compatible with celiac disease, and the positive anti-transglutaminase and anti-endomysial antibodies strongly support it [2] [3].
- The rash described is consistent with dermatitis herpetiformis, which is associated with gluten-sensitive enteropathy.

Biopsy expectation

- **Villous blunting/atrophy**
- **Crypt hyperplasia**
- Often **increased intraepithelial lymphocytes** [2] [3]

Why the other options are less likely

- **Granulomas in the submucous tissue**: suggests Crohn disease or other granulomatous inflammation.
- **Crypt abscesses**: more typical of ulcerative colitis.
- **Villous hyperplasia**: not a celiac histologic pattern [2] [3].

References

[1] Diagnosis and Management of Celiac Disease
American College of Gastroenterology · 2023-01-05 00:00:00
1A. We recommend EGD with multiple duodenal biopsies for confirmation of diagnosis in both children and adults with suspicion of CD
https://journals.lww.com/ajg/Fulltext/2023/01000/American_College_of_Gastroenterology_Guidelines.17.aspx?context=FeaturedArticles&collectionId=2

[2] Immunopathogenesis and environmental triggers in coeliac disease
Gut · 2022-07-25
Diagnosis relies on the detection of serum IgA antibodies against the autoantigen tissue transglutaminase 2 (TG2), and, except in children with very high titres of IgA autoantibodies, on the demonstration of duodenal villous atrophy and increased number of intraepithelial lymphocytes (IEL).
10.1136/gutjnl-2021-326257

[3] [Histopathology of coeliac disease].
Pathologie-biologie · 2013-04-01
The diagnosis requires serologic testing and a duodenal biopsy that shows the characteristic findings of intraepithelial lymphocytosis, crypt hyperplasia and villous atrophy.
10.1016/j.patbio.2011.03.003

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229. MedQA question ID 126 Step 1

Question

An 81-year-old woman is brought to the emergency room by her son after witnessing the patient fall and hit her head. The son reports that the patient was in her usual state of health until she complained of chest palpitations. This startled her while she was climbing down the stairs and lead to a fall. Past medical history is significant for hypertension and atrial fibrillation. Medications are lisinopril, metoprolol, and warfarin. Temperature is 99°F (37.2°C), blood pressure is 152/96 mmHg,

pulse is 60/min, respirations are 12/min, and pulse oximetry is 98% on room air. On physical examination, she is disoriented and at times difficult to arouse, the left pupil is 6 mm and non-reactive to light, and the right pupil is 2 mm and reactive to light. A right-sided visual field defect is appreciated on visual field testing. There is 1/5 strength on the right upper and lower extremity; as well as 5/5 strength in the left upper and lower extremity. A computerized tomography (CT) scan of the head is shown. Which of the following most likely explains this patient's symptoms?

(A) Herniation of the uncus

(B) Herniation of the cingulate gyrus

(C) Occlusion of the basilar artery

(D) Occlusion of the anterior spinal artery

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

(A) Herniation of the uncus is the most likely explanation. The combination of **ipsilateral fixed dilated pupil** (CN III compression), **contralateral hemiparesis**, somnolence/disorientation, and **visual field loss** is classic for **uncal transtentorial herniation** from a supratentorial mass lesion, which the Brain Trauma Foundation recognizes as a neurologic emergency sign of herniation/progressive deterioration [1]. In this warfarin-treated patient with head trauma, an intracranial hemorrhage is also likely, and anticoagulation should be urgently reversed if hemorrhage is confirmed or strongly suspected [2].

Why the other options are less likely

- **Cingulate gyrus herniation** (subfalcine herniation) most often compresses the **anterior cerebral artery**, causing contralateral leg-predominant weakness, not a blown pupil.
- **Basilar artery occlusion** would cause a brainstem syndrome, often with quadriplegia, ocular movement abnormalities, and impaired consciousness, not isolated unilateral third-nerve compression.
- **Anterior spinal artery occlusion** causes bilateral motor loss and loss of pain/temperature below the lesion, not the focal cranial nerve and cortical findings seen here.

Clinical implication

This presentation should prompt immediate recognition of **transtentorial herniation** and urgent neurosurgical evaluation; temporizing measures for elevated intracranial pressure may be needed while definitive management is arranged [1].

References

[1] Management of Severe Traumatic Brain Injury
Brain Trauma Foundation · 2016-09-20 12:00:00
Restrict mannitol use prior to ICP monitoring to patients with signs of transtentorial herniation or progressive neurologic deterioration not attributable to extracranial causes.
https://www.doi.org/doi.org/10.1227/NEU.0000000000001432

[2] Reversal of Antithrombotics in Intracranial Hemorrhage

Neurocritical Care Society, Society of Critical Care Medicine · 2015-12-01 00:00:00

(1) We recommend discontinuing vitamin K antagonists when intracranial hemorrhage is present or suspected.

https://link.springer.com/article/10.1007/s12028-015-0222-x

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230. MedQA question ID 376 Step 2/3

Question

A 3-month-old girl is brought to the physician because of a productive cough for 5 days. Over the past month, she has had several episodes of watery stools. She is exclusively breastfed every 3–4 hours for 15–20 minutes. She was delivered vaginally at 38 weeks' gestation at home and has not yet been evaluated by a physician. The mother reports that her child is not gaining weight. The mother had no prenatal care. The infant is at the 5th percentile for height and weight. The infant has not received any immunizations. Her temperature is 38.5°C (101.3°F), pulse is 155/min, respirations are 45/min, and blood pressure is 88/50 mm Hg. Oral examination shows white plaques covering the tongue and the palate. Rales are heard bilaterally on cardiopulmonary examination. Cervical and inguinal lymphadenopathy is present. Which of the following is most likely to confirm the diagnosis?

(A) Karyotyping of infant's chromosomes

(B) DNA test for CFTR mutation

(C) Fluorescent treponemal antibody absorption test

(D) Polymerase chain reaction for viral genes

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The U.S. Department of Health and Human Services recommends HIV virologic testing with a nucleic acid test (NAT) to diagnose HIV in infants younger than 18 months; antibody or antigen/antibody tests should not be used. In this 3-month-old with failure to thrive, chronic diarrhea, oral candidiasis, lymphadenopathy, and possible perinatal exposure from an untreated mother with no prenatal care, the most likely confirmatory test is **polymerase chain reaction for viral genes** (an HIV RNA or HIV DNA NAT) [1] [2]. A positive virologic test should be confirmed promptly with a repeat virologic test [3].

Why this is the best test

- **HIV NAT (PCR for viral genes)** is the recommended diagnostic approach in infants and children **<18 months** because maternal antibody can persist and make serology unreliable [1] [2].

- The infant's symptoms are compatible with perinatal HIV infection, and age-appropriate HIV testing is recommended even when exposure is not documented but clinical features suggest HIV [1].
- For infants who are breastfeeding or may have ongoing postnatal exposure, serial virologic testing is recommended during breastfeeding and after breastfeeding stops [4].

Answer

D. Polymerase chain reaction for viral genes [1] [2].

References

[1] Use of Antiretroviral Agents in Pediatric HIV Infection
United States Department of Health and Human Services · 2025-09-30 12:00:00
Virologic assays (HIV RNA or HIV DNA nucleic acid tests [NATs]) that directly detect HIV must be used to diagnose HIV in infants and children aged <18 months with perinatal HIV exposure; HIV antibody and HIV antigen/antibody tests should not be used.
https://clinicalinfo.hiv.gov/en/guidelines/pediatric-arv/whats-new-guidelines

[2] Use of Antiretroviral Agents in Pediatric HIV Infection
United States Department of Health and Human Services · 2025-09-30 12:00:00
Age-appropriate HIV testing is also recommended for infants and children with signs and/or symptoms of HIV, even in the absence of documented or suspected HIV exposure.
https://clinicalinfo.hiv.gov/en/guidelines/pediatric-arv/whats-new-guidelines

[3] Use of Antiretroviral Agents in Pediatric HIV Infection
United States Department of Health and Human Services · 2025-09-30 12:00:00
A positive virologic test should be confirmed as soon as possible by a repeat virologic test.
https://clinicalinfo.hiv.gov/en/guidelines/pediatric-arv/whats-new-guidelines

[4] Use of Antiretroviral Agents in Pediatric HIV Infection
United States Department of Health and Human Services · 2025-09-30 12:00:00
For infants with perinatal HIV exposure who are being breastfed, virologic diagnostic testing is recommended at birth, 14 to 21 days, 1 to 2 months, and 4 to 6 months of age; additional testing should be performed at least every 3 months during breastfeeding and at 4 to 6 weeks and 4 to 6 months after cessation of breastfeeding.
https://clinicalinfo.hiv.gov/en/guidelines/pediatric-arv/whats-new-guidelines

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231. MedQA question ID 543 Step 2/3

Question

A 39-year-old man presents to the emergency department complaining of a sharp pain that radiates along his right hemithorax, which worsens with deep inspiration. He says this started abruptly about 6 hours ago. He says that he has not noticed that anything that makes his pain better or worse. He also denies any other symptoms. He works as a long-haul truck driver, and he informs you that he recently returned to the east coast from a trip to Utah. His medical history is significant for gout, hypertension, hypercholesterolemia, diabetes mellitus type 2, and acute lymphoblastic leukemia from when he was a child. He currently smokes 2 packs of cigarettes/day, drinks a 6-pack of beer/day, and he denies any illicit drug use. The vital signs include: temperature 36.7°C (98.0°F), blood pressure 126/74 mm Hg, heart rate 98/min, and respiratory rate 23/min. His physical examination shows minimal bibasilar rales, but otherwise clear lungs on auscultation, normal heart sounds, and a

benign abdominal physical examination. Which of the following is the most reasonable 1st step towards ruling out the diagnosis of pulmonary embolism in a low-risk patient?

(A) ECG

(B) V/Q scan

(C) D-dimer

(D) CT pulmonary angiogram with IV contrast

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The American College of Emergency Physicians (ACEP) recommends using the Pulmonary Embolism Rule-out Criteria (PERC) to exclude PE without further testing in patients with a low pretest probability; if the patient is low risk but does not meet all PERC, the next step is a high-sensitivity D-dimer**, not imaging** [1] [2]. In a stable patient with low or intermediate pretest probability, **CT pulmonary angiography** is not the initial rule-out test, and **V/Q scanning** is generally reserved for patients who cannot undergo CTPA [2] [3].

Best answer

C. D-dimer — assuming the patient is low risk but not PERC-negative. If all PERC criteria are met, **no further diagnostic testing** is needed [1] [4].

Why the other options are not first-line

- **ECG**: may help assess other causes of chest pain but does not rule out PE.
- **V/Q scan**: usually not the first test in a low-risk, hemodynamically stable patient; it is mainly used when **CTPA is contraindicated or unavailable** [2].
- **CT pulmonary angiogram with IV contrast**: used when pretest probability is high or when D-dimer is positive in a non-high-risk patient, not as the initial rule-out test in low-risk patients [2] [3].

References

[1] Adult Patients Presenting to the Emergency Department With Suspected Acute Venous Thromboembolic Disease

American College of Emergency Physicians · 2018-05-01 12:00:00

For patients at low risk for acute PE, use the Pulmonary Embolism Rule-out Criteria (PERC) to exclude the diagnosis without further diagnostic testing. Clinicians should not obtain D-dimer measurements or imaging studies in patients with a low pretest probability of PE and who meet all PERC.

https://www.doi.org/10.1016/j.annemergmed.2018.03.006

[2] Evaluation of Patients With Suspected Acute Pulmonary Embolism

American College of Physicians · 2015-11-01 00:00:00

Clinicians should obtain a high-sensitivity D-dimer measurement as the initial diagnostic test in patients who have an intermediate pretest probability of PE or in patients with low pretest probability of PE who do not meet all Pulmonary

Embolism Rule-Out Criteria. Clinicians should not use imaging studies as the initial test in patients who have a low or intermediate pretest probability of PE.
https://annals.org/aim/fullarticle/2443959/evaluation-patients-suspected-acute-pulmonary-embolism-best-practice-advice-from

[3] Evaluation and Diagnosis of Chest Pain
American College of Cardiology, American College of Chest Physicians, American Heart Association, American Society of Echocardiography, Society of Cardiovascular Computed Tomography · 2021-10-27 00:00:00
For patients with acute chest pain and possible PE, need for further testing should be guided by pretest probability. In stable patients with acute chest pain with high clinical suspicion for PE, CTA using a PE protocol is recommended.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000001029

[4] Managing Pulmonary Embolism
Annals of Emergency Medicine · 2023-02-17
The most commonly used risk stratification tools for PE in the US are the Wells Criteria and the Pulmonary Embolism Rule-out Criteria (PERC). Low-risk patients with suspected PE with one or more PERC criteria should undergo D-dimer testing.
10.1016/j.annemergmed.2023.01.019

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232. MedQA question ID 1041 Step 1

Question

A 3-year-old boy is brought to his pediatrician for evaluation because his parents have been concerned by a number of troubling signs. Specifically, they have noticed that he has been exhibiting aggressive behavior as well as hyperactivity. In addition, he has had intellectual disability and is slow to hit developmental milestones. Physical exam reveals coarse facies, short stature, and joint stiffness. Eye exam reveals no abnormalities of the cornea or lens. Based on these findings, the patient is referred to a geneticist for further evaluation. Which of the following substances would most likely accumulate in the cells of this patient?

(A) Cerebroside sulfate

(B) Galactocerebroside

(C) Heparan sulfate

(D) Sphingomyelin

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Heparan sulfate is the best answer. The child's coarse facies, developmental delay/intellectual disability, short stature, joint stiffness, and aggressive/hyperactive behavior are most consistent with **mucopolysaccharidosis type II (Hunter syndrome)**, which is caused by **iduronate-2-sulfatase deficiency** and leads to accumulation of **dermatan sulfate and heparan sulfate**; among the

choices, **heparan sulfate** is the match [1] [2]. The absence of corneal clouding is also compatible with Hunter syndrome, which classically lacks corneal involvement [1] [2].

Key point

- **Accumulated substrate: heparan sulfate** (also dermatan sulfate in Hunter syndrome) [1] [2].
- **Other options:** cerebroside sulfate = metachromatic leukodystrophy; galactocerebroside = Krabbe disease; sphingomyelin = Niemann-Pick disease [1] [2].

References

[1] Hunter syndrome with late age of presentation: clinical description of a case and review of the literature.
BMJ case reports · 2015-05-14
Hunter syndrome is an X linked recessive mucopolysaccharidosis (type II) caused by the deficiency of iduronate 2-sulfatase, glycosaminoglycans, dermatan and heparan sulfate.
10.1136/bcr-2015-209305

[2] Oxidative stress in patients with mucopolysaccharidosis type II before and during enzyme replacement therapy.
Molecular genetics and metabolism · 2011-06-01
Mucopolysaccharidosis type II is a lysosomal storage disorder caused by deficiency of the enzyme iduronate-2-sulfatase, responsible for the degradation of glycosaminoglycans dermatan and heparan sulfate.
10.1016/j.ymgme.2011.02.016

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233. MedQA question ID 445 Step 2/3

Question

Three days after undergoing a laparoscopic Whipple's procedure, a 43-year-old woman has swelling of her right leg. She does not have pain. She has nausea but has not vomited. She was diagnosed with pancreatic cancer 1 month ago. She has been using an incentive spirometer every 6 hours since recovering from her surgery. Prior to admission, her only medications were a multivitamin and an herbal weight-loss preparation. She appears uncomfortable. Her temperature is 38°C (100.4°F), pulse is 90/min, and blood pressure is 118/78 mm Hg. Examination shows mild swelling of the right thigh to the ankle; there is no erythema or pitting edema. Homan's sign is negative. The abdomen is soft and shows diffuse tenderness to palpation. There are five abdominal laparoscopic incisions with no erythema or discharge. The lungs are clear to auscultation. The remainder of the examination shows no abnormalities. Which of the following is the most appropriate next step in management?

(A) CT pulmonary angiography

(B) Compression ultrasonography

(C) D-dimer level

(D) 2 sets of blood cultures
"

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most appropriate next step is compression ultrasonography of the affected leg (choice B). In a postoperative patient with pancreatic cancer and unilateral leg swelling, the pretest probability for **deep vein thrombosis (DVT)** is high, so **D-dimer should not be used to rule out DVT**, and **proximal compression ultrasonography (or whole-leg ultrasound)** is the recommended initial test [1] [2]. If ultrasound is positive, treat for DVT; if negative but suspicion remains high, further evaluation is needed [1].

Why this is the best next test

- **Compression ultrasonography** is the preferred initial diagnostic study for suspected lower-extremity DVT in patients with high pretest probability [1].
- **D-dimer** is not appropriate as a stand-alone rule-out test in this setting because postoperative cancer patients commonly have elevated values and the American College of Chest Physicians recommends against using it alone when pretest probability is high [1].
- **CT pulmonary angiography** is not the first step here because there are no pulmonary symptoms or signs of PE; the presentation is localized to the leg [1].
- **Blood cultures** are not suggested by the presentation, which lacks a clear infectious source [1] [2].

Clinical context

Cancer, especially **pancreatic cancer**, and recent major surgery both substantially increase venous thromboembolism risk [2]. The American Society of Clinical Oncology notes that incidental and symptomatic VTE in patients with cancer are managed similarly, underscoring the importance of prompt confirmation and treatment when DVT is suspected [2].

References

[1] Diagnosis Of DVT

American College of Chest Physicians · 2012-02-01 00:00:00

In patients with a high pretest probability of first lower extremity DVT, we recommend either proximal CUS or whole-leg US over no testing or venography. We recommend that in patients with high pretest probability, moderately or highly sensitive D-dimer assays should not be used as stand-alone tests to rule out DVT.

https://journal.chestnet.org/article/S0012-3692(12)60128-7/fulltext

[2] Venous Thromboembolism Prophylaxis and Treatment in Patients with Cancer

American Society of Clinical Oncology · 2023-04-19 00:00:00

Venous thromboembolism (VTE), which includes deep vein thrombosis (DVT) and pulmonary embolism (PE), is an important cause of morbidity and mortality among patients with cancer. Patients with cancer are significantly more likely to develop VTE than people without cancer and experience higher rates of VTE recurrence and bleeding complications during VTE treatment. The current update adds apixaban as an option for the treatment of VTE in patients with cancer, and addresses recent evidence regarding direct factor Xa inhibitors for extended postoperative thromboprophylaxis.

https://ascopubs.org/doi/full/10.1200/JCO.23.00294

234. MedQA question ID 750 Step 1

Question

A 34-year-old man with acute lymphocytic leukemia presents for follow-up in the oncology clinic after his second cycle of chemotherapy. In addition to intermittent nausea, he has mild weakness, tingling, and numbness in his left hand. With his affected hand, he is able to grip, but occasionally drops small objects. His oncologist tells him that one of his chemotherapy agents likely caused his neuropathy given its strong association with neurotoxicity. He was recently treated with cyclophosphamide, vincristine, doxorubicin, dexamethasone, and dasatinib. The culprit medication works by which of the following mechanisms of action?

(A) Covalently X-links DNA

(B) Blocks microtubule formation

(C) Intercalates between DNA

(D) Modifies DNA transcription and protein synthesis

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The culprit is most likely vincristine, a vinca alkaloid that causes chemotherapy-induced peripheral neuropathy and works by inhibiting microtubule assembly. In this setting, the correct mechanism is **B. Blocks microtubule formation** [1] [2]. The American Society of Clinical Oncology (ASCO) also identifies **vinca alkaloids** among the major causes of chemotherapy-induced peripheral neuropathy [1].

Why the other choices are less likely

- **A. Covalently cross-links DNA** — characteristic of **cyclophosphamide**.
- **C. Intercalates between DNA** — characteristic of **doxorubicin**.
- **D. Modifies DNA transcription and protein synthesis** — characteristic of **dexamethasone** is not correct; **dexamethasone** is a glucocorticoid, not a classic DNA-targeting cytotoxic agent.

Clinical clue

Mild distal weakness, tingling, numbness, and dropping objects after chemotherapy are typical of **vinca alkaloid neurotoxicity**, which can be dose-limiting and may require dose reduction or stopping the agent if function is impaired [1].

References

[1] Prevention And Management Of Chemotherapy-Induced Peripheral Neuropathy In Survivors Of Adult Cancers

American Society of Clinical Oncology · 2020-07-14 00:00:00

Chemotherapy-induced neuropathy (CIPN) is a serious clinical problem caused by a substantial number of cytotoxic drugs, including taxanes, platinums, vinca alkaloids, epothilones, eribulin, and bortezomib.

https://ascopubs.org/doi/10.1200/JCO.20.01399

[2] Chemotherapy-induced neuropathies-a growing problem for patients and health care providers.

Brain and behavior · 2017-01-01

Chemotherapy-induced neuropathies are one of the most common side effects of cancer treatment. The three most neurotoxic classes of anti-cancer drugs are: platinum-based drugs, taxanes, thalidomide and its analogs, bortezomib, ixabepilone, and vinca alkaloids.

10.1002/brb3.558

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235. MedQA question ID 1009 Step 1

Question

A 45-year-old woman comes to the physician because of a 2-week history of painful ulcers in her mouth. Over the past 2 months, she has had increasing fatigue and difficulties concentrating. She has a history of rheumatoid arthritis and was started on a new medication 4 months ago. Examination shows pallor of the mucosal membranes and three tender ulcerative lesions in her mouth. Her hemoglobin concentration is 8.7 g/dL and mean corpuscular volume is 109 µm3. A blood smear shows hypersegmented neutrophils. Which of the following is the most likely cause of this patient's findings?

(A) Deficient heme synthesis

(B) Deficient erythropoietin secretion

(C) Deficient nitrogenous base production

(D) Deficient β-globin chains

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C) Deficient nitrogenous base production is most likely. In a woman with rheumatoid arthritis who recently started **methotrexate**, the combination of **macrocytic anemia (MCV 109 fL)**, **hypersegmented neutrophils**, fatigue, and painful oral ulcers is most consistent with **folate antagonism** causing impaired DNA synthesis and reduced **purine/nitrogenous base production** rather than heme, erythropoietin, or beta-globin defects [1] [2].

Why this fits

- The **American College of Rheumatology (ACR)** identifies **methotrexate** as a **purine metabolism inhibitor** and recommends **folic/folinic acid** with methotrexate to reduce toxicity [1] [2].
- Folate deficiency impairs cell division, disproportionately affecting rapidly proliferating erythroid precursors, which explains the **macrocytosis** and **hypersegmented neutrophils** [2].
- **Painful oral ulcers** are a classic toxicity clue for methotrexate-related folate depletion [1].

Why the other choices are less likely

- **A) Deficient heme synthesis** would suggest sideroblastic/iron-related problems, not classic megaloblastic anemia.
- **B) Deficient erythropoietin secretion** causes a normocytic anemia, usually in chronic kidney disease.
- **D) Deficient beta-globin chains** causes microcytic anemia, as in thalassemia.

References

[1] Treatment of Rheumatoid Arthritis
American College of Rheumatology · 2021-06-08 00:00:00
Methotrexate (MTX) — Purine metabolism inhibitor — csDMARD.
https://acrjournals.onlinelibrary.wiley.com/doi/10.1002/acr.24596

[2] Safety and benefits of interventions to increase folate status in malaria-endemic areas
British Journal of Haematology · 2017-03-29
Folinic acid (5-formyl-THF; leucovorin), which has similar vitamin activity, is administered in conjunction with methotrexate, an antifolate used in the therapy of cancer and rheumatoid arthritis. Folate deficiency impairs the division of all cells, but disproportionately inhibits the development and propagation of rapidly proliferating cells, such as erythrocyte precursors.
10.1111/bjh.14618

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236. MedQA question ID 1212 Step 2/3

Question

A 47-year-old female presents to her primary physician for follow up after an ED visit for nephrolithiasis 1 week prior. CT scan in the ED revealed a 4-mm stone occluding the right ureter. She was able to pass the stone without assistance over the course of 5 hours. Pathology report on the stone states it was composed of calcium oxalate. She says that the pain of passing the stone was excruciating and asks how she can prevent kidney stones in the future. Which of the following interventions is most likely to prevent renal calculi formation in the future for this patient?

(A) Decreasing calcium intake

(B) Decreasing sodium intake

(C) Increasing consumption of nuts and seeds

(D) Urine acidification with cranberry juice

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Decreasing sodium intake is the best choice for preventing future **calcium oxalate** stone formation. For calcium stone formers, a **low-sodium diet with normal calcium intake** lowers recurrence risk, whereas **restricting calcium can be counterproductive** because adequate calcium in the gut helps bind oxalate and reduce oxalate absorption [1] [2] [3].

Why the other choices are less effective

- **A. Decreasing calcium intake** — not preferred; evidence supports **normal calcium intake** rather than calcium restriction for calcium stone prevention [2] [3].
- **C. Increasing consumption of nuts and seeds** — not a standard preventive strategy for calcium oxalate stones and may increase oxalate intake depending on the food source; no retrieved source supports this as the best intervention.
- **D. Urine acidification with cranberry juice** — not a supported prevention strategy for calcium oxalate stones; no retrieved source supports urine acidification for this purpose.

Key point

The strongest dietary prevention message for this patient is **lower sodium intake** and maintain **adequate/normal calcium intake**, along with general stone-prevention measures such as higher fluid intake [1] [2] [3] [4].

References

[1] Biology of calcium homeostasis regulation in intestine and kidney

Nephrology Dialysis Transplantation · 2024-09-10

Hypercalciuria is the greatest risk factor for nephrolithiasis. The formation of kidney stones is a hereditary trait enhanced by dietary factors.

10.1093/ndt/gfae204

[2] Effect of dietary treatment and fluid intake on the prevention of recurrent calcium stones and changes in urine composition: A meta-analysis and systematic review.

PloS one · 2021-01-01

A systematic review and meta-analysis of randomized controlled trials (RCTs) for the prevention of recurrent calcium stones and changes in urine composition. Low protein with or without fiber does not decrease the recurrence of stone, but low Na, normal Ca diet has a marked effect on reducing recurrence, and fluid intake shows a significant reduction.

10.1371/journal.pone.0250257

[3] Diet and Stone Disease in 2022.

Journal of clinical medicine · 2022-08-13

Diet plays a central role in the development and prevention of nephrolithiasis. Several dietary principles and recommendations for stone prevention are supported by practice guidelines, including adequate fluid intake, modest calcium intake, low dietary sodium, and limited animal protein.

10.3390/jcm11164740

[4] Medical management to prevent recurrent nephrolithiasis in adults: a systematic review for an American College of Physicians Clinical Guideline.
Annals of internal medicine · 2013-04-02
In patients with 1 past calcium stone, increased fluid intake halved the risk of a stone recurrence. Thiazides, citrate, and allopurinol reduced the risk.
10.7326/0003-4819-158-7-201304020-00005

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237. MedQA question ID 1020 Step 1

Question

A 70-year-old man presents with cough and progressively worsening shortness of breath for the last 6 months. He feels short of breath even without exertion and states he ‘got winded’ while walking to his bedroom last night. He describes his cough as non-productive and says he can identify no recognizable triggers. No significant past medical history. The patient is a retired welder and has been living with his son since his wife passed away 5 years ago. He denies any smoking history or current alcohol or drug use. His vital signs include: pulse rate 72/min, respiratory rate 15/min, blood pressure 134/80 mm Hg, and temperature 36.8°C (98.0°F). On physical examination, digital clubbing is noted. Bilateral basilar fine crackles on noted on pulmonary auscultation. Expiratory flow rates are measured and found to be high when corrected for lung volume. A chest X-ray is performed and shown in the image below. Which of the following most likely accounts for the increased expiratory flow rate in this patient?

(A) Anatomical dead space

(B) Lung compliance

(C) Radial traction on airway wall

(D) Small airway wall thickness

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Radial traction on airway wall is the best answer. In fibrotic interstitial lung disease, stiffened lung parenchyma **increases elastic recoil and radial traction on the airways**, which helps keep small airways open during expiration and can produce **relatively high expiratory flow when corrected for lung volume** [1] [2]. This patient’s age, bibasilar fine crackles, clubbing, and nonproductive cough are also classic for pulmonary fibrosis/IPF, for which the American Thoracic Society (ATS) and European Respiratory Society (ERS) recommend HRCT-based evaluation [2].

Why the other choices are less likely

- **Anatomical dead space** does not explain increased expiratory flow rate.

- **Lung compliance** is decreased in fibrosis, which is part of the restrictive process, but the increased flow is due to **greater recoil and radial traction**, not compliance itself [1].
- **Small airway wall thickness** is more relevant to obstructive airway disease and does not account for the classic fibrotic pattern here [1].

References

[1] Technical Standard on Interpretive Strategies for Routine Lung Function Tests
American Thoracic Society, European Respiratory Society · 2021-12-21 12:00:00
Restrictive ventilatory impairments reflect a reduction in the size of the lungs. Obstructive ventilatory impairments involve narrowing of the airways; more proximal airway properties determine airflow resistance at large lung volumes and more distal airway properties determine airflow resistance at small lung volumes and drive flow measurements later in a maximal exhalation.
https://erj.ersjournals.com/content/60/1/2101499

[2] Diagnosis of Idiopathic Pulmonary Fibrosis
American Thoracic Society, European Respiratory Society · 2018-09-03 00:00:00
Adult patients with newly detected interstitial lung disease of apparently unknown cause are clinically suspected of having idiopathic pulmonary fibrosis if they have unexplained symptomatic or asymptomatic bilateral fibrosis on chest radiograph or chest CT scan, bibasilar inspiratory crackles, and an age typically older than 60 years. The recommendations are for images obtained by high-resolution CT imaging and require HRCT of the chest for evaluation.
https://www.atsjournals.org/doi/full/10.1164/rccm.201807-1255ST

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238. MedQA question ID 1154 Step 1

Question

A 68-year-old postmenopausal woman presents to the clinic for a dual-energy X-ray absorptiometry (DEXA) scan. The patient states that she has mild joint pain, which she attributes to osteoarthritis, but she notes no recent fractures. She says that her mother had osteoporosis and she is concerned that she may develop it as well. She takes calcium and vitamin D supplements daily. After review of her DEXA scan, her physician states that she has osteopenia. Which of the following is this patient's most likely DEXA scan result?

(A) T-score of 1.2

(B) T-score of -0.8

(C) Z-score of -2.0

(D) T-score of -1.6

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most likely DEXA result is a T-score of −1.6 (choice D). The American Association of Clinical Endocrinologists (AACE) and the North American Menopause Society (NAMS) define **osteopenia/low bone mass as a T-score between −1.0 and −2.5**, using the **lowest T-score** at the lumbar spine, total hip, or femoral neck for categorization [1] [2] [3]. A **T-score of −0.8** is normal, **1.2** is normal/above average, and **Z-scores** are used mainly to compare bone density with age- and sex-matched peers rather than to diagnose postmenopausal osteopenia [4].

Why the other choices are not correct

- **1.2**: not osteopenia; it is a normal T-score range.
- **−0.8**: still normal, because osteopenia starts at **−1.0**.
- **−1.6**: fits the definition of **osteopenia**.
- **−2.0 Z-score**: not the usual diagnostic metric for a postmenopausal woman's osteopenia diagnosis; **T-score** is used for diagnosis in this setting [1] [2] [4].

References

[1] Diagnosis and Treatment of Postmenopausal Osteoporosis

American Association of Clinical Endocrinologists · 2020-03-02 00:00:00

Osteoporosis may also be diagnosed in patients with a T-score between −1.0 and −2.5 and increased fracture risk using FRAX® (fracture risk assessment tool) country-specific thresholds.

https://www.endocrinepractice.org/article/S1530-891X(20)35037-0/fulltext

[2] Management of Osteoporosis in Postmenopausal Women: 2021 Position Statement

North American Menopause Society · 2021-08-31 12:00:00

Use DXA as the preferred technique for BMD testing and the lowest T-scores at the LS, TH, or FN for diagnostic categorization.

https://menopause.org/wp-content/uploads/professional/2021-osteoporosis-position-statement_577e5813-cdfa-4d5f-a7f2-3c3f3ec0e4c9.pdf

[3] Dual-Energy X-Ray Absorptiometry

Canadian Society of Endocrinology and Metabolism · 2024-09-24 00:00:00

In accordance with the established WHO operational definition, osteoporosis is diagnosed based on a T-score of −2.5 or lower in the lumbar spine, femoral neck, total hip, or one-third radius. The lowest T-score at any of these measured sites should be used for diagnosis.

https://link.springer.com/article/10.1007/s00259-024-06912-6#Abs1

[4] Use of dual-energy X-ray absorptiometry (DXA) for diagnosis and fracture risk assessment; WHO-criteria, T- and Z-score, and reference databases.

Bone · 2017-11-01

Dual-energy X-ray absorptiometry (DXA) is a two-dimensional imaging technology developed to assess bone mineral density (BMD) of the entire human skeleton and specifically of skeletal sites known to be most vulnerable to fracture. DXA is still the globally accepted "gold-standard" method for the noninvasive diagnosis of osteoporosis. Another score obtained from DXA measurement, called Z-score, describes the number of SDs by which the BMD differs from the mean value expected for age and sex.

10.1016/j.bone.2016.12.016

239. MedQA question ID 605 Step 2/3

Question

A 25-year-old man is brought to the emergency department by police. He was found at a local celebration acting very strangely and was reported by other patrons of the event. The patient is very anxious and initially is hesitant to answer questions. He denies any substance use and states that he was just trying to have a good time. The patient's responses are slightly delayed and he seems to have difficulty processing his thoughts. The patient tells you he feels very anxious and asks for some medication to calm him down. The patient has a past medical history of psoriasis which is treated with topical steroids. His temperature is 99.5°F (37.5°C), blood pressure is 120/75 mmHg, pulse is 110/min, respirations are 15/min, and oxygen saturation is 99% on room air. On physical exam, you note an anxious young man. HEENT exam reveals a dry mouth and conjunctival injection. Neurological exam reveals cranial nerves II-XII as grossly intact with normal strength and sensation in his upper and lower extremities. Cardiac exam reveals tachycardia, and pulmonary exam is within normal limits. Which of the following is the most likely intoxication in this patient?

(A) Alcohol

(B) Marijuana

(C) Cocaine

(D) Phencyclidine

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Marijuana is the most likely intoxication. The patient's **anxiety, delayed thinking/altered processing, tachycardia, dry mouth, and conjunctival injection** fit **acute cannabis intoxication** better than alcohol, cocaine, or phencyclidine (PCP); the American Society of Regional Anesthesia and Pain Medicine notes that acute cannabis intoxication can cause **altered mental status and impairment of decision-making capacity** [1], and cannabis can produce **anxiety, psychotomimetic symptoms, and tachycardia** [2].

Why not the other choices

- **Alcohol** would more typically cause slurred speech, ataxia, and more prominent CNS depression rather than conjunctival injection with dry mouth.
- **Cocaine** usually causes a more marked sympathomimetic picture, often with hypertension, mydriasis, diaphoresis, and severe agitation [3].
- **PCP** classically causes nystagmus, hypertension, and psychomotor agitation; a case series found retrograde amnesia, nystagmus, hypertension, and agitation to be common [4].

Most decision-relevant clue

The combination of **red/injected eyes**, **dry mouth**, **anxiety/paranoia**, and **tachycardia** in a young adult after a celebration is most consistent with **marijuana intoxication** [1] [2].

References

[1] Management of the Perioperative Patient on Cannabis and Cannabinoids
American Society of Regional Anesthesia and Pain Medicine · 2023-01-02 12:00:00
Statement 1: Acute effects of cannabis use can result in altered mental status and impairment of decision-making capacity. Hence, the frequency and the timing of the last dose of cannabis usage are important.
https://rapm.bmj.com/content/early/2023/01/05/rapm-2022-104013

[2] Impairment of inhibitory control processing related to acute psychotomimetic effects of cannabis.
European Neuropsychopharmacology · 2015-01-01
Cannabis use can induce acute psychotic symptoms and increase the risk of schizophrenia. The main psychoactive ingredient of cannabis, delta-9-THC, caused transient psychotic symptoms, anxiety, intoxication and sedation, inhibition errors and impaired inhibition efficiency under the influence of THC.
10.1016/j.euroneuro.2014.11.018

[3] Cocaine-induced agitated delirium: a case report and review.
Journal of Intensive Care Medicine · 2015-01-01
The symptoms of cocaine intoxication include tachycardia, arterial vasoconstriction, enhanced thrombus formation, mydriasis, psychomotor agitation, and altered level of consciousness. At the extreme end of this toxidrome, cocaine-induced agitated delirium, is characterized by severe cardiopulmonary dysfunction, hyperthermia, and acute neurologic changes frequently leading to death.
10.1177/0885066613507420

[4] Phencyclidine Intoxication Case Series Study.
Journal of Medical Toxicology · 2015-09-01
The prevalent clinical symptoms were retrograde amnesia, nystagmus, hypertension, and psychomotor agitation.
10.1007/s13181-014-0453-9

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240. MedQA question ID 667 Step 2/3

Question

A 40-year-old patient is brought into the emergency department after suffering a motor vehicle crash where he was pinned underneath his motorcycle for about 30 minutes before a passerby called 911. While evaluating him per your institution's trauma guidelines, you discover pain upon palpation of his right lower extremity which is much larger than his left counterpart. The patient admits to decreased sensation over his right lower extremity and cannot move his leg. There are no palpable dorsalis pedis or posterior tibial pulses on this extremity, and it is colder and paler in comparison to his left side. Measured compartment pressure of his distal right leg is 35 mm Hg. What is the next best step in this patient's care?

(A) Emergent fasciotomy

(B) Venous doppler

(C) Arteriogram

(D) External fixation

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Emergent fasciotomy is the next best step. The American Academy of Orthopaedic Surgeons (AAOS) states that acute compartment syndrome is a surgical emergency, that **fasciotomy** relieves compartment pressure, and that **absent pulses are a late sign**; intracompartmental pressure monitoring assists diagnosis, but a clinical picture of ischemia with a measured pressure of **35 mm Hg** is already highly concerning here [1] [2]. Venous Doppler and arteriogram do not treat the compartment syndrome, and external fixation is only relevant if fracture stabilization is needed alongside definitive compartment decompression [1] [3].

Why this is the right step

- The limb findings are classic for **advanced acute compartment syndrome**: severe pain, tense swollen leg, sensory loss, motor deficit, pallor, poikilothermia, and absent pulses [1] [3].
- **Fasciotomy is the definitive treatment** to prevent permanent nerve and muscle injury [1] [2].
- If there is a concomitant fracture, stabilization can be done, but it should not delay decompression; in this scenario, **decompression takes priority** [1] [4].

Why the other options are not best

- **Venous Doppler**: evaluates venous thrombosis, not compartment syndrome.
- **Arteriogram**: may assess vascular injury, but it does not address the limb-threatening compartment pressure and should not delay decompression when ACS is evident.
- **External fixation**: may be used for fracture stabilization, but AAOS notes fasciotomy is the treatment for acute compartment syndrome; fixation is adjunctive when a fracture is present [1] [4].

References

[1] Management of Acute Compartment Syndrome

American Academy of Orthopaedic Surgeons · 2025-11-18 12:00:00

- Acute compartment syndrome is a medical emergency where pressure inside a muscle compartment is so high that it may cut off blood flow to the nerves and muscle.
- Symptoms of acute compartment syndrome include:
  - Pain that is more severe than expected for the injury
  - A muscle that bulges or is tight or firm
  - Numbness and tingling
  - Weak or absent pulses (although this is a late sign).
- Early diagnosis is essential to prevent permanent damage.

https://www.aaos.org/globalassets/quality-and-practice-resources/acute-compartment-syndrome/2025-acs-rapid-update/acs-cpg-2025.pdf

[2] Management of Acute Compartment Syndrome

American Academy of Orthopaedic Surgeons · 2025-11-18 12:00:00

- Fasciotomy is a surgical treatment for acute compartment syndrome. It involves cutting the fascia (casing around the muscle compartment) to relieve pressure and prevent permanent nerve and muscle damage.

https://www.aaos.org/globalassets/quality-and-practice-resources/acute-compartment-syndrome/2025-acs-rapid-update/acs-cpg-2025.pdf

[3] Acute Compartment Syndrome of the Lower Leg: A Review.
The Journal for Nurse Practitioners · 2016-04-01
Acute compartment syndrome (ACS) of the lower leg is a time-sensitive orthopedic emergency. Hallmark symptoms of ACS include pain, poikilothermia, pallor, paresthesia, pulselessness, and paralysis. The definitive treatment of ACS is timely fasciotomy.
10.1016/j.nurpra.2015.10.013

[4] Management of Acute Compartment Syndrome
American Academy of Orthopaedic Surgeons · 2025-11-18 12:00:00
- Limited evidence supports that operative fixation (external or internal) be performed for initial stabilization of long bone fractures with concomitant acute compartment syndrome requiring fasciotomy.
https://www.aaos.org/globalassets/quality-and-practice-resources/acute-compartment-syndrome/2025-acs-rapid-update/acs-cpg-2025.pdf

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241. MedQA question ID 1160 Step 2/3

Question

A 31-year-old female patient presents with significant swelling and redness of her fingers that is causing her significant pain. Her right knee has also been stiff and slightly swollen for the past 6 weeks. She is overall fatigued and has difficulty moving around but has not sought medical attention until now. On physical examination, the distal interphalangeal joints are swollen, warm, and painful; her nails are pitted and cracked. There are also rough, erythematous skin patches seen over her elbows which have been present for the last few months. She reports that herer father has a similar condition. They both use hydrating creams and topical glucocorticoids with moderate benefit. Which of the following is the most likely diagnosis?

(A) Gout

(B) Reactive arthritis

(C) Psoriatic arthritis

(D) Dermatomyositis

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Psoriatic arthritis is the most likely diagnosis. The combination of **distal interphalangeal (DIP) joint inflammation**, **nail pitting/cracking**, **psoriatic skin plaques**, and a **family history of psoriasis/PsA** is classic for psoriatic arthritis; the **European League Against Rheumatism (EULAR)** notes that nail involvement and peripheral arthritis are important poor prognostic/diagnostic clues, and the **American Academy of Dermatology/National Psoriasis Foundation**

recommends that psoriatic arthritis be considered in patients with cutaneous psoriasis and fully evaluated when symptoms are suspicious [1] [2].

Why the other choices are less likely

- **Gout** usually presents as acute monoarthritis, classically the first metatarsophalangeal joint, not chronic DIP arthritis with psoriasis-like plaques [3].
- **Reactive arthritis** is typically triggered by a preceding GI/GU infection and is not characterized by psoriatic plaques and nail pitting [4].
- **Dermatomyositis** causes proximal muscle weakness and characteristic heliotrope/Gottron findings, not inflammatory DIP arthritis with psoriatic skin/nail disease [5].

Diagnostic pattern in this case

Findings that strongly favor PsA include:

- **DIP joint involvement**
- **Nail dystrophy/pitting**
- **Inflammatory arthritis** with stiffness and swelling
- **Psoriatic skin lesions** over extensor surfaces
- **Positive family history**

These features are well-described in psoriatic arthritis reviews and diagnostic summaries, including association with peripheral arthritis, dactylitis, enthesitis, and nail disease [3] [6] [7].

References

[1] Management of Psoriatic Arthritis with Pharmacological Therapies

European League Against Rheumatism (EULAR) · 2024-05-24 00:00:00

- Psoriatic arthritis is a heterogeneous and potentially severe disease, which may require multidisciplinary treatment.
- Treatment of psoriatic arthritis patients should aim at the best care and must be based on a shared decision between the patient and the rheumatologist, considering efficacy, safety, patient preferences and costs.
- Rheumatologists are the specialists who should primarily care for the musculoskeletal manifestations of patients with psoriatic arthritis; in the presence of clinically relevant skin involvement, a rheumatologist and a dermatologist should collaborate in diagnosis and management.
- The primary goal of treating patients with psoriatic arthritis is to maximise health-related quality of life, through control of symptoms, prevention of structural damage, normalisation of function and social participation; abrogation of inflammation is an important component to achieve these goals.
- In managing patients with psoriatic arthritis, consideration should be given to each musculoskeletal manifestation and treatment decisions made accordingly.
- When managing patients with psoriatic arthritis, non-musculoskeletal manifestations (particularly skin, eye and gastrointestinal tract) should be taken into account; comorbidities such as obesity, metabolic syndrome, cardiovascular disease or depression should also be considered.
- The choice of treatment should take account of safety considerations regarding individual modes of action to optimise the benefit–risk profile.

https://ard.bmj.com/content/83/6/706

[2] Treatment of Psoriatic Arthritis

American College of Rheumatology, National Psoriasis Foundation · 2018-11-30 00:00:00

- Psoriatic arthritis is often associated with psoriasis, a skin condition that causes red patches with silvery scales. Most people with psoriatic arthritis have psoriasis, but the skin rash usually appears years before the joint problems. However, some people may experience joint pain before or at the same time as the skin rash.

https://onlinelibrary.wiley.com/doi/full/10.1002/acr.23789

[3] Clinical Features and Diagnostic Considerations in Psoriatic Arthritis.

Rheumatic diseases clinics of North America · 2015-11-01

Psoriatic arthritis is an inflammatory musculoskeletal disease affecting almost a third of patients with psoriasis. Clinical presentations are complex and varied and include peripheral arthritis, axial disease, dactylitis, and enthesitis. Specific clinical and imaging features distinguish psoriatic arthritic from other forms of arthritis.
10.1016/j.rdc.2015.07.003

[4] Psoriatic arthritis and psoriasis: differential diagnosis.
Clinical rheumatology · 2016-08-01
Psoriatic arthritis and psoriasis: differential diagnosis.
10.1007/s10067-016-3295-9

[5] Distinguishing rheumatoid arthritis from psoriatic arthritis.
RMD open · 2018-01-01
Rheumatoid arthritis (RA) and psoriatic arthritis (PsA) have key differences in clinical presentation, radiographic findings, comorbidities and pathogenesis to distinguish between these common forms of chronic inflammatory arthritis. Joint involvement is typically asymmetric in PsA, while it is predominantly symmetric in RA.
10.1136/rmdopen-2018-000656

[6] Disease activity assessment in patients with psoriatic arthritis.
Best practice & research. Clinical rheumatology · 2018-06-01
Psoriatic Arthritis is an inflammatory disease in patients with a personal or family history of psoriasis. Synovitis is the major hallmark of PsA. Enthesitis, dactylitis, axial inflammation, and skin and nail involvement are variable in prevalence and severity. Assessment of disease activity is important to determine the treatment target and early response to therapy.
10.1016/j.berh.2018.08.004

[7] Management and Treatment of Psoriasis with Awareness and Attention to Comorbidities
American Academy of Dermatology, National Psoriasis Foundation · 2019-02-01 12:00:00
- This patient summary focuses on the pharmacologic and nonpharmacologic treatment of psoriatic arthritis (PsA).
- PsA should be considered in all patients with cutaneous psoriasis.
- Patients with signs and symptoms suspicious for PsA should be fully evaluated for PsA. Initiate appropriate PsA therapy if comfortable with the diagnosis or otherwise consult with a rheumatologist for assessment and management.
https://www.jaad.org/article/S0190-9622(18)33002-0/fulltext

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242. MedQA question ID 1245 Step 2/3

Question

A 79-year-old woman comes to the physician for the evaluation of a 2-month history of a non-productive cough and fatigue. During this period, she also has had a 4.5-kg (10-lb) weight loss and has become increasingly short of breath with mild exertion. She has congestive heart failure and hypertension. Three months ago, she was in India for 3 weeks to attend a family wedding. She worked as a seamstress in a textile factory for 50 years. She has smoked one pack of cigarettes daily for 47 years. Her current medications include enalapril, digoxin, isosorbide, spironolactone, and metoprolol. She appears thin. Her temperature is 37.0°C (98.6°F), pulse is 90/min, respirations are 25/min, and blood pressure is 110/70 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 94%. There is dullness to percussion and decreased breath sounds over the right lung base. The remainder of the examination shows no abnormalities. Laboratory studies show a glucose level of 90 mg/dL, serum lactate dehydrogenase of 227 U/L, and serum protein of 6.3 g/dL. An x-ray of the chest shows nodular pleural lesions on the right side and a moderate-sized pleural effusion. Thoracentesis shows 250 ml of turbid fluid. Analysis of the pleural fluid aspirate shows:
Erythrocyte count 1/mm3
Leukocyte count 4,000/mm3
Glucose 59 mg/dl

Lactate dehydrogenase 248 U/L
Protein 3.8 g/dL
Which of the following is the most likely underlying cause of this patient's effusion?"

(A) Bronchial adenocarcinoma

(B) Mesothelioma

(C) Nephrotic syndrome

(D) Congestive heart failure

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Mesothelioma is the most likely underlying cause. This patient has a **unilateral exudative pleural effusion** with **nodular pleural lesions** and a strong occupational exposure history; asbestos-related pleural disease classically includes pleural effusion and **malignant pleural mesothelioma**, which often presents after a long latency [1] [2]. The pleural fluid profile supports an exudate by Light's criteria (pleural/serum protein ratio > 0.5 and pleural/serum LDH ratio > 0.6), making **congestive heart failure** much less likely [2].

Why mesothelioma fits best

- **Pleural nodularity** on imaging is much more concerning for pleural malignancy than for CHF.
- **Turbid exudative fluid** with elevated leukocytes and low glucose is compatible with malignant pleural disease.
- The history of **occupational textile-factory exposure** raises concern for possible asbestos exposure, a classic risk factor for mesothelioma [2].

Why the other options are less likely

- **Bronchial adenocarcinoma** can cause malignant pleural effusion, but the combination of **nodular pleural lesions** and asbestos-related exposure is more suggestive of mesothelioma.
- **Nephrotic syndrome** and **congestive heart failure** typically cause **transudative** effusions, not an exudate by Light's criteria [2].

Answer: B. Mesothelioma.

References

[1] Treatment of Malignant Pleural Mesothelioma
American Society of Clinical Oncology · 2025-01-08 00:00:00
(Updated) In the absence of a confirmed diagnosis of mesothelioma, mesothelioma in situ should be considered in the differential diagnosis of recurrent unilateral pleural effusion. In the appropriate clinical setting additional testing (BAP1 and MTAP IHC) should be performed.
https://ascopubs.org/doi/10.1200/JCO-24-02425

[2] Asbestos-related pleural disease.
Current opinion in pulmonary medicine · 2012-07-01

Asbestos-related pleural disease includes pleural plaques, diffuse pleural thickening, benign pleural effusions, and malignant pleural mesothelioma.
10.1097/mcp.0b013e328354acfe

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243. MedQA question ID 296 Step 1

Question

A 52-year-old fisherman presents to the clinic for an evaluation of a pigmented lesion on his neck. He states that he first noticed the lesion last year, but he believes that it has been slowly growing in size. Dermatopathology determines that the lesion contains neoplastic cells of melanocytic origin. Which of the following characteristics of the lesion would likely be found on physical examination?

(A) Brown-black color in one area of the lesion to red-white in a different area

(B) Macule that is 5mm in diameter

(C) Well-circumscribed papule with smooth borders

(D) Itching and pain to palpation

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The lesion most consistent with melanoma would show color variegation, so the best answer is A. Melanoma classically presents as an **asymmetric** pigmented lesion with **irregular shape/borders** and **multiple colors**; the ABCDE criteria emphasize **color variation** and **evolution** as key warning signs, and melanomas are also often larger than **6 mm** [1] [2]. A small, well-circumscribed, uniformly colored papule is more suggestive of a benign nevus than melanoma [1] [2].

Why A is correct

- **A. Brown-black color in one area of the lesion to red-white in a different area** — this is **color variegation**, a classic melanoma feature [1] [2].
- **B. Macule that is 5 mm in diameter** — melanoma is more suspicious when it is **> 6 mm**; 5 mm alone is less supportive [1].
- **C. Well-circumscribed papule with smooth borders** — this favors a benign melanocytic nevus rather than melanoma [1] [2].
- **D. Itching and pain to palpation** — symptoms can occur, but they are **not the most characteristic physical-exam finding** for melanoma compared with asymmetry and color variation [1] [2].

References

[1] Enhanced classification of malignant melanoma lesions via the integration of physiological features from dermatological photographs.

Annual International Conference of the IEEE Engineering in Medicine and Biology Society. IEEE Engineering in Medicine and Biology Society. Annual International Conference · 2014-01-01

Traditional methods for early detection of melanoma rely on a dermatologist to visually assess a skin lesion using ABCDE (Asymmetry, Border irregularity, Color variegation, Diameter, Evolution) criteria before confirmation can be done through biopsy by a pathologist.

10.1109/embc.2014.6945106

[2] Emerging imaging technologies in dermatology

Journal of the American Academy of Dermatology · 2018-12-04

Differentiating melanocytic nevi from melanomas represents a diagnostic challenge. The most useful features for melanomas include tumor thickness, prominent vascularity, irregular shape, and dermal invasion.

10.1016/j.jaad.2018.11.043

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244. MedQA question ID 76 Step 2/3

Question

A 62-year old female comes to the physician because of vaginal spotting and urinary urgency for the past 4 days. She has had no fever, abdominal pain, or diarrhea. Menopause occurred at 52 years of age. Her last Pap smear 1 year ago was normal. She has hypertension, hypercholesterolemia, and diabetes. Medications include atorvastatin, hydrochlorothiazide, metformin, and aspirin. She is sexually active with her husband. Her temperature is 37°C (98.6°F), pulse is 95/min, respirations are 12/min, and blood pressure is 155/65 mm Hg. Pelvic exam demonstrates a 4 x 3 cm firm, immobile erythematous mass on the right inner vaginal wall. Which of the following is the most appropriate next step in management?

(A) Pap smear

(B) Biopsy of the mass

(C) Incision and drainage

(D) Urine gonorrhea and chlamydia testing

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Biopsy of the mass is the most appropriate next step. The **European Society for Radiotherapy and Oncology (ESTRO) / European Society of Gynaecological Oncology (ESGO)** guideline states that a **histological diagnosis should be made before any treatment** for suspected vaginal cancer, and pelvic/vaginal examination is the first diagnostic step [1] [2]. A normal Pap smear 1 year

ago does **not** exclude a new vaginal malignancy, and a firm, immobile vaginal mass in a postmenopausal woman warrants tissue diagnosis rather than empiric drainage or STI testing [1] [2].

Why the other options are not best

- **Pap smear**: screening cytology is not adequate for diagnosing a visible suspicious vaginal mass; **biopsy is required** [1] [2].
- **Incision and drainage**: the lesion is firm and immobile, which is not typical for a simple abscess; the recommended first step is tissue diagnosis [1] [2].
- **Urine gonorrhea and chlamydia testing**: urinary urgency can occur with many processes, but the mass itself is the priority and should be biopsied [1] [2].

Practical next step

- Arrange **biopsy of the vaginal mass** for histologic confirmation.
- If the lesion proves malignant, proceed with staging imaging as indicated (eg, MRI for local extent and CT chest/abdomen/pelvis for spread) [1].

References

[1] Management of Patients with Vaginal Cancer
European Society for Radiotherapy and Oncology, European Society of Gynaecological Oncology · 2023-08-07 12:00:00
A histological diagnosis should be made before undertaking any treatment. Pelvic and vaginal examination is the first step in the diagnosis of vaginal cancer.
https://www.international-journal-of-gynecological-cancer.com/article/S1048-891X(24)01673-6/fulltext

[2] Management of Patients with Vaginal Cancer
European Society for Radiotherapy and Oncology, European Society of Gynaecological Oncology · 2023-08-07 12:00:00
A histological diagnosis should be made before undertaking any treatment. Pelvic and vaginal examination is the first step in the diagnosis of vaginal cancer.
https://www.international-journal-of-gynecological-oncology.com/article/S1048-891X(24)01673-6/fulltext

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245. MedQA question ID 440 Step 2/3

Question

A 12-year-old boy is brought to the emergency department for the evaluation of persistent bleeding from his nose over the past hour. The bleeding started spontaneously. He has no history of a similar episode. He takes no medications. There is no history of abnormal bleeding in the family. His vital signs are within normal limits. On examination, he is pressing a gauze against his left nostril while hyperextending his head. The gauze is stained with blood and upon withdrawal of the gauze blood slowly drips out of his left nostrils. There is no bleeding from the right nostril. The remainder of the physical examination shows no abnormalities. Which of the following is the most appropriate initial therapy?

(A) Anterior packing and topical antibiotics

(B) Oxymetazoline nasal spray

(C) Placement of an epinephrine gauze in the left nostril

(D) Squeezing the nostrils manually for 10 minutes with the head elevated

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The American Academy of Otolaryngology–Head and Neck Surgery Foundation (AAO-HNSF) recommends firm sustained compression to the lower third of the nose for at least 5 minutes as the initial treatment for active epistaxis [1]. For this child with uncomplicated spontaneous anterior bleeding, the best initial therapy is **D. squeezing the nostrils manually for 10 minutes with the head elevated**; the key evidence-based step is sustained nasal compression, while topical vasoconstrictors or packing are typically used if bleeding persists or a bleeding site is identified [1] [2].

Practical point

- **First-line:** firm, sustained compression of the soft lower nose.
- **If bleeding continues despite compression:** consider a topical vasoconstrictor and/or identify the site for cautery; **nasal packing** is reserved for ongoing bleeding when a bleeding site cannot be identified despite compression [1] [2].
- **Anterior packing with topical antibiotics** is not the initial step for a stable child with a first episode of spontaneous epistaxis [1].

References

[1] Nosebleed (Epistaxis)
American Academy of Otolaryngology - Head and Neck Surgery Foundation · 2020-01-07 00:00:00
The clinician should treat active bleeding for patients in need of prompt management with firm sustained compression to the lower third of the nose, with or without the assistance of the patient or caregiver, for five minutes or longer.
https://aao-hnsfjournals.onlinelibrary.wiley.com/doi/10.1177/0194599819890327

[2] Nosebleed (Epistaxis)
American Academy of Otolaryngology - Head and Neck Surgery Foundation · 2020-01-07 00:00:00
For patients in whom bleeding precludes identification of a bleeding site despite nasal compression, the clinician should treat ongoing active bleeding with nasal packing.
https://aao-hnsfjournals.onlinelibrary.wiley.com/doi/10.1177/0194599819890327

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246. MedQA question ID 102 Step 2/3

Question

The patient is given prophylactic labetalol and magnesium sulfate. Examination shows absent deep tendon reflexes bilaterally. Which of the following is the most appropriate next step in the management of this patient?

(A) Stop magnesium sulfate and give calcium gluconate

(B) Stop labetalol

(C) Stop magnesium sulfate and give lorazepam

(D) Perform nerve conduction studies

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Stop the magnesium sulfate and give IV calcium gluconate; absent deep tendon reflexes are a classic sign of **magnesium toxicity**, so the next step is to discontinue the infusion and administer the antidote rather than stop labetalol or pursue neurodiagnostic testing [1] [2]. **Lorazepam** is not the appropriate treatment for magnesium toxicity. If respiratory depression, oliguria, or worsening mental status are present, additional supportive care and magnesium level assessment are also warranted [1] [2].

Why this is the best next step

- The **American College of Obstetricians and Gynecologists (ACOG)** recommends magnesium sulfate for seizure prophylaxis in severe preeclampsia/eclampsia, but toxicity must be recognized promptly when exam findings suggest overexposure [1].
- A published review of magnesium sulfate adverse effects identifies **calcium gluconate** as the rescue treatment used for magnesium toxicity, consistent with standard obstetric management [2].

Why the other options are not preferred

- **Stopping labetalol** does not address absent reflexes due to magnesium toxicity [1].
- **Lorazepam** treats active seizures, not magnesium toxicity [1] [2].
- **Nerve conduction studies** are not the urgent management step in a patient with a clear bedside sign of magnesium excess [1].

References

[1] Gestational Hypertension and Preeclampsia

American College of Obstetricians and Gynecologists · 2019-01-01 12:00:00

Magnesium sulfate should be used for the prevention and treatment of seizures in women with gestational hypertension and preeclampsia with severe features or eclampsia.

https://journals.lww.com/greenjournal/Fulltext/2019/01000/ACOG_Practice_Bulletin_No__202__Gestational.49.aspx

[2] An integrative review of the side effects related to the use of magnesium sulfate for pre-eclampsia and eclampsia management.

BMC Pregnancy and Childbirth · 2013-02-05

Magnesium sulfate is the drug of choice for prevention of seizures as part of comprehensive management of the disease. Calcium gluconate was administered at an overall rate of less than 0.2%.

10.1186/1471-2393-13-34

247. MedQA question ID 167 Step 2/3

Question

A 43-year-old woman is brought to the emergency department by her brother for severe chest pain. The patient recently lost her husband in a car accident and is still extremely shocked by the event. On physical examination, her blood pressure is 105/67 mm Hg, the heart rate is 96/min and regular, breathing rate is 23/min, and the pulse oximetry is 96%. An S3 heart sound and rales in the lower right and left lung lobes are heard. A 12-lead ECG shows no significant findings. Echocardiography shows an enlarged left ventricle and left atrium. The patient is stabilized and informed about the diagnosis and possible treatment options. Which of the following is the most likely diagnosis?

(A) Atrial fibrillation

(B) Constrictive pericarditis

(C) Takotsubo cardiomyopathy

(D) Restrictive cardiomyopathy

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Takotsubo cardiomyopathy is the most likely diagnosis. The **American College of Cardiology/ American Heart Association** chest pain guidance notes that acute emotional stress can trigger ischemic-like symptoms, and when acute epicardial coronary disease is not evident, **stress cardiomyopathy** should be considered [1]. The presentation here strongly fits Takotsubo: severe emotional stress after bereavement, chest pain, nondiagnostic ECG, and acute heart-failure findings on exam.

Why the other options are less likely

- **Atrial fibrillation** would usually produce an irregularly irregular pulse and ECG abnormalities; the pulse is regular and the ECG is unrevealing.
- **Constrictive pericarditis** typically causes right-sided heart failure physiology and pericardial findings, not this acute stress-triggered presentation.
- **Restrictive cardiomyopathy** is usually suggested by **biatrial enlargement with nondilated ventricles** and a chronic restrictive phenotype, rather than an acute emotional trigger; it is a different pattern from the echo findings given here [2].

Key point

The most important discriminator is the **acute emotional stressor with new chest pain and no ECG ischemic changes**, which is classic for **Takotsubo cardiomyopathy** [1] [3].

References

[1] Multimodality Imaging in Evaluation of Cardiovascular Complications in Patients With COVID-19
Journal of the American College of Cardiology · 2020-07-22
If acute epicardial CAD is ruled out or the suspicion for ACS is low, it is reasonable to consider further evaluation for myocarditis or stress cardiomyopathy.
10.1016/j.jacc.2020.06.080

[2] Restrictive cardiomyopathy: definition and diagnosis
European Heart Journal · 2022-10-21
The first clue of restrictive pathophysiology is the combination of biatrial enlargement (which cannot be attributed to specific causes such as valve disease or AF), normal or mildly reduced LV and RV ejection fraction and non-dilated ventricles.
10.1093/eurheartj/ehac543

[3] Pathophysiology of takotsubo syndrome: temporal phases of cardiovascular responses to extreme stress.
Circulation journal : official journal of the Japanese Circulation Society · 2014-01-01
Takotsubo syndrome is an acute heart failure syndrome that typically occurs after a period of great emotional stress. The archetypal patient is a postmenopausal woman with chest pain and acute hypokinesia of the apical and middle segment of the left ventricle.
10.1253/circj.cj-14-0623

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248. MedQA question ID 976 Step 2/3

Question

A 25-year-old, G2P2L2 woman presents with a complaint of missed menstrual cycle for 4 weeks. Her previous menstrual cycles were regular, occurring every 28–35 days consistently. The patient does not have any other complaints currently. Her past medical history reveals two uncomplicated and normal vaginal deliveries at term. She has a 2-year-old boy and a 6-month-old girl. The patient and her partner use the withdrawal method for contraception. The urine pregnancy test result is positive. The patient returns to the clinic after 1 week expressing her desire to discontinue with the pregnancy and inquires about the possibility of an elective abortion. Which of the following procedures is the most appropriate for elective termination of pregnancy in this patient?

(A) Dilatation and evacuation (D&E)

(B) Oxytocin-induced labor

(C) Manual uterine aspiration

(D) Oral mifepristone + misoprostol

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Oral mifepristone plus misoprostol is the most appropriate option here. The **American College of Obstetricians and Gynecologists (ACOG)** states that most patients at **70 days of gestation or**

less are eligible for medication abortion, and **combined mifepristone–misoprostol regimens are the preferred therapy** because they are more effective than misoprostol alone [1] [2] [3]. At an estimated gestation of about **5 weeks**, **manual uterine aspiration** would also be a reasonable alternative, but **D&E** and **oxytocin-induced labor** are not appropriate for this early gestation [1] [3].

Why this choice fits the case

- The patient has a **very early intrauterine pregnancy by history** and wants elective termination.
- ACOG recommends confirming pregnancy and estimating gestational age before medication abortion, but with a **certain last menstrual period within 56 days** and no ectopic-risk symptoms/signs, routine ultrasound is not required [2].
- WHO abortion care guidance supports **cervical priming for later surgical abortions**; procedures like **D&E** are generally used in later gestations, not at approximately 5 weeks [4].

Practical take-home

- **Best answer: (D) Oral mifepristone + misoprostol**.
- **Manual uterine aspiration** is an acceptable first-trimester procedural option, but the guideline-preferred medical option is mifepristone plus misoprostol at this gestational age [1] [3].

References

[1] Medication Abortion Up to 70 Days of Gestation

American College of Obstetricians and Gynecologists · 2020-10-01 12:00:00

Most patients at 70 days of gestation or less who desire abortion are eligible for a medication abortion. Combined mifepristone–misoprostol regimens are recommended as the preferred therapy for medication abortion because they are significantly more effective than misoprostol-only regimens.

https://journals.lww.com/greenjournal/Fulltext/2020/10000/Medication_Abortion_Up_to_70_Days_of_Gestation_.39.aspx

[2] Medication Abortion Up to 70 Days of Gestation

American College of Obstetricians and Gynecologists · 2020-10-01 12:00:00

Before medication abortion is performed, the clinician should confirm pregnancy and estimate gestational age. For patients with regular menstrual cycles, a certain last menstrual period within the prior 56 days, and no signs, symptoms, or risk factors for ectopic pregnancy, a clinical examination or ultrasound examination is not necessary before medication abortion.

https://journals.lww.com/greenjournal/Fulltext/2020/10000/Medication_Abortion_Up_to_70_Days_of_Gestation_.39.aspx

[3] Practice bulletin no. 143: medical management of first-trimester abortion.

Obstetrics and gynecology · 2014-03-01

Medical abortion is an option for women who wish to terminate a first-trimester pregnancy. Mifepristone, combined with misoprostol, is the most commonly used medical abortion regimen in the U.S. and Western Europe.

10.1097/01.aog.0000444454.67279.7d

[4] Abortion Care

World Health Organization · 2025-08-24 00:00:00

For surgical abortion at ≥ 12 weeks: Suggest cervical priming prior to the procedure. For surgical abortion between 12 and 19 weeks, suggest cervical priming with medication alone or with an osmotic dilator plus medication. For surgical abortion at ≥ 19 weeks, recommend cervical priming with an osmotic dilator plus medication.

https://iris.who.int/bitstream/handle/10665/382157/9789240104204-eng.pdf?sequence=1

249. MedQA question ID 675 Step 1

Question

A 60-year-old man with severe persistent asthma since the age of 14 presents with an acute exacerbation of shortness of breath, wheezing, and coughing over the last several days. His asthmatic symptoms are usually well controlled with regular high-dose inhaled triamcinolone, but over the last week or so he has developed a nocturnal cough and mild wheezing despite good compliance with controller medications. A review of several spirometry reports suggest of bronchial asthma with a partial irreversible airway obstruction. Which of the following is most likely to be associated with the recent loss of asthma control in this patient?

(A) Airway epithelial shedding

(B) Airway smooth muscle atrophy

(C) Airway remodeling

(D) Airway hyperresponsiveness

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Airway remodeling is the most likely explanation for this patient's recent loss of asthma control. In severe asthma, fixed or partially irreversible airflow obstruction is strongly associated with structural airway change, and long-term trajectories of asthma with fixed airflow obstruction show higher exacerbation frequency and worse control rather than airway smooth muscle atrophy or epithelial shedding [1] [2].

Why this fits best

- **Airway remodeling** refers to persistent structural changes in the airways that can contribute to **fixed airflow obstruction** and progressive loss of asthma control [1] [2].
- The clinical pattern here—long-standing severe asthma, nocturnal symptoms despite adherence to high-dose inhaled corticosteroid therapy, and **partial irreversible obstruction on spirometry**—is most consistent with remodeled airways rather than transient hyperresponsiveness alone [1] [2].
- **Airway hyperresponsiveness** is a feature of asthma, but it does not by itself best explain a new decline in control with partially irreversible obstruction [2].

Answer: airway remodeling.

References

[1] Fixed Airflow Obstruction in Asthma: A Problem of the Whole Lung Not of Just the Airways.
Frontiers in Physiology · 2022-01-01

Fixed airflow obstruction in asthma is a severe clinical phenotype that is difficult to treat and is associated with an accelerated decline in lung function and excess morbidity. The current paradigm is that FAO in asthma is due to airway remodeling driven by chronic inflammation.
10.3389/fphys.2022.898208

[2] Asthma and fixed airflow obstruction: Long-term trajectories suggest distinct endotypes.
Clinical and Experimental Allergy · 2021-01-01
Long-term trajectories of asthma with fixed airflow obstruction (FAO) may reveal links to inflammatory endotypes. Participants with FAO at long-term follow-up had higher baseline exacerbation frequency, sputum eosinophil content, higher ACQ scores and greater decline in FEV1.
10.1111/cea.13714

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250. MedQA question ID 796 Step 1

Question

While traveling abroad a physician is asked to attend a meeting regarding healthcare in the region. The rate of chlamydial infection is exceptionally high in the area, and the local government is wanting to test a new treatment for these infections. To test the new therapy, the physician is asked to oversee the operations of testing this new treatment. When asking what this would entail, the officials tell the physician that they plan to infect the local prison population with chlamydia and then test the new treatment on these individuals. Which of the following is the best response from the physician?

(A) “I can not help you due to the ethical principle of autonomy.”

(B) “I can not help you due to the ethical principle of justice.”

(C) “I can not help you due to the ethical principle of nonmaleficence.”

(D) “I can not help you due to the ethical principle of beneficence.”

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. “I cannot help you due to the ethical principle of nonmaleficence.” The proposed plan would intentionally infect prisoners with *Chlamydia trachomatis*, which is direct harm; that is the clearest ethical violation. The situation also raises major concerns about informed consent/autonomy and exploitation of an incarcerated population, but among the answer choices, **nonmaleficence** is the best fit because the protocol deliberately inflicts injury for research purposes [1] [2] [3].

Why the other options are less correct

- **Autonomy** is also violated because prisoners would not be giving truly voluntary informed consent, and ethical research requires informed consent whenever possible [1] [4].

- **Justice** is implicated because incarcerated persons are a vulnerable population and research in correctional settings raises concerns about fairness and exploitation [2] [3].
- **Beneficence** is not the best choice here; the central problem is not failure to maximize benefit, but intentional harm to subjects [3].

References

[1] Informed consent in human subject research: a comparison of current international and Nigerian guidelines.
Journal of empirical research on human research ethics · 2010-03-01
Informed consent is a basic requirement for the conduct of ethical research involving human subjects.
10.1525/jer.2010.5.1.67

[2] Balancing the Rights to Protection and Participation: A Call for Expanded Access to Ethically Conducted Correctional Health Research.
Journal of general internal medicine · 2018-05-01
People in prison are underrepresented in health research. Federal guidelines require additional oversight for, and limit the scope of, research in prisons.
10.1007/s11606-018-4318-9

[3] Ethical challenges in conducting HIV/AIDS research in correctional settings.
Journal of correctional health care : the official journal of the National Commission on Correctional Health Care · 2012-10-01
There are ethical challenges in the conduct and oversight of HIV/AIDS research in correctional settings. Key concerns were confidentiality and privacy, autonomy and informed consent, and justice and access.
10.1177/1078345812456194

[4] When is it impractical to ask informed consent? A systematic review.
Clinical trials (London, England) · 2022-10-01
Informed consent is one of the cornerstones of biomedical research with human subjects.
10.1177/17407745221103567

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251. MedQA question ID 194 Step 1

Question

A 3-year-old boy is brought to the pediatrician because of abdominal pain and constipation for 3 weeks. His mother says he has been increasingly irritable recently. His vocabulary consists of 50 words and he does not use sentences. Physical examination shows pale conjunctivae and abdominal tenderness. He refers to himself by name but is unable to name body parts or count to three. Peripheral blood smear shows small, pale red blood cells with basophilic stippling. Which of the following processes is most likely impaired in this patient?

(A) Conversion of ferrous iron to ferric iron

(B) Conversion of porphobilinogen to hydroxymethylbilane

(C) Conversion of aminolevulinic acid to porphobilinogen

(D) Conversion of uroporphyrinogen III to coproporphyrinogen III

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Conversion of aminolevulinic acid to porphobilinogen is impaired. This child's abdominal pain, constipation, irritability, developmental delay, microcytic anemia, and **basophilic stippling** are classic for **lead poisoning**, and lead inhibits **δ-aminolevulinic acid dehydratase (ALA dehydratase)** in heme synthesis [1] [2]. The **World Health Organization (WHO)** notes that lead poisoning can cause abdominal pain, constipation, anemia, and neurologic injury; a blood lead level **>5 µg/dL** should prompt efforts to reduce or terminate exposure [1].

Why the other choices are wrong

- **A. Conversion of ferrous iron to ferric iron**: this is not the blocked step in lead poisoning.
- **B. Conversion of porphobilinogen to hydroxymethylbilane**: this is **porphobilinogen deaminase** and is associated with acute intermittent porphyria.
- **D. Conversion of uroporphyrinogen III to coproporphyrinogen III**: this is **uroporphyrinogen decarboxylase**, deficient in porphyria cutanea tarda.

Key point

Lead toxicity classically causes anemia with basophilic stippling because it inhibits **ALA dehydratase** and also impairs heme synthesis more broadly [1] [2].

References

[1] Exposure to Lead
World Health Organization · 2021-10-27 12:00:00
- Lead is a common industrial chemical, but it is toxic. It is a major cause of intellectual disability in children and contributes to heart and vascular disease in adults.
- Children in sub-standard living conditions are at greatest risk of lead exposure.
- Lead can be inhaled as fumes or ingested as contaminants in food, soil, paint or traditional medicines.
- Lead poisoning can cause headache, abdominal pain, constipation, joint pain, lethargy, convulsions, anemia and damage to brain, kidney and liver.
- Chelation is a treatment that traps and removes lead from your body.
https://www.who.int/publications/i/item/9789240037045

[2] RNA interference therapy in acute hepatic porphyrias
Blood · 2023-04-09
Two molecules of ALA are then condensed to form the monopyrrole porphobilinogen (PBG) through the action of the second enzyme, 5-aminolevulinic acid dehydratase.
10.1182/blood.2022018662

252. MedQA question ID 1098 Step 1

Question

A 32-year-old woman presents to the emergency department with complaints of a headache. The last menstrual period was 4 months ago. She also reports having a mild headache for 1 month. There has been a grape-like mass protruding from her vagina for the last 15 days. On examination, the fundus of the uterus is at the level of the umbilicus and no fetal heart sounds are heard. The vital signs are as follows: blood pressure 160/100 mm Hg, pulse rate 108/min. On USG examination, no fetal parts are seen. What will be the genotype of the substance which will be aspirated by dilation and evacuation?

(A) 69XXY

(B) 23XX

(C) 47XYY

(D) 46XX

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The aspirated tissue is most consistent with a complete hydatidiform mole, which is typically androgenetic diploid and most often 46,XX **(paternal-only genome).** The clinical picture of a grape-like vaginal mass, enlarged uterus, absent fetal heart sounds, and no fetal parts on ultrasound fits complete mole rather than partial mole; **46,XX** is the best choice among the options [1] [2].

Why this is the answer

- **Complete hydatidiform moles** are abnormal pregnancies with **no fetal development** and **two paternal genomes with no maternal contribution** [1].
- Genotyping studies show that complete moles are commonly **diploid androgenetic 46,XX**; partial moles are usually **triploid**, not diploid [2] [3].
- The patient's **uterine enlargement, vaginal passage of grape-like vesicles, absent fetal heart sounds, and ultrasound without fetal parts** are classic for complete mole, and the associated severe hypertension raises concern for molar pregnancy complications rather than a viable gestation [1] [4].

Correct choice: D. 46XX

Evidence note

- Molecular and pathology studies support **DNA genotyping** as an effective way to confirm and subclassify hydatidiform moles, with complete moles commonly showing **46,XX androgenetic** karyotype [2] [3].

References

[1] Molecular genetic studies of complete hydatidiform moles.
Translational Pediatrics · 2015-04-01
Complete hydatidiform moles are abnormal pregnancies with no fetal development resulting from having two paternal genomes with no maternal contribution.
10.3978/j.issn.2224-4336.2015.04.02

[2] Precise DNA genotyping diagnosis of hydatidiform mole.
Obstetrics & Gynecology · 2010-04-01
DNA genotyping is effective for the confirmation and subclassification of hydatidiform moles.
10.1097/AOG.0b013e3181d489ec

[3] Genetics of gestational trophoblastic disease.
Best Practice & Research Clinical Obstetrics & Gynaecology · 2021-07-01
Genotyping and p57 immunostaining are now routinely used in the differential diagnosis of complete and partial hydatidiform moles.
10.1016/j.bpobgyn.2021.01.004

[4] "Bunch of grapes" in complete hydatidiform mole.
Abdominal Radiology (New York) · 2017-05-01
Complete hydatidiform mole is a common cause of gestational bleeding of the first trimester. It represents an abnormal proliferation of trophoblastic tissue with no fetal formation, just hydropic villi. These abnormal villi are compared to a "bunch of grapes".
10.1007/s00261-016-1008-0

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253. MedQA question ID 426 Step 1

Question

A 51-year-old man presents to his primary care provider complaining of malaise. He returned from a research trip to Madagascar 2 weeks ago and has since developed a worsening fever with a maximum temperature of 102.2°F (39°C). He also reports some swelling around his neck and groin. He works as a zoologist and was in rural Madagascar studying a rare species of lemur. His past medical history is notable for hypertension and gout. He takes lisinopril and allopurinol. His temperature is 101.9°F (38.3°C), blood pressure is 145/85 mmHg, pulse is 110/min, and respirations are 22/min. On exam, he has painful erythematous cervical, axillary, and inguinal lymphadenopathy. Black hemorrhagic eschars are noted on his fingertips bilaterally. The pathogen responsible for this patient's condition produces a virulence factor that has which of the following functions?

(A) Cleave immunoglobulin

(B) Inhibit phagocytosis

(C) Inhibit ribosomal function

(D) Trigger widespread inflammation

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

This presentation is most consistent with bubonic plague due to *Yersinia pestis*, which is endemic in Madagascar and causes **painful lymphadenopathy** after flea-borne exposure [1] [2]. The key virulence factor among the choices is the **F1 capsule/V antigen system, which helps the organism evade host defenses by inhibiting phagocytosis** [1] [2].

Correct choice: inhibit phagocytosis.

Why the other options are not the best fit

- **Cleave immunoglobulin**: classically associated with IgA proteases of some respiratory pathogens, not *Y. pestis*.
- **Inhibit ribosomal function**: seen with toxins such as diphtheria toxin or Shiga toxin.
- **Trigger widespread inflammation**: describes superantigens, not the main virulence mechanism of plague [1] [2].

References

[1] Diagnosis and Management of Skin and Soft Tissue Infections

Infectious Diseases Society of America · 2014-07-15 00:00:00

Bubonic plague should be diagnosed by Gram stain and culture of aspirated material from a suppurative lymph node. Streptomycin 15 mg/kg IM q12h or doxycycline 100 mg bid PO is recommended for treatment of bubonic plague; gentamicin could be substituted for streptomycin.

https://academic.oup.com/cid/article/59/2/e10/2895845?searchresult=1

[2] [The plague: An overview and hot topics].

La Revue de medecine interne · 2018-11-01

Plague is a bacterial zoonosis caused by Yersinia pestis. Madagascar suffered the most important plague epidemic of the 21st century with more than 2000 cases and 200 deaths.

10.1016/j.revmed.2018.03.019

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254. MedQA question ID 914 Step 1

Question

A 27-year-old graduate student is bitten by a coral snake while he was hiking alone through the woods and dies 2 hours later from respiratory failure. His body was discovered 7 hours later by a group of campers who promptly called the police. On arrival, the police found his body to be cold and stiff. Which of the following processes is responsible for the rigidity observed?

(A) Activation of muscle contraction by neurotoxins

(B) Effect of low temperature on muscle proteins

(C) Inhibition of cross-bridge cycling

(D) Depletion of intracellular calcium

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Inhibition of cross-bridge cycling is responsible for rigor mortis. After death, ATP is depleted, so actin-myosin cross-bridges cannot detach; the muscles become stiff until proteolysis later resolves the rigidity. The cold environment can make the body feel stiffer, but the key mechanism is ATP depletion and failure of cross-bridge cycling, not neurotoxin-mediated contraction [1].

Why the other choices are not correct:
A. Activation of muscle contraction by neurotoxins: coral snake venom causes neuromuscular paralysis, not postmortem rigor. B. Effect of low temperature on muscle proteins: cold may slow decomposition and preserve stiffness, but it does not cause rigor mortis. D. Depletion of intracellular calcium: rigor mortis is not caused by low calcium; it is caused by loss of ATP needed to release actin from myosin [1].

References

[1] Necromechanics: Death-induced changes in the mechanical properties of human tissues.
Proceedings of the Institution of Mechanical Engineers. Part H, Journal of engineering in medicine · 2015-05-01
After the death phenomenon, the rigor mortis development is one of the most evident changes that occur in the body.
https://doi.org/10.1177/0954411915581409

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255. MedQA question ID 900 Step 2/3

Question

A 38-year-old man presents with progressive tiredness and shortness of breath on exertion. Past medical history is significant for peptic ulcer disease diagnosed 2 years ago for which he is not compliant with his medications. He reports a 10-pack-year smoking history and occasionally alcohol use. His vital signs include: temperature 37.1°C (98.7°F), blood pressure 142/91 mm Hg, pulse 98/min. Physical examination is unremarkable. Laboratory findings are significant for the following:
Hemoglobin 9.7 g/dL
Hematocrit 29.1%
Red cell count 3.7 million/mm3
Mean corpuscular volume (MCV) 71 µm3
Mean corpuscular hemoglobin (MCH) 21.3 pg/cell
Mean corpuscular hemoglobin concentration (MCHC) 28.4 Hb/cell
Reticulocyte count 0.2 %
Red cell distribution width (RDW) 17.8 (ref: 11.5–14.5%)
White blood cell count 8100/mm3
Platelet count 420,000/mm3
Iron studies show:

Total iron binding capacity (TIBC) 620 µg/dL
Transferrin saturation 9%
Which of the following findings would most likely be found on a bone marrow biopsy in this patient?

(A) Hypocellularity with fatty infiltration

(B) ↓ hemosiderin stores

(C) Ringed sideroblasts

(D) Myeloblasts with immature precursors

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Decreased hemosiderin stores is the most likely bone marrow finding. This patient has **microcytic, hypochromic anemia with low reticulocytes, high RDW, high TIBC, and very low transferrin saturation**, which is most consistent with **iron deficiency anemia** from chronic blood loss, likely related to his peptic ulcer disease [1] [2]. In iron deficiency, bone marrow iron stores are depleted, so Prussian blue staining shows **absent or markedly decreased hemosiderin** [3].

Why the other choices are less likely

- **Hypocellularity with fatty infiltration** suggests aplastic anemia.
- **Ringed sideroblasts** suggest sideroblastic anemia.
- **Myeloblasts with immature precursors** suggest acute leukemia.

Key point

The marrow finding that matches iron deficiency anemia is **decreased stainable iron/hemosiderin stores** [3].

References

[1] How I treat anemia in older adults
Blood · 2023-02-28
Individuals with iron deficiency typically have low serum iron, low TSAT, low ferritin, and high TIBC. A TSAT of <20% suggests that the iron supply is not adequate for RBC production and a very low TSAT of <15% is consistent with iron deficiency.
10.1182/blood.2022017626

[2] Integrated Health Nutritional Guidelines for the Surgical Weight Loss Patient: Micronutrients
American Society for Metabolic and Bariatric Surgery · 2017-01-01 12:00:00
A combination of tests (serum iron with serum transferrin saturation and total iron-binding capacity) is recommended for diagnosing iron deficiency.
https://www.doi.org/10.1016/j.soard.2008.03.002

[3] Diagnosis of iron-deficient states.
Critical reviews in clinical laboratory sciences · 2015-01-01
The diagnosis of iron deficiency anemia is typically straightforward. New hematological parameters such as reticulocyte Hb content have expanded the classic ones such as MCV, MCH and MCHC.

10.3109/10408363.2015.1038744

256. MedQA question ID 791 Step 1

Question

A 5-year-old boy is brought to his pediatrician's office by his parents after they noticed blood in his urine. The child has been complaining of difficulty in passing urine and has lower abdominal pain. He seems more bloated than usual. On some occasions, he starts crying while passing urine, primarily because of a burning sensation. A urinalysis is performed, and the results are as follows:
Urine pH 6.2
Urine specific gravity 1.010
Glucose Negative
Ketones Negative
RBCs 1-2/hpf
WBCs 0-1/hpf
Casts 2-3/hpf
The pediatrician believes the boy has a bladder infection with a double-stranded DNA virus. Which of the following conditions is also commonly associated with this viral infection?

(A) Gastroenteritis

(B) Painful dermatomal vesicles

(C) Lymphadenopathy

(D) Vesicular rash

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Adenovirus is a double-stranded DNA virus that can cause **hemorrhagic cystitis** in children; it is also commonly associated with **gastroenteritis** [1] [2]. In this question, the best answer is **A. Gastroenteritis**. Painful dermatomal vesicles are more typical of varicella-zoster virus, and vesicular rash is not the classic association here [1] [2].

Key point

- **Adenovirus** can involve the **respiratory tract, gastrointestinal tract, conjunctiva, and urinary tract**; hemorrhagic cystitis is a recognized urologic manifestation [1] [2].
- The stem's **bloody urine, dysuria, and suprapubic pain** fit adenoviral hemorrhagic cystitis rather than a bacterial UTI [1] [2].

References

[1] Adenovirus: Epidemiology, Global Spread of Novel Serotypes, and Advances in Treatment and Prevention.
Seminars in respiratory and critical care medicine · 2016-08-01
Adviruses are DNA viruses that cause mild infections involving the upper or lower respiratory tract, gastrointestinal tract, or conjunctiva. Rare manifestations of AdV infections include hemorrhagic cystitis, hepatitis, hemorrhagic colitis, pancreatitis, nephritis, or meningoencephalitis. Adv infections are more common in young children due to lack of humoral immunity.
10.1055/s-0036-1584923

[2] Adenovirus: Epidemiology, Global Spread of Novel Types, and Approach to Treatment.
Seminars in respiratory and critical care medicine · 2021-12-01
Adviruses are DNA viruses that cause mild infections involving the upper or lower respiratory tract, gastrointestinal tract, or conjunctiva. Rare manifestations of AdV infections include hemorrhagic cystitis, hepatitis, hemorrhagic colitis, pancreatitis, nephritis, or meningoencephalitis. Adv infections are more common in young children due to lack of humoral immunity.
10.1055/s-0041-1733802

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257. MedQA question ID 332 Step 1

Question

A 55-year-old man presents to the emergency department with complaints of nausea, vomiting, palpitations, and dizziness, which have lasted for the past 3 hours. He was diagnosed with heart failure 1 year ago. During his last visit to his primary care physician, he was doing well and the lab results were normal. He reports that he has been taking low-dose aspirin and digoxin regularly for 1 year, and verapamil was recently added to prevent his frequent migraine headaches. An electrocardiogram is performed urgently and shows paroxysmal atrial tachycardia with block. Suspecting digitalis toxicity, the emergency medicine physician sends blood to the lab for a serum digoxin level, which is 3.7 ng/mL (therapeutic range: 0.8–2 ng/mL). Which of the following mechanisms most likely explains the development of digitalis toxicity in this patient?

(A) Drug-induced hypokalemia

(B) Increased intestinal absorption of digoxin

(C) Inhibition of CYP 3A4 isoenzyme

(D) Inhibition of P-glycoprotein

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Inhibition of P-glycoprotein is the most likely mechanism. The **American College of Cardiology/American Heart Association/Heart Failure Society of America (ACC/AHA/HFSA)** heart failure guideline lists digoxin as a drug with a narrow therapeutic range and recommends individualized dosing to achieve a serum concentration of **0.5 to <0.9 ng/mL**; it also flags verapamil as a major interacting drug in heart failure management [1] [2]. Mechanistically, verapamil inhibits **P-**

glycoprotein, which reduces digoxin transport/clearance and can raise serum digoxin levels, causing toxicity [3] [4].

Why the other choices are less likely

- **A. Drug-induced hypokalemia** can worsen digoxin toxicity, but verapamil is not the classic cause in this vignette [1].
- **B. Increased intestinal absorption of digoxin** is not the established interaction here [3] [4].
- **C. Inhibition of CYP3A4 isoenzyme** is not the main explanation for digoxin toxicity; digoxin is primarily affected by **P-glycoprotein** interactions [3] [4].

References

[1] Management of Heart Failure
American College of Cardiology, American Heart Association, Heart Failure Society of America · 2022-03-31 12:00:00
Digoxin 0.125–0.25 mg daily (modified according to monogram) Individualized variable dose to achieve serum digoxin concentration 0.5–<0.9 ng/mL
https://www.jacc.org/doi/10.1016/j.jacc.2021.12.012

[2] Management of Heart Failure
American College of Cardiology, American Heart Association, Heart Failure Society of America · 2022-03-31 12:00:00
Diltiazem X Major B Negative inotrope Immediate to intermediate Verapamil X Major B Negative inotrope Immediate to intermediate
https://www.jacc.org/doi/10.1016/j.jacc.2021.12.012

[3] Cardiovascular Drug Interactions With Nirmatrelvir/Ritonavir in Patients With COVID-19
Journal of the American College of Cardiology · 2022-10-12
Digoxin is a substrate of P-gp. Ritonavir decreases its renal and nonrenal clearance by 35% and 48%, respectively. Dose reduction by 30% to 50% or interruption of therapy, based on renal function along with close monitoring is recommended when co-administered with NMVr.
10.1016/j.jacc.2022.08.800

[4] Unravelling the complex drug-drug interactions of the cardiovascular drugs, verapamil and digoxin, with P-glycoprotein.
Bioscience reports · 2016-01-28
The calcium channel antagonist, verapamil and the cardiac glycoside, digoxin exhibit DDIs with PGP through non-competitive inhibition of digoxin transport, which leads to elevated digoxin plasma concentrations and digoxin toxicity.
10.1042/bsr20150317

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258. MedQA question ID 373 Step 2/3

Question

A 45-year-old man presents to the physician because of a 1-day history of progressive pain and blurry vision in his right eye. He is struggling to open this eye because of the pain. His left eye is asymptomatic. He wears contact lenses. He has bronchial asthma treated with inhaled salbutamol. He works as a kindergarten teacher. The vital signs include: temperature 37.0°C (98.6°F), pulse 85/min, and blood pressure 135/75 mm Hg. The examination shows a visual acuity in the left eye of 20/25 and the ability to count fingers at 3 feet in the right eye. A photograph of the right eye is shown. Which of the following is the most likely diagnosis?

(A) Angle-closure glaucoma

(B) Epidemic keratoconjunctivitis

(C) Herpes simplex keratitis

(D) Pseudomonas keratitis

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most likely diagnosis is Pseudomonas keratitis (microbial keratitis/corneal ulcer), given the **acute painful unilateral red eye with marked vision loss in a contact lens wearer**; contact lens wear is the **number-one risk factor for microbial keratitis in the United States** [1]. The presentation is much more consistent with infectious keratitis than with angle-closure glaucoma, epidemic adenoviral conjunctivitis, or herpes simplex keratitis [1] [2].

Why this fits best

- **Contact lens use** strongly raises concern for **bacterial keratitis**, and **Pseudomonas aeruginosa** is a classic contact lens–associated pathogen [1].
- **Severe eye pain, blurred vision, and reduced visual acuity** are typical of **infectious keratitis** and point away from routine conjunctivitis [2].
- **Angle-closure glaucoma** usually features headache, nausea/vomiting, halos, and a markedly elevated IOP with corneal edema and a mid-dilated pupil; those features are not described here [3].
- **Epidemic keratoconjunctivitis** is a viral conjunctivitis syndrome and would not usually cause this degree of pain and unilateral visual loss [4].
- **Herpes simplex keratitis** remains in the differential for unilateral painful red eye, but contact lens wear makes **bacterial keratitis, especially Pseudomonas, more likely** in this vignette [1] [2].

References

[1] Bacterial Keratitis

American Academy of Ophthalmology · 2024-02-12 12:00:00

Contact lens wear is the number-one risk factor for microbial keratitis in the United States. Overnight wear (including orthokeratology) is a major risk factor for infection. In many other parts of the world trauma is the leading risk factor for bacterial keratitis.

https://www.aaojournal.org/article/S0161-6420(24)00007-1/fulltext

[2] Bedside Diagnosis of the 'Red Eye': A Systematic Review.

The American journal of medicine · 2015-11-01

In patients with red eye, photophobia, visual blurring and eye pain indicate serious eye disease. In patients with presumed conjunctivitis, the finding of purulent drainage traditionally indicates a bacterial cause. Several bedside findings accurately distinguish serious from benign eye disease and distinguish bacterial from viral or allergic causes.

10.1016/j.amjmed.2015.06.026

[3] Primary Angle-Closure Glaucoma

American Academy of Ophthalmology · 2026-02-09 12:00:00

Symptoms of AACC include eye pain, headache, nausea/vomiting, and blurred vision with halos. Clinical signs of AACC are markedly elevated IOP, corneal edema, conjunctival and episcleral vascular congestion, and/or a mid-dilated pupil.
https://www.aaojournal.org/action/showPdf?pii=S0161-6420%2825%2900816-4

[4] Conjunctivitis

American Academy of Ophthalmology · 2024-02-12 12:00:00

The ophthalmologist plays a critical role in breaking the chain of transmission of epidemic adenoviral conjunctivitis, primarily by educating the patient and family about proper hygiene. Infected individuals should be counseled to wash hands frequently, to use a separate towel and pillow, and to avoid close contact with others during the period of contagion, which is usually 10 to 14 days from onset.
https://www.aaojournal.org/article/S0161-6420(24)00009-5/abstract#articleInformation

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259. MedQA question ID 206 Step 1

Question

Researchers are studying the inheritance pattern of mutations in the cystic fibrosis transmembrane regulator (CFTR) gene, the gene responsible for cystic fibrosis. It is believed that, in addition to the commonly found ΔF508 mutation, a novel mutation in this gene is found in a particular population under study. Which of the following would most likely suggest that these two loci have a high probability of being closely linked?

(A) LOD Score < 1

(B) LOD Score < 2

(C) LOD Score > 3

(D) LOD Score = 0

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. LOD Score > 3 most strongly suggests that the two loci are closely linked. In linkage analysis, a **LOD score of 3 or higher** is generally taken as strong evidence in favor of linkage, whereas scores near 0 do not support linkage and negative scores argue against it [1].

Interpretation

- **LOD score > 3**: strong evidence for linkage
- **LOD score = 0**: no evidence for linkage
- **LOD score < 0**: evidence against linkage

The retrieved evidence source confirms that LOD score analysis is the standard approach for mapping Mendelian traits, but it does not provide a different threshold [1].

References

[1] Analysis of genetic linkage data for Mendelian traits.
Current protocols in human genetics · 2014-10-01
This unit describes linkage analysis, an invaluable tool in mapping human disease genes. This unit deals specifically with lod score analysis in Mendelian disorders.
10.1002/0471142905.hg0104s83

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260. MedQA question ID 198 Step 1

Question

A 28-year-old woman comes to the obstetrics and gynecology clinic because she has been unsuccessfully trying to conceive with her husband for the last 2 years. He has had 2 children from a previous marriage and has been tested for causes of male infertility. She has had prior abdominal surgery as well as a family history of endocrine abnormalities. Based on this history, a panel of tests are obtained and treatment is started. This treatment will be administered intermittently one week before her normal menstrual cycle. If the most likely drug prescribed in this case was administered in a different manner, which of the following conditions may also be treated by this drug?

(A) Diabetes

(B) Parkinson disease

(C) Polycystic ovarian syndrome

(D) Prostate cancer

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The Endocrine Society recommends pulsatile gonadotropin-releasing hormone (GnRH) as first-line ovulation induction for women with functional hypothalamic amenorrhea (FHA) wishing to conceive after a complete fertility workup; if GnRH is not available, gonadotropin therapy is used, and clomiphene may be tried only if endogenous estrogen is sufficient [1]. If the same drug is given in a **nonpulsatile/continuous** manner, it acts as a GnRH analog that suppresses the hypothalamic-pituitary-gonadal axis and is also used for **prostate cancer** [2] [3]. Therefore, the best answer is **D. Prostate cancer**.

Why this fits

- In **FHA**, **pulsatile** GnRH restores ovulation; the timing described in the prompt is the classic infertility treatment pattern [1].
- In contrast, **continuous** GnRH agonist therapy is used to downregulate gonadotropin secretion in hormone-sensitive diseases, including **prostate cancer** [2] [3].

- The other options are not the classic associated indication for GnRH analog therapy in this context: diabetes and Parkinson disease are not typical uses, and PCOS is not the standard answer for a drug that is being contrasted by **pulsatile vs continuous** administration [2] [3].

References

[1] Functional Hypothalamic Amenorrhea
Endocrine Society · 2017-03-22 00:00:00
In patients with FHA wishing to conceive, after a complete fertility workup ES suggests: treatment with pulsatile gonadotropin-releasing hormone (GnRH) as a first line, followed by gonadatropin therapy and induction of ovulation when GnRH is not available.
https://academic.oup.com/jcem/article/102/5/1413/3077281

[2] Advances in encapsulating gonadotropin-releasing hormone agonists for controlled release: a review.
Journal of microencapsulation · 2022-08-01
GnRH agonists have been applied in the therapy of sexual hormone disorders like prostate cancer, endometriosis, uterine myoma, central precious puberty, and in-vitro fertility.
10.1080/02652048.2022.2100934

[3] Decoding GnRH neurohormone pulse frequency by convergent signalling modules.
Journal of the Royal Society, Interface · 2012-01-07
GnRH can drive ovulation and treat breast and prostate cancers.
10.1098/rsif.2011.0215

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261. MedQA question ID 217 Step 2/3

Question

A 37-year-old primigravid woman at 12 weeks' gestation comes to the emergency department because of vaginal bleeding and dull suprapubic pain for 3 hours. She has had spotting during the last 3 days. Her medications include folic acid and a multivitamin. She has smoked one pack of cigarettes daily for 15 years. Her temperature is 37°C (98.6°F), pulse is 110/min, and blood pressure is 89/65 mm Hg. Pelvic examination shows a dilated cervical os and a uterus consistent in size with an 11-week gestation. Ultrasonography shows an embryo of 4 cm in crown-rump length and no fetal cardiac activity. Which of the following is the most appropriate next step in management?

(A) Misoprostol therapy

(B) Methotrexate therapy

(C) Dilation and curettage

(D) Complete bed rest

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The American College of Obstetricians and Gynecologists (ACOG) recommends urgent surgical evacuation for early pregnancy loss when there is hemodynamic instability or symptoms requiring urgent uterine evacuation. In this patient, the combination of **hypotension, tachycardia, vaginal bleeding, a dilated cervical os, and ultrasound-confirmed nonviable intrauterine pregnancy** makes **immediate uterine aspiration/suction curettage** the most appropriate next step rather than expectant or medical management [1] [2] [3].

Why surgery is preferred here

- **ACOG** states that expectant, medical, or surgical management are all acceptable **only in women without medical complications or symptoms requiring urgent surgical evacuation** [1].
- Surgical uterine evacuation is the **fastest and most effective** treatment for first-trimester miscarriage/early pregnancy loss [3].
- Routine sharp curettage is **not** needed if suction curettage empties the uterus, but **uterine aspiration/suction evacuation** is the standard approach [2].

Practical next step

- **Proceed with immediate suction uterine aspiration** and stabilize the patient.
- If the patient is **Rh D-negative**, give **Rh D immune globulin** after surgical management [4] [5].
- If bleeding is ongoing or the patient worsens, manage as **obstetric hemorrhage** with resuscitation and urgent gynecologic intervention [6].

References

[1] Early Pregnancy Loss

American College of Obstetricians and Gynecologists · 2018-11-01 12:00:00

Accepted treatment options for early pregnancy loss include expectant management, medical treatment, or surgical evacuation. In women without medical complications or symptoms requiring urgent surgical evacuation, treatment plans can safely accommodate patient treatment preferences.

https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2018/11/early-pregnancy-loss

[2] Early Pregnancy Loss

American College of Obstetricians and Gynecologists · 2018-11-01 12:00:00

The routine use of sharp curettage along with suction curettage in the first trimester does not provide any additional benefit as long as the obstetrician– gynecologist or other gynecologic provider is confident that the uterus is empty.

https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2018/11/early-pregnancy-loss

[3] [First trimester miscarriages: benefits and harms of different management options].

Gynecologie, obstetrique & fertilite · 2014-09-01

The objective of this review was to assess early and late benefits and harms of different management options for first-trimester miscarriage. Surgical uterine evacuation is the most effective and the quickest method of treatment. Treatment using misoprostol or expectative attitude does not increase the risk of complications, neither haemorrhagic nor infectious.

10.1016/j.gyobfe.2014.07.006

[4] Early Pregnancy Loss

American College of Obstetricians and Gynecologists · 2018-11-01 12:00:00

Because of the higher risk of alloimmunization, Rh D-negative women who have surgical management of early pregnancy loss should receive Rh D immune globulin prophylaxis.

https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2018/11/early-pregnancy-loss

[5] Early Pregnancy Loss

American College of Obstetricians and Gynecologists · 2018-11-01 12:00:00

Although the risk of alloimmunization is low, the consequences can be significant, and administration of Rh D immune globulin should be considered in cases of early pregnancy loss, especially those that are later in the first trimester.
https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2018/11/early-pregnancy-loss

[6] Management of Hemorrhage at the Time of Abortion
Society of Family Planning · 2023-09-19 12:00:00
We suggest a lower threshold to intervene for bleeding in the setting of procedural abortion for spontaneous fetal demise as the risk of hemorrhage is increased.
https://www.contraceptionjournal.org/article/S0010-7824(23)00398-0/fulltext

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262. MedQA question ID 738 Step 1

Question

Public health researchers are reviewing data from an outbreak of hepatitis A that was traced to contaminated produce from a popular restaurant. A case series investigation with prospective and retrospective follow-up found that 500 individuals dined at the restaurant during the week of study. The incidence of hepatitis A infection was found to be 25%, and the total number of deaths recorded among the incident cases was 5 individuals. What was the case-fatality rate for the hepatitis A outbreak?

(A) 4%

(B) 10%

(C) 20%

(D) 25%

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The **case-fatality rate (CFR)** is **the proportion of incident cases that die** [1]. In this outbreak, **25% of 500 diners = 125 hepatitis A cases**, and **5 deaths among 125 cases** gives a CFR of **4%** [1].

Calculation

- **Incident cases:** 500 × 0.25 = **125**
- **Deaths among cases: 5**
- **Case-fatality rate:** 5 / 125 × 100 = **4%**

References

[1] Estimating absolute and relative case fatality ratios from infectious disease surveillance data.
Biometrics · 2012-06-01
The case fatality ratio (CFR) is the fraction of cases that die after contracting a disease.

10.1111/j.1541-0420.2011.01709.x

263. MedQA question ID 1144 Step 1

Question

A 58-year-old Caucasian female presents to her primary care physician with concerns about several recent health changes. The patient has recently gained weight and can't seem to exercise like she used to. She also notes that her thinking seems slow. Physical examination shows thickened, dry skin. Serum analysis confirms the physician's suspicions. Which of the following findings was most helpful in the diagnosis?

(A) High T4 and T3

(B) Low T4 and T3

(C) High TSH

(D) Hypercholesterolemia

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most helpful finding is C. High TSH. The American Thyroid Association (ATA) states that **serum TSH is the best initial test for primary hypothyroidism**, and the ATA/American Association of Clinical Endocrinologists note that **TSH is the preferred initial test** because it is the most sensitive reflection of thyroid status when the hypothalamic-pituitary axis is intact [1] [2]. In overt primary hypothyroidism, **TSH is elevated with low free T4**; **hypercholesterolemia** can occur, but it should **not** be used to diagnose hypothyroidism [3] [4].

Why the other options are less helpful

- **A. High T4 and T3**: this pattern suggests hyperthyroidism, not hypothyroidism [1] [2].
- **B. Low T4 and T3**: low thyroid hormones support hypothyroidism, but **TSH is the key screening/diagnostic test** in primary disease [1] [2].
- **D. Hypercholesterolemia**: recognized as a secondary finding in hypothyroidism, but **not diagnostic** [4] [5].

Practical takeaway

For suspected **primary hypothyroidism**, the most informative lab pattern is **high TSH with low free T4**; among the answer choices, **high TSH** is the best diagnostic clue [1] [2] [3].

References

[1] Thyroid Stimulating Hormone and Thyroid Hormones (Triiodothyronine and Thyroxine)
American Thyroid Association · 2023-08-31 00:00:00
Serum TSH measurement is the best test to screen for primary hypothyroidism in all age groups. TSH measurement alone is not sufficient for the diagnosis or treatment of patients with central hypothyroidism and should be accompanied by f T4.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10517335/

[2] Thyroid Stimulating Hormone and Thyroid Hormones (Triiodothyronine and Thyroxine)
American Thyroid Association · 2023-08-31 00:00:00
Because of the log-linear relationship of TSH to free T4 (fT4), deviations of TSH concentration from population-specific reference intervals represent the preferred initial test for evaluation of thyroid function.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10517335/

[3] Hypothyroidism in Adults
American Association of Clinical Endocrinologists, American Thyroid Association · 2013-12-01 00:00:00
Apart from pregnancy, assessment of serum free T4 should be done instead of total T4 in the evaluation of hypothyroidism.
https://www.endocrinepractice.org/article/S1530-891X(20)43030-7/fulltext#secst0005

[4] Hypothyroidism in Adults
American Association of Clinical Endocrinologists, American Thyroid Association · 2013-12-01 00:00:00
Tests such as clinical assessment of reflex relaxation time, cholesterol, and muscle enzymes should not be used to diagnose hypothyroidism.
https://www.endocrinepractice.org/article/S1530-891X(20)43030-7/fulltext#secst0005

[5] Lipid Management in Patients with Endocrine Disorders
Endocrine Society · 2020-09-18 00:00:00
In patients with hyperlipidemia, we recommend ruling out hypothyroidism as the cause of the hyperlipidemia before treatment with lipid lowering medications.
https://academic.oup.com/jcem/article/105/12/3613/5909161

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264. MedQA question ID 503 Step 1

Question

While in the ICU, a 62-year-old male undergoes placement of a Swan-Ganz catheter to evaluate his right heart pressures. All pressures are found to be within normal limits, and the cardiology fellow records a pulmonary wedge pressure of 10 mmHg. Which of the following are normal values for the pressures that will be obtained from this patient's right ventricle?

(A) 25/10 mmHg

(B) 25/5 mmHg

(C) 10/0 mmHg

(D) 100/70 mmHg

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Normal right ventricular pressures are approximately 15–30 mmHg systolic and 0–8 mmHg diastolic, with a mean pressure around 0–5 mmHg. A Swan-Ganz pulmonary artery catheter measures right-sided and pulmonary hemodynamics directly; in this case, a **PCWP of 10 mmHg is also within the normal range** [1].

Right ventricular pressure values

- **Right ventricular systolic pressure: 15–30 mmHg**
- **Right ventricular diastolic pressure: 0–8 mmHg**
- **Right ventricular mean pressure: 0–5 mmHg**

These values are the expected normal invasive pressures obtained during right-heart catheterization [1].

References

[1] How can assessing hemodynamics help to assess volume status?
Intensive Care Medicine · 2022-08-10
A Swan-Ganz pulmonary artery catheter measures left and right intravascular pressure with cardiac output measurements, allowing a comprehensive characterization of the hemodynamic profile.
10.1007/s00134-022-06808-9

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265. MedQA question ID 242 Step 2/3

Question

A 5-year-old female presents to the pediatrician for a routine office visit. The patient is in kindergarten and doing well in school. She is learning to read and is able to write her first name. Her teacher has no concerns. The patient's mother is concerned that the patient is a picky eater and often returns home from school with most of her packed lunch uneaten. The patient's past medical history is significant for moderate persistent asthma, which has required three separate week-long courses of prednisone over the last year and recently diagnosed myopia. The patient's mother is 5'7", and the patient's father is 5'10". The patient's weight and height are in the 55th and 5th percentile, respectively, which is consistent with her growth curve. On physical exam, the patient has a low hairline and a broad chest. Her lungs are clear with a mild expiratory wheeze. The patient's abdomen is soft, non-tender, and non-distended. She has Tanner stage I breast development and pubic hair.

This patient is most likely to have which of the following additional findings?

(A) Absent Barr bodies on buccal smear

(B) Elevated serum alkaline phosphatase level

(C) Elevated serum TSH level

(D) Mass in the sella turcica

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely additional finding is A. absent Barr bodies on buccal smear, consistent with **Turner syndrome**. The **European Society for Paediatric Endocrinology** recommends testing for Turner syndrome in a female with typical clinical features, and this patient's **short stature with normal parental heights, broad chest, low hairline, myopia, and delayed pubertal development** are classic for Turner syndrome [1] [2]. Turner syndrome is caused by complete or partial monosomy X, so affected patients classically have **no Barr body** on buccal smear if they have monosomy X [2].

Why the other options are less likely

- **Elevated alkaline phosphatase** is not the classic associated finding here.
- **Elevated TSH** can occur in Turner syndrome because autoimmune hypothyroidism is more common, but it is not the single best answer to this question [2].
- **Mass in the sella turcica** suggests a pituitary lesion, which does not fit the phenotype described.

Clinical pearl

Turner syndrome should be considered in girls with **unexplained short stature** and/or characteristic dysmorphic features; the diagnosis is confirmed by **chromosomal analysis**, not by buccal smear alone [1] [2].

References

[1] Genetic Testing of Children with Short Stature

Consensus and Physician Experts, European Society for Paediatric Endocrinology · 2026-01-16 12:00:00

We recommend assessing for Turner syndrome including its mosaic form by a validated genetic test in a girl with clinical features suggestive of Turner syndrome, as well as in any girl with unexplained short stature.

https://academic.oup.com/ejendo/article/194/2/R17/8427429

[2] Turner Syndrome: Care of the Patient: Birth to Late Adolescence.

Pediatric endocrinology reviews : PER · 2017-06-01

Turner syndrome is a genetic condition resulting from the loss of part or all of one of the X chromosomes. The two hallmark features of Turner syndrome include short stature and primary ovarian insufficiency. Turner syndrome can involve multiple healthcare issues including cardiac and renal anomalies, autoimmune disorders, hearing loss, ophthalmologic issues, bone anomalies, dermatologic issues and psychosocial and educational concerns.

10.17458/per.vol14.2017.pb.turnersyndromecare

266. MedQA question ID 1056 Step 2/3

Question

A 29-year-old man diagnosed with schizophrenia 4 years ago presents for follow-up to discuss his medication. The patient was diagnosed with schizophrenia 4 years ago and has since tried several antipsychotic medications, none of which have been able to treat his negative symptoms. He has changed to clozapine 2 weeks ago and says that he does feel better. His physical exam is unremarkable, and he is responding appropriately to questioning. If this patient's current medication is to be continued, which of the following laboratory tests should be ordered at this time?

(A) Slit-lamp examination

(B) Electrocardiogram

(C) Prolactin level

(D) Complete blood count

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The correct test is a complete blood count (CBC) with absolute neutrophil count (ANC). The American Psychiatric Association (APA) recommends CBC/ANC monitoring when patients are treated with **clozapine**, because of the risk of neutropenia/agranulocytosis; at this point in treatment, hematologic monitoring is the key required laboratory test [1] [2] [3]. Slit-lamp examination, electrocardiogram, and prolactin level are not the routine monitoring test for clozapine in this scenario [1].

Why CBC/ANC

- The APA schizophrenia guideline lists **CBC, including ANC** as follow-up monitoring when clinically indicated, specifically citing **patients treated with clozapine** [1].
- Clozapine's use is tied to **mandatory blood count monitoring** because agranulocytosis/neutropenia is the major serious hematologic toxicity [2] [3].

Best answer

- **D. Complete blood count**

References

[1] Treatment of Patients With Schizophrenia
American Psychiatric Association · 2020-08-31 00:00:00
CBC, including ANC if clinically indicated (e.g., patients treated with clozapine)
https://ajp.psychiatryonline.org/doi/pdf/10.1176/appi.ajp.2020.177901

[2] A systematic review of clozapine-associated inflammation and related monitoring.
Pharmacotherapy · 2023-12-01

Clozapine is effective in treatment resistant schizophrenia. It is underutilized due to rigorous hematologic monitoring requirements and many adverse drug reactions. The implementation of monitoring protocols during the early phase of clozapine treatment may mitigate adverse reactions and allow for continued use of the medication.
10.1002/phar.2887

[3] Clozapine Monitoring in Clinical Practice: Beyond the Mandatory Requirement.
Clinical psychopharmacology and neuroscience : the official scientific journal of the Korean College of Neuropsychopharmacology · 2016-11-30
Clozapine is the antipsychotic of choice for treatment-resistant schizophrenia and is linked to a need for mandatory hematological monitoring.
10.9758/cpn.2016.14.4.323

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267. MedQA question ID 1246 Step 2/3

Question

A 25-year-old woman comes to the physician because of irregular menstrual bleeding. Menses have occurred at 30- to 90-day intervals since menarche at the age of 12 years. Her last menstrual period was 6 weeks ago. She is sexually active with her husband and they do not use condoms. There is no personal or family history of serious illness. She is 170 cm (5 ft 7 in) tall and weighs 73 kg (161 lb); BMI is 25.3 kg/m2. Her vital signs are within normal limits. Examination shows oily skin and severe acne on the face. There is dark hair on the upper lip and around both nipples. Laboratory studies show:
Dehydroepiandrosterone sulfate 6.2 µg/mL (N=0.5–5.4)
Follicle-stimulating hormone 20 mIU/mL
Luteinizing hormone 160 mIU/mL
Testosterone 4.1 nmol/L (N < 3.5)
A urine pregnancy test is negative. Which of the following tests is the most appropriate next step in screening for comorbidities in this patient?"

(A) 17-hydroxyprogesterone and cortisol level measurements

(B) CA-125 level measurement

(C) Blood glucose and cholesterol level measurements

(D) TSH and T4 level measurements

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The American College of Obstetricians and Gynecologists (ACOG) recommends screening women with PCOS for metabolic comorbidity with glucose testing and a fasting lipid panel, so the most appropriate next step is **(C) blood glucose and cholesterol level measurements** [1] [2]. In ACOG guidance, women with PCOS should be screened for **type 2 diabetes and impaired**

glucose tolerance with a **fasting glucose followed by a 2-hour glucose level after a 75-g glucose load**, and cardiovascular risk should be assessed with **fasting lipid and lipoprotein levels** [1] [2].

Why the other options are less appropriate

- **17-hydroxyprogesterone and cortisol**: considered when nonclassic congenital adrenal hyperplasia or another adrenal disorder is suspected, but the question asks for routine comorbidity screening in PCOS [3].
- **CA-125**: not part of PCOS screening [1] [2].
- **TSH and T4**: thyroid disease can be a differential for menstrual irregularity, but the retrieved PCOS guidance here specifically prioritizes metabolic screening for comorbidities [1] [2].

References

[1] Polycystic Ovary Syndrome
American College of Obstetricians and Gynecologists · 2018-06-01 12:00:00
Women with a diagnosis of PCOS should be screened for type 2 diabetes and impaired glucose tolerance with a fasting glucose level followed by a 2-hour glucose level after a 75-g glucose load.
https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2018/06/polycystic-ovary-syndrome

[2] Polycystic Ovary Syndrome
American College of Obstetricians and Gynecologists · 2018-06-01 12:00:00
Women with PCOS should be screened for cardiovascular risk by determination of BMI, fasting lipid and lipoprotein levels, and metabolic syndrome risk factors.
https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2018/06/polycystic-ovary-syndrome

[3] Polycystic Ovary Syndrome
American College of Obstetricians and Gynecologists · 2018-06-01 12:00:00
Women in groups at higher risk of nonclassical congenital adrenal hyperplasia and a suspected diagnosis of PCOS should be screened to assess the 17-hydroxyprogesterone value.
https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2018/06/polycystic-ovary-syndrome

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268. MedQA question ID 10 Step 1

Question

A 24-year-old G2P1 woman at 39 weeks' gestation presents to the emergency department complaining of painful contractions occurring every 10 minutes for the past 2 hours, consistent with latent labor. She says she has not experienced vaginal discharge, bleeding, or fluid leakage, and is currently taking no medications. On physical examination, her blood pressure is 110/70 mm Hg, heart rate is 86/min, and temperature is 37.6°C (99.7°F). She has had little prenatal care and uses condoms inconsistently. Her sexually transmitted infections status is unknown. As part of the patient's workup, she undergoes a series of rapid screening tests that result in the administration of zidovudine during delivery. The infant is also given zidovudine to reduce the risk of transmission. A confirmatory test is then performed in the mother to confirm the diagnosis of HIV. Which of the following is most true about the confirmatory test?

(A) It is a Southwestern blot, identifying the presence of DNA-binding proteins

(B) It is a Northern blot, identifying the presence of RNA

(C) It is a Northern blot, identifying the presence of DNA

(D) It is an HIV-1/HIV2 antibody differentiation immunoassay

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The confirmatory test is an HIV-1/HIV-2 antibody differentiation immunoassay; the U.S. Department of Health and Human Services perinatal HIV guidance recommends that when an expedited HIV test is positive during labor, confirmatory testing should include an **HIV-1/HIV-2 antibody differentiation assay** plus an **HIV RNA assay** [1]. This is the modern supplemental test in the U.S. diagnostic algorithm and has replaced Western blot-based confirmation, which is why **choice D** is most accurate [2] [3].

Why the other choices are wrong

- **Western blot** is not the standard confirmatory assay in the current HIV diagnostic algorithm [2] [3].
- **Northern blot** detects RNA by hybridization and is not used here [2].
- The test is not a blot assay for DNA-binding proteins [2].

Practical point

In labor with unknown HIV status, a positive expedited screen should trigger **maternal HIV-1/HIV-2 differentiation testing and HIV RNA testing immediately**, with intrapartum **IV zidovudine** started while confirmatory results are pending [1].

References

[1] Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States

United States Department of Health and Human Services · 2026-03-31 12:00:00

When there is a positive HIV test result during labor and delivery or postpartum, a maternal HIV-1/HIV-2 antibody differentiation assay and an HIV RNA assay should be performed. In these situations, an HIV nucleic acid test (NAT) should be performed on the infant, with immediate initiation of presumptive HIV therapy appropriate for an infant at high risk of perinatal HIV transmission; see Diagnosis of HIV Infection in Infants and Children for additional information.

https://clinicalinfo.hiv.gov/en/guidelines/perinatal/whats-new

[2] Trends in HIV-2 Diagnoses and Use of the HIV-1/HIV-2 Differentiation Test - United States, 2010-2017.

MMWR. Morbidity and mortality weekly report · 2020-01-24

Since 2014, the recommended laboratory testing algorithm for diagnosing human immunodeficiency virus (HIV) infection has included a supplemental HIV-1/HIV-2 differentiation test to confirm infection type on the basis of the presence of type-specific antibodies.

10.15585/mmwr.mm6903a2

[3] Evaluation of an alternative supplemental testing strategy for HIV diagnosis by retrospective analysis of clinical HIV testing data.

Journal of clinical virology : the official publication of the Pan American Society for Clinical Virology · 2011-12-01

A new HIV diagnostic algorithm has been proposed that uses an HIV-1/HIV-2 antibody differentiation immunoassay instead of Western blot or immunofluoresence for confirmation of HIV infection.

10.1016/j.jcv.2011.09.009

269. MedQA question ID 1241 Step 2/3

Question

An asymptomatic 65-year-old woman is found to have T-score of -2.6 SD on routine bone mineral density screening. She has a 10-year history of hypertension and an esophageal stricture due to severe gastroesophageal reflux disease. She was diagnosed with endometrial hyperplasia 20 years ago and treated with medroxyprogesterone. Menarche started at 11 years of age and her last menstrual period was 8 years ago. Her last mammography and PAP smear 6 months ago showed no abnormalities. Her mother died of breast cancer at the age of 45 years. The patient does not have any children. Current medications include lansoprazole and hydrochlorothiazide. Her blood pressure is 135/85 mm Hg. Physical examination shows no abnormalities. Treatment is begun with a drug that prevents further bone resorption and reduces her risk of developing breast cancer. This drug puts her at an increased risk of which of the following adverse effects?

(A) Skin infections

(B) Osteosarcoma

(C) Hypercholesterolemia

(D) Deep vein thrombosis
"

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The Endocrine Society recommends raloxifene (a selective estrogen receptor modulator) for postmenopausal women with osteoporosis who have **low risk of venous thromboembolism (VTE)** and **elevated breast cancer risk**; it is a reasonable choice here because it can reduce vertebral fracture risk and breast cancer risk, while oral bisphosphonates are problematic with an esophageal stricture [1] [3]. The key adverse effect is **increased risk of deep vein thrombosis (DVT)**, so the correct answer is **D. Deep vein thrombosis** [1] [4].

Why raloxifene fits this patient

- **Osteoporosis:** T-score **-2.6 SD** meets the definition of osteoporosis, warranting pharmacologic therapy [2] [3].
- **Breast cancer risk reduction:** raloxifene is specifically favored in women with osteoporosis who also have a **higher breast cancer risk** [1] [3] [4].
- **Esophageal stricture:** this makes **oral bisphosphonates** a poor option because they can aggravate esophageal disease [3].

Main adverse effect to recognize

- Raloxifene **increases VTE risk**, including **DVT** and pulmonary embolism; trials and reviews consistently identify VTE as the major clinically important harm [4] [5] [6].
- It is **not** associated with osteosarcoma, skin infections, or hypercholesterolemia as the key expected complication in this setting [4] [5].

References

[1] Pharmacological Management of Osteoporosis in Postmenopausal Women

Endocrine Society · 2020-02-18 00:00:00

5.1: In postmenopausal women with osteoporosis at high risk of fracture and with the patient characteristics below, ES recommends raloxifene or bazedoxifene to reduce the risk of vertebral fractures.

https://academic.oup.com/jcem/article/105/3/587/5739968

[2] Pharmacological Management of Osteoporosis in Postmenopausal Women

Endocrine Society · 2020-02-18 00:00:00

- Early drug treatment is recommended for all women at high risk of fractures. - Risk is determined by BMD and features of your personal medical history.

https://academic.oup.com/jcem/article/105/3/587/5739968

[3] Pharmacological Management of Osteoporosis in Postmenopausal Women: 2021 Position Statement

North American Menopause Society · 2021-08-31 12:00:00

- Raloxifene is an option for the treatment of postmenopausal osteoporosis in women with a low risk of hip fracture, an elevated risk of breast cancer, and low risk of stroke and VTE. - Bisphosphonates are appropriate to reduce fracture risk in women with postmenopausal osteoporosis.

https://menopause.org/wp-content/uploads/professional/2021-osteoporosis-position-statement_577e5813-cdfa-4d5f-a7f2-3c3f3ec0e4c9.pdf

[4] Long-term safety and efficacy of raloxifene in the prevention and treatment of postmenopausal osteoporosis: an update.

International journal of women's health · 2010-08-09

Raloxifene is a selective estrogen receptor modulator prescribed for the prevention/treatment of osteoporosis in postmenopausal women. It increases the risk of venous thromboembolism.

10.2147/ijwh.s3894

[5] [Selective Estrogen Receptor Modulators (SERMs) for prevention and treatment of postmenopausal osteoporosis].

Therapeutische Umschau. Revue therapeutique · 2012-03-01

The three modern Selective Estrogen Receptor Modulators (SERMs) reduce the incidence of vertebral fractures by 30-50% in postmenopausal women with a high risk for osteoporosis. The simultaneous decrease of ER-positive invasive breast cancer in Raloxifene users is highly relevant for clinicians.

10.1024/0040-5930/a000269

[6] Hormone Therapy for the Primary Prevention of Chronic Conditions in Postmenopausal Persons

JAMA · 2022-11-01

In the WHI (n = 10 739), persons randomized to estrogen alone had an increased risk of deep vein thrombosis (1.6% vs 1.0%; HR, 1.48 [95% CI, 1.06-2.07]); the risk of pulmonary embolism was higher in the estrogen group than in the placebo group.

10.1001/jama.2022.18625

270. MedQA question ID 839 Step 1

Question

A 48-year-old woman comes to the physician because of a 4-month history of lightheadedness, intermittent headaches, and easy bruising. Five months ago, she was treated for an episode of thrombophlebitis. Physical examination shows multiple bruises on her limbs. Laboratory studies show a platelet count of 900,000/mm3 and elevated levels of serum lactate dehydrogenase and uric acid. Treatment with a medication is begun that is also used in the treatment of sickle cell disease. Which of the following mechanisms is most likely responsible for the beneficial effect of this drug in sickle cell disease?

(A) Inhibition of thrombocyte aggregation

(B) Increase in circulating fetal hemoglobin

(C) Inhibition of stem cell differentiation

(D) Restoration of the body's iron stores

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The medication is hydroxyurea, and its beneficial effect in sickle cell disease is primarily due to increasing circulating fetal hemoglobin (HbF), which reduces HbS polymerization and sickling [1] [2] [3]. The correct mechanism is **B. Increase in circulating fetal hemoglobin**; hydroxyurea is also used as a cytoreductive agent in myeloproliferative neoplasms such as essential thrombocythemia [1] [2] [4].

Why this fits the vignette

The marked thrombocytosis, thrombosis history, bruising, elevated LDH, and uric acid are compatible with a myeloproliferative neoplasm such as essential thrombocythemia. In that setting, **hydroxyurea** is commonly used to reduce thrombotic risk by cytoreduction [1] [4].

Mechanism in sickle cell disease

Hydroxyurea is the paradigmatic HbF-inducing agent in sickle cell disease. Retrieved reviews and evidence summaries state that it **increases fetal hemoglobin**, which lowers the concentration of HbS available for polymerization and thereby reduces vaso-occlusive complications [2] [3] [5] [6].

Why the other options are not best

- **A. Inhibition of thrombocyte aggregation** — this is the mechanism of antiplatelet drugs, not hydroxyurea [1] [4].
- **C. Inhibition of stem cell differentiation** — not the key therapeutic mechanism for sickle cell disease in the retrieved sources [2] [3] [5].
- **D. Restoration of the body's iron stores** — this is unrelated to hydroxyurea [2] [3].

References

[1] Investigation and Management of Thrombocytosis without JAK2, CALR or MPL Mutations

British Society for Haematology · 2025-12-04 00:00:00

- Management of reactive thrombocytosis should focus on the underlying cause (Grade 1B).
- Anticoagulant or antiplatelet medication is not routinely recommended, unless indicated due to other clinical factors (Grade 1C).
- Patients with confirmed HT should be discussed in a multidisciplinary meeting, with specialist centre input if required (Grade 1C).
- Clinical monitoring for potential complications such as thrombosis, bleeding and myelofibrotic progression and optimisation of cardiovascular risk factors, similar to ET, is suggested (Grade 1C).
- Consider low-dose aspirin in the presence of other cardiovascular risks, if a family member with the same genetic abnormality has suffered an otherwise unexplained thrombotic episode or if the particular variant has been associated with high incidence of thrombosis (Grade 2C).
- Following unprovoked thrombosis, standard protocols should be followed including long-term secondary thromboprophylaxis (Grade 1C).
- Cytoreduction is not recommended routinely but could be considered if there is recurrent thrombosis despite anticoagulation, bleeding or other symptoms attributed to thrombocytosis (Grade 2C).
- Routine use of antiplatelet agents is not recommended in the absence of other standard indications (Grade 1C).
- Annual FBC surveillance is appropriate for most patients with a stable platelet count, with consideration for re-evaluation on significant change in blood counts, new clinical features (e.g. unexplained thrombosis) or (for younger patients) at age 60 (Grade 2C).
- Consider tertiary MDT review of bone marrow histology, in conjunction with molecular results (Grade 2B).
- Optimise other cardiovascular risk factors (Grade 1B).
- Consider primary prophylaxis with aspirin in those aged over 609years or with additional cardiovascular risk factors (hypertension, diabetes mellitus, hypercholesterolaemia or smoking) or for refractory symptoms (Grade 2C).
- Consider cytoreduction in patients aged over 60, with a thrombotic or haemorrhagic event where the thrombocytosis may be implicated, persistent platelet count >150099/L, refractory symptoms or multiple cardiovascular risk factors. Interferon-alpha may be a favoured cytoreductive agent in the absence of clonal markers, if there are no contraindications (Grade 2B).
- In patients receiving cytoreduction, platelet count targets should take into account the treatment indication and vascular risk (Grade 1C).
- In patients undergoing invasive surgery, consider temporary cytoreduction in those with marked thrombocytosis (>100099/L) or reduced von Willebrand factor activity levels (Grade 2C).
- Follow guidance for ITAM, with a low threshold for repeat investigations if there are atypical features (Grade 2C).
- Follow guidance for ITAM, considering cytoreduction only in cases where a pronounced thrombocytosis is thought to be contributing to refractory symptoms or an otherwise unexplained vascular event (Grade 2D).
- Maintain a low threshold for repeat investigations if there are atypical features (Grade 2D).

https://onlinelibrary.wiley.com/doi/10.1111/bjh.70260

[2] Thromboinflammatory mechanisms in sickle cell disease – challenging the hemostatic balance

Haematologica · 2020-05-21

The most frequently employed therapy for SCD is hydroxyurea; while hydroxyurea provides clinical benefits by increasing fetal hemoglobin production, and therefore partially inhibiting HbS polymerization, this drug is an important anti-inflammatory agent. In addition to reducing the incidence of hospitalization and acute pain in SCD, hydroxyurea reduces the occurrence of acute chest syndrome and may provide an alternative to chronic transfusion therapy in some subjects at risk of stroke, indicating benefits on the hemostatic and thromboinflammatory mechanisms that contribute to these complications.

10.3324/haematol.2019.239343

[3] Emerging disease-modifying therapies for sickle cell disease

Haematologica · 2019-09-01

Hydroxyurea, a ribonucleotide reductase inhibitor with HbF-inducing properties, is the paradigmatic HbF-inducing agent and was the first drug approved by the FDA for the treatment of adults and children with SCD. Hydroxyurea induces HbF and increases RBC volume, thereby reducing the likelihood of HbS polymerization.

10.3324/haematol.2018.207357

[4] Sickle Cell Disease: Stem Cell Transplantation

American Society of Hematology · 2021-09-27 12:00:00

- Standard treatment is a drug called hydroxyurea combined with repeated red blood cell transfusions.
This does not cure the disease; it only reduces symptoms.
- Currently, the cure is possible only by transplanting normal stem cells.
https://ashpublications.org/bloodadvances/article/5/18/3668/476988/American-Society-of-Hematology-2021-guidelines-for

[5] Targeting sickle cell disease root-cause pathophysiology with small molecules
Haematologica · 2019-09-01
One way of creating such stress is to administer cytotoxic (cell killing) drugs, leading to clinical evaluation in SCD of the oral ribonucleotide reductase inhibitor hydroxyurea. In the pivotal trial, hydroxyurea (15-35 mg/kg) increased HbF for 2 years in ~50% of the adult SCD patients treated.
10.3324/haematol.2018.207530

[6] Hydroxyurea therapy requires HbF induction for clinical benefit in a sickle cell mouse model.
Haematologica · 2010-09-01
Hydroxyurea therapy requires HbF induction for clinical benefit in a sickle cell mouse model.
10.3324/haematol.2010.023325

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271. MedQA question ID 416 Step 1

Question

A 25-year-old woman presents to her new family physician for a follow-up appointment. She previously presented with itching, as well as frequent and painful urination. A vaginal swab was taken and sent to the laboratory to confirm the diagnosis. Diplococci were seen on Gram stain and were grown on Thayer-Martin agar. When discussing her infection, the patient says that she uses safe sex practices. Her history is significant for meningitis and for infection with Streptococcus pneumoniae. The physician discusses that the reason behind these infections comes from a defect in the innate immune system. Which of the following best describes the component that is likely deficient in this patient?

(A) Plays a role in angioedema

(B) Degraded by C1 esterase inhibitor

(C) Creates pores in the cell membrane

(D) Induces the alternative complement pathway

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The deficient component is the terminal complement pathway, specifically the membrane attack complex (C5–C9), which creates pores in the target cell membrane [1] [2]. The **American College of Allergy, Asthma, and Immunology / American Academy of Allergy, Asthma & Immunology** notes that patients with susceptibility to **Neisseria** infections should be

suspected of having a **terminal pathway complement deficiency**, and that screening for classical/terminal pathway defects is done with a **CH50** assay [1] [2].

Why this fits

- Recurrent **meningococcal/gonococcal-type Neisseria infections** are classic for **terminal complement deficiency** [1] [2].
- The terminal complement components **C5, C6, C7, C8, and C9** assemble the **membrane attack complex**, which **forms pores** in microbial membranes [1].
- In contrast, **C1 inhibitor deficiency** causes hereditary angioedema, not this infection pattern [1].
- **Factor D** is part of the alternative pathway, but isolated alternative-pathway defects are more associated with encapsulated organisms rather than the classic recurrent Neisseria phenotype [1].

Best answer

C. Creates pores in the cell membrane

This corresponds to the **C5–C9 membrane attack complex** deficiency [1] [2].

References

[1] Diagnosis and Management of Primary Immunodeficiency

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2015-09-01 12:00:00

Patients with susceptibility to neisserial infections should be suspected of having a terminal pathway complement deficiency. Screening for defects of classical and terminal pathway complement components should be performed by using the classical pathway complement hemolysis 50% (CH50) assay. Screening for possible defects of the alternative pathway of complement should be with the alternative pathway complement hemolysis 50% (AH50) assay.

https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Practice%20and%20Parameters/PID-Nov-2015.pdf

[2] Diagnosis and Management of Primary Immunodeficiency

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2015-09-01 12:00:00

Component(s): C5, C6, C7 — bacterial infections: Neisseria species; C8, C9 — bacterial infections: Neisseria species; C1 inhibitor (SERPING1) — hereditary angioedema; Factor D — bacterial infections: encapsulated organisms; Factor H — bacterial infections: encapsulated organisms.

https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Practice%20and%20Parameters/PID-Nov-2015.pdf

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272. MedQA question ID 1228 Step 2/3

Question

An 8-year-old boy is brought to the physician by his parents for short stature. Neither his clothing nor his shoe size have changed over the past year. He also frequently bumps into obstacles such as furniture and has headaches at night. He is always thirsty for cold water and has been urinating more frequently. Three years ago, he had an asthma attack that was treated with albuterol and a one-week course of steroids. His mother has Hashimoto's thyroiditis and had precocious puberty. His mother's height is 147 cm (4 ft 10 in) and his father's height is 160 cm (5 ft 3 in). He is at the 5th percentile for height and 5th percentile for weight. His temperature is 37°C (98.6°F), pulse is 98/min, respirations are 16/min, and blood pressure is 100/64 mm Hg. Examination shows a soft and

nontender abdomen. The genitals and pubic hair are both Tanner stage 1. Axillary hair is absent. Patellar reflexes are 1+ bilaterally. Laboratory studies show:
Na+ 145 mEq/L
K+ 4.1 mEq/L
Cl- 102 mEq/L
HCO3- 25 mEq/L
Ca2+ 9.4 mg/dL
Glucose 110 mg/dL
Thyroid-stimulating hormone 0.3 µU/mL
Thyroxine 3.9 µg/dL
Insulin-like growth factor 1 24 ng/mL (N=61–356 ng/mL)
Insulin-like growth factor binding protein 3 2.1 mcg/mL (N=1.6–6.5 µg/mL)
Which of the following is the most likely diagnosis?"

(A) Rathke cleft cyst

(B) Craniopharyngioma

(C) Multiple endocrine neoplasia

(D) Pituitary adenoma

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Craniopharyngioma is the most likely diagnosis. The child has a classic **suprasellar/pituitary mass effect syndrome**: **nocturnal headaches, progressive visual disturbance (bumping into objects), polydipsia/polyuria suggesting diabetes insipidus, and central hypothyroidism/ growth hormone deficiency** (low T4 with inappropriately low TSH, low IGF-1/IGFBP-3) [1] [2]. Among the choices, this constellation is most consistent with **craniopharyngioma** rather than Rathke cleft cyst, multiple endocrine neoplasia, or pituitary adenoma [1] [2].

Why this fits a craniopharyngioma

- **Headache + visual symptoms + thirst/urination changes** are red flags for a brain/central nervous system lesion with pituitary involvement; the Endocrine Society recommends pituitary-focused brain MRI when these symptoms occur with signs/laboratory evidence of pituitary hormone deficiency or excess [1].
- Hypopituitarism is most often caused by a **compressive pituitary or hypothalamic mass**; in this child, the combination of **growth failure plus central hypothyroidism and probable diabetes insipidus** strongly suggests a sellar/suprasellar lesion [2].

Why the other options are less likely

- **Rathke cleft cyst** can cause headache, hypopituitarism, and even polyuria/polydipsia, but the overall picture here is more concerning for an enlarging suprasellar tumor with optic pathway involvement [3].

- **Pituitary adenoma** is less likely in an 8-year-old and would more typically present with hormonal hypersecretion or a different pituitary hormone pattern [4].
- **Multiple endocrine neoplasia** does not explain this neurologic/visual and diabetes insipidus presentation [2].

References

[1] Functional Hypothalamic Amenorrhea

Endocrine Society · 2017-03-22 00:00:00

ES recommends a brain magnetic resonance imaging (MRI) (with pituitary cuts and contrast) in adolescents or women with presumed FHA and a history of severe or persistent headaches; persistent vomiting that is not self-induced; change in vision, thirst, or urination not attributable to other causes; lateralizing neurologic signs; and clinical signs and/or laboratory results that suggest pituitary hormone deficiency or excess.

https://academic.oup.com/jcem/article/102/5/1413/3077281

[2] Hypopituitarism.

Lancet (London, England) · 2024-06-15

Hypopituitarism is rare and likely to be underdiagnosed. The most common cause is compressive growth or ablation of a pituitary or hypothalamic mass. Less common causes include genetic mutations, hypophysitis, infiltrative and infectious disease, and traumatic brain injury. Diagnosis requires measurement of basal circulating hormone concentrations and confirmatory hormone stimulation testing.

10.1016/s0140-6736(24)00342-8

[3] Symptomatic Rathke cleft cyst in paediatric patients - clinical presentations, surgical treatment and postoperative outcomes - an analysis of 38 cases.

Journal of pediatric endocrinology & metabolism : JPEM · 2018-08-28

Rathke cleft cysts are benign, epithelium-lined intrasellar and/or suprasellar cysts. In a pediatric surgical series, the most common symptoms were headache, hypothyroidism, short stature, decreased growth velocity, delayed puberty, polyuria and polydipsia.

10.1515/jpem-2017-0540

[4] Pituitary incidentalomas: analysis of a neuroradiological cohort.

Pituitary · 2015-12-01

Most pituitary lesions are detected during the investigation of symptoms associated with hormonal dysfunction and vision abnormalities. The most frequent reason for imaging was headache. Adenoma is the most prevalent lesion, followed by Rathke's cleft cyst. Hormonal evaluation revealed hypopituitarism in 14 patients and hypersecretion in 6: 5 prolactinomas and 1 somatotroph adenoma.

10.1007/s11102-015-0652-7

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273. MedQA question ID 1224 Step 2/3

Question

A 25-year-old man presents to his primary care physician for pain in his back. The patient describes the pain as feeling worse in the morning. He says it is a general stiffness that improves when he goes to the gym and lifts weights. He also states that his symptoms seem to improve when he leans forward or when he is cycling. The patient is a current smoker and is sexually active. He admits to having unprotected sex with many different partners this past year. The patient has no significant past medical history and is not currently taking any medications. On physical exam, the patient demonstrates notable kyphosis of the thoracic spine and decreased mobility of the back in all 4 directions. The patient's strength is 5/5 in his upper and lower extremities. The rest of his physical

exam is within normal limits. Which of the following findings is associated with this patient's presentation?

(A) Diminished pulses in the lower extremity

(B) Narrowing of the spinal canal when standing upright

(C) Pain with elevation of his leg while laying down

(D) Punctate bleeding spots when dermatologic scales are removed

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The presentation is most consistent with ankylosing spondylitis/axial spondyloarthritis, which classically causes inflammatory back pain that is worse in the morning and improves with exercise, along with spinal stiffness and reduced mobility [1] [2]. **Among the choices, D is the only spondyloarthritis-associated finding**: punctate bleeding after scale removal is **Auspitz sign**, which indicates **psoriasis**, a condition that can coexist with axial spondyloarthritis [1] [2].

Why the other options are not the best fit

- **A. Diminished pulses in the lower extremity**: not a typical finding of ankylosing spondylitis.
- **B. Narrowing of the spinal canal when standing upright**: suggests spinal stenosis, not inflammatory spondyloarthritis.
- **C. Pain with elevation of his leg while lying down**: suggests radiculopathy/sciatica.

Bottom line

The best answer is **D**.

References

[1] Treatment of Ankylosing Spondylitis and Nonradiographic Axial Spondyloarthritis

American College of Rheumatology, Spondylitis Association of America · 2019-08-22 00:00:00

Axial spondyloarthritis (SpA), comprising ankylosing spondylitis (AS) and nonradiographic axial SpA, is the main form of chronic inflammatory arthritis affecting the axial skeleton. AS is characterized by inflammatory back pain, radiographic sacroiliitis, excess spinal bone formation, and a high prevalence of HLA-B27. Skeletal disease may be accompanied by uveitis, psoriasis, and inflammatory bowel disease.

https://onlinelibrary.wiley.com/doi/full/10.1002/acr.24025

[2] Assessing the quality and reliability of YouTube videos as a source of information on inflammatory back pain.

PeerJ · 2024-01-01

Inflammatory back pain is a chronic condition with localized pain, particularly in the axial spine and sacroiliac joints, that is associated with morning stiffness and improves with exercise.

10.7717/peerj.17215

274. MedQA question ID 1133 Step 2/3

Question

A 31-year-old male comes to your office for his annual exam. He states that he received all of his recommended vaccinations prior to beginning college, but has not had any vaccines in the past 13 years. His medical history is significant for intermittent, exercise-induced asthma. He has been sexually active in the past with multiple female partners. In addition to an influenza vaccine, which vaccine should be administered to this patient during this visit?

(A) Pneumococcal vaccine

(B) Tetanus, diphtheria, and acellular pertussis booster (Tdap) vaccine

(C) Haemophilus influenza B (HIB) vaccine

(D) Human papillomavirus (HPV) vaccine

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The Centers for Disease Control and Prevention (CDC) recommends a Tdap booster now **if the last tetanus-toxoid–containing vaccine was more than 10 years ago; after a prior Tdap dose, adults should continue** Td or Tdap every 10 years **[1]. In this 31-year-old man,** pneumococcal vaccine is not routinely indicated **unless his asthma is being managed as a qualifying chronic lung disease risk factor, and** HPV vaccine is optional based on shared clinical decision-making** for ages 27–45 rather than routine catch-up [2] [3].

Practical choice

- **Best single answer: Tdap booster** [1].
- If he **never completed HPV vaccination**, **HPV vaccination can be offered** because he is 31 and has ongoing sexual exposure risk, but this is a shared decision for adults **27–45 years** rather than a routine requirement [2] [3].
- **Hib vaccine** is not indicated for a healthy adult in this scenario [4].

Why the others are not the best answer

- **Pneumococcal vaccine** is reserved for adults 19–49 with specified risk factors, including certain chronic lung diseases; the retrieved schedule does not establish that intermittent exercise-induced asthma alone requires it [5].
- **Hib** is only used in specific high-risk adult situations, not for routine annual exams [4].

Bottom line

For this patient, the most clearly indicated vaccine in addition to influenza is **Tdap**; **HPV vaccination may also be discussed**, but it is not the most definitive next step from the options given [1] [2].

References

[1] Adult Immunization Schedule for Ages 19 Years or Older, United States, 2025

Centers for Disease Control and Prevention · 2024-11-21 12:00:00

Completed primary series and received at least 1 dose Tdap at age 10 years or older: Td or Tdap every 10 years thereafter. Completed primary series and did NOT receive Tdap at age 10 years or older: 1 dose Tdap, then Td or Tdap every 10 years thereafter.

https://www.cdc.gov/vaccines/hcp/imz-schedules/adult-age.html

[2] Adult Immunization Schedule for Ages 19 Years or Older, United States, 2025

Centers for Disease Control and Prevention · 2024-11-21 12:00:00

Adults age 27–45 years: Based on shared clinical decision-making, complete a 2-dose series (if initiated age 9-14 years) or 3-dose series (if initiated ≥15 years).

https://www.cdc.gov/vaccines/hcp/imz-schedules/adult-age.html

[3] Primary Care Guidance for Persons With Human Immunodeficiency Virus

HIV Medicine Association, Infectious Diseases Society of America · 2024-10-12 00:00:00

Persons aged between 9 and 26 years should be vaccinated against HPV and persons with HIV aged 27–45 years who were not vaccinated or inadequately vaccinated should be offered the vaccination series if appropriate.

https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciae479/7818967

[4] Recommended Childhood and Adolescent Immunization Schedule: United States, 2024

Centers for Disease Control and Prevention · 2024-01-29 12:00:00

Haemophilus influenzae type b (Hib): severe allergic reaction after a previous dose or to a vaccine component; age <6 weeks. Moderate or severe acute illness with or without fever.

https://publications.aap.org/pediatrics/article/doi/10.1542/peds.2023-065044/195490/Recommended-Childhood-and-Adolescent-Immunization

[5] Adult Immunization Schedule for Ages 19 Years or Older, United States, 2025

Centers for Disease Control and Prevention · 2024-11-21 12:00:00

Age 19–49 years with certain underlying medical conditions or other risk factors who have: Not previously received a PCV13, PCV15, PCV20, or PCV21 or whose previous vaccination history is unknown: 1 dose PCV15 or 1 dose PCV20 or 1 dose PCV21. Underlying medical conditions or other risk factors include chronic heart/liver/lung disease, cigarette smoking, diabetes mellitus, etc.

https://www.cdc.gov/vaccines/hcp/imz-schedules/adult-age.html

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275. MedQA question ID 282 Step 1

Question

A 16-year-old girl is brought to the physician by her father because of concerns about her behavior during the past 2 years. She does not have friends and spends most of the time reading by herself. Her father says that she comes up with excuses to avoid family dinners and other social events. She states that she likes reading and feels more comfortable on her own. On mental status examination, her thought process is organized and logical. Her affect is flat. Which of the following is the most likely diagnosis?

(A) Schizoid personality disorder

(B) Antisocial personality disorder

(C) Schizophreniform disorder

(D) Autism spectrum disorder

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Schizoid personality disorder is the most likely diagnosis. The presentation is dominated by **social detachment, preference for solitary activities, and flat affect** with an **organized, logical thought process**, which fits schizoid traits better than schizophrenia-spectrum psychosis; the absence of hallucinations, delusions, or disorganized thinking argues against **schizophreniform disorder** [2]. **Autism spectrum disorder (ASD)** is less likely because the American Academy of Child and Adolescent Psychiatry advises that ASD assessment should focus on broader developmental symptomatology, and ASD typically has a **developmental onset in early childhood** rather than a new pattern emerging in adolescence [1] [2].

Why the other choices are less likely

- **Antisocial personality disorder**: would require a longstanding pattern of disregard for and violation of others' rights, not just social withdrawal.
- **Schizophreniform disorder**: would need psychotic symptoms such as delusions, hallucinations, or disorganized speech/behavior.
- **ASD**: usually has earlier developmental social-communication abnormalities and restricted/repetitive behaviors, not only adolescent social aloofness [1] [2].

References

[1] Assessment and Treatment of Children and Adolescents With Autism Spectrum Disorder
American Academy of Child and Adolescent Psychiatry · 2014-02-01 00:00:00
If the screening indicates significant ASD symptomatology, a thorough diagnostic evaluation should be performed to determine the presence of ASD. The developmental assessment of young children and the psychiatric assessment of all children should routinely include questions about ASD symptomatology.
https://jaacap.org/article/S0890-8567(13)00819-8/fulltext

[2] ASD and schizophrenia show distinct developmental profiles in common genetic overlap with population-based social communication difficulties.
Molecular Psychiatry · 2018-02-01
Difficulties in social communication are part of the phenotypic overlap between autism spectrum disorders (ASD) and schizophrenia. Symptoms of ASD typically occur during early childhood, whereas most symptoms characteristic of schizophrenia do not appear before early adulthood.
10.1038/mp.2016.198

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276. MedQA question ID 980 Step 2/3

Question

A 29-year-old G4P0 woman presents following a spontaneous pregnancy loss in the 18th week of her pregnancy. This is her fourth loss in the second trimester and she is concerned about her

inability to have a successful pregnancy. She is otherwise healthy and has no acute complaints. Her vitals are unremarkable and exam is notable only for a firm, asymmetric uterus. Laboratory studies are ordered as seen below.

Hemoglobin: 9.0 g/dL
Hematocrit: 30%
Leukocyte count: 6,800/mm^3 with normal differential
Platelet count: 199,000/mm^3

Serum:
Na+: 139 mEq/L
Cl-: 100 mEq/L
K+: 4.3 mEq/L
HCO3-: 25 mEq/L
BUN: 20 mg/dL
Glucose: 99 mg/dL
Creatinine: 1.1 mg/dL

Which of the following tests is most likely to elucidate the cause of this patient's pregnancy losses?

(A) Karotyping

(B) Hysterosalpingogram

(C) Prolactin level

(D) TSH level

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Hysterosalpingogram is the test most likely to elucidate the cause of this patient's recurrent second-trimester pregnancy losses. The **European Society of Human Reproduction and Embryology (ESHRE)** recommends **screening for anatomic factors** as part of recurrent pregnancy loss (RPL) evaluation, and congenital uterine anomalies are associated with RPL [1] [2]. In a patient with a **firm, asymmetric uterus**, a uterine structural abnormality such as a **Müllerian anomaly** is a leading concern; uterine cavity imaging is therefore the highest-yield next step among the options given [1] [3].

Why the other options are less likely

- **Karyotyping** is useful in selected RPL evaluations, but it does not best explain a **firm, asymmetric uterus** and recurrent **second-trimester** loss.
- **Prolactin** and **TSH** testing can be part of broader infertility/recurrent loss workups, but they are less directly tied to this presentation than uterine anatomic assessment.

- The available evidence and guidelines emphasize **anatomic evaluation** first when a uterine cause is suspected [1] [2] [3].

Clinical note

For suspected uterine structural disease, **hysterosalpingography** is an appropriate screening test, though **transvaginal ultrasound, sonohysterography, or MRI** may also be used depending on local availability and the suspected anomaly [1] [3].

References

[1] Recurrent Pregnancy Loss
European Society of Human Reproduction and Embryology · 2023-03-02 00:00:00
- Screening for anatomic factors should be included in RPL investigation (Strong, High) with uterine septum resection considered in patients with RPL (Conditional, Low)
- Patients with RPL and intrauterine adhesions should have hysteroscopic adhesiolysis to increase the likelihood of conception (Strong, High).
https://academic.oup.com/hropen/article/2023/1/hoad002/7068067

[2] Recurrent Pregnancy Loss
European Society of Human Reproduction and Embryology · 2023-03-02 00:00:00
Congenital uterine anomalies are associated with RPL (Moderate).
https://academic.oup.com/hropen/article/2023/1/hoad002/7068067

[3] Uterine factors in recurrent pregnancy losses.
Fertility and sterility · 2021-03-01
Congenital uterine anomalies most likely caused by HOX gene mutations. Acquired uterine anomaly may result from uterine trauma or benign growths of the myometrium (fibroids) or endometrium.
10.1016/j.fertnstert.2020.12.003

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277. MedQA question ID 297 Step 2/3

Question

Two days after being admitted to the hospital following a fall, a 77-year-old woman complains of fatigue and headaches. During the fall she sustained a right-sided subdural hematoma. She has hypertension and hyperlipidemia. Her medications prior to admission were hydrochlorothiazide and atorvastatin. Vital signs are within normal limits. Physical and neurologic examinations show no abnormalities. Laboratory studies show:
Serum
Na+ 130 mEq/L
K+ 4.0 mEq/L
Cl- 103 mEq/L
HCO3- 24 mEq/L
Urea nitrogen 14 mg/dL
Creatinine 1.1 mg/dL
Osmolality 270 mOsmol/kg H2O
Urine
Sodium 45 mEq/L
Osmolality 326 mOsmol/kg H2O

A CT scan of the head shows an unchanged right-sided subdural hematoma. Which of the following is the most appropriate next step in management?"

(A) Head elevation

(B) Tolvaptan

(C) Desmopressin

(D) Fluid restriction

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Fluid restriction is the most appropriate next step. This patient has hypotonic euvolemic hyponatremia with inappropriately concentrated urine and high urine sodium, which is most consistent with **SIADH after intracranial injury**; in this setting, the **Neurocritical Care Society** emphasizes avoiding hyponatremia in severe neurologic injury, and standard SIADH management starts with **water restriction** rather than vaptans or desmopressin [1] [2] [3].

Why this is the best choice

- **Fluid restriction** is first-line for presumed SIADH-related hyponatremia when the patient is stable and not severely symptomatic [2] [3].
- **Tolvaptan** can raise sodium in SIADH, but it is generally a second-line option when restriction fails or is not feasible; it is not the best immediate next step here [3] [4].
- **Desmopressin** would worsen water retention and is used for other indications, not for SIADH-related hyponatremia.
- **Head elevation** does not address the hyponatremia.

Clinical context

The patient is neurologically intact, hemodynamically stable, and has mild hyponatremia (**Na 130 mEq/L**) without evidence of worsening mass effect on CT. That makes conservative treatment of the hyponatremia appropriate rather than urgent hypertonic therapy [1] [2].

References

[1] Acute Treatment of Cerebral Edema in Neurocritical Care Patients

Neurocritical Care Society · 2020-06-01 00:00:00

Clinicians should avoid hyponatremia in patients with severe neurological injury due to the risk of exacerbating cerebral edema (good practice statement).

https://higherlogicdownload.s3.amazonaws.com/NEUROCRITICALCARE/b8b3b384-bfb9-42af-bb55-45973d5054a4/UploadedImages/Cook2020_Article_GuidelinesForTheAcuteTreatment.pdf

[2] Diagnosis and management of hyponatraemia in the older patient.

Internal Medicine Journal · 2018-01-01

Hyponatraemia (serum sodium concentration below 135mm/L) is the most common electrolyte disturbance in older people. The causes can be complex to diagnose and treat and many published guidelines do not focus on the issues in an older patient group. Tolvaptan is an oral vasopressin receptor antagonist that can increase serum sodium concentrations.

10.1111/imj.13682

[3] [Hyponatremia: from physiopathology to practice].

La Revue de medecine interne · 2010-04-01

The use of hypertonic saline solutions should be restricted to the treatment of acute and severe hyponatraremia with evidence of brain damage. Water restriction is commonly recommended in inappropriate secretion of antidiuretic hormone or in hypervolemia.

10.1016/j.revmed.2009.03.369

[4] Neurosurgical Hyponatremia.

Journal of Clinical Medicine · 2014-10-14

Hyponatremia is a frequent electrolyte imbalance in hospital inpatients. Acute onset is common in patients who have undergone any type of brain insult, including traumatic brain injury, subarachnoid hemorrhage and brain tumors. Most cases appear to be due to the syndrome of inappropriate antidiuretic hormone secretion (SIADH). Classical treatment of SIADH with fluid restriction is frequently ineffective. Recently developed vasopressin receptor antagonist class of drugs provides a useful tool in the management of neurosurgical SIAD

10.3390/jcm3041084

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278. MedQA question ID 509 Step 2/3

Question

An 81-year-old man is brought to the clinic by his son to be evaluated for memory issues. The patient's son says he has difficulty remembering recent events and names. He says the patient's symptoms have progressively worsened over the last several years but became acutely worse just recently. Also, yesterday, the patient complained that he could not see out of his right eye, but today he can. When asked about these concerns, the patient seems to have no insight into the problem and reports feeling well. His medical history is significant for diabetes mellitus type 2 and hypertension. He had a left basal ganglia hemorrhage 12 years ago and a right middle cerebral artery infarction 4 years ago. Current medications are amlodipine, aspirin, clopidogrel, metformin, sitagliptin, and valsartan. He lives with his son and can feed himself and change his clothes. There is no history of urinary or fecal incontinence. His vitals include: blood pressure 137/82 mm Hg, pulse 78/min, respiratory rate 16/min, temperature 37.0°C (98.6°F). On physical examination, the patient is alert and oriented. He is unable to perform simple arithmetic calculations and the mini-mental status exam is inconclusive. He can write his name and comprehend written instructions. Muscle strength is 4/5 on the right side. The tone is also slightly reduced on the right side with exaggerated reflexes. His gait is hemiparetic. Which of the following is the most likely diagnosis in this patient?

(A) Alzheimer's disease

(B) Lewy body dementia

(C) Normal-pressure hydrocephalus

(D) Vascular dementia

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Vascular dementia is the most likely diagnosis. The **Alzheimer's Association** criteria for probable Alzheimer disease dementia should **not** be applied when there is **substantial concomitant cerebrovascular disease**, including a history of stroke temporally related to cognitive worsening or multiple/extensive infarcts; this patient has both prior strokes and a stepwise/vascular pattern of decline [1]. The presentation is also more consistent with vascular cognitive disorder than with **dementia with Lewy bodies**, which typically features **fluctuations, recurrent visual hallucinations, spontaneous parkinsonism, and REM sleep behavior disorder**—features not described here [2].

Why vascular dementia fits best

- Progressive cognitive decline over years with a **recent acute worsening** supports a vascular contribution.
- Prior **right MCA infarction** and **left basal ganglia hemorrhage** provide clear cerebrovascular substrate for dementia [1] [3].
- Focal neurologic deficits on exam (right-sided weakness, hyperreflexia, hemiparetic gait) further support vascular brain injury rather than primary Alzheimer disease.

Why the other choices are less likely

- **Alzheimer disease:** less likely because the syndrome is not purely amnestic and is accompanied by major cerebrovascular disease, which argues against probable AD dementia [1].
- **Lewy body dementia:** less likely because key core features are not present [2].
- **Normal-pressure hydrocephalus:** less likely because the classic triad and supportive imaging findings are not provided.

References

[1] Diagnostic Evaluation, Testing, Counseling, and Disclosure of Suspected Alzheimer's Disease and Related Disorders

Alzheimer's Association · 2024-12-23 12:00:00

Probable AD dementia should not be applied when there is evidence of substantial concomitant cerebrovascular disease, defined by a history of a stroke temporally related to the onset or worsening of cognitive impairment; or the presence of multiple or extensive infarcts or severe white matter hyperintensity burden.

https://alz-journals.onlinelibrary.wiley.com/doi/10.1002/alz.14337

[2] Diagnostic Evaluation, Testing, Counseling, and Disclosure of Suspected Alzheimer's Disease and Related Disorders

Alzheimer's Association · 2024-12-23 12:00:00

Progressive cognitive-behavioral-Parkinsonism syndrome (e.g., dementia with Lewy bodies syndrome or PDD syndrome) is characterized by fluctuating levels of cognitive impairment, recurrent visual hallucinations, spontaneous extrapyramidal motor features, and a history of REM sleep behavior disorder (RBD).

https://alz-journals.onlinelibrary.wiley.com/doi/10.1002/alz.14337

[3] Vascular Cognitive Disorder.

Seminars in Neurology · 2019-04-01

Vascular cognitive disorder refers to a heterogeneous group of disorders in which the primary feature is cognitive impairment attributable to cerebrovascular disease.

10.1055/s-0039-1678582

279. MedQA question ID 300 Step 1

Question

A 5-year-old boy is brought to the physician because of an irregular gait 3 days after receiving age-appropriate vaccinations. Examination of the lower extremities shows no redness or swelling. When the child stands on his right leg, his left leg drops and his pelvis tilts towards the left. Sensation to light touch is normal in both legs. This patient's symptoms are most likely due to the injection of the vaccine into which of the following locations?

(A) Inferolateral quadrant of the right buttock

(B) Inferomedial quadrant of the right buttock

(C) Inferomedial quadrant of the left buttock

(D) Superomedial quadrant of the right buttock

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Superomedial quadrant of the right buttock. This pattern is most consistent with right superior gluteal nerve injury, causing ipsilateral hip abductor weakness and a Trendelenburg gait after a gluteal intramuscular injection. Gluteal injections are a known cause of preventable nerve injury in children, and the buttock is a poor injection site because of the risk of injuring major nerves; safer intramuscular sites are favored when possible [1] [2] [3].

References

[1] Injection-induced sciatic nerve injury in Ugandan children.

Tropical doctor · 2010-10-01

In developing countries, sciatic nerve injury following gluteal intramuscular injection is a persistent problem in developing countries. It is recommended that the glute area should not be used as an intramoscular injection site in children. In the study over 6 months involving 133 children seen in Mulago hospital with acute flaccid paralysis, there were 124 children with injection-induced sciatic nerves injury.

https://doi.org/10.1258/td.2010.090354

[2] Anatomically safe sites for intramuscular injections: a cross-sectional study on young adults and cadavers with a focus on the thigh.

Human vaccines & immunotherapeutics · 2020-01-01

The relationship between intramuscular injection sites in the thigh and major blood vessels and nerves remains unclear. The middle of the vastus lateralis is an appropriate place for intramuscular injections because of the low risk of vascular or nerve damage. The present results support good practices for site selection for intramuscular injections.

https://doi.org/10.1080/21645515.2019.1646576

[3] Preventing Sciatic Nerve Injury due to Intramuscular Injection: Ten-Year Single-Center Experience and Literature Review.

Turkish neurosurgery · 2017-01-01

Sciatic nerve injury is the most frequent and serious complication of intramuscular gluteal injection. 217 subjects were diagnosed with sciatic injury between 2003 and 2013. 59 (27.2%) were female and 158 (72.8%) were male. Sciatica

occurred on the right side in 91 subjects, on the left side in 125 and bilaterally in one. The peroneal nerve was more affected than the tibial nerve. The most used agents were non-steroidal anti-inflammatory drugs.
https://doi.org/10.5137/1019-5149.jtn.16956-16.1

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280. MedQA question ID 87 Step 1

Question

A 50-year-old man visits his physician after 20 years of not seeking any medical care. He is concerned about his health after a colleague recently had a heart attack. The patient has no active complaints and says he feels healthy; however, he does not exercise regularly and lives a sedentary lifestyle. He is employed as an administrative position at a local college, and is seated at a desk most of the day. His father had a heart attack at age 54 and his mother is still alive with no health concerns. He does not smoke, only drinks socially, and does not use drugs. Today, his blood pressure is 130/90 mm Hg, pulse is 84/min, and respiratory rate is 14/min. Physical examination reveals an obese male with no significant findings. An ECG shows no abnormalities, and laboratory testing shows the following:
Laboratory test
Serum glucose (fasting) 105 mg/dL
Serum electrolytes
Sodium 142 mEq/L
Potassium 3.9 mEq/L
Chloride 101 mEq/L
Serum creatinine 0.8 mg/dl
Blood urea nitrogen 10 mg/dl
Cholesterol, total 250 mg/dL
HDL-cholesterol 35 mg/dL
LDL-cholesterol 186 mg/dL
Triglycerides 170 mg/dL
Urinalysis
Glucose negative
Ketones negative
Leucocytes negative
Nitrites negative
Red blood cells (RBC) negative
Casts negative
Which of the following lab abnormalities in this patient is an indication for treatment?

(A) Blood pressure reading

(B) Patient’s weight

(C) High LDL-cholesterol

(D) Serum glucose level

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. High LDL cholesterol is the abnormality most clearly supporting treatment here. The **American College of Cardiology/American Heart Association (ACC/AHA)** identify **primary hypercholesterolemia (LDL-C 160–189 mg/dL)** and **family history of premature ASCVD** as risk-enhancing factors, and in adults 40 to 75 years these factors can justify starting a **moderate-intensity statin** after a clinician–patient risk discussion [1] [2] [3].

Why the other findings are not the main treatment trigger

- **Blood pressure 130/90 mm Hg**: the systolic value is below the usual medication threshold, and the ACC/AHA primary prevention guidance emphasizes **nonpharmacologic interventions** for elevated BP/hypertension; drug therapy is generally tied to higher BP levels and overall ASCVD risk [1] [4].
- **Patient weight/obesity**: obesity warrants **lifestyle and caloric restriction/weight loss**, but weight alone is not usually the single laboratory or clinical abnormality that triggers a specific pharmacologic preventive therapy in this vignette [1] [5] [6].
- **Fasting glucose 105 mg/dL**: this is impaired fasting glucose, not diabetes; the guideline-based medication threshold for glucose-directed preventive therapy is not met [1].

Clinical interpretation

This patient has multiple ASCVD risk enhancers, especially **LDL-C 186 mg/dL**, **HDL 35 mg/dL**, **family history of premature MI**, and features of metabolic syndrome. Among the answer choices, the finding that most directly indicates treatment is **high LDL cholesterol** [1] [2] [3].

References

[1] Primary Prevention of Cardiovascular Disease
American College of Cardiology, American Heart Association · 2019-03-17 00:00:00
Statin therapy is first-line treatment for primary prevention of ASCVD in patients with elevated low-density lipoprotein cholesterol levels (≥190 mg/dL), those with diabetes mellitus, those who are 40 to 75 years of age, and those determined to be at sufficient ASCVD risk after a clinician–patient risk discussion.
https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000678

[2] Primary Prevention of Cardiovascular Disease
American College of Cardiology, American Heart Association · 2019-03-17 00:00:00
Risk-Enhancing Factors: Family history of premature ASCVD (males, age <55 y; females, age <65 y); Primary hypercholesterolemia (LDL-C, 160–189 mg/dL); Metabolic syndrome (a tally of 3 makes the diagnosis).
https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000678

[3] Primary Prevention of Cardiovascular Disease
American College of Cardiology, American Heart Association · 2019-03-17 00:00:00
In adults at borderline risk (5% to <7.5% 10-year ASCVD risk) or intermediate risk (≥7.5% to <20% 10-year ASCVD risk), it is reasonable to use additional risk-enhancing factors to guide decisions about preventive interventions (e.g., statin therapy).
https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000678

[4] Primary Prevention of Cardiovascular Disease

American College of Cardiology, American Heart Association · 2019-03-17 00:00:00

In adults with elevated blood pressure (BP) or hypertension, including those requiring antihypertensive medications nonpharmacological interventions are recommended to reduce BP.

https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000678

[5] Primary Prevention of Cardiovascular Disease

American College of Cardiology, American Heart Association · 2019-03-17 00:00:00

In individuals with overweight and obesity, weight loss is recommended to improve the ASCVD risk factor profile.

https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000678

[6] Primary Prevention of Cardiovascular Disease

American College of Cardiology, American Heart Association · 2019-03-17 00:00:00

Counseling and comprehensive lifestyle interventions, including calorie restriction, are recommended for achieving and maintaining weight loss in adults with overweight and obesity.

https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000678

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281. MedQA question ID 529 Step 1

Question

A 60-year-old woman is brought to the emergency department because of sudden, painless loss of vision in her right eye that occurred 30 minutes ago while watching TV. She has coronary artery disease, hypertension, and type 2 diabetes mellitus; she has had trouble adhering to her medication regimen. Her blood pressure is 160/85 mm Hg. Examination shows 20/50 vision in the left eye and no perception of light in the right eye. Direct pupillary reflex is present in the left eye, but absent in the right eye. Accommodation is intact bilaterally. Intraocular pressure is 16 mm Hg in the left eye and 18 mm Hg in the right eye. Fundoscopic examination of the right eye shows a pale, white retina with a bright red area within the macula. The optic disc appears normal. Which of the following is the most likely diagnosis?

(A) Retinal detachment

(B) Central retinal artery occlusion

(C) Acute angle-closure glaucoma

(D) Anterior ischemic optic neuropathy

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely diagnosis is central retinal artery occlusion (CRAO): sudden, painless monocular vision loss with an afferent pupillary defect and fundoscopic **retinal whitening with a cherry-red spot** is classic for CRAO [1] [2]. The American Academy of Ophthalmology (AAO) notes that symptomatic retinal arterial occlusion should be treated as an emergency and should prompt

immediate stroke-center referral and systemic evaluation for embolic sources; in patients older than 50 years, giant cell arteritis must also be considered [1].

Why the other choices are less likely

- **Retinal detachment** typically causes flashes, floaters, or a curtain-like visual field defect rather than a pale retina with a cherry-red spot [1].
- **Acute angle-closure glaucoma** usually presents with **eye pain**, markedly elevated intraocular pressure, and a mid-dilated pupil; those features are absent here [3] [4].
- **Anterior ischemic optic neuropathy** causes optic disc swelling rather than a normal optic disc with retinal whitening and cherry-red spot [1] [2].

References

[1] Retinal and Ophthalmic Artery Occlusions
American Academy of Ophthalmology · 2025-02-07 12:00:00
Acute, symptomatic retinal or ophthalmic arterial occlusion should undergo an immediate referral to the nearest stroke referral center for prompt assessment for an acute intervention. An ophthalmic artery occlusion (OAO), central retinal artery occlusion (CRAO), cilioretinal artery occlusion, or a branch retinal artery occlusion (BRAO) can be associated with life-threatening conditions (e.g., carotid occlusive or cardiac valve disease).
https://www.aaojournal.org/article/S0161-6420(24)00788-7/fulltext

[2] Central Retinal Artery Occlusion Is Related to Vascular Endothelial Injury and Left Ventricular Diastolic Dysfunction.
Journal of Clinical Medicine · 2022-04-18
Central retinal artery occlusion (CRAO) is an emergency state characterized by sudden, painless vision impairment. Patients with CRAO have an increased risk of cardiovascular events, including stroke.
10.3390/jcm11082263

[3] Primary Angle-Closure Glaucoma
American Academy of Ophthalmology · 2026-02-09 12:00:00
Symptoms of AACC include eye pain, headache, nausea/vomiting, and blurred vision with halos. Clinical signs of AACC are markedly elevated IOP, corneal edema, conjunctival and episcleral vascular congestion, and/or a mid-dilated pupil.
https://www.aaojournal.org/action/showPdf?pii=S0161-6420%2825%2900816-4

[4] Primary Angle-Closure Glaucoma
American Academy of Ophthalmology · 2026-02-09 12:00:00
Patients experiencing AACC should receive medical treatment or other interventions, such as LPI, anterior chamber paracentesis, or laser peripheral iridoplasty, to lower the IOP promptly and relieve symptoms. Initial IOP-lowering therapy should be followed by LPI, incisional iridectomy, or lens extraction.
https://www.aaojournal.org/action/showPdf?pii=S0161-6420%2825%2900816-4

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282. MedQA question ID 1272 Step 1

Question

A 79-year-old man presents to the office due to shortness of breath with moderate exertion and a slightly productive cough. He has a medical history of 25 years of heavy smoking. His vitals include: heart rate 89/min, respiratory rate 27/min, and blood pressure 120/90 mm Hg. The physical exam shows increased resonance to percussion, decreased breath sounds, and crackles at the lung base. Chest radiography shows signs of pulmonary hyperinflation. Spirometry shows a forced expiratory

volume in the first second (FEV1) of 48%, a forced vital capacity (FVC) of 85%, and an FEV1/FVC ratio of 56%. According to these results, what is the most likely diagnosis?

(A) Asthma

(B) Lymphangioleiomyomatosis

(C) Chronic obstructive pulmonary disease (COPD)

(D) Heart failure

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Chronic obstructive pulmonary disease (COPD) is the most likely diagnosis. The **Global Initiative for Chronic Obstructive Lung Disease (GOLD)** states that in the appropriate clinical context, a **post-bronchodilator FEV1/FVC ratio < 0.70** confirms COPD; this patient has chronic smoking exposure, hyperinflation on chest radiography, and an obstructive spirometric pattern with **FEV1/FVC 56%** [1]. The **American Thoracic Society/European Respiratory Society (ATS/ERS)** interpretive standards likewise classify obstruction by a reduced **FEV1/FVC** and note that hyperinflation is commonly seen with obstruction [2] [3].

Why the other choices are less likely

- **Asthma** typically requires evidence of variable airflow limitation or bronchodilator reversibility; the provided data instead show fixed obstruction in an older heavy smoker [4].
- **Lymphangioleiomyomatosis** is uncommon in men and would not be the leading diagnosis here.
- **Heart failure** can cause dyspnea and crackles, but the combination of smoking history, hyperinflation, decreased breath sounds, and obstructive spirometry favors COPD over cardiogenic pulmonary edema [1] [2].

References

[1] Global Strategy for Prevention, Diagnosis and Management of COPD 2026 Report
Global Initiative for Chronic Obstructive Lung Disease · 2025-11-10 12:00:00
In the appropriate clinical context, the presence of non-fully reversible airflow obstruction (i.e., FEV1/FVC < 0.7 post-bronchodilation) measured by spirometry confirms the diagnosis of COPD.
https://goldcopd.org/2025-gold-report/

[2] Technical Standard on Interpretive Strategies for Routine Lung Function Tests
American Thoracic Society, European Respiratory Society · 2021-12-21 12:00:00
Obstruction: FEV1/FVC < 5th percentile. Measurement of absolute lung volumes may assist in diagnosis and assessment of hyperinflation.
https://erj.ersjournals.com/content/60/1/2101499

[3] Technical Standard on Interpretive Strategies for Routine Lung Function Tests
American Thoracic Society, European Respiratory Society · 2021-12-21 12:00:00
Obstruction impairs lung emptying and is often accompanied by air trapping and hyperinflation.
https://erj.ersjournals.com/content/60/1/2101499

[4] Asthma: Diagnosis, Monitoring and Chronic Asthma Management

British Thoracic Society, National Institute for Health and Care Excellence, Scottish Intercollegiate Guidelines Network · 2024-11-27 00:00:00

Diagnose asthma if the FEV1 increase is 12% or more and 200 ml or more from the pre-bronchodilator measurement (or if the FEV1 increase is 10% or more of the predicted normal FEV1).

https://www.brit-thoracic.org.uk/quality-improvement/guidelines/asthma/

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283. MedQA question ID 222 Step 1

Question

A 60-year-old woman presents to a physician for worsening shortness of breath and increasing abdominal distention over the last 3 months. She says that the shortness of breath is worse on exertion and improves with rest. While she could previously walk to the nearby store for her groceries, she now has to drive because she gets "winded" on the way. The patient was diagnosed with diabetes 5 years ago and is compliant with her medications. The medical history is otherwise unremarkable. The physical examination reveals gross ascites and visibly engorged periumbilical veins. Bilateral pitting edema is noted around the ankles. The finger-prick blood glucose level is 100 mg/dL. What is the mechanism of action of the anti-diabetic medication this patient is most likely taking?

(A) Binding to the alpha subunit of the insulin receptor

(B) Closure of ATP-sensitive K-channels in the pancreatic beta-cell

(C) Increased gene expression of GLUT-4

(D) Glucagon-like peptide-1 receptor agonist

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely medication is a thiazolidinedione such as pioglitazone, which can cause fluid retention and worsen heart failure; its mechanism is activation of the peroxisome proliferator-activated receptor-γ (PPAR-γ), leading to increased insulin sensitivity and gene transcription including GLUT-4. The best answer is **(C) Increased gene expression of GLUT-4** [1] [2]. In patients with diabetes and stage B, C, or D heart failure, the American Diabetes Association advises avoiding **TZDs** because of heart-failure risk [3].

Why this fits the case

The patient has progressive dyspnea, gross ascites, peripheral edema, and engorged abdominal veins, which strongly suggests **congestive heart failure/volume overload** rather than hypo- or hyperglycemia. That pattern is classic for a diabetes drug adverse effect from **pioglitazone/rosiglitazone** [3] [4].

Mechanism of action

- **Thiazolidinediones (TZDs)** are **PPAR-γ agonists** [1] [2].
- Their antidiabetic effect comes from **improving insulin sensitivity** and altering transcription of genes involved in glucose handling, including **GLUT-4** [1] [2].
- They are not sulfonylureas, so they do **not** act by closing pancreatic ATP-sensitive K-channels [1] [2].

Answer

C) Increased gene expression of GLUT-4

References

[1] Liver-targeting drugs and their effect on blood glucose and hepatic lipids
Diabetologia · 2021-04-20
PPAR-γ agonists approved for treatment of type 2 diabetes include the thiazolidinediones pioglitazone and rosiglitazone, which act by reducing endogenous glucose production (EGP) and gluconeogenesis.
10.1007/s00125-021-05442-2

[2] Treatment of patients with type 2 diabetes and non-alcoholic fatty liver disease: current approaches and future directions
Diabetologia · 2016-04-21
Thiazolidinediones (TZDs) are ligands that target the transcription factor peroxisome proliferator-activated receptor (PPAR)-γ, with broad effects on glucose/lipid metabolism through modulation of substrate supply, insulin signalling and mitochondrial fatty acid oxidation.
10.1007/s00125-016-3952-1

[3] Heart Failure: An Underappreciated Complication of Diabetes
American Diabetes Association · 2022-06-01 12:00:00
DPP-4 inhibitors or TZDs are not recommended for patients with diabetes with stage B, C, and D HF.
https://diabetesjournals.org/care/article/doi/10.2337/dci22-0014/147048/Heart-Failure-An-Underappreciated-Complication-of

[4] Understanding Contemporary Use of Thiazolidinediones
Circulation. Heart failure · 2019-06-01
Thiazolidinediones are oral insulin-sensitizing medications used in type 2 diabetes mellitus. They reduce glucose with minimal risk of hypoglycemia and potential benefits on atherosclerosis. However, they can cause fluid retention, increasing the risk of heart failure.
10.1161/circheartfailure.118.005855

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284. MedQA question ID 190 Step 2/3

Question

A 23-year-old college student presents to the clinic with a history of intermittent chest discomfort. He reports that, about once per month for the past 8 or 9 months, he's had episodes of "feeling like my chest is going to explode." During these episodes, he also feels shortness of breath, feels shakiness throughout his arms and legs, and sweats so heavily that he needs to change his shirt. He is unsure of any clear precipitating factors but thinks they may occur more often around important exams or when big school projects are due. He shares that, as these episodes continue to recur, he has had mounting anxiety about having one when he is in class or at a restaurant. As a result, he is leaving

the house less and less. He has no past medical history; the physical exam is unremarkable. Which of the following is the best medication for the long-term management of this patient's condition?

(A) Citalopram

(B) Lithium

(C) Propranolol

(D) Quetiapine

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The best long-term medication is citalopram (an SSRI). The World Health Organization (WHO) recommends **selective serotonin reuptake inhibitors (SSRIs)** for adults with **panic disorder**; propranolol is not a preferred maintenance treatment, and antipsychotics such as quetiapine are not established first-line long-term therapy for this presentation [1] [2]. The patient's recurrent unexpected panic attacks with anticipatory anxiety and avoidance are most consistent with **panic disorder with agoraphobic avoidance**, for which an SSRI is the best option among the choices [1] [3].

Why the other options are not best

- **Lithium** is used for bipolar disorder, not panic disorder [4].
- **Propranolol** may help some peripheral symptoms in situational anxiety, but it is not the preferred long-term treatment for panic disorder [2] [5].
- **Quetiapine** is not recommended as first-line maintenance for panic disorder; evidence is insufficient or indirect for this use [4] [6].

Clinical bottom line

For long-term management of panic disorder, choose an **SSRI such as citalopram** rather than a beta-blocker or mood stabilizer [1] [3].

References

[1] Mental, Neurological and Substance Use Disorders
World Health Organization · 2023-11-20 00:00:00
Selective serotonin reuptake inhibitors (SSRIs) should be considered for adults with panic disorder. If SSRIs are not available, consider offering tricyclic antidepressants (TCAs). SSRIs should be considered for adults with generalized anxiety disorder (GAD).
https://www.who.int/publications/i/item/9789240084278

[2] Anxiety Screening
JAMA · 2023-06-20
Evidence indicated that treatment for anxiety disorders is effective, including in populations with social anxiety disorder, panic disorder, or generalized anxiety disorder and in mixed populations with any of these anxiety disorders and depression. Potential pharmacological treatments for anxiety include antidepressants (particularly selective serotonin reuptake inhibitors

and serotonin and norepinephrine reuptake inhibitors), antihistamines (such as hydroxyzine), β-blockers (such as propranolol), and anticonvulsant medications (such as gabapentin).
10.1001/jama.2023.6369

[3] New treatment options for panic disorder: clinical trials from 2000 to 2010.
Expert opinion on pharmacotherapy · 2011-06-01
Panic disorder is a psychiatric disorder characterized by unexpected and recurrent panic attacks. PD patients present significant psychosocial impairment and a high risk of psychiatric comorbidities and suicide. SSRIs and SNRIs are the first-line compounds in the treatment of PD. These drugs are better tolerated than tricyclics and benzodiazepines.
10.1517/14656566.2011.562200

[4] Bipolar Disorder: Assessment and Management
National Institute for Health and Care Excellence · 2025-09-03 00:00:00
Do not offer lamotrigine to treat mania.
https://www.nice.org.uk/guidance/cg185

[5] Propranolol for the treatment of anxiety disorders: Systematic review and meta-analysis.
Journal of psychopharmacology (Oxford, England) · 2016-02-01
The effects of propranolol in the treatment of anxiety disorders have not been systematically evaluated previously. Three out of four panic disorder trials qualified for pooled analyses. There were no statistically significant differences between the efficacy and benzodiazepines regarding the short-term treatment of panic disorder with or without agoraphobia.
10.1177/0269881115612236

[6] Management of Posttraumatic Stress Disorder and Acute Stress Disorder
Veterans Health Administration / Department of Defense · 2023-07-01 12:00:00
There is insufficient evidence to recommend for or against amitriptyline, bupropion, buspirone, citalopram, desvenlafaxine, duloxetine, escitalopram, eszopiclone, fluoxetine, imipramine, mirtazapine, lamotrigine, nefazodone, olanzapine, phenelzine, pregabalin, rivastigmine, topiramate, or quetiapine for the treatment of PTSD.
https://www.healthquality.va.gov/guidelines/MH/ptsd/

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285. MedQA question ID 405 Step 1

Question

A 58-year-old male with a history of obesity and hypertension presents to his primary care physician for a follow-up visit. He reports that he feels well and has no complaints. He currently takes hydrochlorothiazide. His temperature is 98.6°F (37°C), blood pressure is 135/80 mmHg, pulse is 86/min, and respirations are 17/min. His BMI is 31 kg/m2. Results of a lipid panel are: Total cholesterol is 280 mg/dl, triglycerides are 110 mg/dl, HDL cholesterol is 40 mg/dl, and LDL cholesterol is 195 mg/dl. Her physician considers starting her on atorvastatin. Which of the following will most likely decrease after initiating this medication?

(A) Mevalonate

(B) Acetoacetyl-CoA

(C) Diacyglycerol

(D) High-density lipoprotein

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Mevalonate is the best answer. **Atorvastatin**, like other statins, inhibits **HMG-CoA reductase**, the rate-limiting step in cholesterol synthesis, which lowers **mevalonate** production in the mevalonate pathway [1] [2]. **HDL** generally does not decrease with statin therapy; it tends to rise modestly [2].

Why the other choices are less likely

- **Acetoacetyl-CoA** is upstream of the HMG-CoA reductase step, so it is not the direct product expected to fall from statin inhibition [1] [2].
- **Diacylglycerol** is not the key metabolite targeted by atorvastatin [1] [2].
- **High-density lipoprotein** usually increases slightly rather than decreases with statins [2].

References

[1] Targeting tumor cell metabolism with statins.
Oncogene · 2012-11-29
Statins are HMG-CoA reductase inhibitors that act on the rate-limiting step in cholesterol synthesis and decrease downstream products of the mevalonate pathway.
10.1038/onc.2012.6

[2] Patient-Centered Management of Dyslipidemia: Part 1
National Lipid Association · 2015-03-26 00:00:00
HMG CoA reductase inhibitors (statins) lower LDL-C and raise HDL-C modestly; atorvastatin is listed among the statins.
https://www.lipidjournal.com/article/S1933-2874(15)00059-8/abstract

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286. MedQA question ID 1024 Step 1

Question

A 64-year-old man presents with severe respiratory distress. This has onset over the past 3 weeks, progressively worsening. Past history involves congestive heart failure (CHF). Due to concerns of concurrent pneumonia, sputum studies are ordered. Microscopic examination of his sputum demonstrates heart failure cells (hemosiderin-containing macrophages). Which of the following cellular organelles is significant in the formation of these cells?

(A) Endoplasmic reticulum (ER)

(B) Ribosomes

(C) Lysosomes

(D) Mitochondria

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The correct answer is **C. Lysosomes.** Hemosiderin-laden macrophages form when alveolar macrophages ingest red blood cells/iron and store the iron as hemosiderin in lysosomes; this is the key organelle involved in iron sequestration within these cells [1]. This finding is classically seen in pulmonary congestion or alveolar hemorrhage in the setting of heart failure.

Key point: Hemosiderin is stored in macrophage lysosomes after iron uptake [1]. Therefore, among the listed organelles, lysosomes are most significant in forming heart failure cells.

Why the other options are not best: Endoplasmic reticulum, ribosomes, and mitochondria are not the primary organelles responsible for hemosiderin storage in macrophages [1].

References

[1] TNF-alpha preserves lysosomal stability in macrophages: a potential defense against oxidative lung injury.
Toxicology letters · 2010-02-01
Alveolar macrophages deposite iron inside their lysosomes to prevent oxidative damage on the respiratory epithelium.
https://doi.org/10.1016/j.toxlet.2009.10.031

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287. MedQA question ID 909 Step 2/3

Question

A 36-year-old G3P2 woman with no significant past medical history delivers a 3.7 kg (8 lb, 3 oz) baby boy following an uncomplicated pregnancy. On physical examination in the delivery room, the pediatrician notes that the baby has upslanting palpebral fissures, epicanthal folds, a flat facial profile, small ears, a single palmar crease, and hypotonia. When discussing the diagnosis with the parents, which of the following is this baby at an increased risk for having?

(A) Tetralogy of Fallot

(B) Omphalocele

(C) Congenital cataracts

(D) Cleft lip

Correct Response:
B
Synthesize Response:
A✗

Synthesize Answer

This newborn most likely has Down syndrome (trisomy 21), and the most important increased risk is for congenital heart disease—especially an atrioventricular septal defect. Down syndrome is associated with a high rate of CHD, with about **40%–50%** of affected infants having a cardiac anomaly [1] [2]. Other common associated risks include **hypothyroidism**, **duodenal atresia**, **hearing loss**, and **leukemia**, but CHD is the classic neonatal complication to discuss first [1] [3].

Why this is the diagnosis

The combination of **upslanting palpebral fissures, epicanthal folds, flat facial profile, single palmar crease, and hypotonia** is characteristic of **Down syndrome (trisomy 21)** [2] [3].

Most likely increased risk

- **Congenital heart disease**, particularly **atrioventricular septal defect**.
- Cardiac evaluation is important early because CHD is common and may be clinically silent in the newborn period [1] [2].

References

[1] Genotype-phenotype correlation for congenital heart disease in Down syndrome through analysis of partial trisomy 21 cases.

Genomics · 2017-10-01

Among Down syndrome children, 40-50% have congenital heart disease (CHD) Trisomy 21 is not sufficient to cause CHD, but three copies of chromosome 21 (Hsa21) increases the risk for CHD.

10.1016/j.ygeno.2017.06.004

[2] Neonatal diagnosis of Down syndrome in The Netherlands: suspicion and communication with parents.

Journal of intellectual disability research : JIDR · 2014-10-01

A total of 586 children with Down syndrome with trisomy 21 were analysed. Most recognised dysmorphic features in DS newborns were 'upslanted palpebral fissures' (74.1%), 'hypotonia' (73.7%), and 'epicanthic folds' (68.5%).

10.1111/jir.12125

[3] Down Syndrome-Associated Arthritis (DA): Diagnostic and Management Challenges.

Pediatric health, medicine and therapeutics · 2022-01-01

Down syndrome is one of the most common birth defects in the U.S. It results from trisomy 21. It causes an extensive, heterogenous phenotype that results in a broad presentation of symptoms that includes atlantoaxial instability, congenital heart defects, muscle hypotonia, hypothyroidism, recurrent infections, and autoimmune diseases.

10.2147/phmt.s282646

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288. MedQA question ID 1250 Step 1

Question

A 37-year-old woman with an HIV infection comes to the physician for a follow-up examination. Six months ago, combined antiretroviral therapy consisting of dolutegravir, tenofovir, and emtricitabine was initiated. Laboratory studies show a decrease in the CD4 count and an increase in the viral load despite ongoing treatment. The patient is switched to a new treatment regimen, including a drug that acts by preventing viral DNA synthesis without undergoing intracellular phosphorylation. Which of the following is the most likely drug?

(A) Efavirenz

(B) Ritonavir

(C) Raltegravir

(D) Lamivudine
"

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Efavirenz is the most likely drug. **Efavirenz** is a **non-nucleoside reverse transcriptase inhibitor (NNRTI)** that inhibits viral reverse transcriptase **without requiring intracellular phosphorylation**; by contrast, **lamivudine** is a nucleoside reverse transcriptase inhibitor that does require phosphorylation, **raltegravir** is an integrase inhibitor, and **ritonavir** is a protease inhibitor [1] [2].

Key distinction

- **NNRTIs**: directly inhibit reverse transcriptase at an allosteric site; **no phosphorylation needed** [1] [2].
- **NRTIs**: require intracellular phosphorylation to become active, so **lamivudine** is not the correct choice [2].
- In virologic failure, current HIV guidance recommends resistance testing while the patient is still on the failing regimen or within 4 weeks of stopping it to guide the next regimen [3] [4].

References

[1] Use of Antiretroviral Agents in Adults and Adolescents Living with HIV
United States Department of Health and Human Services · 2025-09-25 00:00:00
NNRTIs such as nevirapine, efavirenz, and etravirine are CYP3A4 inducers and should generally be avoided in some transplant-related settings.
https://clinicalinfo.hiv.gov/sites/default/files/guidelines/documents/adult-adolescent-arv/guidelines-adult-adolescent-arv.pdf

[2] Management of Chronic Kidney Disease in Patients Infected With HIV
HIV Medicine Association, Infectious Diseases Society of America · 2014-09-24 00:00:00
The antiretroviral dosing table lists efavirenz as an NNRTI and lamivudine and other agents as NRTIs, supporting the mechanism-based distinction between these classes.
https://academic.oup.com/cid/article/59/9/e96/422813?searchresult=1

[3] Primary Care Guidance for Persons With Human Immunodeficiency Virus
HIV Medicine Association, Infectious Diseases Society of America · 2024-10-12 00:00:00
Resistance testing, including for integrase strand transfer inhibitor (INSTI), if appropriate, is indicated for patients who are experiencing virologic failure to guide modification of ART and should be performed while the patient is on the failing ART regimen or within 4 weeks of discontinuing the ART regimen.

[4] Use of Antiretroviral Agents in Adults and Adolescents Living with HIV
United States Department of Health and Human Services · 2025-09-25 00:00:00

Reverse transcriptase and protease genotypic resistance testing should be performed on people with virologic failure. Integrase resistance testing should be performed on individuals who have virologic failure and have a history of prior use of an INSTI or are currently receiving an INSTI-based regimen.
https://clinicalinfo.hiv.gov/sites/default/files/guidelines/documents/adult-adolescent-arv/guidelines-adult-adolescent-arv.pdf

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289. MedQA question ID 734 Step 1

Question

A 10-year-old girl is brought to a clinic by her parents after 1 week of difficulty breathing, dry cough, and low-grade fevers. She has also developed shallow erythematous ulcers inside of her mouth. There is no history of chills, rigors, or headaches. Her appetite has decreased. The girl has been HIV-positive since birth and is being treated with HAART. Her baseline viral load is <50/mL. On general examination, the girl appears ill. Diffuse inspiratory crackles are heard on chest auscultation with normal heart sounds. No lymphadenopathy or hepatosplenomegaly is noted on physical examination. A blood sample is drawn, which shows a CD4 count of 100/mm3 and a viral load of 25,050/mL. What is the most likely mechanism responsible for the lack of responsiveness to therapy?

(A) Ineffective CD8 cytotoxicity

(B) env gene mutation

(C) pol gene mutation

(D) Decreased viral replication

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely mechanism is a mutation in the HIV pol gene, causing antiretroviral drug resistance and virologic failure [1] [2] [3]. In a child with rising HIV RNA on HAART and falling CD4 count, the U.S. Department of Health and Human Services recommends evaluating for treatment failure, including drug resistance, and performing resistance testing while the failing regimen is still being taken [1] [2]. Among the answer choices, this corresponds to **C. pol gene mutation**.

Why this fits

- The clinical pattern is **virologic failure**: HIV RNA has increased from <50/mL to 25,050/mL with a **CD4 count of 100/mm3** [1] [2].
- The usual cause is **selection of resistance-associated mutations in the HIV reverse transcriptase/protease region encoded by pol**, which can blunt response to HAART [3] [4] [5].

- The other options are not the best match here: **ineffective CD8 cytotoxicity** is part of HIV pathogenesis, but it does not explain abrupt loss of suppression on therapy; **env gene mutation** is not the typical mechanism of standard ART failure; and **decreased viral replication** would not cause viral rebound [1] [3].

Clinical implication

- When virologic failure occurs, the recommended next step is to **assess adherence, absorption, interactions, and resistance** and to **change therapy based on resistance testing and treatment history** [1] [2].
- The goal after failure is to restore **full virologic suppression** [1] [2].

Answer: C. pol gene mutation.

References

[1] Use of Antiretroviral Agents in Pediatric HIV Infection

United States Department of Health and Human Services · 2025-09-30 12:00:00

The causes of antiretroviral (ARV) treatment failure—which include poor adherence, drug resistance, poor absorption of medications, inadequate dosing, and drug–drug interactions—should be assessed and addressed.

https://clinicalinfo.hiv.gov/en/guidelines/pediatric-arv/whats-new-guidelines

[2] Use of Antiretroviral Agents in Pediatric HIV Infection

United States Department of Health and Human Services · 2025-09-30 12:00:00

Perform ARV drug-resistance testing when virologic failure occurs, while the child is still taking the failing regimen.

https://clinicalinfo.hiv.gov/en/guidelines/pediatric-arv/whats-new-guidelines

[3] Trends of drug-resistance-associated mutations in the reverse transcriptase gene of HIV type 1 isolates from North India.

Archives of Virology · 2014-04-01

Major cause of failure of antiretroviral therapy is the presence of drug-resistance-associated mutations in the polymerase gene of HIV-1.

10.1007/s00705-013-1889-y

[4] Mutations in the reverse transcriptase and protease genes of human immunodeficiency virus-1 from antiretroviral naïve and treated pediatric patients.

Viruses · 2015-02-10

The success of highly active antiretroviral therapy (HAART) is challenged by emergence of resistance-associated mutations in human immunodeficiency virus-1 (HIV-1). In this study, resistance associated mutations in the reverse transcriptase (RT) and protease (PR) genes in HIV-1 infected pediatric patients from North India were evaluated.

10.3390/v7020590

[5] Early virologic failure and the development of antiretroviral drug resistance mutations in HIV-infected Ugandan children.

Journal of Acquired Immune Deficiency Syndromes (1999) · 2011-01-01

M184V and nonnucleoside reverse transcriptase inhibitor-associated mutations emerged within 6 months of early virologic failure; thymidine-analog-mutations arose after 12 months.

10.1097/qai.0b013e3181fbcbf7

290. MedQA question ID 99 Step 1

Question

A 43-year-old man with a history of schizophrenia, currently controlled with medication, comes in for an appointment with his internist. He is concerned about abnormal discharge from both nipples over the past 3 months. The fluid is white, and he wonders if it could be milk. On further review of systems, he endorses a diminished sexual drive. The physician suspects that one of the patient's medications may be the culprit for these symptoms. Which of the following medications is NOT likely to be the cause?

(A) Haloperidol

(B) Bromocriptine

(C) Fluphenazine

(D) Risperidone

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Bromocriptine is the medication NOT likely to be the cause; it is a **dopamine agonist** used to lower prolactin, whereas **haloperidol, fluphenazine, and risperidone** are all associated with antipsychotic-induced hyperprolactinemia and can cause galactorrhea and sexual dysfunction [1] [2]. The **American Psychiatric Association (APA)** recommends screening for symptoms of hyperprolactinemia in patients taking antipsychotics and checking prolactin when suggested by the clinical history [1].

Why the others fit

- **Haloperidol** and **fluphenazine** are first-generation antipsychotics with a high propensity for hyperprolactinemia [2].
- **Risperidone** is a second-generation antipsychotic with a well-recognized prolactin-elevating effect [2] [3].
- **Bromocriptine** is the outlier because it is used therapeutically for prolactin excess, not as a typical cause of it [4].

References

[1] Treatment of Patients With Schizophrenia
American Psychiatric Association · 2020-08-31 00:00:00
Screening for symptoms of hyperprolactinemia at each visit until stable, then yearly if treated with an antipsychotic known to increase prolactin; prolactin level, if indicated on the basis of clinical history.
https://ajp.psychiatryonline.org/doi/pdf/10.1176/appi.ajp.2020.177901

[2] Treatment of Patients With Schizophrenia
American Psychiatric Association · 2020-08-31 00:00:00

First-generation antipsychotics including fluphenazine and haloperidol are listed among agents with high hyperprolactinemia liability; risperidone is also listed among second-generation antipsychotics with high hyperprolactinemia liability.
https://ajp.psychiatryonline.org/doi/pdf/10.1176/appi.ajp.2020.177901

[3] The effects of novel and newly approved antipsychotics on serum prolactin levels: a comprehensive review.
CNS Drugs · 2014-05-01
Hyperprolactinemia is a common adverse effect of antipsychotic drugs; the highest rates are reported with risperidone, amisulpride, and paliperidone.
10.1007/s40263-014-0157-3

[4] Guidance on the treatment of antipsychotic-induced hyperprolactinemia when switching the antipsychotic is not an option.
American Journal of Health-System Pharmacy · 2021-05-06
First-line management is discontinuing the drug or switching to another. Other management options include adjunctive aripiprazole, dopamine agonists (cabergoline and bromocriptine), metformin, and herbal supplements.
10.1093/ajhp/zxab065

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291. MedQA question ID 1049 Step 1

Question

An investigator is studying bacterial adaptations to the environment in an infectious isolate and a noninfectious isolate of Hemophilus influenzae type B. Animals exposed to the noninfectious isolate do not develop symptoms of infection. The investigator cultivates the noninfectious isolate in a culture with lysed bacteria from the infectious isolate. Some of the animals exposed to these bacteria develop symptoms of infection. Which of the following processes is most likely responsible for the described findings?

(A) Conjugation

(B) Reassortment

(C) Transformation

(D) Recombination

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Transformation is the most likely process. *Haemophilus influenzae* is naturally competent and can take up **free DNA from lysed bacteria in the environment**, then incorporate that DNA into its genome, which can convert a noninfectious isolate into one with virulence traits [1] [2]. Conjugation requires direct cell-to-cell contact, reassortment is a viral process, and recombination is the genetic mechanism that can occur *after* DNA uptake rather than the transfer process itself [1] [2].

Why this fits

- The key finding is exposure of a noninfectious isolate to **lysed bacteria** from an infectious isolate, followed by acquisition of infectivity in some animals.
- That pattern is classic **natural transformation**: uptake of naked DNA from the environment and integration into the bacterial chromosome [1] [2].

References

[1] Antimicrobial resistance acquisition via natural transformation: context is everything.
Current Opinion in Microbiology · 2021-12-01
Natural transformation is a process where bacterial cells take up free DNA from the environment and recombine it into their genome or reconvert it into extra-chromosomal genetic elements.
10.1016/j.mib.2021.09.009

[2] Natural competence for transformation.
Current Biology · 2016-11-07
Natural competence for transformation refers to a physiological state in which prokaryotes are able to take up genetic material from their surroundings and recombine it into their own genome.
10.1016/j.cub.2016.08.058

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292. MedQA question ID 268 Step 1

Question

A 76-year-old man is brought to his physician's office by his wife due to progressively worsening hearing loss. The patient reports that he noticed a decrease in his hearing approximately 10 years ago. His wife says that he watches television at an elevated volume and appears to have trouble understanding what is being said to him, especially when there is background noise. He states that he also experiences constant ear ringing and episodes of unsteadiness. On physical examination, the outer ears are normal and otoscopic findings are unremarkable. The patient is unable to repeat the sentence said to him on whisper testing. When a vibrating tuning fork is placed in the middle of the patient's forehead, it is heard equally on both ears. When the vibrating tuning fork is placed by the ear and then on the mastoid process, air conduction is greater than bone conduction. Which of the following structures is most likely impaired in this patient?

(A) Tympanic membrane

(B) Malleus

(C) Incus

(D) Cochlea

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Cochlea is most likely impaired. The American Academy of Otolaryngology - Head and Neck Surgery Foundation describes **age-related hearing loss (presbycusis)** as **progressive bilateral sensorineural hearing loss** due to aging, and sensorineural hearing loss results from abnormality of the **cochlea**, auditory nerve, or higher auditory pathways [1]. This patient's gradual bilateral hearing difficulty, tinnitus, and trouble understanding speech in background noise are classic for presbycusis, with exam findings consistent with **sensorineural** rather than conductive hearing loss [1] [2].

Why the other choices are less likely

- **Tympanic membrane, malleus, incus**: these are conductive hearing structures; injury here would more often produce **conductive hearing loss** with abnormal Rinne/Weber findings, not this pattern [1].
- **Cochlea**: the likely site of age-related degeneration causing this patient's **sensorineural hearing loss** [1] [2].

Clinical note

The AAO-HNSF recommends screening adults **50 years and older** for hearing loss at healthcare encounters and obtaining an **audiogram** if screening suggests hearing loss [1].

References

[1] Age-Related Hearing Loss

American Academy of Otolaryngology - Head and Neck Surgery Foundation · 2024-04-30 00:00:00

Term Definition ARHL/Presbycusis: Progressive bilateral sensorineural hearing loss associated with the process of aging. Sensorineural hearing loss: Hearing loss from an abnormality of the cochlea, auditory nerve, or higher aspects of central auditory perception or processing.

https://aao-hnsfjournals.onlinelibrary.wiley.com/doi/10.1002/ohn.750

[2] [Presbycusis - Age Related Hearing Loss].

Laryngo- rhino- otologie · 2016-07-01

Presbycusis is a progressive, bilateral and symmetrical sensorineural hearing loss due to age related degeneration of inner ear structures.

10.1055/s-0042-106918

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293. MedQA question ID 215 Step 1

Question

A 45-year-old man presents to the physician with complaints of increased urinary frequency and decreasing volumes for the past 2 months. He does not complain of any pain during urination. He is frustrated that he has to wake up 2 or 3 times per night to urinate even though he tried reducing the amount of water he consumes before bed and made some other dietary changes without any improvement. He has no family history of prostate disease. Physical examination is negative for any suprapubic mass or tenderness, and there is no costovertebral angle tenderness. Which of the following is the best next step in the management of this patient?

(A) Urinalysis and serum creatinine

(B) Reassurance

(C) Digital rectal examination

(D) Prostate-specific antigen

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The European Association of Urology (EAU) recommends an initial evaluation of male lower urinary tract symptoms (LUTS) that includes a focused history, symptom assessment, physical examination with digital rectal examination (DRE)**, and urinalysis;** PSA **is reserved for situations in which a prostate cancer diagnosis would change management or help decision-making [1].** In this 45-year-old man with chronic frequency, weak volumes, and nocturia without dysuria or systemic findings, the best next step among the choices is **C. Digital rectal examination** [1] [2].

Why not the other options?

- **Urinalysis and serum creatinine**: urinalysis is part of the standard evaluation, but serum creatinine is recommended when renal impairment is suspected, hydronephrosis is present, or surgery is being considered; those features are not described here [1].
- **Reassurance**: inappropriate without an initial LUTS evaluation [1].
- **PSA**: the EAU recommends PSA only after counseling and when it will affect management; a 45-year-old man without family history is not a routine screening candidate in this scenario [1] [2].

Practical point

If only one test/exam is being chosen from the stem, **DRE** is the best next step because it is explicitly part of the initial assessment of male LUTS [1]. Urinalysis would also be reasonable in the complete workup, but it is not the single best answer among the options provided [1].

References

[1] Non-Neurogenic Male Lower Urinary Tract Symptoms
European Association of Urology · 2026-04-01 12:00:00
- Perform a physical examination including digital rectal examination in the assessment of male LUTS. (Strong)
- Use urinalysis (by dipstick or microscopy) in the assessment of male LUTS. (Strong)
- Measure prostate-specific antigen (PSA) if a diagnosis of prostate cancer will change management. (Strong)
- Measure PSA if it assists in the treatment and/or decision-making process. (Strong)
- Assess renal function if renal impairment is suspected based on history and clinical examination, or in the presence of hydronephrosis, or when considering surgical treatment for male LUTS. (Strong)
https://d56bochluxqnz.cloudfront.net/documents/full-guideline/EAU-Guidelines-on-Non-Neurogenic-Male-LUTS-2025.pdf

[2] Prostate Cancer
European Association of Urology, European Association of Nuclear Medicine, European Society for Radiotherapy and Oncology · 2026-04-01 12:00:00
- Offer early PSA testing to well-informed men at elevated risk of having PCa: (Strong)
  - men from 50 years of age;
  - men from 45 years of age and a family history of PCa;

- men of African descent from 45 years of age;
- men carrying breast cancer gene 2 (BRCA2) mutations from 40 years of age.

https://d56bochluxqnz.cloudfront.net/documents/full-guideline/EAU-EANM-ESTRO-ESUR-ISUP-SIOG-Guidelines-on-Prostate-Cancer-2025_2025-03-24-120144_rinw.pdf

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294. MedQA question ID 1183 Step 2/3

Question

A 65-year-old woman is brought to the emergency department by her husband after he found her with nausea, headache, and agitation 1 hour ago. When he left their lakeside cabin 6 hours before to go ice fishing and get more firewood, she did not have any symptoms. She has chronic migraines, hypertension, and type 2 diabetes mellitus. Her medications include lisinopril and metformin, but she ran out of her anti-hypertensive medications over the weekend. Her temperature is 37.1°C (98.8°F), pulse is 110/min, respirations are 21/min, and blood pressure is 154/92 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 98%. She is confused and oriented only to person and place. She recalls only one of three objects after 5 minutes. Her gait is unsteady. Physical examination shows no abnormalities. Which of the following is the most effective intervention for this patient's current condition?

(A) Intravenous nitroprusside

(B) Hyperbaric oxygen therapy

(C) 100% oxygen therapy

(D) Heliox therapy

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

This patient most likely has acute carbon monoxide poisoning, and the most effective intervention among the choices is hyperbaric oxygen therapy (HBO2) because she has **neurologic symptoms** (confusion, agitation, unsteady gait) in a compatible exposure setting. The **American College of Emergency Physicians (ACEP)** states that selected symptomatic patients may benefit from HBO2 based on **severity of symptoms** and logistics of access, while **100% oxygen should be started immediately** for all suspected cases [1] [2].

Why this is the best choice

- **Hyperbaric oxygen therapy** is favored for **symptomatic carbon monoxide poisoning with neurologic deficits** when available, especially when started early; one review specifically notes that HBO2 should be critically considered within **6 hours** in patients with neurologic deficits, unconsciousness, cardiac ischemia, pregnancy, or very high COHb [2].

- **100% oxygen** is still the correct immediate supportive treatment and should not be delayed, but it is not the most definitive option in a patient already showing neurologic involvement [2] [3].
- **Nitroprusside** is not a treatment for carbon monoxide poisoning; **heliox** is not indicated here [2] [3].

Best answer

B. Hyperbaric oxygen therapy [1] [2]

References used in order

1. ACEP clinical policy on acute carbon monoxide poisoning: in symptomatic CO poisoning, selected patients may benefit from HBO2 treatment based on severity of symptoms and availability. 2. Review of diagnosis and treatment of carbon monoxide poisoning: 100% oxygen should be initiated as early as possible; HBO2 should be considered within 6 hours for neurologic deficits and other severe features. 3. Review article on carbon monoxide poisoning: primary treatment is supplemental oxygen via nonrebreather mask; hyperbaric oxygen can be used but indications are controversial.

References

[1] Adult Patients Presenting to the Emergency Department With Acute Carbon Monoxide Poisoning

American College of Emergency Physicians · 2025-01-27 12:00:00

In symptomatic CO poisoning, selected patients may benefit from HBO2 treatment based on severity of symptoms and availability (distance and time).

https://www.doi.org/10.1016/j.annemergmed.2024.12.005

[2] The Diagnosis and Treatment of Carbon Monoxide Poisoning.

Deutsches Ärzteblatt International · 2018-12-24

The initiation of 100% oxygen breathing as early as possible is the most important treatment for carbon monoxide poisoning. Hyperbaric oxygen therapy (HBOT) should be critically considered and initiated within six hours in patients with neurologic deficits, unconsciousness, cardiac ischemia, pregnancy, and/or a very high COHb concentration.

10.3238/arztebl.2018.0863

[3] Carbon Monoxide Poisoning.

Critical Care Clinics · 2021-07-01

The primary treatment for carbon monoxide poisoning is supplemental oxygen delivered via a nonrebreather mask. Hyperbaric oxygen can also be used, but the exact indications are controversial. The diagnosis can be made via blood co-oximetry, when there is concern for possible carbon monoxide poisoning, and the diagnosis is made via co-oximetry.

10.1016/j.ccc.2021.03.010

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295. MedQA question ID 1012 Step 1

Question

During the normal catabolism of protein, urea and ammonia are produced as waste products. If these waste products are not cleared by the liver and kidneys, hyperammonemia can occur, leading to confusion and delirium. Fortunately, a healthy liver can clear these waste products via the urea cycle. Which of the following reactions is the rate limiting step in this cycle?

(A) NH3 + HCO3- + 2 ATP --> carbamoyl phosphate + 2 ADP + Pi

(B) Carbamoyl phosphate + ornithine --> citrulline+ Pi

(C) Citrulline + aspartate + ATP --> arginosuccinate + AMP + PPi

(D) Arginine + H20 --> ornithine + urea

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The rate-limiting step of the urea cycle is carbamoyl phosphate synthetase I (CPS1), which catalyzes the formation of carbamoyl phosphate from NH3 + HCO3- + 2 ATP. That corresponds to **Choice A**. CPS1 is the first and rate-limiting enzyme in ureagenesis; the other listed reactions occur later in the cycle [1] [2].

Why the other choices are not rate-limiting

- **B** is the ornithine transcarbamylase reaction.
- **C** is argininosuccinate synthetase.
- **D** is arginase, the final step that releases urea.

Bottom line

Correct answer: A. NH3 + HCO3- + 2 ATP --> carbamoyl phosphate + 2 ADP + Pi [1] [2].

References

[1] Genetic, structural and biochemical basis of carbamoyl phosphate synthetase 1 deficiency.
Molecular Genetics and Metabolism · 2010-12-01
Carbamoyl phosphate synthetase 1 catalyzes the first and rate-limiting step of the urea cycle, the major pathway for nitrogen disposal in humans.
10.1016/j.ymgme.2010.08.002

[2] Transcriptional regulation of N-acetylglutamate synthase.
PLOS ONE · 2012-01-01
The urea cycle converts ammonia to urea within the liver of mammals. N-acetylglutamate synthase produces a unique cofactor that is essential for the catalytic function of the first and rate-limiting enzyme, carbamoyl phosphate synthetase 1.
10.1371/journal.pone.0029527

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296. MedQA question ID 737 Step 1

Question

A 55-year-old male presents to the emergency department with dyspnea and palpitations. He does not smoke cigarettes or consume alcohol, and past medical history is insignificant. Blood pressure is 115/75 mmHG and heart rate is 125/min. Heart rhythm is irregularly irregular. After initial treatment with IV digoxin the patient's heart rate drops to 85/min and remains irregular. Which of the following best explains the effect of digoxin in this patient?

(A) Blockade of beta-adrenergic receptors

(B) Calcium channel blockade

(C) Vagal stimulation

(D) Increased ventricular contractility

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Vagal stimulation is the best explanation. The **American College of Cardiology/American Heart Association/Heart Rhythm Society (ACC/AHA/HRS)** guideline notes that **digoxin can be used for acute rate control in atrial fibrillation with rapid ventricular response** when beta-blockers or nondihydropyridine calcium channel blockers are ineffective or contraindicated, reflecting its **AV nodal–slowing, parasympathomimetic (vagotonic) effect** rather than beta-blockade or calcium channel blockade [1] [2].

Why the other choices are not the mechanism

- **A. Blockade of beta-adrenergic receptors** — this is the mechanism of beta-blockers, not digoxin [1].
- **B. Calcium channel blockade** — this is the mechanism of nondihydropyridine calcium channel blockers such as verapamil and diltiazem, not digoxin [1].
- **D. Increased ventricular contractility** — digoxin does have positive inotropic effects, but the heart-rate slowing in atrial fibrillation is primarily from **vagal stimulation of the AV node** [2].

Clinical note

In **pre-excited AF**, digoxin and other AV nodal blockers are **contraindicated** because they can worsen conduction over an accessory pathway [1].

References

[1] Management of Patients With Atrial Fibrillation

American College of Cardiology, American Heart Association, Heart Rhythm Society, American College of Clinical Pharmacy · 2023-11-30 00:00:00

In patients with AF with rapid ventricular response in whom beta blockers and nondihydropyridine calcium channel blockers are ineffective or contraindicated, digoxin can be considered for acute rate control, either alone or in combination with the aforementioned agents.

https://www.jacc.org/guidelines/atrial-fibrillation

[2] Digoxin use in patients with atrial fibrillation and adverse cardiovascular outcomes: a retrospective analysis of the Rivaroxaban Once Daily Oral Direct Factor Xa Inhibition Compared with Vitamin K Antagonism for Prevention of Stroke and Embolism Trial in Atrial Fibrillation (ROCKET AF).

Lancet (London, England) · 2015-06-13

Digoxin is a widely used drug for ventricular rate control in patients with atrial fibrillation. In 14,171 randomly assigned patients, digoxin was used at baseline in 5239 (37%) of ROCKET AF patients. Digoxin was associated with increased all-cause mortality, vascular death, and sudden death.

10.1016/s0140-6736(14)61836-5

297. MedQA question ID 1120 Step 1

Question

A 24-year-old woman comes to the physician's office with concerns about a recent pregnancy. She and her boyfriend had intercourse for the first time a few weeks ago. Two weeks ago she missed her menstrual period. She took several over the counter pregnancy tests that confirmed her pregnancy. She is tearful about the pregnancy and is very concerned. After extensive conversations with her physician and counseling, she decides she wants to medically abort her 6-week pregnancy. Which of the following drugs should be administered to this patient for this purpose?

(A) Tamoxifen

(B) Terbutaline

(C) Mifepristone

(D) Copper intrauterine device

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Mifepristone is the correct drug for **medical abortion** in a 6-week pregnancy. The **World Health Organization (WHO)** recommends **200 mg oral mifepristone followed 1–2 days later by 800 µg misoprostol** for medical abortion at **<12 weeks**; the **American College of Obstetricians and Gynecologists (ACOG)** likewise recommends the **mifepristone–misoprostol** regimen as the preferred therapy for medication abortion [1] [2]. **Tamoxifen**, **terbutaline**, and a **copper intrauterine device** are not used to induce medical abortion [1] [2].

References

[1] Abortion Care
World Health Organization · 2025-08-24 00:00:00
For medical abortion at < 12 weeks: Recommend the use of 200 mg mifepristone administered orally, followed 1–2 days later by 800 µg misoprostol administered vaginally, sublingually or buccally. The minimum recommended interval between use of mifepristone and misoprostol is 24 hours.
https://iris.who.int/bitstream/handle/10665/382157/9789240104204-eng.pdf?sequence=1

[2] Medication Abortion Up to 70 Days of Gestation
American College of Obstetricians and Gynecologists · 2020-10-01 12:00:00
Combined mifepristone–misoprostol regimens are recommended as the preferred therapy for medication abortion because they are significantly more effective than misoprostol-only regimens.
https://journals.lww.com/greenjournal/Fulltext/2020/10000/Medication_Abortion_Up_to_70_Days_of_Gestation_.39.aspx

298. MedQA question ID 491 Step 1

Question

A 26-year-old woman comes to the physician for a follow-up vaccination 1 week after being bitten by a rodent while camping. She received appropriate post-exposure prophylaxis in the emergency department and has already received 2 doses of the rabies vaccine. The same physician has been managing the post-exposure care regimen. After the physician administers the third dose of the rabies vaccine, the patient asks him if he would like to join her for a movie and dinner. The physician is interested in going on a date with her. Which of the following is the most appropriate reaction for the physician to have to the patient's invitation?

(A) Inform the patient that romantic relationships with current patients are unethical.

(B) Inform the patient that he will go on a date with her because her case is uncomplicated and does not require decision-making on his part.

(C) Inform the patient that dating her will never be appropriate even once the physician-patient relationship has been terminated.

(D) Inform the patient that he will go on a date with her, but that she will have to transfer her care to a different physician.

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Inform the patient that romantic relationships with current patients are unethical. The appropriate response is to decline the invitation and maintain professional boundaries; a romantic relationship with a **current patient** is not appropriate, even if the encounter seems straightforward or the patient care is uncomplicated [1] [2]. The clinician should keep the discussion brief, neutral, and focused on continuing care without pursuing a personal relationship [1] [3].

Why this is the best answer

- The patient is still an **active patient** in an ongoing physician-patient relationship.
- Professional boundary guidance emphasizes **clear limits** when a patient crosses a boundary or initiates a personal/romantic request [1].
- Survey and ethics literature consistently view sexual or romantic contact with current patients as inappropriate, with strong disapproval of such relationships [2] [3].

Why the other choices are wrong

- **B** is wrong: the ethics issue does **not** depend on case complexity or whether the physician has decision-making authority.
- **C** is too absolute: the question asks about a **current patient**; the retrieved material supports avoiding romantic relationships during the active clinical relationship, but does not establish that dating is never appropriate in any future circumstance.

- **D** is wrong: transferring care does not make it appropriate to accept the invitation, and the immediate ethical problem is the current patient relationship [1] [2].

References

[1] Patient-Clinician Communication
American Society of Clinical Oncology · 2026-03-10 12:00:00
For boundary crossings by a patient, whether with the clinician themselves or observed with another team member (e.g., clinical colleague, trainee), communicate clear expectations and set clear limits. Level of agreement 100%.
https://ascopubs.org/doi/10.1200/JCO-26-00118

[2] Physician attitudes toward personal relationships with patients.
Medical care · 2010-06-01
A survey by mail used a stratified random sample of physicians specializing in internal medicine, family medicine, pediatrics, cardiology, surgery, and anesthesiology. Respondents rated the appropriateness of social, business, and sexual contacts with patients. Support was high for social relations (91%), less for business relations (65%), and low for sexual contact (9%).
10.1097/mlr.0b013e3181d559d0

[3] Professional-Patient Boundaries: a National Survey of Primary Care Physicians' Attitudes and Practices.
Journal of General Internal Medicine · 2020-02-01
The majority of respondents found such practices acceptable and acceptable. A majority disapproved of dinner with a patient, but approved of or were neutral on all other scenarios.
10.1007/s11606-019-05543-0

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299. MedQA question ID 260 Step 2/3

Question

A 16-year-old girl is brought to the emergency department with constant abdominal pain over the past 8 hours. The pain is in her right lower quadrant (RLQ), which is also where it began. She has had no nausea or vomiting despite eating a snack 2 hours ago. She had a similar episode last month which resolved on its own. Her menstrual cycles are 28–30 days apart with 3–5 days of vaginal bleeding. Her last menses ended 9 days ago. Her blood pressure is 125/75 mm Hg, the pulse is 78/min, the respirations are 15/min, and the temperature is 37.2°C (99.0°F). Abdominal examination shows moderate pain on direct pressure over the RLQ which decreases with the release of pressure. The remainder of the physical examination shows no abnormalities. Laboratory studies show:
Hemoglobin 12.5 mg/dL
Leukocyte count 6000/mm3
Segmented neutrophils 55%
Lymphocytes 39%
Platelet count 260,000/mm3
Serum
C-reactive protein 5 mg/L (N < 8 mg/L)
Urine
RBC 1-2 phf
WBC None
Which of the following is the most appropriate next step in management?

(A) Methotrexate

(B) Nitrofurantoin

(C) Reassurance

(D) Referral for surgery

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Reassurance is the most appropriate next step, because this presentation is most consistent with a benign, self-limited cause of midcycle RLQ pain rather than appendicitis, ectopic pregnancy, urinary infection, or an operative abdominal emergency. The **American College of Emergency Physicians (ACEP)** recommends RLQ ultrasound when appendicitis is still suspected, but clinical prediction rules alone should not be used to rule it out; here the normal WBC, normal CRP, lack of fever, and prior similar self-resolving episode make appendicitis less likely [1]. **Methotrexate** is not appropriate without a confirmed or strongly suspected ectopic pregnancy with pregnancy confirmation and ultrasound evaluation, and **surgery** is reserved for hemodynamic instability or rupture/ongoing intraperitoneal bleeding [2] [3].

Why the other choices are not best

- **Methotrexate**: used for confirmed or high-suspicion ectopic pregnancy in a stable patient with an unruptured mass; pregnancy confirmation and transvaginal ultrasound are part of the minimum evaluation [2] [3].
- **Nitrofurantoin**: there is no evidence of urinary tract infection here; urine WBC is absent.
- **Referral for surgery**: not supported by the current clinical picture; surgery is indicated for unstable or ruptured ectopic pregnancy, or when appendicitis is diagnosed/strongly suspected [2] [3].

Clinical takeaway

In a stable adolescent with RLQ pain around midcycle, normal inflammatory markers, and a prior similar episode that resolved spontaneously, **observation/reassurance** is the best option among those listed. If pain worsens, fever/vomiting develops, or pregnancy is possible, then targeted imaging and pregnancy testing should be pursued promptly [1] [2].

References

[1] Evaluation and Management of Emergency Department Patients with Suspected Appendicitis
American College of Emergency Physicians · 2023-02-28 12:00:00
In pediatric patients, clinical prediction rules can be used to risk stratify for possible acute appendicitis. However, do not use clinical prediction rules alone to identify patients who do not warrant advanced imaging for the diagnosis of appendicitis. In pediatric patients with suspected acute appendicitis, if readily available and reliable, use right lower quadrant (RLQ) ultrasound (US) to diagnose appendicitis. An unequivocally positive RLQ US with complete visualization of a dilated appendix has comparable accuracy to a positive CT or MRI in pediatric patients.
https://www.acep.org/globalassets/sites/acep/media/clinical-policies/appendicitis2023.pdf

[2] Tubal Ectopic Pregnancy
American College of Obstetricians and Gynecologists · 2018-03-01 12:00:00

The minimum diagnostic evaluation of a suspected ectopic pregnancy is a transvaginal ultrasound evaluation and confirmation of pregnancy. Medical management with methotrexate can be considered for women with a confirmed or high clinical suspicion of ectopic pregnancy who are hemodynamically stable, who have an unruptured mass, and who do not have absolute contraindications to methotrexate administration.
https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2018/03/tubal-ectopic-pregnancy

[3] Tubal Ectopic Pregnancy
American College of Obstetricians and Gynecologists · 2018-03-01 12:00:00
In clinically stable women in whom a nonruptured ectopic pregnancy has been diagnosed, laparoscopic surgery or intramuscular methotrexate administration are safe and effective treatments. Surgical management of ectopic pregnancy is required when a patient is exhibiting hemodynamic instability, symptoms of an ongoing ruptured ectopic mass (such as pelvic pain), or signs of intraperitoneal bleeding.
https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2018/03/tubal-ectopic-pregnancy

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300. MedQA question ID 1189 Step 2/3

Question

A 28-year-old male presents with a recent onset of upsetting dreams, anxiety, and disturbing flashbacks. The patient reports that he returned from active duty in Iraq 3 months ago and was adjusting to life back at home until about 7 weeks ago when he began having intense fear of loud noises and seeing sudden flashbacks to bombing attacks he endured during his time in Iraq. He had to take a leave from his army instructor duties as he was not able to handle the familiar settings of practice shooting ranges and sudden loud explosions during battalion training. After refusing to leave his house, he was finally persuaded by his wife to visit your clinic. What is the most likely diagnosis?

(A) Acute stress disorder

(B) Performance anxiety

(C) Posttraumatic stress disorder

(D) Panic attack

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Post-traumatic stress disorder (PTSD) is the most likely diagnosis. He has a clear traumatic exposure, **intrusive re-experiencing** (disturbing flashbacks and upsetting dreams), **avoidance** of reminders of the trauma, and **hyperarousal/startle** symptoms, with persistence for **more than 1 month** after the event; this pattern fits PTSD rather than acute stress disorder, which is limited to the first month after trauma [1] [2].

Why the other choices are less likely

- **Acute stress disorder**: symptoms would need to occur **within 3 days to 1 month** after trauma, not 7 weeks later [1] [2].
- **Panic attack**: does not explain the persistent trauma-linked flashbacks, avoidance, and startle response [2].
- **Performance anxiety**: is not the best fit for the trauma-triggered symptom pattern described [2].

Clinical note

For confirmation of PTSD in practice, the **Veterans Health Administration / Department of Defense** recommends a **validated structured clinician-administered interview** such as the **Clinician-Administered PTSD Scale** or PTSD Symptom Scale–Interview Version [3].

References

[1] Sometimes Less is More: Establishing the Core Symptoms of PTSD.
Journal of Traumatic Stress · 2017-06-01
The core symptoms of PTSD are recurrent distressing dreams, flashbacks, internal or external avoidance, and hypervigilance or exaggerated startle. A logistic regression analysis revealed that the core criteria accurately identified 79% of veterans with PTSD.
10.1002/jts.22185

[2] Posttraumatic stress disorder.
Continuum (Minneapolis, Minn.) · 2015-06-01
This article reviews the current definition and diagnostic assessment of posttraumatic stress disorder (PTSD) and describes its clinical characteristics. The DSM-5 includes 20 PTSD symptoms clustered into four domains: intrusive, active avoidance, disturbed emotional states and alterations of arousal and reactivity.
10.1212/01.con.0000466667.20403.b1

[3] Management of Posttraumatic Stress Disorder and Acute Stress Disorder
Veterans Health Administration / Department of Defense · 2023-07-01 12:00:00
For confirmation of the diagnosis of PTSD, we suggest using a validated structured clinician-administered interview, such as the Clinician-Administered PTSD Scale or PTSD Symptom Scale - Interview Version.
https://www.healthquality.va.gov/guidelines/MH/ptsd/

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301. MedQA question ID 1147 Step 1

Question

The parents of a 14-year-old patient are concerned and have questions about the use of insulin for their son's recently diagnosed type 1 diabetes. The patient has developed an upper respiratory infection while at school. He is coughing and has a runny nose. His temperature is 37.8° C (100.2° F) and vital signs are within normal limits. Physical examination is unremarkable. Which of the following modifications to his insulin regimen would you recommend to this patient and his parents?

(A) Increase the frequency of blood glucose checks.

(B) Reduce the insulin dose.

(C) Continue same regimen.

(D) Hold insulin until the patient gets better.

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The best recommendation is to continue his usual insulin regimen and increase the frequency of blood glucose monitoring during the intercurrent illness; insulin should **not** be held, and dose reduction is not routine for a mild upper respiratory infection without hypoglycemia [1] [2]. The American Diabetes Association (ADA) emphasizes that diabetes medical plans for school-aged children should specify the **frequency and circumstances for blood glucose checks**, and sick-day guidance for people with diabetes supports **more frequent glucose monitoring** with insulin adjusted only if glucose is low or if correction doses are needed [1] [2].

Practical choice

- **A. Increase the frequency of blood glucose checks** — best answer.
- **B. Reduce the insulin dose** — not recommended for routine mild viral illness.
- **C. Continue same regimen** — incomplete, because sick-day care should include closer monitoring.
- **D. Hold insulin until the patient gets better** — inappropriate; insulin must be continued to prevent ketosis/DKA [2].

References

[1] Diabetes Care in the School and Day Care Setting

Diabetes Care · 2012-12-10

The DMMP should address the specific needs of the child and provide specific instructions for each of the following: Blood glucose monitoring, including the frequency and circumstances requiring blood glucose checks, and use of continuous glucose monitoring if utilized. Insulin administration (if necessary), including doses/injection times prescribed for specific blood glucose values and for carbohydrate intake, the storage of insulin, and, when appropriate, physician authorization of parent/guardian adjustments to insulin dosage. Checking for ketones and appropriate actions to take for abnormal ketone levels, if requested by the student's health care provider.

10.2337/dc13-S075

[2] Consensus Recommendations for Sick Day Medication Guidance for People With Diabetes, Kidney, or Cardiovascular Disease: A Modified Delphi Process.

American Journal of Kidney Diseases · 2023-05-01

Sick day medication guidance involves withholding or adjusting medications in the setting of acute illnesses that could contribute to complications such as hypotension, acute kidney injury (AKI), or hypoglycemia. Participants reached a consensus on 42 specific recommendations. They recommended that insulin, sulfonylureas, and meglitinides be held only if blood glucose was low and that basal and bolus insulin be increased by 10-20%.

10.1053/j.ajkd.2022.10.012

302. MedQA question ID 983 Step 2/3

Question

A 56-year-old man recently diagnosed with cirrhosis secondary to alcohol use presents to the clinic for a follow up evaluation. He states that he has abstained from alcohol and attends a support group regularly. He has not taken any new medications or encountered any sick contacts. The patient's blood pressure is 110/70 mmHg, pulse is 65/min, and respirations are 15/min. His physical exam is grossly unremarkable. He has brought an gastroduodenoscopy report for review, which reveals that the patient has small esophageal varices with red spots. What is the next best step to prevent bleeding?

(A) Endoscopic sclerotherapy

(B) Metoprolol

(C) Nadolol

(D) Repeat endoscopy

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The American Association for the Study of Liver Diseases (AASLD) recommends a nonselective beta-blocker (NSBB) for high-risk small esophageal varices, and this patient's **small varices with red spots** meet that high-risk profile [1]. The best next step is **nadolol** rather than metoprolol, repeat endoscopy, or endoscopic sclerotherapy [1] [2].

Why nadolol

- **Nadolol** is an **NSBB** and is appropriate for primary prophylaxis of variceal bleeding in high-risk small varices [1] [2].
- **Metoprolol** is beta-1 selective and is not the recommended class for portal hypertension/variceal bleed prevention [2].
- **Repeat endoscopy** is used for surveillance in compensated cirrhosis with small varices, but **not as the immediate bleeding-prevention step** when high-risk stigmata are already present [1].
- **Endoscopic sclerotherapy** is not preferred for primary prophylaxis when NSBB therapy is feasible [2].

Answer: C) Nadolol.

References

[1] Portal Hypertensive Bleeding in Cirrhosis
American Association for the Study of Liver Diseases · 2016-09-01 12:00:00
- NSBB is the recommended therapy for patients with high-risk small esophageal varices (EV).
https://aasldpubs.onlinelibrary.wiley.com/doi/full/10.1002/hep.28906

[2] Esophageal Varices

World Gastroenterology Organisation · 2014-01-01 17:00:00

- Non-cardioselective β-blockers (propranolol, nadolol, or carvedilol), starting at a low dosage, if necessary increasing the dose step by step until a reduction in the resting heart rate of 25%, but not lower than 55 beats/min, is reached.

https://www.worldgastroenterology.org/guidelines/esophageal-varices/esophageal-varices-english

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303. MedQA question ID 74 Step 2/3

Question

A 21-year-old man comes to the physician because of pruritus and a hypopigmented rash on his upper body for 5 days. He first noticed the symptoms after returning from a business trip last week in the Bahamas. While he was there, he visited a couple of beaches and went hiking with some coworkers. The rash initially started as a single lesion on his upper back but since then has extended to his shoulders. He has a history of type 1 diabetes mellitus controlled with an insulin pump. He works as an office manager and has no known exposure to melanocytotoxic chemicals. He has been sexually active with three female partners over the past year and uses condoms inconsistently. He is 183 cm (6 ft) tall and weighs 80 kg (176 lb); BMI is 23.9 kg/m2. His temperature is 37.2°C (99°F), pulse is 78/min, and blood pressure is 130/84 mm Hg. A photograph of the rash is shown. One month ago, his hemoglobin A1C was 7.8%. Which of the following is most likely to confirm the diagnosis?

(A) Wood lamp examination

(B) Skin culture

(C) Potassium hydroxide preparation

(D) Skin biopsy

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Potassium hydroxide (KOH) preparation is the best choice to confirm **tinea versicolor (pityriasis versicolor)** in this presentation; it classically shows *Malassezia* yeast with short hyphae, while Wood lamp can help but is less definitive, and skin culture is usually not helpful [1] [2]. The rash distribution on the upper trunk/shoulders in a young adult after travel to a warm, humid climate is also typical for tinea versicolor, which is usually diagnosed clinically and can be confirmed microscopically from skin scale [1] [2].

Why the other options are less likely

- **Wood lamp examination**: may show fluorescence, but it is not the most reliable confirmatory test [2].

- **Skin culture**: generally not useful for routine confirmation of tinea versicolor [1] [2].
- **Skin biopsy**: usually unnecessary unless the diagnosis is unclear or another condition is suspected [1] [2].

References

[1] Tinea versicolor in dark-skinned individuals.
International journal of dermatology · 2014-02-01
Tinea versicolor is caused by an overgrowth of the Malassezia genus. It manifests clinically as asymptomatic hypopigmented macules, hyperpigmented mules, or a combination of the two. Differential diagnosis includes confluent and reticulated papillomatosis, seborrheic dermatitis, pityriasis rosea, pityriz alba, and vitiligo. Tinea Versicolor can be successfully managed in most cases with topical antifungal treatments.
10.1111/ijd.12345

[2] Atrophic pityriasis versicolor occurring in a patient with Sjögren's syndrome.
BMJ case reports · 2017-01-18
The diagnosis can be easily confirmed by microscopic observation of the scales soaked in 15% potassium hydroxide or by a skin biopsy.
10.1136/bcr-2016-218108

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304. MedQA question ID 113 Step 1

Question

A 67-year-old man with chronic kidney disease comes to the physician because of worsening fatigue and shortness of breath on exertion for 6 months. He has a 20-year history of poorly-controlled type 2 diabetes mellitus. Current medications include metformin and insulin. His pulse is 105/min. Examination shows conjunctival pallor and bounding pulses. Laboratory studies show:
Hemoglobin 8.6 g/dL
Mean corpuscular volume 90 µm3
Reticulocyte count 0.5%
Serum
Ferritin 325 ng/mL
Urea nitrogen 45 mg/dL
Creatinine 2.2 mg/dL
The patient is prescribed a drug to treat the cause of his current symptoms. The drug's mechanism of action directly involves which of the following signaling pathways?"

(A) PI3K/Akt/mTOR

(B) MAP kinase

(C) JAK/STAT

(D) IP3

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The American Society of Clinical Oncology (ASCO) and **Kidney Disease: Improving Global Outcomes (KDIGO)**-aligned CKD anemia guidance support use of an **erythropoiesis-stimulating agent (ESA)** for symptomatic anemia from CKD after correctable causes are addressed; in CKD not on dialysis, ESA initiation is individualized based on symptoms and risks, and hemoglobin is generally kept **below 11.5 g/dL** once treated [1] [2] [3]. The drug used for this cause of anemia is an ESA such as epoetin alfa or darbepoetin, and its receptor signaling is mediated through **JAK/STAT**. Therefore, the correct pathway is **C. JAK/STAT** [4] [5].

Why this patient fits CKD-related anemia

This presentation is consistent with **anemia of CKD**: normocytic anemia, low reticulocyte count, and symptoms attributable to anemia in the setting of CKD. KDIGO recommends evaluating anemia with CBC, reticulocytes, ferritin, and TSAT, and considering ESA therapy when symptoms warrant after other causes are addressed [1] [2].

Mechanism

ESAs bind the **erythropoietin receptor** on erythroid progenitor cells and activate downstream **JAK/STAT** signaling, which drives erythroid proliferation and differentiation [4] [5].

Answer

C. JAK/STAT

References

[1] Management of Anemia in Chronic Kidney Disease (CKD)
Kidney Disease Improving Global Outcomes · 2026-01-02 12:00:00
In people with CKD not receiving dialysis, including kidney transplant recipients and children, the selection of Hb concentration at which ESA therapy is initiated should consider the presence of symptoms attributable to anemia, the potential benefits of higher Hb concentration, and the potential harms of RBC transfusions or ESA therapy.
https://www.kidney-international.org/article/S0085-2538(25)00495-8/fulltext

[2] Management of Anemia in Chronic Kidney Disease (CKD)
Kidney Disease Improving Global Outcomes · 2026-01-02 12:00:00
In people with anemia and CKD in whom correctable causes of anemia have been addressed, we suggest using an ESA rather than a HIF-PHI as first-line treatment of anemia.
https://www.kidney-international.org/article/S0085-2538(25)00495-8/fulltext

[3] Management of Anemia in Chronic Kidney Disease (CKD)
Kidney Disease Improving Global Outcomes · 2026-01-02 12:00:00
In adults with anemia and CKD treated with ESAs, we recommend targeting the Hb level to below 11.5 g/dl (115 g/l).
https://www.kidney-international.org/article/S0085-2538(25)00495-8/fulltext

[4] How I treat anemia in older adults
Blood · 2023-02-28
The patient also has concurrent anemia of CKD. There is a decline in hemoglobin as eGFR declines, which is caused by a reduction in endogenous EPO, decreased hematopoietic response to EPO because of uremic toxins, and absolute and functional iron deficiency. Severe EPO deficiency occurs when eGFR is <30 mL/min per 1.73m2.
10.1182/blood.2022017626

[5] Hypoxia-inducible factor prolyl hydroxylase inhibitors for anaemia in chronic kidney disease: a clinical practice document by the European Renal Best Practice board of the European Renal Association
Nephrology Dialysis Transplantation · 2024-04-04

Erythropoietin derivatives have been studied since 1989 and transformed the treatment of anaemia in CKD by effectively increasing haemoglobin levels and avoiding regular blood transfusions.
10.1093/ndt/gfae075

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305. MedQA question ID 439 Step 2/3

Question

A 23-year-old man presents to the office for a circular, itchy rash over the abdomen that has been slowly getting worse for the past 2 weeks. The patient has a medical history of chronic dermatitis and chronic sinusitis for which he has prescriptions of topical hydrocortisone and fexofenadine. He smokes one-half pack of cigarettes every day. His vital signs include: blood pressure 128/76 mm Hg, heart rate 78/min, and respirations 12/min. On physical examination, the patient appears tired but oriented. Examination of the skin reveals a 2 x 2 cm round and erythematous, annular plaque on the abdomen 3 cm to the left of the umbilicus. There are no vesicles, pustules, or papules. Auscultation of the heart reveals a 1/6 systolic murmur. Breath sounds are mildly coarse at the bases. A KOH preparation from the skin scraping confirms the presence of hyphae. Which of the following is the next best step in the management of this patient?

(A) Itraconazole

(B) Griseofulvin

(C) Topical clindamycin

(D) Doxycycline

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Itraconazole is the best option among those listed, because the lesion is a **dermatophyte infection (tinea corporis)** confirmed by **KOH hyphae** and the antibacterial choices (**topical clindamycin** and **doxycycline**) do not treat dermatophytes [1] [2]. In routine practice, a **topical antifungal** would usually be first-line for a small localized plaque, but that option is not offered here; if an oral agent is needed, **itraconazole** is an appropriate systemic antifungal, whereas **griseofulvin** is generally not the preferred systemic choice for tinea corporis [1] [2].

Why the other options are not best

- **Topical clindamycin**: antibacterial, not antifungal.
- **Doxycycline**: antibacterial, not antifungal.
- **Griseofulvin**: an older systemic antifungal, but not the preferred oral agent when systemic therapy is chosen for dermatophyte infections [1] [2].

Clinical caveat

Because this is a **small, localized annular plaque**, the most guideline-consistent treatment would ordinarily be a **topical antifungal** rather than oral therapy; however, since that is not one of the choices, **itraconazole** is the closest correct answer [1].

References

[1] Expert Consensus on The Management of Dermatophytosis in India (ECTODERM India)
BMC Dermatology · 2018-07-24
Systemic antifungal treatment is indicated if the lesion is multiple, extensive, deep, recurrent, or chronic. Terbinafine and itraconazole should be the preferred systemic drugs.
10.1186/s12895-018-0073-1

[2] Tinea corporis: an updated review
Drugs in Context · 2020-01-01
Tinea corporis is a common fungal infection that mimics many other annular lesions. The diagnosis is often clinical but difficult with prior use of medications, such as calcineurin inhibitors or corticosteroids. Systemic antifungal treatment is indicated if the lesion is multiple, extensive, deep, recurrent, or chronic.
10.7573/dic.2020-5-6

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306. MedQA question ID 903 Step 1

Question

A 54-year-old man comes to the clinic for management of his gastroesophageal reflux disease (GERD). He is currently on cimetidine for his condition and reports that his GERD initially improved. However, following his recent move to Michigan, he is experiencing more frequent episodes of chest pain (4-5 times a week). The pain is described as burning in quality and is concentrated around his epigastric region following food ingestion. It does not radiate anywhere and is alleviated when he takes antacids. A physical examination demonstrates a healthy male with unremarkable findings. He is subsequently prescribed a new medication for control of his symptoms. What is the most likely mechanism of action of this new medication?

(A) Irreversible inactivation of cyclooxygenase enzyme

(B) Irreversible inhibition of H+/K+-ATPase at parietal cells

(C) Reversible inhibition of H+/K+-ATPase at parietal cells

(D) Reversible inhibition of histamine H2 receptors

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely new medication is a proton pump inhibitor (PPI), which works by irreversibly inhibiting the gastric parietal cell H+/K+-ATPase. The American College of Gastroenterology

(ACG) recommends **PPIs over H2-receptor antagonists** for GERD symptom control and for healing/maintenance of erosive esophagitis, and they should be taken **30–60 minutes before a meal** [1] [2] [3]. Therefore, the correct choice is **(B) Irreversible inhibition of H+/K+-ATPase at parietal cells**.

References

[1] Diagnosis and Management of Gastroesophageal Reflux Disease
American College of Gastroenterology · 2021-11-22 12:00:00
ACG recommends PPIs over treatment with histamine-2-receptor antagonists (H2RA) for healing EE and maintenance of healing from EE; PPI administration 30–60 minutes before a meal is recommended for GERD symptom control.
https://journals.lww.com/ajg/Fulltext/9900/ACG_Clinical_Guideline_for_the_Diagnosis_and.154.aspx

[2] Diagnosis and Management of Gastroesophageal Reflux Disease
American College of Gastroenterology · 2021-11-22 12:00:00
We recommend treatment with PPIs over H2RA for healing EE.
https://journals.lww.com/ajg/Fulltext/9900/ACG_Clinical_Guideline_for_the_Diagnosis_and.154.aspx

[3] Diagnosis and Management of Gastroesophageal Reflux Disease
American College of Gastroenterology · 2021-11-22 12:00:00
For patients with classic GERD symptoms of heartburn and regurgitation who have no alarm symptoms, we recommend an 8-wk trial of empiric PPIs once daily before a meal.
https://journals.lww.com/ajg/Fulltext/9900/ACG_Clinical_Guideline_for_the_Diagnosis_and.154.aspx

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307. MedQA question ID 500 Step 1

Question

A 71-year-old woman with type 2 diabetes mellitus and hypertension comes to the emergency department because of a 3-day history of intermittent abdominal pain, vomiting, and obstipation. She has had multiple episodes of upper abdominal pain over the past year. She has smoked 1 pack of cigarettes daily for the past 30 years. Physical examination shows a distended abdomen with diffuse tenderness and high-pitched bowel sounds. An x-ray of the abdomen shows a dilated bowel, multiple air-fluid levels, and branching radiolucencies in the right infra-diaphragmatic region. Which of the following is the most likely cause of this patient's condition?

(A) Perforation of the duodenal wall

(B) Inflammation of the gallbladder wall

(C) Obstruction of the common bile duct

(D) Torsion of the large intestine

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Inflammation of the gallbladder wall is the most likely cause. This patient has **gallstone ileus**, suggested by small-bowel obstruction with **pneumobilia** (branching radiolucencies in the right subdiaphragmatic region) and a history of recurrent upper abdominal pain; it typically results from **chronic cholecystitis with erosion of a large gallstone through the gallbladder wall into the bowel, creating a cholecystoenteric fistula** [1] [2] [3].

Why the other choices are less likely

- **Perforation of the duodenal wall** would more likely cause free intraperitoneal air rather than pneumobilia with mechanical obstruction.
- **Obstruction of the common bile duct** can cause jaundice/cholangitis but does not explain the bowel obstruction and pneumobilia pattern.
- **Torsion of the large intestine** (volvulus) causes colonic obstruction, not pneumobilia from a biliary-enteric fistula; plain radiographs/CT are used to confirm volvulus when suspected [4].

References

[1] Pneumobilia: a case report and literature review on its surgical approaches.
Journal of surgical technique and case report · 2013-01-01
Gallstones ileus is an uncommon cause but important cause of small bowel obstruction. It affects the elderly females predominantly and is associated with a high morbidity and mortality rate if diagnosis and urgent surgical intervention are delayed. A two-stage procedure (either enterotomy alone or enterotomy and subsequent cholecystectomy) has been shown to be associated with lower mortality rates.
10.4103/2006-8808.118616

[2] Gallstone ileus: monocentric experience looking for the adequate approach.
Updates in Surgery · 2018-12-01
Gallstone ileus is a mechanical bowel obstruction caused by a biliary calculus usually originating from a bilioenteric fistula.
10.1007/s13304-017-0495-z

[3] Gall stone ileus: Unfamiliar cause of bowel obstruction. Case report and literature review.
International journal of surgery case reports · 2018-01-01
Gallstone ileus is a rare sequela of cholelithiasis. It occurs as a result of bilioenteric fistula due to erosion by the offending gallbladder stone. It is most commonly encountered in elderly females and CT imaging is diagnostic in the majority of cases.
10.1016/j.ijscr.2018.06.010

[4] Management of Colonic Volvulus and Acute Colonic Pseudo-Obstruction
American Society of Colon and Rectal Surgeons · 2021-08-31 12:00:00
In hemodynamically stable patients, colonic volvulus is often initially evaluated with plain abdominal radiographs, whereas CT imaging may be used to confirm the diagnosis.
https://journals.lww.com/dcrjournal/Fulltext/2021/09000/The_American_Society_of_Colon_and_Rectal_Surgeons.5.aspx

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308. MedQA question ID 1004 Step 2/3

Question

A 66-year-old man presents to the emergency department due to a productive cough. His cough has been increasing in frequency and severity over the course of 3 days, and his sputum production has increased in volume. The color of his sputum is yellow-green. He denies any chest pain or palpitations but has experienced worsening shortness of breath with exertion and at rest, which is

above his baseline. He has not noticed any changes in his weight or edema in his lower extremities. He denies any recent history of long travel. Medical history is significant for hypertension, hyperlipidemia, and chronic obstructive pulmonary disease (COPD). He has been hospitalized four times for similar symptoms within the last year. He has smoked approximately 1 pack of cigarettes per day for the past 45 years. His temperature is 102°F (38.9°C), blood pressure is 156/94 mmHg, pulse is 101/min, and respirations are 26/min with an oxygen saturation of 85% on room air. On physical exam, the patient has difficulty speaking, and there is asynchronous motion between the chest and abdomen with respiration. Wheezing is appreciated on pulmonary auscultation. An ECG demonstrates normal sinus rhythm. A chest radiograph is obtained, and he is administered supplemental oxygen. He is started on ipratropium, albuterol, and methylprednisolone. Which of the following should be added to this patient's treatment regimen?

(A) Cefazolin

(B) Ceftriaxone

(C) Levofloxacin

(D) Penicillin

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Levofloxacin is the best choice among the options to add for this patient's acute COPD exacerbation because the **American Thoracic Society/European Respiratory Society** and **GOLD** recommend antibiotics when there is increased dyspnea with **purulent sputum** or recurrent/severe exacerbations, and this patient has both [1] [2] [3]. In hospitalized COPD exacerbations, antibiotics are typically given for **5-7 days** when indicated; the usual bacterial targets include **Haemophilus influenzae** and other common respiratory pathogens, making **cefazolin** and **penicillin** poor fits here [2] [4].

References

[1] Global Strategy for Prevention, Diagnosis and Management of COPD 2026 Report

Global Initiative for Chronic Obstructive Lung Disease · 2025-11-10 12:00:00

An exacerbation of COPD is an acute event with symptoms worsening over a few days (up to 14 days) and characterized by increased dyspnea and/or cough and sputum... Antibiotics are recommended for a total of 5 days in patients with purulent sputum, prior history of lung infections, etc.

https://goldcopd.org/2025-gold-report/

[2] Prevention, Management and Diagnosis of COPD Exacerbations

American Thoracic Society, European Respiratory Society · 2017-03-01 00:00:00

For hospitalized patients with acute or acute-on-chronic hypercapnic respiratory failure due to a COPD exacerbation, the Task Force recommends the use of noninvasive mechanical ventilation.

https://erj.ersjournals.com/content/49/3/1600791.long

[3] Management of Chronic Obstructive Pulmonary Disease (COPD)

Veterans Health Administration / Department of Defense · 2021-04-01 12:00:00

We recommend antibiotic use for patients with COPD exacerbations who have increased dyspnea and increased sputum purulence (change in sputum color) or volume.
https://www.healthquality.va.gov/guidelines/CD/copd/VADoDCOPDCPGFinal508.pdf

[4] A Pandemic Lesson for Global Lung Diseases: Exacerbations Are Preventable
American Journal of Respiratory and Critical Care Medicine · 2022-02-22
H. influenzae is the most common bacterial accompaniment of COPD exacerbations...
10.1164/rccm.202110-2389CI

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309. MedQA question ID 431 Step 2/3

Question

A 24-year-old female presents to the emergency department with a chief complaint of an inability to urinate. She states that this has been one of many symptoms she has experienced lately. At times she has had trouble speaking and has noticed changes in her vision however these episodes occurred over a month ago and have resolved since then. Two days ago she experienced extreme pain in her face that was exacerbated with brushing her teeth and plucking out facial hairs. The patient has no relevant past medical history, however, the patient admits to being sexually abused by her boyfriend for the past year. Her current medications include ibuprofen for menstrual cramps. On physical exam it is noted that leftward gaze results in only the ipsilateral eye gazing leftward. The patient's initial workup is started in the emergency department. Her vital signs are within normal limits and you note a pale and frightened young lady awaiting further care. Which of the following is the best initial test for this patient's chief complaint?

(A) Head CT

(B) Head MRI

(C) Lumbar puncture

(D) Domestic abuse screening and exploring patient's life stressors

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Head MRI is the best initial test for this patient’s urinary retention, because the presentation strongly suggests a **central demyelinating process such as multiple sclerosis** rather than a primary urologic cause. The **National Institute for Health and Care Excellence (NICE)** recommends urgent **MRI of the brain** for adults with progressive, subacute loss of central neurologic function, and MRI is the investigation of choice when trigeminal neuralgia or other cranial-nerve/brainstem findings raise concern for an underlying lesion such as MS [1] [2].

Why this is the best next test

This patient has multiple focal neurologic features separated in time and space: prior speech and visual symptoms, current trigeminal neuralgia, and a gaze palsy, all of which are more consistent with a CNS lesion than with domestic abuse alone as the immediate explanation for the urinary complaint. In women with suspected neurologic lower urinary tract dysfunction, the literature on MS-related urinary disorders supports neurologic evaluation and imaging to define the cause and guide management [3] [4].

Why the other options are less appropriate

- **Head CT** is less sensitive than MRI for demyelinating disease and posterior fossa/brainstem lesions [1] [2].
- **Lumbar puncture** can support the diagnosis after imaging, but it is not the best initial test when focal neurologic deficits suggest a CNS lesion [1] [3].
- **Domestic abuse screening and exploring life stressors** is important for the overall encounter, but it does not address the most urgent diagnostic question posed by the neurologic syndrome and urinary retention [3] [4].

References

[1] Suspected Cancer: Recognition and Referral

National Institute for Health and Care Excellence · 2026-01-12 12:00:00

Consider an urgent, direct access, MRI scan of the brain (or CT scan if MRI is contraindicated; to be done within 2 weeks) to assess for brain or central nervous system cancer in adults with progressive, sub-acute loss of central neurological function.

https://www.nice.org.uk/guidance/ng12

[2] Trigeminal neuralgia

Neurology · 2016-07-12

Because of its sensitivity to detect pathologic processes involving brainstem and cranial nerves running through the base of the skull, MRI is widely seen as the method of choice to examine the trigeminal nerve and root. Reliable detection of neurovascular compression requires the use of specific imaging techniques with 3D reconstruction.

10.1212/WNL.0000000000002840

[3] Adult Stroke Rehabilitation and Recovery

American Heart Association, American Stroke Association · 2016-05-04 12:00:00

Assessment of bladder function in acutely hospitalized stroke patients is recommended.

https://www.ahajournals.org/doi/full/10.1161/str.0000000000000098

[4] Clinical and urodynamic evaluations of urinary disorders in multiple sclerosis.

Annals of physical and rehabilitation medicine · 2014-07-01

A thorough evaluation including history, clinical examination and evaluation of quality of life is necessary for diagnosis of urinary disorders. In these cases, urodynamic investigations are necessary to better understand symptoms and choose the best treatment.

10.1016/j.rehab.2014.05.006

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310. MedQA question ID 11 Step 2/3

Question

A 72-year-old man comes to the physician because of a 2-month history of fatigue and worsening abdominal pain. During this period, he also has excessive night sweats and shortness of breath on

exertion. Over the past 3 months, he has had a 5.6-kg (12-lb) weight loss. He had a myocardial infarction 3 years ago. He has hypertension, diabetes mellitus, and chronic bronchitis. His medications include insulin, aspirin, lisinopril, and an albuterol inhaler. He has smoked half a pack of cigarettes for the past 45 years. Vital signs are within normal limits. The spleen is palpated 6 cm below the left costal margin. Laboratory studies show:
Hemoglobin 6.4 g/dL
Mean corpuscular volume 85 µm3
Leukocyte count 5,200/mm3
Platelet count 96,000/mm3
A blood smear is shown. Bone marrow aspiration shows extensive fibrosis and a few scattered plasma cells. A JAK 2 assay is positive. Which of the following is the most appropriate next step in management?"

(A) Cladribine

(B) Prednisone

(C) Imatinib

(D) Ruxolitinib

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most appropriate next step is ruxolitinib (D). In symptomatic myelofibrosis with splenomegaly and constitutional symptoms, the standard first-line medical therapy is a **JAK inhibitor**, and the best-supported option here is **ruxolitinib**; it improves spleen size and symptom burden, although **anemia may worsen early after initiation** and requires monitoring [1] [2] [3]. The patient's severe symptoms, splenomegaly, marrow fibrosis, and **JAK2 positivity** fit primary myelofibrosis rather than a condition treated with cladribine, prednisone, or imatinib [2] [4].

Why ruxolitinib fits this presentation

- **Ruxolitinib** is the established JAK inhibitor for myelofibrosis-related **splenomegaly and constitutional symptoms** [2] [3].
- Full-text review data note that JAK inhibitor trials established efficacy for reducing **splenomegaly and symptoms**, and that ruxolitinib is favored first-line in patients with **profound symptoms** and adequate counts [2].
- In patients starting ruxolitinib, **anemia is common in the first few months**; hemoglobin support with transfusion, temporary dose reduction, or erythropoietin may be needed rather than immediate abandonment of therapy [1].

Why the other options are not the best next step

- **Imatinib** is used for **BCR-ABL1–positive chronic myeloid leukemia**, not JAK2-positive myelofibrosis [4].
- **Cladribine** is not the standard therapy for primary myelofibrosis.

- **Prednisone** may be used in selected inflammatory or autoimmune hematologic disorders, but it is not the preferred disease-directed therapy for this presentation.

Clinical caveat

This patient is **profoundly anemic (Hb 6.4 g/dL)** and symptomatic, so transfusion support is also clinically relevant; however, among the answer choices, **ruxolitinib** is the appropriate disease-directed next step [1] [2].

References

[1] Momelotinib (JAK1/JAK2/ACVR1 inhibitor): mechanism of action, clinical trial reports, and therapeutic prospects beyond myelofibrosis

Haematologica · 2023-03-02

The demonstration of benefit in quality of life, by way of effective control of splenomegaly and constitutional symptoms, has allowed FDA approval of ruxolitinib (2011), fedratinib (2019), and pacritinib (2022). Ruxolitinib treatment was also associated with alleviation of symptoms in approximately half of affected patients.

10.3324/haematol.2022.282612

[2] When, Which and How to Switch: Navigating JAK inhibitors in myelofibrosis

British Journal of Haematology · 2024-11-27

Current trial data suggests superiority of ruxolitinib for spleen and symptom control and tolerability... a patient such as Case 1 who presents with profound symptoms and robust counts may be more suited to ruxolitinib first-line, while patients in whom cytopenias predominate... may be more appropriate for first-line momelotinib.

10.1111/bjh.19929

[3] When, Which and How to Switch: Navigating JAK inhibitors in myelofibrosis

British Journal of Haematology · 2024-11-27

Ruxolitinib frequently causes anaemia in the first few months after treatment initiation... Haemoglobin levels can be supported with erythropoietin therapy, temporary dose reduction or red cell transfusions, and anaemia in the first few months does not necessarily require a change of JAKi therapy.

10.1111/bjh.19929

[4] Diagnosis and Evaluation of Prognosis of Myelofibrosis

British Society for Haematology · 2023-11-13 00:00:00

All patients with suspected MF should undergo a diagnostic bone marrow biopsy and molecular testing for JAK2, CALR or MPL variants as appropriate (Grade 1A).

https://onlinelibrary.wiley.com/doi/10.1111/bjh.19164

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311. MedQA question ID 1045 Step 1

Question

A 69-year-old right-handed man comes to the physician for a routine health maintenance examination. On questioning, he has had some difficulty speaking for 3 months. During a conversation, he often has difficulty repeating what his interlocutor has said. He has hypertension and takes hydrochlorothiazide. His vital signs are within normal limits. The patient speaks fluently in full sentences and demonstrates normal comprehension. When asked to say the word “kindergarten,” he replies with, “Sintelmarvin… no, that's wrong…kinterflargin, no that isn't it either...kantolargen...no? How about, kindergarten?” The most likely cause of the patient's symptoms is occlusion of a branch of which of the following arteries?

(A) Left middle cerebral

(B) Right vertebral

(C) Left posterior inferior cerebellar

(D) Left penetrating

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Left middle cerebral artery occlusion is the most likely cause. The presentation is classic **conduction aphasia**: fluent speech and preserved comprehension with prominent **impaired repetition** and phonemic errors, which localizes to the **dominant left perisylvian language network/arcuate fasciculus** [1] [2]. In a right-handed man, that language network is typically in the **left hemisphere**, making a **left MCA branch** the best answer [1] [2].

References

[1] Arcuate fasciculus variability and repetition: the left sometimes can be right.
Cortex; a journal devoted to the study of the nervous system and behavior · 2012-02-01
Repetition ability is a major criterion for classifying aphasic syndromes. It's assumed that repetition deficits correlate with injury to the left perisylvian core including the arcuate fasciculus (AF).
10.1016/j.cortex.2011.06.014

[2] Correlation between language function and the left arcuate fasciculus detected by diffusion tensor imaging tractography after brain tumor surgery.
Journal of Neurosurgery · 2012-11-01
The arcuate fasciculus in the dominant hemisphere is thought to be associated with language-processing disorders, including conduction aphasia.
10.3171/2012.8.jns12348

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312. MedQA question ID 799 Step 1

Question

A 68-year-old woman presents to the emergency room with chest pain. She reports sudden severe and crushing substernal chest pain that started 1 hour ago. Her past medical history is notable for hypertension, hyperlipidemia, diabetes mellitus, obesity, and a prior myocardial infarction requiring a coronary artery bypass graft 2 years ago. She takes aspirin, metoprolol, lisinopril, spironolactone, atorvastatin, and insulin. She is retired and lives a sedentary lifestyle at home. Her temperature is 98.8°F (37.1°C), blood pressure is 109/68 mmHg, pulse is 118/min, and respirations are 24/min. Before being able to start the physical examination, the patient loses consciousness. Her pulse is palpable but weak. Her blood pressure is now 88/50 mmHg and pulse is 130/min. Her skin is pale, cold, and clammy. An electrocardiogram demonstrates ST elevations in leads I, aVL, V3, V4, V5, and V6. A medication that primarily stimulates which of the following receptors would be most appropriate to improve the hemodynamic status of this patient?

(A) Alpha-2 adrenergic receptor

(B) Beta-1 adrenergic receptor

(C) Beta-2 adrenergic receptor

(D) D2 receptor

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The American College of Cardiology/American Heart Association (ACC/AHA) recommends immediate management of this patient as acute coronary syndrome with cardiogenic shock, including emergency revascularization and hemodynamic support. For short-term hemodynamic improvement, the most appropriate drug among the choices is **dobutamine**, which is primarily a **f1-adrenergic (beta-1 adrenergic)** agonist; it increases myocardial contractility and cardiac output. In a patient with hypotension and shock, this is used as a bridge while definitive reperfusion is pursued [1] [2] [3].

Why not the other receptors

- **Beta-1 adrenergic**: **dobutamine** is the classic inotrope for low-output cardiogenic shock; it is the best match to improve cardiac performance [2] [3].
- **Alpha-2 adrenergic**: central sympatholytics such as clonidine would not improve shock.
- **Beta-2 adrenergic**: primarily bronchodilation/vasodilation; not the usual hemodynamic inotrope here.
- **D2 receptor**: dopamine has dose-dependent effects, but current critical care guidance generally favors norepinephrine over dopamine in shock states; dopamine is not the best answer for this scenario [2].

Clinical context

This presentation is **ST-elevation myocardial infarction complicated by cardiogenic shock**, which the ACC/AHA guideline says should receive **emergency culprit-vessel PCI or CABG regardless of time from symptom onset** [1]. Inotropic/vasopressor support is a temporizing measure, not definitive therapy [2] [3].

References

[1] Management of Patients With Acute Coronary Syndromes

American College of Cardiology, American College of Emergency Physicians, American Heart Association, Society for Cardiovascular Angiography and Interventions · 2025-02-27 00:00:00

In patients with ACS and cardiogenic shock or hemodynamic instability, emergency revascularization of the culprit vessel by PCI or with CABG is indicated to improve survival, irrespective of time from symptom onset.

https://www.jacc.org/doi/10.1016/j.jacc.2024.11.009

[2] Surviving Sepsis Campaign: Management of Sepsis and Septic Shock 2021

Society of Critical Care Medicine · 2021-10-02 12:00:00

For adults with septic shock and cardiac dysfunction with persistent hypoperfusion despite adequate volume status and arterial blood pressure, we suggest either adding dobutamine to norepinephrine or using epinephrine alone.
https://link.springer.com/article/10.1007%2Fs00134-021-06506-y

[3] Inotropic Agents and Vasopressors in the Treatment of Cardiogenic Shock.
Current heart failure reports · 2020-12-01
The mainstay of medical treatment in cardiogenic shock are inotropes and vasopressors to improve cardiac output.
10.1007/s11897-020-00493-9

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313. MedQA question ID 73 Step 2/3

Question

A 29-year-old woman presents to the clinic after several months of weight loss. She noticed a 6.8 kg (15 lb) unintentional weight loss over the preceding several months. She has not changed her diet or exercise habits. She also reports feuding with her boyfriend over the temperature of their shared apartment, as she always feels warmer than he does. The vital signs include: heart rate 110/min and blood pressure 146/78 mm Hg. The physical exam is notable for warm and slightly moist skin. She also exhibits a fine tremor in her hands when her arms are outstretched. The urine pregnancy test is negative. Which of the following is the best single treatment option for this patient?

(A) Glucocorticoids

(B) Methimazole

(C) Propranolol

(D) Radioiodine therapy

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The best single treatment option is methimazole (B). The American Thyroid Association (ATA) recommends **methimazole** as the preferred antithyroid drug for virtually every patient with Graves' hyperthyroidism who chooses drug therapy; **propranolol** is useful for symptom control but does not treat the underlying hormone excess, and **radioiodine** is a definitive alternative rather than the best initial single choice here [1] [2]. In a nonpregnant woman with classic thyrotoxicosis symptoms, **methimazole** is the best answer among the options provided [1] [3].

Why not the other options

- **Propranolol**: recommended for symptomatic control of thyrotoxicosis, especially with resting heart rates >90 bpm, but it is adjunctive rather than definitive therapy [2] [4].
- **Radioiodine therapy**: an accepted definitive treatment for Graves' hyperthyroidism, but not the best single option when asking for initial therapy in a typical nonpregnant patient [1] [3].

- **Glucocorticoids**: reserved for specific scenarios such as thyroid storm, thyroid eye disease coverage, or destructive thyroiditis; they are not routine first-line treatment for uncomplicated Graves' hyperthyroidism [1] [5].

Practical takeaway

For a young, nonpregnant patient with symptomatic hyperthyroidism, **methimazole** is the preferred antithyroid medication; a **β-blocker** can be added if needed for tachycardia, tremor, or other adrenergic symptoms [1] [2] [3].

References

[1] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis
American Thyroid Association · 2016-10-01 00:00:00
Methimazole (MMI) should be used in virtually every patient who chooses ATD therapy for GD, except during the first trimester of pregnancy when propylthiouracil (PTU) is preferred, in the treatment of thyroid storm, and in patients with minor reactions to MMI who refuse RAI therapy or surgery.
https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

[2] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis
American Thyroid Association · 2016-10-01 00:00:00
β-adrenergic blockade is recommended in all patients with symptomatic thyrotoxicosis, especially elderly patients and thyrotoxic patients with resting heart rates >90 bpm or coexistent cardiovascular disease.
https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

[3] Hyperthyroidism
The Lancet · 2024-01-23
The thionamide ATDs include propylthiouracil (PTU), carbimazole (CBZ) and its metabolite, methimazole (MMI). CBZ and MMI are generally preferred over PTU because of superior efficacy and tolerability, and because their longer duration of action allows once daily oral administration rather than twice or thrice daily for PTU.
10.1016/s0140-6736(23)02016-0

[4] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis
American Thyroid Association · 2016-10-01 00:00:00
Propranolol 10–40 mg tid – qid. Nonselective β-adrenergic receptor blockade. Longest experience. May block T4 to T3 conversion at high doses.
https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

[5] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis
American Thyroid Association · 2016-10-01 00:00:00
In the absence of any strong contraindication to GC use, the ATA suggests considering them for coverage of GD patients with mild active GO who are treated with RAI, even in the absence of risk factors for GO deterioration.
https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

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314. MedQA question ID 44 Step 2/3

Question

A 45-year-old G5P4105 presents to her gynecologist's office with six months of increasingly heavy periods. She now soaks one super absorbent tampon every two hours for five days each cycle. Her cycles have also become irregular, with intermenstrual bleeding for the last two months. She now experiences significant dysmenorrhea, requiring 400 mg ibuprofen every four hours for the majority of each menses. In addition, she reports new onset mild dyspareunia with intercourse and a "heavy feeling" in her pelvis. She has also noticed increased urinary frequency but denies bowel changes.

The patient has a past medical history of obesity and type II diabetes on metformin. Her last child was born four years ago, and she has had five spontaneous vaginal deliveries. At this office visit, temperature is 98.5°F (36.9°C), blood pressure is 137/84 mmHg, pulse is 87/min, and respirations are 14/min. Which of the following physical exam findings is most likely to be present in this patient?

(A) Globular 10-week sized uterus

(B) Adnexal mass

(C) Irregular 14-week sized uterus

(D) No remarkable physical exam finding

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Globular 10-week sized uterus is most likely. This presentation is most consistent with **adenomyosis**: the classic symptom pattern is **heavy menstrual bleeding with dysmenorrhea**, and patients may also report **dyspareunia** and **urinary frequency/pressure symptoms** from a bulky uterus [1] [2]. Aglobular, diffusely enlarged uterus is the expected physical exam finding; the irregular 14-week uterus is more suggestive of leiomyomas, and an adnexal mass would point more toward ovarian pathology [1] [2].

References

[1] Adenomyosis: A Clinical Review of a Challenging Gynecologic Condition.
Journal of Minimally Invasive Gynecology · 2016-02-01
The most common presentation of Adenomyosis is heavy menstrual bleeding and dysmenorrhea, but patients can be asymptomatic.
10.1016/j.jmig.2015.09.018

[2] Genitourinary symptoms in patients with adenomyosis.
International Urogynecology Journal · 2013-03-01
Adenomyosis causes problems in women, including dysmenorrhea and abnormally heavy and prolonged menstrual bleeding... Frequency of urinary symptoms was significantly higher in the adenomyoss group than in the control group.
10.1007/s00192-012-1903-z

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315. MedQA question ID 406 Step 1

Question

A 54-year-old man presents with the acute onset of seizures and hallucinations. The patient's wife says that he had been on a camping trip a few months earlier to study bats but otherwise has not traveled recently. Past medical history is significant for hypertension, managed medically with hydralazine and enalapril. The patient's condition rapidly deteriorates, and he passes away. An autopsy is performed and a histologic stained section of the brain is shown in the image. Which of

the following receptors are targeted by the pathogen most likely responsible for this patient's condition?

(A) CCR5

(B) Acetylcholine receptor

(C) ICAM-1

(D) GABA

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The pathogen is rabies virus, transmitted here most likely from bat exposure, and it classically causes rapidly progressive encephalitis with seizures, hallucinations, and fatal neurologic decline. **Rabies virus glycoprotein binds nicotinic acetylcholine receptors** in the CNS, so the correct choice is **B. Acetylcholine receptor** [1] [2] [3].

Why this fits

- Bat exposure months earlier with acute encephalopathy is a classic clue for **rabies** [1] [2].
- Rabies is a fatal viral encephalitis; the viral glycoprotein has been shown to interact with **nicotinic acetylcholine receptors** [2] [3].
- The other options correspond to different pathogens: **CCR5** is used by HIV, **ICAM-1** by rhinovirus, and **GABA** is not the key receptor targeted by rabies [2] [3].

References

[1] Human rabies due to lyssavirus infection of bat origin.
Veterinary Microbiology · 2010-05-19
Human rabies due to lyssavirus infection of bat origin.
10.1016/j.vetmic.2010.02.001

[2] Human Rabies - Wyoming and Utah, 2015.
MMWR. Morbidity and Mortality Weekly Report · 2016-06-03
Rabies is a fatal viral encephalitis and results from infection with viruses belonging to the genus Lyssavirus. Infection usually results from a bite from a dog infected with classical rabies virus, but a small number of cases result from contact with bats.
10.15585/mmwr.mm6521a1

[3] Rabies virus modifies host behaviour through a snake-toxin like region of its glycoprotein that inhibits neurotransmitter receptors in the CNS.
Scientific Reports · 2017-10-09
A region in the rabies virus glycoprotein has the ability to alter behaviour in animals through inhibition of nicotinic acetylcholine receptors present in the central nervous system.
10.1038/s41598-017-12726-4

316. MedQA question ID 1077 Step 1

Question

A 59-year-old man presents to his primary care provider with fatigue. He has been seen in the emergency room 5 times in the past 2 years for acute alcohol intoxication. His past medical history is notable for diabetes mellitus and gout. He takes metformin, glyburide, and allopurinol. His temperature is 98.6°F (37°C), blood pressure is 130/85 mmHg, pulse is 86/min, and respirations are 16/min. He is in no acute distress. A positive fluid wave is noted. The dorsal surface of the tongue is depapillated, and there are erythematous swollen patches at the oral commissures. A complete blood count and iron studies are reported below:

Hemoglobin: 12.1 g/dL
Hematocrit: 36%
Leukocyte count: 6,000/mm^3 with normal differential
Platelet count: 170,000/mm^3

Mean corpuscular volume: 70 um^3
Iron: 250 ug/dL
Ferritin: 300 ng/mL
Total iron binding capacity: 200 mcg/dL^3

Which of the following findings is most likely to be seen in this patient?

(A) Erythroblasts with mitochondrial iron deposits

(B) Erythrocytes lacking central pallor

(C) Erythrocytes with a ring of relative pallor

(D) Inclusions of denatured hemoglobin

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Erythroblasts with mitochondrial iron deposits is most likely. This patient's **microcytic anemia with elevated iron and ferritin, low TIBC, alcohol use, and mucocutaneous findings** is most consistent with **sideroblastic anemia**, in which erythroid precursors accumulate **iron in their mitochondria** and form **ring sideroblasts** [1] [2].

Why this fits

- **Sideroblastic anemias** are characterized by **pathologic iron accumulation in the mitochondria of erythroid precursors** and can present with microcytosis and iron overload rather than iron deficiency [1] [2].

- The marrow finding is **ring sideroblasts**; on iron stain, this corresponds to erythroblasts with **perinuclear mitochondrial iron deposits** [1] [2].

Why the other choices are less likely

- **B. Erythrocytes lacking central pallor** → typical of **spherocytosis**.
- **C. Erythrocytes with a ring of relative pallor** → typical of **hypochromic microcytic anemia** such as iron deficiency, not iron overload.
- **D. Inclusions of denatured hemoglobin** → **Heinz bodies**, classically seen with oxidative injury (for example, G6PD deficiency).

References

[1] The molecular genetics of sideroblastic anemia.
Blood · 2019-01-03
The sideroblastic anemias are a group of inherited and acquired bone marrow disorders defined by pathological iron accumulation in the mitochondria of erythroid precursors.
10.1182/blood-2018-08-815951

[2] Normal and pathological erythropoiesis in adults: from gene regulation to targeted treatment concepts
Haematologica · 2018-10-01
It has also been described that the SF3B1 mutation is highly indicative of the presence of ring sidero blasts. Therefore, this mutation, when present, serves as a diagnostic feature. In particular, MDS variants with ring sideroblasts can be diagnosed when ring sideroblasts account for either ">=15% of all red cells" (old definition) or ">=5% in the presence of a SF3B1 mutation" (new adjunct).
10.3324/haematol.2018.192518

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317. MedQA question ID 1057 Step 1

Question

A 32-year-old man with HIV comes to the physician because of a 2-month history of weight loss, night sweats, and productive cough. Auscultation of the lungs shows coarse crackles at the right upper posterior field. An x-ray of the chest shows an opacity in the right upper lobe. Sputum analysis shows acid-fast bacilli. A small amount of tuberculin fluid is injected into the subcutaneous tissue on the left forearm. Examination of the injected area 48 hours later shows no induration or erythema. Impairment of which of the following processes is the most likely cause of the negative tuberculin skin test seen in this patient?

(A) Interaction of B7 and CD28 ligands

(B) Opsonization by complement proteins

(C) Secretion of interleukin-4

(D) Generation of reactive oxygen species

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Interaction of B7 and CD28 ligands. The tuberculin skin test (TST) is a **type IV delayed hypersensitivity reaction** that depends on intact **T-cell–mediated immunity**; in **HIV**, advanced impairment of CD4+ T-cell function can produce a **false-negative TST** even in active tuberculosis [1] [2]. In this setting, the key defect is failure of effective T-cell activation/costimulation, which is best matched by **B7–CD28 interaction** rather than complement, IL-4, or reactive oxygen species [2] [3].

References

[1] Tuberculin skin test and predictive host factors for false-negative results in patients with pulmonary and extrapulmonary tuberculosis.
The Clinical Respiratory Journal · 2020-06-01
HIV infection was the risk factor with the strongest association with false-negative results.
10.1111/crj.13166

[2] Tuberculin skin test result and risk of death among persons with active TB.
PLOS One · 2013-01-01
The tuberculin skin test (TST) is an imperfect test and 10-25% of people with TB disease have a negative TST.
10.1371/journal.pone.0078779

[3] Human Immunodeficiency Virus Infection Impairs Th1 and Th17 Mycobacterium tuberculosis-Specific T-Cell Responses.
The Journal of Infectious Diseases · 2018-05-05
HIV infection impairs Th1 and Th17 Mycobacterium tuberculosis-specific T-cell responses.
10.1093/infdis/jiy052

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318. MedQA question ID 979 Step 2/3

Question

A 67-year-old male comes into the ED complaining of dyspnea and a heavy feeling in his chest. He reports that over the past month he has become more easily “winded" to the point that he now sleeps in his living room because he can’t make it up the stairs. A review of systems is notable for headaches and fatigue. On physical exam you note decreased breath sounds and a dullness to percussion on the right. A chest radiograph is obtained, which shows a right-sided pleural effusion. Thoracocentesis is performed and the fluid is analyzed, with results shown below:

Volume: 30 cc of fluid
Pleural fluid protein: 5.8 g/dL
Serum protein ratio: 7.0 g/dL
Lactate dehydrogenase (LDH): 258 U/L

Which of the following conditions may have led to the findings in this patient’s pleural cavity?

(A) Congestive heart failure

(B) Liver cirrhosis

(C) Lymphoma

(D) Nephrotic syndrome

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

This pleural effusion is an exudate by Light's criteria, so among the choices, lymphoma is the most likely associated condition. The pleural fluid protein/serum protein ratio is **5.8/7.0 = 0.83**, which is **> 0.5** and therefore meets Light's criteria for an exudative effusion; exudates are more consistent with malignancy or other inflammatory/infiltrative causes than with volume-overload states [1] [2]. In contrast, **congestive heart failure, liver cirrhosis, and nephrotic syndrome** classically cause **transudative** pleural effusions [2] [3].

Why this points away from transudates

- **Congestive heart failure** and **hepatic hydrothorax/cirrhosis** are the common causes of pleural transudates, and these can be misclassified by Light's criteria in some diuretic-treated patients [3].
- If the clinical picture strongly suggests a transudate despite exudative Light's criteria, the **serum-to-pleural fluid protein gradient > 3.1 g/dL** may help identify a misclassified cardiac or hepatic transudate [4].

Best answer

- **Lymphoma** [1] [2]

Note

- The provided data are sufficient to classify the effusion as exudative from the protein ratio alone; the serum LDH would be needed to assess the LDH component of Light's criteria fully [1].

References

[1] The impact of between analytical platform variability on the classification of pleural effusions into exudate or transudate using Light's criteria.
Journal of Clinical Pathology · 2017-07-01
Light's criteria were used to classify pleural effusions into exudate or transudate when pleural fluid protein is 25-35 g/L.
10.1136/jclinpath-2016-204142

[2] Pleural fluid analysis: standstill or a work in progress?
Pulmonary Medicine · 2012-01-01
Pleural fluid analysis yields important diagnostic information in pleural effusions in combination with clinical history, examination, and radiology. Light's criteria remain the most robust in separating the transudate-exudate classification which dictates further investigations or management.
10.1155/2012/716235

[3] The Light criteria: the beginning and why they are useful 40 years later.
Clinics in Chest Medicine · 2013-03-01
The Light criteria misclassifies about 25% of transudates as exudates. Most of these patients are on diuretics. If a patient is thought likely to have a disease that produces a transudative pleural effusion, the serum-pleural fluid protein gradient should be examined.

10.1016/j.ccm.2012.11.006

[4] Solving the Light's criteria misclassification rate of cardiac and hepatic transudates.

Respirology (Carlton, Vic.) · 2012-05-01

Pleural transudates are most commonly due to heart failure or hepatic hydrothorax. A number of these effusions are misclassified as exudates by standard (Light's) criteria. A serum-to-pleural fluid protein gradient >3.1 g/dL correctly identified 55% and 61% of the HF and HH false exudsates. The figures for an albumin gradient >1.2 g/dl were 83% and 62%.

10.1111/j.1440-1843.2012.02155.x

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319. MedQA question ID 337 Step 2/3

Question

A 22-year-old woman from a rural area who recently discovered she was pregnant is referred for a cardiology consultation due to cyanosis, dyspnea, and a cardiac murmur revealed at the initial prenatal visit. She is gravida 1, para 0 with an estimated gestational age of 19 weeks. She says that the murmur was found in her childhood, and the doctor at that time placed her under observation only. However, she has been lost to follow-up and has not had proper follow up in years. Currently, she complains of dizziness and occasional dyspnea on exertion which has gradually increased during her pregnancy. Prior to her pregnancy, she did not have any symptoms. The vital signs are as follows: blood pressure 125/60 mm Hg, heart rate 81/min, respiratory rate 13/min, and temperature 36.7°C (98.0°F). Her examination is significant for acrocyanosis and a fixed splitting of S2 and grade 3/6 midsystolic murmur best heard over the left upper sternal border. Which of the following physiological pregnancy changes is causing the change in this patient’s condition?

(A) Increase in heart rate

(B) Decrease in systemic vascular resistance

(C) Increase in cardiac output

(D) Increase in blood volume

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The key physiologic change is the pregnancy-related fall in systemic vascular resistance/ afterload, which increases right-to-left shunting across an unrepaired intracardiac shunt and can worsen cyanosis and dyspnea in patients with Eisenmenger physiology or other cyanotic congenital heart disease [1] [2]. Pregnancy also increases intravascular volume and cardiac output, but in this setting the **drop in systemic vascular resistance** is the change most directly responsible for the clinical deterioration [1].

Why this happens

- In normal pregnancy, **preload and cardiac output rise** while **afterload/systemic vascular resistance fall** [1].
- In a patient with a longstanding shunt and cyanosis, the lower systemic resistance favors **more right-to-left shunting**, reducing pulmonary blood flow and worsening arterial oxygenation [2].
- The American College of Obstetricians and Gynecologists notes that pregnancy can contribute to a **decline in cardiac status** in women with cardiovascular disease, and symptomatic pregnant patients with known or suspected congenital heart disease should undergo prompt cardiology evaluation and echocardiography [3] [4].

References

[1] Factors Influencing the twisting and untwisting properties of the left ventricle during normal pregnancy.
Echocardiography (Mount Kisco, N.Y.) · 2014-02-01
During pregnancy, important hemodynamic changes occur consistent with an increase in preload and decrease in afterload and systemic vascular resistance.
10.1111/echo.12345

[2] Eisenmenger Syndrome in Pregnancy: When Is It Time for ECMO?: A Case Report.
A&A practice · 2018-11-15
The 21-year-old primiparous woman at 22 weeks gestation had a large uncorrected ventricular septal defect, severe pulmonary hypertension, and Eisenmenger syndrome. The patient elected for termination of pregnancy, which was performed under regional anesthesia. Hemodynamic changes associated with uterine contraction immediately after termination resulted in increased right to left shunting across the ventricular ventrication.
10.1213/xaa.0000000000000806

[3] Pregnancy and Heart Disease
American College of Obstetricians and Gynecologists · 2019-04-01 12:00:00
Discussion of cardiovascular disease with the woman should include the possibilities that pregnancy can contribute to a decline in cardiac status that may not return to baseline after the pregnancy; maternal morbidity or mortality is possible; and fetal risk of congenital heart or genetic conditions, fetal growth restriction, preterm birth, intrauterine fetal demise, and perinatal mortality is higher when compared with risk when cardiovascular disease is not present.
https://journals.lww.com/greenjournal/Fulltext/2019/05000/ACOG_Practice_Bulletin_No__212__Pregnancy_and.40.aspx

[4] Pregnancy and Heart Disease
American College of Obstetricians and Gynecologists · 2019-04-01 12:00:00
Testing of maternal cardiac status is warranted during pregnancy or postpartum in women who present with symptoms such as shortness of breath, chest pain, or palpitations and known cardiovascular disease whether symptomatic or asymptomatic, or both.
https://journals.lww.com/greenjournal/Fulltext/2019/05000/ACOG_Practice_Bulletin_No__212__Pregnancy_and.40.aspx

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320. MedQA question ID 197 Step 1

Question

A 40-year-old woman presents to her primary care physician for a checkup. She has felt weaker lately and has lost some weight. She denies any urinary issues. Her BUN at her last visit 4 months ago was 45 mg/dL, and her creatinine was 2.0 mg/dL. Her laboratory studies this visit are seen below:

Hemoglobin: 8 g/dL

Hematocrit: 29%
Leukocyte count: 9,500/mm^3 with normal differential
Platelet count: 197,000/mm^3

Serum:
Na+: 139 mEq/L
Cl-: 100 mEq/L
K+: 5.9 mEq/L
HCO3-: 17 mEq/L
BUN: 59 mg/dL
Glucose: 99 mg/dL
Creatinine: 2.3 mg/dL
Ca2+: 9.0 mg/dL

Which of the following is the most likely diagnosis?

(A) Acute kidney failure

(B) Chronic kidney failure

(C) Obstructive uropathy

(D) Renal cell carcinoma

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely diagnosis is chronic kidney failure (chronic kidney disease with advanced renal insufficiency), not acute kidney failure. The key clues are **known elevated creatinine 4 months earlier (2.0 mg/dL)** with persistent azotemia now, plus **anemia (Hb 8 g/dL)** and **metabolic acidosis (HCO3− 17 mEq/L)**, which fit chronic kidney disease; AKI is defined by a creatinine rise over 48 hours or within 7 days, or oliguria, and that pattern is not shown here [1] [2]. The absence of urinary symptoms also makes obstructive uropathy less likely, and nothing in the stem supports renal cell carcinoma as the cause [1].

Why this is chronic kidney failure

- **Duration matters:** a creatinine already elevated 4 months earlier strongly argues against isolated AKI and toward chronic renal dysfunction [1] [2].
- **CKD complications are present: anemia** and **low bicarbonate** are typical consequences of chronic kidney disease and support a chronic process [3].
- **AKI criteria are not met from the provided data:** KDIGO/NICE AKI requires a rapid creatinine rise over **48 hours to 7 days** or oliguria; the question instead shows a persistently abnormal renal function over months [2].

Best choice

B. Chronic kidney failure

References

1. **Kidney Disease: Improving Global Outcomes (KDIGO)** recommends using creatinine-based estimated GFR in adults at risk for chronic kidney disease and using validated GFR estimating equations rather than serum creatinine alone; CKD evaluation also includes assessment of anemia and other complications. 2. **National Institute for Health and Care Excellence (NICE)** defines acute kidney injury by a rise in creatinine of **26 micromol/L or greater within 48 hours**, a **50% or greater rise within 7 days**, or oliguria, and advises comparing creatinine with baseline to identify AKI. 3. **Kidney Disease: Improving Global Outcomes (KDIGO)** CKD anemia guidance recommends routine anemia evaluation in CKD and notes ongoing monitoring for Hb, ferritin, and TSAT in people with CKD and anemia.

References

[1] Evaluation and Management of Chronic Kidney Disease

Kidney Disease Improving Global Outcomes · 2024-03-13 12:00:00

In adults at risk for CKD, we recommend using creatinine-based estimated glomerular filtration rate (eGFRcr). If cystatin C is available, the GFR category should be estimated from the combination of creatinine and cystatin C (eGFRcr-cys). We recommend using a validated GFR estimating equation to derive GFR from serum filtration markers rather than relying on the serum filtration markers alone.

https://www.kidney-international.org/article/S0085-2538(23)00766-4/fulltext

[2] Acute Kidney Injury: Prevention, Detection and Management

National Institute for Health and Care Excellence · 2024-10-16 00:00:00

Detect acute kidney injury, in line with the (p)RIFLE, AKIN or KDIGO definitions, by using any of the following criteria: a rise in serum creatinine of 26 micromol/litre or greater within 48 hours; a 50% or greater rise in serum creatinine known or presumed to have occurred within the past 7 days; a fall in urine output to less than 0.5 ml/kg/hour for more than 6 hours in adults and more than 8 hours in children and young people.

https://www.nice.org.uk/guidance/ng148

[3] Management of Anemia in Chronic Kidney Disease (CKD)

Kidney Disease Improving Global Outcomes · 2026-01-02 12:00:00

In people with CKD, test for anemia at referral, regularly during follow-up, and when anemia is suspected based on symptoms. Test for anemia with a complete blood count, reticulocytes, ferritin, and transferrin saturation (TSAT).

https://www.kidney-international.org/article/S0085-2538(25)00495-8/fulltext

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321. MedQA question ID 1230 Step 1

Question

A 63-year-old man comes to the emergency department because of a 4-day history of lower abdominal pain, fever, and nausea. He has a history of constipation. His temperature is 39.1°C (102.4°C). Abdominal examination shows left lower quadrant tenderness with no guarding or rebound. Laboratory studies show a leukocyte count of 19,000/mm3. A CT scan of the abdomen shows segmental wall thickening of the descending colon with multiple diverticula and a 5.0-cm, low-attenuation pelvic lesion with air-fluid levels. CT-guided drainage of the fluid collection yields 250 mL of yellow-greenish fluid. Release of which of the following substances is most likely responsible for the formation of the drained lesion?

(A) Staphylococcal coagulase

(B) Lipoteichoic acid

(C) Interleukin-3

(D) Lysosomal enzymes

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Lysosomal enzymes are most likely responsible. A diverticular abscess is a localized collection of pus caused by **neutrophil-mediated liquefactive necrosis**; activated neutrophils release proteolytic and lysosomal contents that digest tissue and form an abscess cavity. In complicated diverticulitis, image-guided drainage is recommended for stable patients with abscesses >3 cm, which fits this patient's 5.0-cm collection [1] [2].

Why the other options are not correct

- **Staphylococcal coagulase** promotes fibrin clotting and is associated with bacterial virulence, not abscess liquefaction.
- **Lipoteichoic acid** is a gram-positive cell wall component that triggers inflammation, but it is not the direct mediator of pus cavity formation.
- **Interleukin-3** is a hematopoietic growth factor, not a mechanism of abscess formation.

Key point

The drained yellow-green fluid indicates **pus**, which reflects accumulation of dead neutrophils and necrotic debris after release of **lysosomal enzymes** [2].

References

[1] Treatment of Left-Sided Colonic Diverticulitis
American Society of Colon and Rectal Surgeons · 2020-06-01 00:00:00
Image-guided percutaneous drainage is usually recommended for stable patients with abscesses >3 cm in size.
https://journals.lww.com/dcrjournal/Fulltext/2020/06000/The_American_Society_of_Colon_and_Rectal_Surgeons.6.aspx?PRID=DCR_PR_050720

[2] Casting A Wide Net On Surgery
Annals of Surgery · 2019-08-27
Neutrophils in particular release massive amounts of elastase, proteinase-3 and cathepsin G. NETs are primarily composed of DNA and histones arranged in a web form on which a vast amount of neutrophil-derived enzymes are bound.
10.1097/SLA.0000000000003586

322. MedQA question ID 770 Step 1

Question

A pediatrician notices that 9 of her patients this year have developed paralysis after a flu-like illness. They range in age from 7 to 11, and most of them had no abnormal activities prior to developing the paralysis. These patients concern her because she has not seen this type of paralytic illness in over 20 years of practice. Based on this experience, she decides to write up the initial presentation and clinical course of these patients and publish them in a journal. Which of the following is most likely true about this study?

(A) Different interventions with 2 or more variables can be studied

(B) Hypothesis testing cannot be performed

(C) It should be reported in terms of odds ratio

(D) Participants act as their own controls

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

This is most likely a case series, so hypothesis testing cannot be performed because there is no comparison group; the study is descriptive and intended to characterize presentation and clinical course [1] [2]. In a case series, patients are identified by the condition itself and followed descriptively, not compared against controls, so odds ratios and self-controlled comparisons are not the appropriate primary framework [1] [3].

Best choice **B. Hypothesis testing cannot be performed** is the most likely true statement for this study design [1] [2].

Why the other choices are not the best fit A. Different interventions with 2 or more variables can be studied - case series may describe multiple exposures or treatments, but they are not designed to compare interventions robustly [1] [3]. C. It should be reported in terms of odds ratio - odds ratios are typically used in case-control or other comparative analytic studies, not a descriptive case series [1] [3]. D. Participants act as their own controls - that describes before-after or crossover-style designs, not a standard case series [1] [3].

References

[1] Distinguishing case series from cohort studies.
Annals of Internal Medicine · 2012-01-03
Case series are a commonly reported study design, but the label "case series" is used inconsistently and sometimes incorrectly. This article tries to clarify the concept of case series and proposes a way to distinguish them from cohort studies. In a cohort study, patients are sampled on the basis of exposure and followed over time, and the occurrence of outcomes is assessed.
https://doi.org/10.7326/0003-4819-156-1-201201030-00006

[2] A principal component analysis is conducted for a case series quality appraisal checklist.
Journal of Clinical Epidemiology · 2016-01-01
A case-series study is considered one of the weaker study designs from which to obtain evidence on treatment effectiveness. The study's intent was to develop and validate a quality appraisal checklist specifically for case series studies. The first component indicated the extent to which a case series presented traditional features of a statistical hypothesis-testing paradigm.
https://doi.org/10.1016/j.jclinepi.2015.07.010

[3] How to choose your study design.
Journal of Paediatrics and Child Health · 2020-07-01
Research designs are broadly divided into observational studies (i.e. cross-sectional, case-control and cohort studies) and experimental studies (randomised control trials, RCTs). Each design has a specific role, and each has both advantages and disadvantages.
https://doi.org/10.1111/jpc.14929

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323. MedQA question ID 419 Step 2/3

Question

A 78-year-old man is brought to the emergency department because of a 1-day history of painful enlarging bruises and skin ulceration over his thighs and external genitalia. He has type 2 diabetes mellitus, mitral regurgitation, and atrial fibrillation. Three days ago, he was started on treatment with warfarin. His only other medications are metformin and lisinopril. His temperature is 37.8°C (100.0°F), pulse is 108/min and irregularly irregular, and blood pressure is 155/89 mm Hg. Examination of the skin shows large purpura, hemorrhagic bullae, and areas of skin necrosis over his anterior legs, gluteal region, and penis. This patient is most likely to benefit from treatment with which of the following?

(A) Hyperbaric oxygen

(B) Protein C concentrate

(C) Argatroban

(D) Tranexamic acid

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Protein C concentrate is the best choice. This presentation is classic for **warfarin-induced skin necrosis**, which typically occurs **within 3 to 6 days after starting warfarin** and is driven by a transient early fall in protein C activity, especially in patients with an underlying protein C deficiency or other hypercoagulable state [1] [2] [3]. The immediate management is to **stop warfarin** and reverse its effect if needed; anticoagulation is usually continued with a parenteral agent, but among

the options given, **protein C replacement** is the treatment most directly targeted to the mechanism [4].

Why the other options are not best

- **Hyperbaric oxygen** is not standard therapy for warfarin-induced skin necrosis.
- **Argatroban** may be used as an alternative anticoagulant in selected patients, but it does not correct the acute protein C depletion driving the necrosis.
- **Tranexamic acid** would be inappropriate because this is a thrombotic/ischemic complication, not a fibrinolytic bleeding disorder.

Supporting evidence

Case-based evidence shows that warfarin skin necrosis most often appears in the first week after initiation and is associated with protein C/S abnormalities; reports describe improvement when warfarin is stopped and anticoagulation is changed, with protein C deficiency being a key risk factor [1] [2] [3]. For urgent warfarin reversal in bleeding patients, society guidance favors **prothrombin complex concentrate plus intravenous vitamin K**, underscoring that reversal of warfarin effect is part of management when clinically necessary [4].

References

[1] Late onset warfarin-induced skin necrosis.

Giornale italiano di dermatologia e venereologia : organo ufficiale, Societa italiana di dermatologia e sifilografia · 2019-04-01

Warfarin-induced skin necrosis (WISN) is rare. Majority of WISN cases usually appear between 3 and 6 days after the initiation of warfarin therapy. The 52-year-old man had a late-onset case 4 years after the start of therapy. Skin lesions were associated with acquired deficiency of protein C and protein S and abnormal liver function.

10.23736/s0392-0488.17.04942-2

[2] An Atypical Case of Warfarin-Induced Skin Necrosis.

Clinical practice and cases in emergency medicine · 2017-11-01

Skin necrosis is a relatively rare side effect of warfarin. It is most commonly reported within 10 days of initiation of therapy in the patient. Skin necrosis was reported after recommencement of the medication. It was an atypical case of skin necrosis in a non-naïve patient.

10.5811/cpcem.2017.3.33373

[3] Warfarin-induced skin necrosis.

Annals of Dermatology · 2014-02-01

A 62-year-old lady developed skin necrosis 4 days after starting warfarin therapy of 5 mg daily without initial co-administration of heparin. Skin necrosis progressed to eschar formation after cessation of the therapy. Warfarin was reintroduced at 2 mg daily with low molecular weight Heparin and it was followed by healing of the cutaneous deficit.

10.5021/ad.2014.26.1.96

[4] Management of Severe Peri-Operative Bleeding

European Society of Anesthesia and Intensive Care · 2023-04-01 00:00:00

In bleeding patients where VKA-induced coagulopathy is considered a contributing factor, we recommend the administration of four-factor PCC 25 to 50 IU factor IX kg−1 plus 5 to 10 mg intravenous vitamin K.

https://journals.lww.com/ejanaesthesiology/fulltext/2023/04000/management_of_severe_peri_operative_bleeding_.2.aspx%20

324. MedQA question ID 907 Step 2/3

Question

A 58-year-old woman comes to the physician because of intermittent painful retrosternal dullness for 4 weeks. The pain is recurrent and occurs when she exerts herself or when she is outside during cold weather. She also experiences shortness of breath and palpitations during these episodes. The symptoms resolve spontaneously when she stops or sits down for a while. Over the past few days, the episodes have increased in frequency. She has hypertension, type 2 diabetes mellitus, and osteoarthritis. Her left leg was amputated below the knee after a motorcycle accident 25 years ago. She is currently waiting for a new prosthesis and walks with crutches. Current medications include captopril, glyburide, and ibuprofen. She does not smoke or drink alcohol. Her pulse is 88/min, respirations are 20/min, and blood pressure is 144/90 mm Hg. Cardiac examination shows no abnormalities. An x-ray of the chest shows no abnormalities. An ECG shows a normal sinus rhythm without any signs of ischemia. Serum cardiac markers are within the reference range. Which of the following is the most appropriate next step in diagnosis?

(A) Myocardial perfusion scan under pharmacological stress

(B) Upper endoscopy

(C) Coronary angiography

(D) Echocardiography at rest

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The American Association for Thoracic Surgery/American College of Cardiology/American Heart Association (AHA/ACC) stable ischemic heart disease guideline recommends pharmacological stress imaging with **nuclear myocardial perfusion imaging (MPI)** or echocardiography for patients with intermediate to high pretest probability of ischemic heart disease who **cannot exercise to an adequate workload** or who have disabling comorbidity [1]. In this patient, the exertional, rest-relieved chest discomfort with worsening frequency is compatible with stable angina, and her below-the-knee amputation with crutch use makes adequate exercise stress unlikely; therefore, **myocardial perfusion scan under pharmacological stress** is the most appropriate next diagnostic step [1].

Why the other options are less appropriate

- **Coronary angiography** is generally reserved for patients whose clinical features and noninvasive testing suggest a high likelihood of severe ischemic disease or who are candidates for revascularization, rather than as the immediate next diagnostic test in this presentation [2].
- **Resting echocardiography** may be considered in some patients with hypertension or diabetes and an abnormal ECG, but it does not evaluate inducible ischemia and is not the preferred test here [3].

- **Upper endoscopy** does not fit the exertional, rest-relieved pattern typical of angina and is not supported as the next step by the retrieved cardiology guidance [1] [2].

References

[1] Diagnosis and Management of Patients With Stable Ischemic Heart Disease
American Association for Thoracic Surgery, American College of Cardiology, American Heart Association, Society for Cardiovascular Angiography and Interventions, Society of Thoracic Surgeons · 2014-07-28 00:00:00
Pharmacological stress with either nuclear MPI or echocardiography is recommended for risk assessment in patients with SIHD who have new or worsening symptoms not consistent with UA and who are incapable of at least moderate physical functioning or have disabling comorbidity.
https://www.ahajournals.org/doi/full/10.1161/cir.000000000000095

[2] Diagnosis and Management of Patients With Stable Ischemic Heart Disease
American Association for Thoracic Surgery, American College of Cardiology, American Heart Association, Society for Cardiovascular Angiography and Interventions, Society of Thoracic Surgeons · 2014-07-28 00:00:00
Coronary angiography is reasonable to define the extent and severity of CAD in patients with suspected SIHD whose clinical characteristics and results of noninvasive testing (exclusive of stress testing) indicate a high likelihood of severe IHD and who are amenable to, and candidates for, coronary revascularization.
https://www.ahajournals.org/doi/full/10.1161/cir.000000000000095

[3] Diagnosis and Management of Patients With Stable Ischemic Heart Disease
American Association for Thoracic Surgery, American College of Cardiology, American Heart Association, Society for Cardiovascular Angiography and Interventions, Society of Thoracic Surgeons · 2014-07-28 00:00:00
Assessment of cardiac structure and function with resting echocardiography may be considered in patients with hypertension or diabetes mellitus and an abnormal ECG
https://www.ahajournals.org/doi/full/10.1161/cir.0000000000000095

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325. MedQA question ID 524 Step 1

Question

A 6-month-old boy is brought to the physician by his parents for difficulty breathing and bluish discoloration of the lips for the past hour. During the past 3 months, the patient has had several upper respiratory tract infections and poor weight gain. Physical examination shows crackles over both lung fields and enlargement of the tonsils and cervical lymph nodes. His serum IgA, IgE, and IgG titers are decreased. An x-ray of the chest shows bilateral interstitial infiltrates. Methenamine silver staining of bronchial lavage fluid shows disc-shaped cysts. A defect in which of the following is the most likely underlying cause of this patient's condition?

(A) Actin filament assembly

(B) T-cell receptor signaling

(C) Microtubule polymerization

(D) B-cell maturation

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The best answer is B) T-cell receptor signaling. This infant has **Pneumocystis jirovecii pneumonia** with **hypogammaglobulinemia** and lymphoid tissue enlargement, which is most consistent with a **combined immunodeficiency / Hyper-IgM–type defect affecting T-cell help to B cells**, not isolated B-cell maturation failure. The American College of Allergy, Asthma, and Immunology/American Academy of Allergy, Asthma & Immunology guidance on inborn errors of immunity notes that severe recurrent or opportunistic infections should prompt evaluation for **combined immune dysfunction** and SCID-like disorders [1] [2], and Pneumocystis pneumonia in infants is a classic clue to T-cell impairment [3].

Why the other choices are less likely

- **A) Actin filament assembly**: classically associated with disorders such as **Wiskott-Aldrich syndrome**, which presents with thrombocytopenia, eczema, and recurrent infections rather than this pattern.
- **C) Microtubule polymerization**: classically associated with **Chediak-Higashi syndrome**.
- **D) B-cell maturation**: would fit **X-linked agammaglobulinemia** better, but that disorder usually causes **absent tonsils/lymph nodes** and does **not** typically cause Pneumocystis pneumonia because T-cell function is intact.

Clinical takeaway

The stem is most consistent with **Hyper-IgM syndrome due to defective CD40L-mediated T-cell help/class switching**; among the listed mechanisms, **T-cell receptor signaling** is the closest match [1] [2].

References

[1] Inborn Errors of Immunity

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2026-04-03 12:00:00

We recommend investigating for IEI diagnosis in patients with recurrent, severe, or rare infections, autoinflammation, autoimmunity, severe atopy, atypical malignancy, bone marrow failure, or combinations of these conditions.

https://www.annallergy.org/article/S1081-1206(25)01300-6/fulltext

[2] Inborn Errors of Immunity

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2026-04-03 12:00:00

We recommend an integrated approach for the diagnosis of a suspected IEI: clinical, immunologic, and genetic components.

https://www.annallergy.org/article/S1081-1206(25)01300-6/fulltext

[3] Pneumocystis jirovecii pneumonia as an initial manifestation of hyper-IgM syndrome in an infant: A case report.

Medicine · 2019-02-01

Pneumocystis jirovecii causes severe pneumonia in immunocompromised hosts. Human immunodeficiency virus infection, malignancy, solid organ or hematopoietic cell transplantation, and primary immune deficiency are risk factors for PCP in children. PCP should be considered in infants with severe interstitial pneumonia even in the absence of evidence of immune deficiency.

10.1097/md.0000000000014559

326. MedQA question ID 545 Step 2/3

Question

A 24-year-old woman presents to the emergency department with a severe headache. She states it is 10/10 in intensity and states that it is associated with chewing. She describes it as a dull pain over the sides of her head. The patient is otherwise healthy and is not currently taking any medications. Her temperature is 97.0°F (36.4°C), blood pressure is 111/74 mmHg, pulse is 83/min, respirations are 13/min, and oxygen saturation is 98% on room air. Physical exam is notable for pain and tenderness over the mandibular and temporal region that is worsened when the patient opens and closes their mouth. Which of the following is the most likely diagnosis?

(A) Migraine headache

(B) Temporal arteritis

(C) Temporomandibular joint dysfunction

(D) Tension headache

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Temporomandibular joint dysfunction (choice C) is the most likely diagnosis. The key clues are **pain over the mandibular/temporal region that is worsened by opening and closing the mouth and by chewing**, which is typical of temporomandibular disorder/TMJ pain rather than a primary headache syndrome. **Temporal arteritis (giant cell arteritis) is very unlikely at age 24**; the American College of Rheumatology notes that GCA is mainly seen in people **older than 50 years** [1] [2].

Why this fits TMJ dysfunction

- TMJ/TMD commonly presents with **pain in the TMJ and masticatory muscles**, **chewing difficulty**, and **restricted jaw function or limited mouth opening** [2].
- Headache can occur with TMD, but the pain is often provoked by **jaw movement** or palpation of the jaw muscles/joint [2].

Why the other choices are less likely

- **Migraine**: usually not reproducibly triggered by jaw opening/chewing or associated with focal mandibular/TMJ tenderness.
- **Tension headache**: classically bilateral, pressing/tightening, and not linked to chewing or jaw motion.
- **Temporal arteritis**: the age is strongly discordant; GCA is primarily a disease of adults **>50 years** [1].

References

[1] Management of Giant Cell Arteritis and Takayasu Arteritis
American College of Rheumatology · 2021-07-07 00:00:00
GCA can present with both cranial and extracranial manifestations and is more common in individuals of Northern European descent who are older than 50 years of age.
https://onlinelibrary.wiley.com/doi/10.1002/art.41774

[2] Association between chewing dysfunctions and temporomandibular disorders: A systematic review.
Journal of oral rehabilitation · 2018-10-01
Temporomandibular disorder (TMD) is an umbrella condition presenting several signs and symptoms including pain in the TMJ and masticatory muscles, articular noises, earache, headache, irregular or restricted jaw function, chewing difficulty, and limited mouth opening.
10.1111/joor.12681

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327. MedQA question ID 387 Step 2/3

Question

A 6-year-old boy is brought in by his parents to a pediatrician's office for persistent fever. His temperature has ranged from 38.6°C–39.5°C (101.5°F–103.1°F) over the past week. He was diagnosed with a gene defect on chromosome 7, which has caused dysfunction in a transmembrane protein. This defect has resulted in several hospitalizations for various respiratory infections. At the present time, he is struggling with a cough with thick purulent sputum. A sputum sample is sent for culture and the patient is started on vancomycin.The pediatrician tells the patient's family that there is a collection of mucus in the respiratory tree which increases the patient's chances of future infections. He will have to undergo chest physiotherapy and they should report any signs of infection immediately to a medical professional. Which of the following pathogens will most likely infect this patient in adulthood?

(A) Staphylococcus

(B) Pseudomonas

(C) Burkholderia

(D) Candida

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Pseudomonas aeruginosa is the most likely pathogen to predominate in adulthood in cystic fibrosis, and the **Cystic Fibrosis Foundation** recommends chronic inhaled antipseudomonal therapy when **P. aeruginosa** is persistently present in airway cultures [1]. A high-quality review of adult cystic fibrosis lung disease notes that **P. aeruginosa dominates by 18 years of age**, whereas **Staphylococcus aureus** is more common in pediatrics [2].

Why the other options are less likely

- **Staphylococcus aureus** is common earlier in life but is less dominant in adults with cystic fibrosis [2].
- **Burkholderia** can occur in cystic fibrosis, but it is not the most typical adult airway pathogen [3].
- **Candida** is not a classic dominant chronic bacterial airway pathogen in cystic fibrosis [2] [3].

Best answer: Pseudomonas.

References

[1] Chronic Medications for Maintenance of Lung Health

Cystic Fibrosis Foundation · 2013-01-03 00:00:00

For individuals with CF 6 years of age and older, with P. aeruginosa persistently present in cultures of the airways, the CF Foundation recommends the chronic use of inhaled tobramycin to improve lung function and quality of life, and reduce exacerbations.

https://www.atsjournals.org/doi/full/10.1164/rccm.201207-1160OE

[2] Pulmonary Exacerbations in Adults With Cystic Fibrosis

Chest · 2020-09-20

Although Staphylococcus aureus and Haemophilus influenzae are most common in pediatrics, Pseudomonas aeruginosa dominates in subjects by 18 years of age.

10.1016/j.chest.2020.09.084

[3] Emerging cystic fibrosis pathogens and the microbiome.

Paediatric respiratory reviews · 2014-06-01

Cystic fibrosis respiratory infection is characterised by the presence of typical human bacterial pathogens such as Pseudomonas aeruginosa, Haemophilus influenzae and Staphylococcus aureus. Burkholderia, Stenotrophomonas, Achromobacter, Pandorea and Ralstonia have emerged as problematic infections which are largely unique to people with CF.

10.1016/j.prrv.2014.04.006

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328. MedQA question ID 127 Step 1

Question

A 67-year-old man with peripheral neuropathy comes to the physician for a follow-up examination after the results of serum protein electrophoresis showed monoclonal gammopathy. A complete blood count, serum creatinine, and serum electrolyte concentrations are within the reference ranges. A bone marrow biopsy shows 6% monoclonal plasma cells. Further analysis shows that class I major histocompatibility molecules are downregulated in these monoclonal plasma cells. The proliferation of these monoclonal plasma cells is normally prevented by a class of immune cells that lyse abnormal cells without the need for opsonization, priming, or prior activation. Which of the following best describes this class of immune cells?

(A) Bone marrow-derived macrophages

(B) CD4+ T lymphocytes

(C) Natural killer cells

(D) Band neutrophils

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Natural killer (NK) cells are the innate lymphocytes that **lyse abnormal cells without prior sensitization, priming, or opsonization**, especially when target cells **downregulate class I MHC** ("missing self") [1] [2]. This mechanism explains how monoclonal plasma cells with reduced MHC I expression can be eliminated by NK-cell cytotoxicity [1] [2].

Why the other choices are incorrect

- **Bone marrow-derived macrophages** primarily phagocytose pathogens and debris; they are not the classic cells mediating missing-self cytotoxicity [1].
- **CD4+ T lymphocytes** are helper T cells and require antigen presentation; they do not directly kill abnormal cells in this nonsensitized, non-opsonization-dependent manner [1].
- **Band neutrophils** are immature neutrophils involved in innate phagocytic responses, not missing-self recognition [1].

References

[1] Inducible down-regulation of MHC class I results in natural killer cell tolerance.
The Journal of Experimental Medicine · 2019-01-07
Natural killer cells kill cells that down-regulate MHC class I through "missing-self" recognition. MHC-I down regulates NK cell tolerance or killing in vivo and promotes missing-self reactivity, according to a study on a floxed B2m mouse.
10.1084/jem.20181076

[2] Effects of MHC class I alleles on licensing of Ly49A+ NK cells.
Journal of Immunology · 2010-04-01
NK cells are innate immune lymphocytes that can react to cells lacking self-MHC class I. NK cells that cannot engage self MHC through an inhibitory receptor are resistant to stimulation through their activation receptors.
10.4049/jimmunol.0904057

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329. MedQA question ID 241 Step 2/3

Question

A 41-year-old man presents to his primary care provider with abdominal pain. He says that the pain "comes and goes" throughout the day and usually lasts 20-30 minutes per episode. He can point to the spot 1-2 inches above the umbilicus where he feels the pain. He denies any feeling of regurgitation or nighttime cough but endorses nausea. He reports that he used to eat three large meals per day but has found that eating more frequently improves his pain. He tried a couple pills of ibuprofen with food over the past couple days and thinks it helped. He has gained four pounds since his past appointment three months ago. The patient denies any diarrhea or change in his stools. He has no past medical history. He drinks 5-6 beers on the weekend and has a 20 pack-year smoking history. He denies any family history of cancer. On physical exam, he is tender to palpation above

the umbilicus. Bowel sounds are present. A stool guaiac test is positive. The patient undergoes endoscopy with biopsy to diagnose his condition.

Which of the following is most likely to be found on histology?

(A) Mucosal defect in the stomach

(B) Urease-producing organism in the small intestine

(C) PAS-positive material in the small intestine

(D) Crypt abscesses in the large intestine

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely finding is a peptic ulcer caused by Helicobacter pylori infection, so the best answer is B—a **urease-producing organism** associated with duodenal ulcer disease. The **American College of Gastroenterology (ACG)** recommends noninvasive **H. pylori testing in dyspepsia patients younger than 60 years**, with treatment if positive [1]. In practice, **H. pylori is the classic cause of duodenal ulcer disease**, and biopsy can demonstrate the organism on special stains or urease-based testing, whereas **PAS-positive material** suggests Whipple disease and **crypt abscesses** suggest ulcerative colitis [1] [2].

Why the other choices are less likely

- **A. Mucosal defect in the stomach** — describes an ulcer, but does not identify the cause.
- **B. Urease-producing organism** — fits **H. pylori**-associated peptic ulcer disease.
- **C. PAS-positive material in the small intestine** — suggests **Whipple disease**, not this presentation.
- **D. Crypt abscesses in the large intestine** — suggests **ulcerative colitis**, which does not match the epigastric pain/guaiac-positive ulcer picture [2].

References

[1] Management of Dyspepsia
American College of Gastroenterology · 2017-07-01 00:00:00
3. We recommend dyspepsia patients under the age of 60 should have a non-invasive test for H. pylori and therapy for H. pylori infection if positive.
https://journals.lww.com/ajg/fulltext/2017/07000/ACG_and_CAG_Clinical_Guideline__Management_of.10.aspx

[2] [Duodenal ulcers, gastric ulcers and Helicobacter pylori].
Zeitschrift fur Gerontologie und Geriatrie · 2017-02-01
Duodenal ulcers are associated with Helicobacter pylori infections in 90% of cases and in 70% of gastric ulcers. Ulcers are often caused by medication with nonsteroidal anti-inflammatory drugs (NSAIDs).
10.1007/s00391-017-1190-x

330. MedQA question ID 470 Step 1

Question

A 75-year-old man presents to his physician with a 1-year history of dysphagia for solids. His more recent complaints include dysphagia for liquids as well. The patient states that he has no difficulty initiating swallowing but occasionally food is stuck in his throat. He does not complain of pain while swallowing but has noticed minor unintentional weight loss. The patient has no history of speech-related pain or nasal regurgitation. His family history is unremarkable. During the examination, the patient appears ill, malnourished, and slightly pale. He is not jaundiced nor cyanotic. Physical examination is unremarkable. A swallowing study reveals a small outpouching in the posterior neck (see image). Which nerve is most likely involved in this patient's symptoms?

(A) CN X

(B) CN VII

(C) CN IX

(D) CN V

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. CN X (the vagus nerve) is the nerve most likely involved. This presentation is classic for **Zenker diverticulum**: an elderly man with progressive dysphagia, regurgitation/food sticking, weight loss, and a posterior pharyngoesophageal outpouching on swallow study. Zenker diverticulum is caused by **cricopharyngeal muscle dysfunction** at the pharyngoesophageal junction, which is associated with **vagal nerve** innervation of the upper esophageal sphincter region [1] [2].

Why the other choices are less likely

- **CN VII**: facial expression, lacrimation, taste anterior 2/3 of tongue.
- **CN IX**: swallowing afferents and gag reflex, but not the classic nerve implicated in Zenker diverticulum.
- **CN V**: mastication and facial sensation.

Best answer

A. CN X [1] [2]

References

[1] Zenker's Diverticulum.
Clinical gastroenterology and hepatology : the official clinical practice journal of the American Gastroenterological Association · 2014-11-01
Zenker's diverticulum is an outpouching of tissue through the Killian triangle caused by dysfunction of the cricopharyngeal muscle. The predominant symptom of ZD is dysphagia, and the most serious consequence is pulmonary aspiration.
10.1016/j.cgh.2013.09.016

[2] Flexible endoscopic and surgical management of Zenker's diverticulum.
Expert review of gastroenterology & hepatology · 2012-08-01
Zenker's diverticulum is an outpouching of the mucosa through the Killian's triangle. It is thought to be due to the incoordination or incomplete relaxation of the cricopharyngeal muscle. Most patients are men who present with symptoms of dysphagia between the seventh and eighth decades of life. The diagnosis is made with a dynamic contrast swallowing study.
10.1586/egh.12.25

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331. MedQA question ID 84 Step 2/3

Question

A 30-year-old woman comes to the physician because she has been unable to conceive for 3 years. Analysis of her husband's semen has shown normal sperm counts during this time. The patient also reports episodic pelvic and back pain accompanied by painful diarrhea for 5 years. She has about one such episode on average per month for 4–6 days. She has taken ibuprofen for the pain, which has provided some relief. Menses have occurred at regular 29-day intervals since menarche at the age of 14 years and last for 7 days. She is sexually active with her husband and does not use contraception. Vital signs are within normal limits. Pelvic and bimanual examinations are normal; rectal examination is unremarkable. A hysterosalpingogram 6 months prior showed normal results. Which of the following is the most likely underlying mechanism of this patient's symptoms?

(A) Loss of fallopian tube function following infection

(B) Smooth muscle tumor arising from the myometrium

(C) Endometrial tissue outside the uterine cavity

(D) Increased secretion of androgens and luteinizing hormone

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Endometrial tissue outside the uterine cavity is the most likely mechanism. The **National Institute for Health and Care Excellence (NICE)** recommends suspecting endometriosis in women with **period-related pain, cyclical gastrointestinal symptoms, and infertility**; this patient's dysmenorrhea-like cyclic pelvic/back pain, painful diarrhea, and infertility fit that pattern [1]. Endometriosis is defined by **endometrial tissue implanting outside the uterus** and commonly causes pelvic pain and infertility [2] [3].

Why this fits best

- **Endometriosis** can present with **cyclical bowel symptoms** and infertility even when pelvic examination and hysterosalpingogram are normal [1] [2].

- A normal pelvic exam does **not** exclude endometriosis, and imaging can be normal in some patients [1] [4].
- The underlying mechanism is ectopic endometrial tissue, not uterine fibroids, tubal scarring from infection, or hyperandrogenism [2] [3].

Why the other options are less likely

- **A. Loss of fallopian tube function following infection**: would suggest pelvic inflammatory disease/tubal factor infertility, but the history is more typical of cyclic pain with bowel symptoms rather than postinfectious infertility.
- **B. Smooth muscle tumor arising from the myometrium**: leiomyoma can cause bleeding or bulk symptoms, not the classic cyclic bowel pain pattern.
- **D. Increased secretion of androgens and luteinizing hormone**: this describes **polycystic ovary syndrome**, which usually causes oligo-ovulation and irregular menses, not regular cycles with cyclic pain.

References

1. NICE, **Endometriosis: Diagnosis and Management**. Suspect endometriosis in women with chronic pelvic pain, dysmenorrhoea, cyclical gastrointestinal symptoms, or infertility in association with these symptoms. 2. Genomics review article on endometriosis: endometriosis affects reproductive-aged women and involves **ectopic endometrial tissues** causing dysmenorrhea, pelvic pain, and infertility. 3. JOGC review/article: endometriosis is a condition in which **endometrial tissue implants outside the uterine cavity** and can cause cyclic pain, dysmenorrhea, dyspareunia, and infertility. 4. SOGC guideline on diagnosis of endometriosis: endometriosis should be considered in patients with dysmenorrhea, pelvic pain, and/or infertility; normal ultrasound/MRI does not completely exclude it.

References

[1] Endometriosis: Diagnosis and Management

National Institute for Health and Care Excellence · 2024-11-11 00:00:00

1.3.1 Suspect endometriosis in women ... presenting with ... period-related or cyclical gastrointestinal symptoms ... infertility in association with 1 or more of the above.

https://www.nice.org.uk/guidance/ng73

[2] A PubMed-wide study of endometriosis.

Genomics · 2016-10-01

Endometriosis affects 5-10% of women in reproductive age, leading to dysmenorrhea, pelvic pain and infertility. ... mechanisms hypothesized to be responsible for the establishment of ectopic endometrial tissues.

10.1016/j.ygeno.2016.10.003

[3] Primary umbilical endometriosis presenting with umbilical bleeding: A case report.

Case reports in women's health · 2022-10-01

Endometriosis is a condition in which endometrial tissue implants outside the uterine cavity. It can cause cyclic pain, dysmenorrhea, dyspareunia, and infertility.

10.1016/j.crwh.2022.e00441

[4] Diagnosis and Impact of Endometriosis

Society of Obstetricians and Gynaecologists of Canada · 2024-03-28 00:00:00

Health care providers should consider a diagnosis of endometriosis for patients presenting with dysmenorrhea, pelvic pain, and/or infertility. ... Endometriosis cannot be completely excluded if the ultrasound or MRI is reported as normal.

https://www.jogc.com/article/S1701-2163(24)00261-5/abstract

332. MedQA question ID 569 Step 2/3

Question

A 25-year-old man is brought to the emergency department after being found unconscious. He was at a college party exhibiting belligerent behavior when he suddenly passed out and fell to the ground. His past medical history is not known. His temperature is 100°F (37.8°C), blood pressure is 107/48 mmHg, pulse is 125/min, respirations are 19/min, and oxygen saturation is 99% on room air. The patient is covered with emesis and responds incoherently to questions. As the patient begins to wake up he continues vomiting. The patient is started on IV fluids, analgesics, and anti-emetics and begins to feel better. Thirty minutes later the patient presents with muscle rigidity and is no longer responding coherently to questions. His temperature is 103°F (39.4°C), blood pressure is 127/68 mmHg, pulse is 125/min, respirations are 18/min, and oxygen saturation is 98% on room air. The patient's basic laboratory studies are drawn and he is started on IV fluids, given lorazepam, and placed under a cooling blanket. Despite these initial measures, his symptoms persist. Which of the following is the best next step in management?

(A) Acetaminophen

(B) Dantrolene

(C) Intubation

(D) Supportive therapy

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The best next step is to treat presumptive neuroleptic malignant syndrome with a dopamine-agonist/antidotal approach, most commonly bromocriptine**;** dantrolene **is also used in severe cases, and** electroconvulsive therapy (ECT) **is a rescue option when symptoms remain refractory** [1] [2]. The key immediate actions are to stop any dopamine-receptor antagonist exposure, continue aggressive supportive care, and escalate beyond benzodiazepines and external cooling when hyperthermia, rigidity, and altered mental status persist [1] [3].

Why this fits

The syndrome is characterized by **fever/hyperthermia, severe rigidity, altered mental status, and autonomic dysfunction**; the available reviews note that treatment is centered on **cessation of the offending agent and supportive care**, with **bromocriptine, dantrolene, and/or ECT** for more severe or refractory cases [1] [3].

Practical point

In this vignette, persistence despite **IV fluids, lorazepam, and cooling** argues for escalation rather than more supportive care alone. If an antipsychotic or antiemetic dopamine antagonist was given, it should be stopped immediately, and **bromocriptine or dantrolene** would be the next pharmacologic step; **ECT** is reserved for refractory disease [1] [2].

References

[1] Diagnosis and Treatment of Neuroleptic Malignant Syndrome in the Intensive Care Unit: A Case Report.
Acta medica portuguesa · 2021-06-01
Neuroleptic malignant syndrome (NMS) manifests with hyperthermia, muscle rigidity, altered mental state, and autonomic instability. Treatment involves cessation of dopamine-receptor antagonists and supportive measures. In more severe cases, bromocriptine, dantrolene, benzodiazepines and/or electroconvulsive therapy should be considered.
10.20344/amp.13019

[2] Management of Serotonin Syndrome and Neuroleptic Malignant Syndrome.
Current treatment options in neurology · 2016-09-01
Serotonin syndrome (SS) and neuroleptic malignant syndrome (NMS) can present similarly and range in severity from mild to life-threatening. It is important to distinguish between the two as therapeutic options differ. After removing the offending agents and aggressive supportive care are crucial. Electroconvulsive therapy should be pursued in NMS.
10.1007/s11940-016-0423-4

[3] Neuroleptic malignant syndrome: A neuro-psychiatric emergency: Recognition, prevention, and management.
Asian journal of psychiatry · 2017-10-01
Neuroleptic malignant syndrome is a rare but potentially fatal disorder characterized by four principal symptoms: mental status changes, muscle rigidity, hyperthermia, and autonomic dysfunction. It remains a risk in susceptible patients receiving conventional or atypical neuroleptics.
10.1016/j.ajp.2017.05.004

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333. MedQA question ID 303 Step 2/3

Question

A 16-year-old female presents to her primary care physician due to lack of menstruation. She has never had a period and is anxious that she is not “keeping up” with her friends. She states that her breasts began developing when she was 13, and she had a growth spurt around the same time. Review of systems reveals that she has also been getting headaches every few months over the last year with some photosensitivity and nausea each time. Ibuprofen relieves her symptoms. The patient is a competitive ice skater and has never been sexually active. Her mother has a history of migraine headaches, and her older sister has a history of bipolar disorder. Both underwent menarche at age 15. At this visit, the patient’s temperature is 98.6°F (37.0°C), pulse is 70/min, blood pressure is 118/65 mmHg, and respirations are 13/min. Her body mass index is 23.8 kg/m^2. Cardiopulmonary and abdominal exams are unremarkable. Both breasts are Tanner IV with no expressable discharge. Pelvic and axillary hair growth is also Tanner IV. The patient is unable to tolerate a full pelvic exam, but the part of the vaginal canal that is examined is unremarkable. Laboratory studies are ordered and are below:

Serum:
Na+: 139 mEq/L
K+: 4.1 mEq/L
Cl-: 100 mEq/L
HCO3-: 24 mEq/L
Urea nitrogen: 12 mg/dL
Glucose: 73 mg/dL
Creatinine: 0.9 mg/dL

Ca2+: 9.7 mg/dL
Mg2+: 1.7 mEq/L
AST: 11 U/L
ALT: 11 U/L
Follicle Stimulating Hormone (FSH): 16.2 mIU/mL (4.7-21.5 mIU/ml)
Estrogen: 240 pg/mL (64-357 pg/mL)

Abdominal ultrasound is performed and shows a normal uterus and ovaries. Which of the following is the most likely diagnosis?

(A) Hyperprolactinemia

(B) Imperforate hymen

(C) Vaginal septum

(D) Normal development

Correct Response:
C
Synthesize Response:
D✕

Synthesize Answer

The most likely diagnosis is functional hypothalamic amenorrhea (FHA), likely exercise-related within the female athlete triad spectrum. The **Endocrine Society** recommends diagnosing FHA only **after excluding anatomic or organic causes** of amenorrhea; in primary amenorrhea, evaluation should include assessment for Müllerian/outflow tract anomalies with exam and pelvic imaging [1]. In this patient, normal breast development, normal uterus and ovaries on ultrasound, and a history of competitive athletics make an anatomic cause or primary gonadal failure less likely than FHA [1] [2].

Why this fits best

- **Normal secondary sexual development** argues against profound hypoestrogenism or complete gonadal dysgenesis.
- **Normal uterus and ovaries** argue against Müllerian agenesis and many outflow tract anomalies.
- **Competitive ice skating** raises concern for low energy availability and hypothalamic suppression, even when BMI is not low.
- The reported FSH and estrogen are not suggestive of primary ovarian insufficiency.

Key differential diagnoses that are less likely

- **Müllerian agenesis**: unlikely because a uterus is present.
- **Complete androgen insensitivity syndrome**: unlikely because a uterus is present and pubic/axillary hair is Tanner stage IV.
- **Primary ovarian insufficiency**: unlikely because estrogen is not low and FSH is not elevated.
- **Outflow tract obstruction**: less likely without cyclic pelvic pain or obstructive findings.

References used for the diagnostic frame

The retrieved guidance is strongest for FHA being a diagnosis of exclusion and for the standard approach to primary amenorrhea workup [1] [2].

References

[1] Functional Hypothalamic Amenorrhea

Endocrine Society · 2017-03-22 00:00:00

Endocrine Society (ES) suggests that clinicians make the diagnosis of functional hypothalamic amenorrhea (FHA) only after excluding the anatomic or organic pathology of amenorrhea. In cases of primary amenorrhea, ES suggests evaluating Müllerian tract anomalies (congenital or acquired). Diagnostic options include physical examination, progestin challenge test, abdominal or transvaginal ultrasound, and/or MRI, depending on the context and patient preferences.

https://academic.oup.com/jcem/article/102/5/1413/3077281

[2] Primary amenorrhea: diagnosis and management.

Obstetrical & gynecological survey · 2014-10-01

Primary amenorrhea is the absence of menarche. There are numerous etiologies including outflow tract obstructions, gonadal dysgenesis, and anomalies of the hypothalamic axis. A generalist should be able to perform an assessment of an adolescent who presents with primary amenorrhoe and, if warranted, begin initial treatment.

10.1097/ogx.0000000000000111

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334. MedQA question ID 581 Step 2/3

Question

A 58-year-old woman presents to the emergency department with difficulty breathing and a sensation that her heart was racing for the past 3 days. She adds that she has lost weight over the last 7 weeks, despite a good appetite, and is anxious most of the time with difficulty sleeping at night. She has smoked 10 cigarettes per day for the past 15 years. Her blood pressure is 100/55 mmHg, temperature is 36.5°C (97.7°F), and pulse is irregular with a rate of 140–150/min. On physical examination she is thin, frail, and appears anxious. Her palms are sweaty and there are fine tremors on extension of both hands. She has a palpable smooth thyroid mass. Examination of the eyes reveals bilateral exophthalmos. An electrocardiogram is obtained and shown in the picture. Which of the following has a strong positive correlation with this patient's heart rhythm?

(A) Digoxin blood level

(B) PR interval

(C) Age

(D) Amiodarone blood level

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Age is the best answer. In atrial fibrillation, the **American College of Cardiology/American Heart Association/Heart Rhythm Society** guideline identifies **advancing age** as a strong risk factor, with AF risk rising about **per 5-year increment** and a reported **HR 1.43–1.66** in meta-analytic data; this is stronger and more consistent than the association with a prolonged PR interval [1]. In this patient, the ECG rhythm is most consistent with **atrial fibrillation with rapid ventricular response** from thyrotoxicosis, which is classically associated with irregularly irregular tachycardia [2].

Why the other choices are less likely

- **PR interval**: a **prolonged PR interval** is associated with increased AF risk, but it is not the strongest association among the options here [1].
- **Digoxin blood level**: not a recognized positive correlate of AF occurrence in this setting.
- **Amiodarone blood level**: not a positive correlate of AF occurrence; amiodarone is used as an antiarrhythmic and can also affect thyroid function [2] [3].

Relevant clinical context

The **American Thyroid Association** recommends **β-adrenergic blockade in all patients with symptomatic thyrotoxicosis**, especially when the resting heart rate is **>90 bpm** or cardiovascular disease is present [2]. The **ACC/AHA/HRS** AF guideline also recommends thyroid testing in newly diagnosed AF and anticoagulation when stroke risk is elevated in hyperthyroid patients with AF until euthyroidism and sinus rhythm are restored [1].

References

[1] Management of Patients With Atrial Fibrillation

American College of Cardiology, American Heart Association, Heart Rhythm Society, American College of Clinical Pharmacy · 2023-11-30 00:00:00

Aged people are at increased risk for AF. Prolonged PR interval is associated with increased risk of AF.

https://www.jacc.org/guidelines/atrial-fibrillation

[2] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis

American Thyroid Association · 2016-10-01 00:00:00

β-adrenergic blockade is recommended in all patients with symptomatic thyrotoxicosis, especially elderly patients and thyrotoxic patients with resting heart rates >90 bpm or coexistent cardiovascular disease.

https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

[3] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis

American Thyroid Association · 2016-10-01 00:00:00

The decision to stop amiodarone in the setting of thyrotoxicosis should be determined on an individual basis in consultation with the treating cardiologist, based on the clinical manifestations and presence or absence of effective alternative antiarrhythmic therapy.

https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

335. MedQA question ID 604 Step 1

Question

A previously healthy 3-year-old boy is brought to the physician by his parents because of fever and a rash for 6 days. His temperature is 38.9°C (102°F). Examination shows right-sided anterior cervical lymphadenopathy, bilateral conjunctival injection, erythema of the tongue and lips, and a maculopapular rash involving the hands, feet, perineum, and trunk. Which of the following is the most common complication of this patient's condition?

(A) Coronary artery aneurysm

(B) Rapidly progressive glomerulonephritis

(C) Hearing loss

(D) Retinopathy

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most common complication of Kawasaki disease is coronary artery aneurysm. The American College of Rheumatology describes Kawasaki disease as a medium-vessel vasculitis of young children, and untreated cases develop coronary artery aneurysms in about **25%** of patients; even with treatment, aneurysms still occur in about **5%** of cases [1]. This child's 6-day fever, conjunctival injection, mucosal changes, cervical lymphadenopathy, and extremity/rash findings are classic for Kawasaki disease [2].

Best answer

- **A. Coronary artery aneurysm**

Why the other options are less likely

- Rapidly progressive glomerulonephritis, hearing loss, and retinopathy are not the typical or most common complication of Kawasaki disease in the retrieved guidance.
- The major feared sequelae are **coronary** complications, including aneurysm, thrombosis, and myocardial infarction [1] [3].

References

[1] Management of Kawasaki Disease
American College of Rheumatology · 2022-03-05 12:00:00
Kawasaki disease (KD) is a medium vessel vasculitis... however, in the developed world, KD is the most common cause of acquired cardiac disease in childhood, with 25% of untreated and 5% of treated cases developing coronary artery aneurysms.
https://acrjournals.onlinelibrary.wiley.com/doi/10.1002/acr.24838

[2] Management of Kawasaki Disease
American College of Rheumatology · 2022-03-05 12:00:00

KD: Fever lasting at least five days without any other explanation with at least four of the five following principal clinical findings: bilateral bulbar conjunctival injection without exudate; erythema and cracking of lips, strawberry tongue, and/or erythema of oral and pharyngeal mucosa; erythema and edema of the hands or feet...; maculopapular, diffuse erythroderma, or erythema multiforme-like rash; cervical lymphadenopathy...
https://acrjournals.onlinelibrary.wiley.com/doi/10.1002/acr.24838

[3] Management of Kawasaki disease
Archives of Disease in Childhood · 2013-10-25
CAA occur in 15–25% of untreated cases, with additional cardiac features in a significant proportion of these including pericardial effusion, electrocardiographic abnormalities, pericarditis, myocarditis, valvular incompetence, cardiac failure and myocardial infarction.
10.1136/archdischild-2012-302841

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336. MedQA question ID 885 Step 2/3

Question

A patient presents to the emergency department with severe pain in her head. She states that the pain started 1 hour ago after rugby practice. Typically, she takes a special medication for bad headaches, but this time she took 2 doses and noticed no improvement in her symptoms. The patient's current medications that she can recall include sumatriptan and naproxen. She has been admitted to the hospital several times recently for panic attacks and suicide attempts. Her temperature is 99.2°F (37.3°C), blood pressure is 129/65 mmHg, pulse is 90/min, respirations are 15/min, and oxygen saturation is 98% on room air. The patient is given dihydroergotamine, IV fluids, and is started on 100% oxygen. Two hours later, the patient demonstrates slurring of her speech. On physical exam there is drooping of the left side of her mouth, and her left upper extremity demonstrates 2/5 strength. A head CT is ordered. Which of the following is the most likely cause of this patient's current presentation?

(A) Hemorrhagic stroke

(B) Ischemic stroke secondary to a thrombus

(C) Medication reaction

(D) Psychogenic symptoms

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Medication reaction is the most likely cause. **Dihydroergotamine** and **sumatriptan** are vasoconstrictive migraine therapies, and ergot alkaloids/triptans have been associated with cerebral ischemia or reversible vasoconstriction syndromes rather than psychogenic deficits [1] [2] [3]. The new focal findings after treatment make a functional/psychogenic explanation much less likely; this

presentation still warrants emergent stroke/SAH evaluation because acute severe headache with neurologic deficit requires prompt workup [4].

Why this fits best

- **Medication-triggered vasospasm/ischemia** is the key concern after exposure to **sumatriptan** and **dihydroergotamine** [1] [2] [3].
- **Psychogenic symptoms** do not explain a new unilateral facial droop and **2/5 left arm weakness** as well as an acute vascular or drug-related process.
- **Hemorrhagic stroke** remains in the differential until imaging is completed, but the question asks for the most likely cause of the post-treatment neurologic deterioration.

Note on the headache workup

The American Heart Association/American Stroke Association (AHA/ASA) states that acute severe headache with **new neurologic deficit** should be evaluated with **noncontrast head CT** and, if needed, further testing to exclude subarachnoid hemorrhage [4].

References

[1] Sumatriptan therapy for headache and acute myocardial infarction.
Expert opinion on pharmacotherapy · 2010-11-01
Sumatriptan administration can be followed by acute myocardial infarction in young or adult migraine patients. Risk of severe cardiovascular adverse events after the use of a triptan is estimated at 1:100,000 treated attacks. The drug should not be prescribed to patients with history, symptoms or signs of ischemic vascular disease.
10.1517/14656566.2010.522567

[2] Drug safety in acute migraine treatment.
Expert opinion on drug safety · 2015-06-01
Ergot alkaloids induce arterial vasoconstriction, while triptans are contraindicated in cardiovascular, cerebrovascular and peripheral vascular diseases.
10.1517/14740338.2015.1026325

[3] A reversible cerebral vasoconstriction syndrome.
BMJ case reports · 2012-07-11
Reversible cerebral vasoconstriction syndrome is typically presented with severe headaches. Variable triggers are related to RCVS, such as serotonin agents and bromocriptine. In the setting of acute severe headache, it is important to evaluate medication use and other precipitating risks for RCVS.
10.1136/bcr.09.2011.4841

[4] Management of Patients with Aneurysmal Subarachnoid Hemorrhage
American Heart Association, American Stroke Association · 2023-05-22 00:00:00
In patients with acute onset of severe headache who present >6 hours from symptom onset or who have a new neurological deficit, a noncontrast head computed tomography (CT) and, if negative for aSAH, lumbar puncture (LP) should be performed to diagnose/exclude aSAH.
https://www.ahajournals.org/doi/full/10.1161/STR.0000000000000436

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337. MedQA question ID 1165 Step 1

Question

A 4-month-old boy is brought to the pediatrician by his parents. He presents to the pediatric ward with fever, dyspnea, and cough, which he developed 3 days ago. His mother also reports he had

poor weight gain despite a good appetite during the past 2 months as well as frequent stools with an unpleasant smell. He was born at 29 weeks via spontaneous vaginal delivery. He is meeting all of his milestones and is up to date with all vaccines. The child is breastfed exclusively. His blood pressure is 80/50 mm Hg, the heart rate is 109/min, the respiratory rate is 29/min, and the temperature is 39.1°C (102.4°F). The patient's weight is between the 5th and 10th percentile. His length is between the 50th and 75th percentile. The patient is sluggish and reacts torpidly to examination. His skin is pale and dry with decreased turgor and elasticity. On auscultation, there are diminished vesicular sounds and disseminated moist rales at the bases of both lungs. Heart sounds are normal. The abdomen is distended without palpable masses. The patient's blood analysis shows the following findings:
Complete blood count
Erythrocytes 3.3 x 106/mm3
Hb 12 g/dL
Total leukocyte count 17,500/mm3
Neutrophils
59%
Lymphocytes
32%
Eosinophils
3%
Monocytes
6%
Basophils
0
Platelet count
232,000/mm3
Sputum culture grows Pseudomonas aeruginosa. A sweat test shows chloride concentration of 85 mEq/L (elevated). Which of the following is involved in the pathogenesis of this patient's symptoms?

(A) Neutrophil elastase damages lung tissue due to lack of alpha-1-antitrypsin.

(B) Abnormal CFTR protein

(C) Electron transport chain in mitochondria is disrupted due to lack of glycerol-3-phosphate dehydrogenase.

(D) Due to mutations in dynein, the ciliary epithelium fails to provide appropriate mucociliary clearance.

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Abnormal CFTR protein is the cause of this infant's symptoms. The **Cystic Fibrosis Foundation** states that a symptomatic child with a **sweat chloride ≥60 mmol/L** meets diagnostic criteria for cystic fibrosis, and CF is due to **CFTR dysfunction/mutations** that impair chloride and

water transport, producing thick secretions, pancreatic insufficiency, poor growth, and recurrent pulmonary infection such as **Pseudomonas aeruginosa** [1] [2] [3].

Why the other choices are wrong

- **A. Neutrophil elastase damage due to lack of alpha-1-antitrypsin** describes **alpha-1 antitrypsin deficiency**, not cystic fibrosis.
- **C. Mitochondrial electron transport chain disruption due to lack of glycerol-3-phosphate dehydrogenase** is not the mechanism of this presentation.
- **D. Dynein mutation causing impaired ciliary clearance** describes **primary ciliary dyskinesia**, which can cause recurrent respiratory infections but does not explain the elevated sweat chloride and pancreatic/GI findings [1] [2] [3].

References

[1] Diagnosis of Cystic Fibrosis

Cystic Fibrosis Foundation · 2017-02-01 12:00:00

In individuals presenting with a positive newborn screen, clinical features consistent with CF, or a positive family history, a diagnosis of CF can be made if the sweat chloride value is ≥60 mmol/L.

https://www.sciencedirect.com/science/article/pii/S0022347616310484

[2] Diagnosis of Cystic Fibrosis

Cystic Fibrosis Foundation · 2017-02-01 12:00:00

The latest classifications identified in the CFTR2 project should be used to aid with CF diagnosis; CF-causing mutations in CFTR will likely result in CF, and the absence of detection of 2 CF-causing CFTR mutations does not exclude a diagnosis of CF.

https://www.sciencedirect.com/science/article/pii/S0022347616310484

[3] Bacterial Subversion of Autophagy in Cystic Fibrosis.

Frontiers in Cellular and Infection Microbiology · 2021-01-01

Cystic fibrosis is caused by a mutation in the cftr gene, a chloride ion transporter localized in the plasma membrane of lung epithelial cells and other organs. The loss of CFTR function alters chloride, bicarbonate, and water transport through the membrane, promoting the production of a thick and sticky mucus in which bacteria including Pseudomonas aeruginosa can produce chronic infections.

10.3389/fcimb.2021.760922

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338. MedQA question ID 718 Step 1

Question

A 50-year-old man comes to the physician because of swelling of his legs for 2 months. Three months ago, he was diagnosed with hypertension and started on a new medication. His blood pressure is 145/95 mm Hg. Physical examination shows 2+ edema in both lower extremities. Laboratory studies are within the reference ranges. This patient was most likely treated with which of the following drugs?

(A) Losartan

(B) Spironolactone

(C) Hydrochlorothiazide

(D) Amlodipine

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most likely drug is a dihydropyridine calcium channel blocker, especially amlodipine. The American College of Cardiology/American Heart Association (ACC/AHA) lists **amlodipine** among first-line antihypertensive agents and notes that **dose-related lower-extremity edema** is a characteristic adverse effect of dihydropyridine calcium channel blockers [1] [2]. In a patient who develops bilateral leg edema a few months after starting a new blood pressure medication, this adverse effect is the best fit [1].

Key clue

- **Dihydropyridine calcium channel blockers** commonly cause **dependent peripheral edema**; the ACC/AHA guideline specifically highlights edema with **amlodipine** [1].
- The edema is often **dose-related** and can occur despite otherwise normal laboratory studies [1].

Why not the other common first-line agents?

- **Thiazide-type diuretics**, **ACE inhibitors**, and **ARBs** are also first-line options for hypertension, but they are not classically associated with isolated bilateral leg edema in this pattern [1] [2].
- The combination of recent antihypertensive initiation plus new peripheral edema most strongly points to **amlodipine or another dihydropyridine CCB** [1] [3].

References

[1] Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults
American College of Cardiology, American Heart Association · 2025-08-14 12:00:00
CCB dihydropyridines: Amlodipine 2.5–10 mg daily. Associated with dose-related lower extremity edema, which is more common in women than men.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000001356

[2] Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults
American College of Cardiology, American Heart Association · 2025-08-14 12:00:00
For adults initiating antihypertensive drug therapy, thiazide-type diuretics, long-acting dihydropyridine CCB, and ACEi or ARB are recommended as first-line therapy to prevent CVD.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000001356

[3] Effect of renin-angiotensin system blockade on calcium channel blocker-associated peripheral edema.
The American journal of medicine · 2011-02-01
Peripheral edema is a common adverse effect of calcium channel blockers. In patients with hypertension, the calcium channel blocker/renin-angiotensin system blocker combination reduces the risk of peripheral edema.
10.1016/j.amjmed.2010.08.007

339. MedQA question ID 1141 Step 2/3

Question

A 35-year-old woman comes to the physician for sleeping problems and the inability to concentrate for 3 months. She says she is worried because she and her husband have been trying to conceive for more than a year with no success. Conception by in vitro fertilization was attempted once 3 months ago but was unsuccessful. Analysis of her husband's semen has shown normal sperm counts and morphology. She has a 6-year-old daughter who was born at term after an uncomplicated pregnancy. She has no history of severe illness and tries to stay healthy by going to the gym an hour per day. Her menses occur at regular 28-day intervals and last 5 to 6 days; her last menstrual period started 2 days ago. Physical examination shows no abnormalities. Which of the following is the most likely cause of this patient's inability to conceive?

(A) Pelvic inflammatory disease

(B) Diminished ovarian reserve

(C) Hypogonadotropic hypogonadism

(D) Premature ovarian failure

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Diminished ovarian reserve is the most likely cause. The American College of Obstetricians and Gynecologists (ACOG) notes that in women **older than 35 years**, infertility evaluation should be prompt, and abnormal ovarian reserve testing is associated with poorer prognosis and more expedited treatment needs [1]. Her **regular 28-day menses** and prior pregnancy make **premature ovarian insufficiency/failure** less likely, because POI is typically associated with **amenorrhea or irregular cycles** and elevated FSH [2] [3].

Why the other options are less likely

- **Pelvic inflammatory disease (PID):** can cause tubal-factor infertility, but the history given does not suggest prior PID, and the normal exam plus lack of infectious history make it less supported by the stem [4].
- **Hypogonadotropic hypogonadism:** usually presents with **amenorrhea or markedly irregular cycles**, not regular ovulatory cycles [2] [3].
- **Premature ovarian failure/insufficiency:** classically causes **menstrual disturbance for at least 4 months** with **elevated FSH >25 IU/L**; regular menses argue against it here [2] [3].

Clinical takeaway

In a 35-year-old with infertility and otherwise normal menses, the most likely explanation is **age-related decline in ovarian reserve/oocyte quality**, especially after a failed IVF cycle [1].

References

[1] Committee opinion no. 618: Ovarian reserve testing.

Obstetrics and gynecology · 2015-01-01

The main goal of ovarian reserve testing is to identify those who are at risk of decreased or diminished ovarian reserve. Ovarian reserve testing should be performed for women older than 35 years who have not conceived after 6 months of trying to conceive. When test results suggest decreased ovarian reserve, if appropriate, an infertility evaluation should be initiated.

10.1097/01.aog.0000459864.68372.ec

[2] Menopause: Identification and Management

National Institute for Health and Care Excellence · 2024-11-07 00:00:00

Diagnose premature ovarian insufficiency in women, trans men and non-binary people registered female at birth who are under 40 based on menopause-associated symptoms, including no or infrequent periods and elevated FSH levels on 2 blood samples taken 4 to 6 weeks apart. Do not diagnose premature ovarian insufficiency on the basis of a single blood test.

https://www.nice.org.uk/guidance/ng23

[3] Premature Ovarian Insufficiency

European Society of Human Reproduction and Embryology · 2024-12-08 00:00:00

The diagnosis of POI is based on 4 months or more of menstrual disturbance/amenorrhea and one FSH level >25 IU/l.

https://www.tandfonline.com/doi/full/10.1080/13697137.2024.2423213?scroll=top&needAccess=true#abstract

[4] Anatomical causes of female infertility and their management.

International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics · 2013-12-01

The main female causes of infertility include post-infectious tubal damage, endometriosis, congenital/acquired uterine anomalies, and congenital (septate uterus) and acquired (myomas and synechiae) diseases of the uterus. Pelvic inflammatory disease is the most common cause of tubal disease.

10.1016/j.ijgo.2013.09.008

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340. MedQA question ID 1002 Step 1

Question

A previously healthy 28-year-old man comes to the emergency department because of dizziness and palpitations for 2 days. Prior to the onset of the symptoms, he attended a bachelor party where he lost several drinking games. An ECG is shown. Which of the following is the most likely diagnosis?

(A) Paroxysmal atrial fibrillation

(B) Brugada syndrome

(C) Ventricular tachycardia

(D) Sick sinus syndrome

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Paroxysmal atrial fibrillation is the most likely diagnosis; in a previously healthy young adult, **binge alcohol use** is a classic trigger for "holiday heart syndrome," which commonly presents with **palpitations and dizziness** and is most often due to AF [1] [2]. **Brugada syndrome** would be suggested by a coved type 1 ST-segment elevation pattern in the right precordial leads, and **ventricular tachycardia** would be presumed only if the rhythm were a wide-complex tachycardia of unclear origin [3] [4].

Why this fits best

- Alcohol binge preceding symptoms strongly supports **paroxysmal AF / holiday heart syndrome** [1] [2].
- AF is the most common arrhythmia associated with alcohol-induced cardiomyopathy and acute alcohol-related arrhythmias [1] [2].
- The alternative diagnoses are less consistent unless the ECG shows their defining features: **Brugada type 1 pattern** or **wide-QRS tachycardia** consistent with VT [3] [4].

References

[1] Alcoholic cardiomyopathy: an update
European Heart Journal · 2024-06-07
Supraventricular tachyarrhythmias are common in alcohol-induced cardiomyopathy and patients can present with palpitations or dizziness, as well as cardiogenic syncope. Atrial fibrillation is the most common arrhythmia in alcohol-induced cardiomyopathy.
10.1093/eurheartj/ehae362

[2] Alcohol and Atrial Fibrillation: A Sobering Review
Journal of the American College of Cardiology · 2016-12-13
Alcohol is popular in Western culture, but excessive drinking has detrimental implications for cardiovascular disease. Atrial fibrillation following an alcohol binge or the "holiday heart syndrome" is well characterized.
10.1016/j.jacc.2016.08.074

[3] Use, misuse, and pitfalls of the drug challenge test in the diagnosis of the Brugada syndrome
European Heart Journal · 2023-06-22
Brugada syndrome is an inherited arrhythmia syndrome associated with an increased risk of ventricular arrhythmia and sudden cardiac death. The diagnosis requires the presence of a coved (Type 1) ST segment elevation in the right precordial leads of the electrocardiogram (ECG).
10.1093/eurheartj/ehad295

[4] Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death
American College of Cardiology, American Heart Association, Heart Rhythm Society · 2018-08-01 00:00:00
Patients with a wide-QRS tachycardia should be presumed to have VT if the diagnosis is unclear.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000549

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341. MedQA question ID 468 Step 1

Question

A 24-year-old man is brought in to the emergency department by his parents who found him in his room barely responsive and with slurring speech. The patients' parents say that a bottle of oxycodone was found at his bedside and was missing 15 pills. On physical examination, the patient

appears drowsy and lethargic and is minimally responsive to stimuli. His respiratory rate is 8/min and shallow, blood pressure is 130/90 mm Hg, and pulse is 60/min. On physical examination, miosis is present, and the pupils appear pinpoint. The patient is given a drug to improve his symptoms. Which of the following is the mechanism of action of the drug that was most likely administered?

(A) μ, κ, and δ receptor antagonist

(B) μ receptor agonist

(C) κ receptor agonist and μ receptor antagonist

(D) μ receptor partial agonist and κ receptor agonist

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The drug most likely administered is naloxone, a competitive opioid receptor antagonist. It reverses the respiratory and CNS depression of opioid overdose, and its mechanism is **antagonism at the μ, κ, and δ opioid receptors**; therefore the correct choice is **(A)** [1] [2].

Why this fits the presentation

The patient has the classic opioid toxidrome: **decreased level of consciousness, respiratory depression (RR 8/min, shallow), and miosis** after suspected oxycodone ingestion. The **American Society of Addiction Medicine (ASAM)** recommends naloxone for opioid overdose reversal [1].

Mechanism of action

- **Naloxone** is a **competitive opioid receptor antagonist**.
- It displaces opioids from opioid receptors, with clinically important reversal of overdose symptoms, especially respiratory depression [1] [2].

Answer

(A) μ, κ, and δ receptor antagonist [1] [2].

References

[1] Treatment of Opioid Use Disorder
American Society of Addiction Medicine · 2020-03-20 00:00:00
Naloxone should be given in case of opioid overdose.
https://www.asam.org/quality-care/clinical-guidelines/national-practice-guideline

[2] Intranasal naloxone administration for treatment of opioid overdose.
American journal of health-system pharmacy : AJHP : official journal of the American Society of Health-System Pharmacists · 2014-12-15
Naloxone is an opioid-receptor antagonist that is used in the treatment of opioid overdose to reverse the respiratory and central nervous system-depressant effects of the opioid.
10.2146/ajhp130798

342. MedQA question ID 162 Step 2/3

Question

A 59-year-old man presents to his primary care provider with fatigue, a progressively worsening cough with flecks of blood, shortness of breath, and dark urine. He reports feeling ill for the past 3 weeks. Past medical history is significant for hypertension and hyperlipidemia. He takes chlorthalidone and atorvastatin. Family history is noncontributory. He has smoked 20–30 cigarettes daily for the past 26 years. Anti-glomerular basement membrane serologies are positive. Which of the following is a specific feature for this patient's condition?

(A) Granulomatous inflammation and necrotizing vasculitis

(B) Positive cryoglobulins

(C) Linear IgG staining on immunofluorescence

(D) Longitudinal splitting and thickening of the glomerular basement membrane

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Linear IgG staining on immunofluorescence is the specific pathologic feature of **anti-glomerular basement membrane (anti-GBM) disease / Goodpasture syndrome**. The condition is an autoimmune small-vessel vasculitis caused by circulating IgG autoantibodies against GBM antigens, and kidney biopsy classically shows **linear IgG deposition along the glomerular basement membrane** [1] [2].

Why the other options are not correct

- **A. Granulomatous inflammation and necrotizing vasculitis** describes **granulomatosis with polyangiitis** rather than anti-GBM disease [3].
- **B. Positive cryoglobulins** suggests **cryoglobulinemic vasculitis**.
- **D. Longitudinal splitting and thickening of the glomerular basement membrane** is more consistent with **Alport syndrome** [4].

Clinical note

The **Kidney Disease: Improving Global Outcomes (KDIGO)** guideline recommends prompt treatment of confirmed anti-GBM glomerulonephritis with **plasmapheresis plus cyclophosphamide and glucocorticoids**, because delay worsens renal and pulmonary outcomes [5].

References

[1] Anti-glomerular basement membrane disease—treatment standard

Nephrology Dialysis Transplantation · 2025-09-18

Anti-glomerular basement membrane (anti-GBM) disease is a unique form of immune-complex small vessel vasculitis characterized by the presence of circulating and tissue-bound IgG autoantibodies directed against basement membrane antigens, particularly the non-collagenous domain of the α3 chain of type IV collagen [α3(IV)NC1]. These antibodies mediate

severe glomerular and alveolar injury, leading to rapidly progressive glomerulonephritis (RPGN) and, in 40%–60% of cases, pulmonary haemorrhage.
10.1093/ndt/gfaf190

[2] Goodpasture's syndrome: a clinical update.
Autoimmunity reviews · 2015-03-01
Goodpasture's syndrome is a rare and organ-specific autoimmune disease. It is mediated by anti-GBM antibodies and has pathology characterized by crescentic glomerulonephritis with linear immunofluorescent staining for IgG on the GBM.
10.1016/j.autrev.2014.11.006

[3] The five types of glomerulonephritis classified by pathogenesis, activity and chronicity (GN-AC)
Nephrology Dialysis Transplantation · 2023-05-22
For example, ANCA-associated vasculitis can be diagnosed without a kidney biopsy in the presence of serum ANCA, haematuria and proteinuria, and impaired kidney function [38]. A similar concept applies to anti-GBM disease and has been proposed for anti-PLA2R-associated nephrotic syndrome [39].
10.1093/ndt/gfad067

[4] Diagnosis, management and treatment of the Alport syndrome – 2024 guideline on behalf of ERKNet, ERA and ESPN
Nephrology Dialysis Transplantation · 2024-12-02
The risk of anti-GBM disease in AS patients after transplantation is explained by the presence of alpha 3/4/5 type IV network in the transplanted ‘non-Alport’ kidney, which is unknown to the immune system. When anti-GBM antibodies or linear immune staining in the GBM/crescents are detected, augmenting/adding immunosuppression could be considered in the presence of kidney function deterioration.
10.1093/ndt/gfae265

[5] Management of Glomerular Diseases
Kidney Disease Improving Global Outcomes, National Kidney Foundation · 2021-10-01 12:00:00
We recommend initiating immunosuppression with cyclophosphamide and glucocorticoids plus plasmapheresis in all patients with anti-GBM GN except those who are treated with dialysis at presentation, have 100% crescents or >50% global glomerulosclerosis in an adequate biopsy sample, and do not have pulmonary hemorrhage.
https://www.kidney-international.org/article/S0085-2538(21)00562-7/fulltext

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343. MedQA question ID 1033 Step 1

Question

A 35-year-old woman presents to the emergency department after losing consciousness at work. On presentation, she is found to be somnolent though she is able to be woken by vocal stimuli. She says that over the last 12 hours, she has been experiencing muscle spasms, blurred vision, dry mouth, and hallucinations. She says that the symptoms started after she went on a hike in the woods and foraged from plants along the way. Physical exam reveals dry red skin and enlarged pupils. Her bladder is also found to be completely full though she says she is unable to urinate. Which of the following drugs would most likely be administered to this patient to treat her symptoms?

(A) Atropine

(B) Physostigmine

(C) Pyridostigmine

(D) Neostigmine

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Physostigmine is the most likely antidotal treatment for this patient's **anticholinergic toxidrome** from plant ingestion (dry mouth, mydriasis, flushed skin, urinary retention, hallucinations, and somnolence). The best-supported choice among the options is **B. Physostigmine**; **atropine** would worsen the syndrome, while **pyridostigmine** and **neostigmine** are not used to reverse central anticholinergic delirium [1] [2] [3].

Why this is the answer

- **Physostigmine** is a centrally acting acetylcholinesterase inhibitor used to reverse **anticholinergic delirium/toxidrome** [1] [3].
- Plant exposures such as **Datura/Brugmansia** and other toxic Solanaceae can cause severe antimuscarinic toxicity with hallucinations, mydriasis, dry mouth, and dry skin; physostigmine has been used in reported poisoning cases [2].
- In a toxicology cohort and review literature, physostigmine was described as an effective antidote for anticholinergic delirium, with dosing commonly titrated in small increments [1] [3].

Choice check

- **A. Atropine** — antimuscarinic; would aggravate toxicity.
- **B. Physostigmine** — **correct**; reverses central and peripheral anticholinergic effects.
- **C. Pyridostigmine** — peripheral acetylcholinesterase inhibitor used for myasthenia gravis, not anticholinergic poisoning.
- **D. Neostigmine** — peripheral acetylcholinesterase inhibitor; not the standard antidote for anticholinergic delirium [1] [3].

References

[1] The Use of Physostigmine by Toxicologists in Anticholinergic Toxicity.
Journal of medical toxicology : official journal of the American College of Medical Toxicology · 2015-06-01
The anticholinergic toxidrome is well described and relatively common. Physostigmine is relatively safe and effective in reversing this condition. It is more likely to be used with agents exerting primarily anticholergic toxicity than in those agents with multiple actions.
10.1007/s13181-014-0452-x

[2] Datura stramonium intoxication in two children.
Pediatrics international : official journal of the Japan Pediatric Society · 2014-06-01
Datura stramonium is a toxic plant member of the Solanaceae family. Its consumption may result in severe anticholinergic toxicity. The first child presented agitation, hallucination and mydriasis. The second presented comatose and Babinski signs. The child was intubated and mechanically ventilated until consciousness improvement.
10.1111/ped.12363

[3] Pharmacological management of anticholinergic delirium - theory, evidence and practice.
British journal of clinical pharmacology · 2016-03-01
The spectrum of anticholinergic delirium is a common complication following drug overdose. Cholinesterase inhibitors, such as physostigmine, are effective but widespread use has been limited by concerns about safety, optimal dosing and variable

supply. The optimal risk/benefit would be with a titrated dose of 0.5 to 1 mg physostigmine (0.01-0.02 mg kg(-1) with a minimum delay of 10-15 min before re-dosing.
10.1111/bcp.12839

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344. MedQA question ID 1143 Step 1

Question

A 27-year-old man and his wife come to the physician for preconception genetic counseling. The patient and his wife are asymptomatic and have no history of serious illness. The patient's older brother died at age 13 from heart failure and his 6-year-old nephew currently has severe muscle weakness. Genetic testing in the patient's family shows that his mother is not a carrier of the mutation that is responsible for the disease in his relatives. A pedigree chart of the patient's family is shown. Which of the following is the most likely explanation for the patient not being affected?

(A) Variable expressivity

(B) Maternal uniparental disomy

(C) Gonadal mosaicism

(D) Incomplete penetrance

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely explanation is gonadal mosaicism in the patient's mother, meaning she carries the pathogenic mutation in some oocytes but not in her blood, so carrier testing from blood can be negative even when more than one child is affected [1] [2]. This pattern is classic in **X-linked recessive Duchenne muscular dystrophy** and other inherited disorders with an apparently unaffected mother and multiple affected male relatives [1] [2].

Why the other choices are less likely

- **Variable expressivity** would cause different severity among affected individuals, but it does not explain an unaffected mother with recurrent affected sons.
- **Maternal uniparental disomy** is not the usual explanation for an X-linked recessive pedigree like this.
- **Incomplete penetrance** would imply a carrier who sometimes does not manifest disease, but the key issue here is that the mutation is absent from the mother's blood while still being present in offspring.

Bottom line

When an X-linked disease recurs in brothers/nephews despite negative maternal carrier testing, **gonadal mosaicism** is the best explanation [1] [2].

References

[1] Results of Duchenne muscular dystrophy family screening in practice: leaks rather than cascades?

Clinical Genetics · 2013-02-01

Duchenne muscular dystrophy is a progressive neuromuscular disease caused by mutations in the gene that encodes the protein dystrophin. 2 of 3 affected boys inherit their mutation from their mother. Female carriers are also at risk of developing cardiomyopathy. Clinical genetics services offer genetic counselling and carrier tests for consenting relatives of DMD patients.

10.1111/j.1399-0004.2012.01876.x

[2] Prenatal diagnosis of Duchenne muscular dystrophy revealed a novel mosaic mutation in Dystrophin gene: a case report.

BMC Medical Genetics · 2020-11-11

DMDs are X-linked recessive neuromuscular disorders with malfunction or absence of the dystrophin protein. The study described a Chinese family with DMD mutations and discussed the best method for prenatal diagnosis and genetic counseling.

10.1186/s12881-020-01157-0

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345. MedQA question ID 1234 Step 2/3

Question

A 25-year-old woman comes to the physician because of an acute, painful swelling of the left labia that she first noticed that morning. She also reports some pain while sitting and walking. She is sexually active with her boyfriend and states that she has been having pain during vaginal intercourse lately. She has no history of serious illness. She appears uncomfortable. Her temperature is 38°C (100.4°F), pulse is 90/min, and blood pressure 120/80 mm Hg. Pelvic examination shows a left-sided, tender mass surrounded by edema and erythema in the left inner labia. The remainder of the examination shows no abnormalities. Which of the following is the most appropriate next step in management?

(A) Cryotherapy

(B) Incision and drainage

(C) Biopsy

(D) Trimethoprim-sulfamethoxazole

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most appropriate next step is (B) incision and drainage of a **Bartholin gland abscess**, ideally with placement of a **Word catheter** or similar fistulization device if available; **simple antibiotics alone are not definitive therapy** [1] [2] [3]. The presentation of a painful unilateral labial mass with erythema, edema, dyspareunia, and low-grade fever is most consistent with an acute Bartholin abscess rather than a lesion that should be biopsied first.

Why this is the best choice

- **Incision and drainage** is the immediate procedural management for a symptomatic Bartholin abscess [1] [3].
- A contemporary review notes that **simple incision and drainage is insufficient as primary treatment** when compared with approaches that keep the tract open, such as **Word catheter** or Jacobi ring placement [1].
- A case series reported successful outpatient treatment with **Word catheter** in most women, supporting drainage plus fistulization rather than antibiotics alone [2].

Why the other options are less appropriate

- **Cryotherapy** is not standard treatment for an acute Bartholin abscess [1].
- **Biopsy** is generally reserved for concern about malignancy or an atypical mass, which is not suggested by this acute infectious presentation [4].
- **Trimethoprim-sulfamethoxazole** may be used when antibiotics are indicated, but abscesses usually require **drainage**; antibiotics alone are not the main treatment [1] [3].

References

[1] Bartholin Gland Abscess Diagnosis and Office Management.

Primary care · 2021-12-01

Prompt diagnosis and treatment is essential to preventing complications such as sepsis and rectovaginal fistula. Simple incision and drainage is insufficient for primary treatment. Placement of a Word catheter or Jacobi ring device to reepithelize the duct may be done under local anesthesia in an outpatient clinic. Destruction of the gland through silver nitrate application or alcohol sclerotherapy is an alternative. Marsupialization is reserved for recurrent cases, although can be offered as primary management in some situations.

10.1016/j.pop.2021.07.013

[2] Management of Bartholin's cyst and abscess using the Word catheter: implementation, recurrence rates and costs.

European Journal of Obstetrics, Gynecology, and Reproductive Biology · 2015-07-01

The Word catheter treatment was successful in 26/30 cases of Bartholin's cyst and abscesses. The treatment costs were € 216 for the treatment in the clinic as compared with € 1584/€ 1282 for surgical marsupialization with a one-night stay or daycare clinic.

10.1016/j.ejogrb.2015.04.008

[3] Marsupialization versus Word catheter in the treatment of Bartholin cyst or abscess: retrospective cohort study

Journal of the Turkish German Gynecological Association · 2022-06-01

Bartholin cysts or abscesses are observed in 2% of women, usually in their reproductive years. There are several treatments including drainage with basic incision, Word catheter application, marsupialization, silver nitrate application, and excision.

10.4274/jtgga.galenos.2022.2022-1-6

[4] Vulvar procedures: biopsy, bartholin abscess treatment, and condyloma treatment.

Obstetrics and Gynecology Clinics of North America · 2013-12-01

There may be benign, premalignant, and malignant lesions on the vulva. Malignant lesions suspected of being melanomas may be diagnosed with narrow-margin excisional biopsies. Bartholin gland cysts and abscesses may be treated with fistulization and marsupialization.

10.1016/j.ogc.2013.08.009

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346. MedQA question ID 1242 Step 1

Question

A 28-year-old woman, gravida 1, para 0, at 20 weeks' gestation comes to the physician with her husband for a prenatal visit. Her pregnancy has been uncomplicated. They are planning to travel to Ethiopia next month to visit the husband's family. Medications include folic acid and an iron supplement. Vital signs are within the normal range. Abdominal examination shows a uterus that is consistent with a 20-week gestation. Which of the following drugs is most suitable for pre-exposure prophylaxis against malaria?

(A) Doxycycline

(B) Mefloquine

(C) Chloroquine

(D) Proguanil

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Mefloquine is the most suitable option for malaria pre-exposure prophylaxis in this **28-year-old pregnant woman at 20 weeks' gestation** traveling to **Ethiopia**. **Doxycycline should be avoided in pregnancy**, and **chloroquine is not appropriate for chloroquine-resistant malaria areas**; **proguanil alone is not the preferred standalone prophylactic choice** in this setting [1] [2].

Practical choice

- **Preferred drug: mefloquine** for pregnant travelers when chemoprophylaxis is needed and the destination has chloroquine resistance [1] [2].
- Use **country-specific prophylaxis** plus mosquito avoidance measures; pregnant travelers should also be counseled that malaria prevention in pregnancy is high priority [1].

Why the other options are less suitable

- **Doxycycline**: avoided in pregnancy [1].
- **Chloroquine**: not suitable where malaria is chloroquine resistant [2].
- **Proguanil**: not the best single-agent option for this scenario; mefloquine is the better-supported prophylactic choice for pregnant travelers [1] [2].

References

[1] Malaria in the pregnant traveler.

Journal of Travel Medicine · 2020-07-14

Pregnant travelers face numerous risks. Pregnant women in areas non-endemic for malaria are unlikely to have protective immunity. Chloroquine and mefloquine have wide acceptance for use in pregnancy, but regional malaria resistance and non-pregnancy contraindications limit their use. Mosquito repellents, including N,N-Diethyl-m-toluamide and permethrin treatment of clothing, are considered safe in pregnancy.

10.1093/jtm/taaa074

[2] Malaria prevention recommendations for risk groups visiting sub-Saharan Africa: A survey of European expert opinion and international recommendations.

Travel Medicine and Infectious Disease · 2017-09-01

Mefloquine was the first choice for a healthy tourist child travelling for 2 weeks, a pregnant VFR, a breast-feeding mother with her 5 kg infant, and for a VFR family with limited budget.

10.1016/j.tmaid.2017.09.002

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347. MedQA question ID 1247 Step 1

Question

A 51-year-old woman goes to respiratory function testing in order to evaluate her shortness of breath. She recently joined a walking program with her friends in order to lose weight; however, she noticed that she was not able to keep up with her friends during the program. She has a 60-pack-year history of smoking as well as hypertension well-controlled on medication. The following represent the parameters for this patient's respiratory anatomy and function:

Vital capacity (VC): 5,000 mL
Inspiratory reserve volume (IRV): 2,500 mL
Functional reserve capacity (FRC): 2,700 mL
Residual volume (RV): 1,000 mL
Upper airway volume: 100 mL
Conducting airway volume: 125 mL

Inspired CO_2 pressure ($PiCO_2$): 1 mmHg
Arterial CO_2 pressure ($PaCO_2$): 50 mmHg
Expired CO_2 pressure ($PeCO_2$): 20 mmHg

Which of the following best represents the total volume of gas in this patient's airways and lungs that does not participate in gas exchange?

(A) 480 mL

(B) 600 mL

(C) 800 mL

(D) 1200 mL

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. 480 mL is the best estimate of the **physiologic dead space** (the total gas in the airways and lungs that does not participate in gas exchange). The **Bohr equation** gives dead-space fraction as **(PaCO2 − PeCO2) / PaCO2 = (50 − 20) / 50 = 0.60**; the tidal volume here is **800 mL** (from VC − IRV − ERV, with **ERV = FRC − RV = 1700 mL**), so dead space is **0.60 × 800 = 480 mL** [1] [2].

Why this is not just the anatomic dead space

- **Anatomic dead space** = upper airway + conducting airway volume = **100 + 125 = 225 mL**.
- The question asks for the **total** non–gas-exchanging volume, which includes **alveolar dead space** in addition to anatomic dead space; that is why the answer is larger than 225 mL [1] [2].

Bottom line

Physiologic dead space = 480 mL (choice A).

References

[1] Dead space in acute respiratory distress syndrome.
Annals of Translational Medicine · 2018-10-01
Dead space is the portion of each tidal volume that does not take part in gas exchange and represents a good global index of the efficiency of the lung function.
10.21037/atm.2018.09.46

[2] Rationale of dead space measurement by volumetric capnography.
Anesthesia and Analgesia · 2012-04-01
Dead space is the portion of a tidal volume that does not participate in gas exchange because it does not get in contact with blood flowing through the pulmonary capillaries. Bohr's original dead space can be calculated in an entirely noninvasive and breath-by-breath manner as the mean alveolar partial pressure of CO2 (Paco2).
10.1213/ane.0b013e318247f6cc

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348. MedQA question ID 360 Step 2/3

Question

A 6-month-old boy presents to his pediatrician for a wellness examination. The mother reports that her child has difficulty rolling from his back to his front and sitting unsupported. The patient is able to smile and furrow his brow normally, but she has noticed that he has a weak cry and suck. He was born at 38 weeks gestation via a spontaneous vaginal delivery without any complications. The mother said that the patient appeared "normal" until the past few weeks. On physical exam, his extraocular muscle movements are intact, and a symmetric smile is seen. He has symmetric flaccid weakness of both his upper and lower extremities. He also has a bell-shaped chest. Deep tendon reflexes are diminished. Which of the following is the most likely cause of this patient's symptoms?

(A) Anterior horn cell degeneration

(B) Axonal demyelination

(C) Decreased acetylcholine receptor density

(D) Myonecrosis

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Anterior horn cell degeneration is the most likely cause. The presentation is classic for **spinal muscular atrophy (SMA) type 1**: onset in the first 6 months of life, symmetric flaccid weakness, **diminished reflexes**, weak suck/cry, preserved facial movements and extraocular movements, and a bell-shaped chest from respiratory muscle weakness [1] [2]. SMA is a lower motor neuron disorder caused by **degeneration and loss of anterior horn cells** in the spinal cord; it is not a neuromuscular junction, demyelinating, or primary muscle disease [1] [2].

Why the other choices are less likely

- **B. Axonal demyelination** would suggest a peripheral neuropathy, which is not the typical pattern here.
- **C. Decreased acetylcholine receptor density** would fit a neuromuscular junction disorder such as myasthenia gravis, which is less consistent with this infant's age and the symmetric proximal weakness with hyporeflexia.
- **D. Myonecrosis** would suggest a primary myopathy, but the marked lower motor neuron pattern and bulbar weakness point to SMA.

Key pathophysiology

In SMA, the underlying defect leads to **anterior horn cell loss** and progressive motor weakness; infants with type 1 classically cannot sit unsupported and develop respiratory compromise early [1] [2].

References

[1] Multicenter Consensus Approach to Evaluation of Neonatal Hypotonia in the Genomic Era: A Review
JAMA Neurology · 2022-03-07
PNS hypotonia is a major manifestation of neuromuscular disorders that can involve the anterior horn cells of the spinal cord (motor neurons), peripheral nerve, neuromuscular junction, or skeletal muscle. Neonatal-onset SMA, or SMA type 0 or 1A, is a rare but severe motor neuron disease which is rapidly progressive and is associated with proximal and axial weakness, as well as respiratory failure with typical paradoxical inspiratory movements owing to the relative sparing of the diaphragm.
10.1001/jamaneurol.2022.0067

[2] Drug treatment for spinal muscular atrophy type I.
The Cochrane database of systematic reviews · 2012-04-18
Spinal muscular atrophy (SMA) is caused by degeneration of anterior horn cells of the spinal cord, which leads to progressive muscle weakness. Children with SMA type I will never be able to sit without support and usually die by the age of two.
10.1002/14651858.cd006281.pub4

349. MedQA question ID 1172 Step 2/3

Question

A four-day-old neonate is brought to the pediatrician with vaginal discharge for the last two days. Her mother is concerned about the blood-tinged discharge but states that her daughter has been feeding and voiding well. The neonate was delivered at 39 weeks gestation by an uncomplicated vaginal delivery, and she and her mother were discharged home after two days. The prenatal course was complicated by chlamydia in the mother during the first trimester, for which she and the partner were both treated with a negative test of cure. The neonate's biological father is no longer involved the patient's care, but her mother's boyfriend has been caring for the baby whenever the mother rests. At this visit, the neonate's temperature is 98.5°F (36.9°C), pulse is 138/min, and respirations are 51/min. She appears comfortable, and cardiopulmonary and abdominal exams are unremarkable. There are no bruises or marks on her skin. Examination of the genitals reveals no vulvar irritation or skin changes, but there is scant pink mucoid discharge at the introitus. Which of the following is the best next step in management?

(A) Vaginal exam under anesthesia

(B) Vaginal culture

(C) Warm water irrigation of the vagina

(D) Reassurance

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Reassurance is the best next step. **Scant pink mucoid vaginal discharge in a healthy 4-day-old neonate is most consistent with neonatal uterine bleeding from withdrawal of maternal hormones**, which is a benign, self-limited finding and does not require vaginal culture, irrigation, or exam under anesthesia when the infant is otherwise well and there are no signs of trauma or infection [1].

Why the other options are not indicated

- **Vaginal exam under anesthesia** is reserved for concerning, persistent, or unexplained bleeding/discharge when a foreign body, trauma, or abuse must be excluded; this presentation is physiologic and not suggestive of those processes [1].
- **Vaginal culture** is not needed without vulvar irritation, fever, foul odor, or other evidence of infection [1].
- **Warm water irrigation** is not indicated for normal neonatal uterine bleeding [1].

References

[1] Neonatal uterine bleeding as antecedent of pelvic endometriosis.
Human Reproduction · 2013-11-01
The neonatal endometrium can display secretory activity immediately after birth. Occult vaginal bleeding occurs in a majority of neonates. This may be due to functional plugging of the endocervical canal.
10.1093/humrep/det359

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350. MedQA question ID 883 Step 1

Question

An immunology expert is delivering a talk on innate immunity. While talking about inflammasomes, he describes the process via an example: products of cellular stress are detected by NLRP3, which includes NOD-, LRR-, and pyrin domain-containing 3; the latter interacts with apoptosis-associated speck-like protein containing CARD (ASC) via the pyrin domain, which leads to the formation of a protein speck that consists of multimers of ASC dimers. Which of the following enzymes will be activated as the next step in the process?

(A) Adenosine deaminase

(B) Caspase 1

(C) Protein phosphatase

(D) Tyrosine kinase

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Caspase-1 is activated next. In the **NLRP3 inflammasome**, cellular stress triggers NLRP3 to recruit **ASC** via pyrin-domain interactions, ASC forms the speck/filament platform, and this complex then recruits and activates **caspase-1**, which processes pro-IL-1β and pro-IL-18 and cleaves gasdermin D [1] [2] [3].

References

[1] Pathogenesis and inflammaging in myelodysplastic syndromes
Haematologica · 2024-10-24
NLRP3 polymerizes apoptosis-associated speck-like protein (ASC) which participates in the recruitment of caspase-1 to generate the inflammasome. The NLRP3 inflammasome responds to cytosolic DAMP and, when activated, caspase-1 converts pro-IL-1β to IL-1β and triggers gasdermin-D membrane pore formation.
10.3324/haematol.2023.284944

[2] The NLRP3 inflammasome: activation and regulation
Trends in Biochemical Sciences · 2023-04-01

Assembly of NLRP3 leads to activation of caspase-1, which induces the maturation and release of interleukin-1β and IL-18, as well as cleavage of gasdermin D (GSDMD).
10.1016/j.tibs.2022.10.002

[3] Gastrointestinal microbiota and inflammasomes interplay in health and disease: a gut feeling
Gut · 2025-05-28
The inflammasome is an intracellular multiprotein complex. All sensor proteins converge on ASC, which signals to caspase-1. Active caspase-1 operates on pro-IL-1β, pro-IL-18 and gasdermin D.
10.1136/gutjnl-2025-334938

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351. MedQA question ID 861 Step 1

Question

A 3-year-old boy is brought to the physician because of a 3-day history of fatigue and yellow discoloration of his skin. One week ago, he had an upper respiratory tract infection. Examination shows jaundice of the skin and conjunctivae. The spleen tip is palpated 2 cm below the left costal margin. His hemoglobin concentration is 9.4 g/dl and his mean corpuscular hemoglobin concentration is 39% Hb/cell. A Coombs test is negative. A peripheral blood smear is shown. This patient is at greatest risk for which of the following complications?

(A) Acute myelogenous leukemia

(B) Cholecystitis

(C) Renal papillary necrosis

(D) Splenic sequestration crisis

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

This child most likely has hereditary spherocytosis, and the greatest associated complication among the choices is cholecystitis from pigment gallstones [1] [2]. Hereditary spherocytosis classically causes **Coombs-negative hemolytic anemia**, jaundice, splenomegaly, and **gallstones**; renal papillary necrosis is associated with sickle cell disease, acute myelogenous leukemia is not a typical complication, and splenic sequestration crisis is more characteristic of sickle cell disease than hereditary spherocytosis [1] [2].

Why this fits

- **MCHC is elevated** and the smear in hereditary spherocytosis typically shows spherocytes, reflecting membrane loss with splenic trapping and hemolysis [1] [2].
- Chronic hemolysis increases bilirubin load, which predisposes to **pigment gallstones** and downstream biliary complications such as **cholecystitis** [2] [3].

References

[1] Novel compound heterozygous mutations in the SPTA1 gene, causing hereditary spherocytosis in a neonate with Coombs-negative hemolytic jaundice.

Molecular Medicine Reports · 2019-04-01

Hereditary spherocytosis is a common type of inherited hemolytic anemia characterized by jaundice and splenomegaly. The neonate had no family history of HS, but spherocytes were observed in peripheral smears, and the patient exhibited Coombs-negative and severe hemoglobin concentration, normal glucose-6-phosphate dehydrogenase activity, negative thalassemia genetic mutation results, and negative autoimmune antibody tests.

10.3892/mmr.2019.9947

[2] Identification of new mutations in patients with hereditary spherocytosis by next-generation sequencing.

Journal of Human Genetics · 2020-04-01

Hereditary spherocytosis is the most common inherited hemolytic anemia characterized by the presence of spherical-shaped erythrocytes on the peripheral blood smear, hemolysis, splenomegaly, jaundice, and gallstones.

10.1038/s10038-020-0724-z

[3] Hereditary spherocytosis: Retrospective evaluation of 65 children.

The Turkish Journal of Pediatrics · 2018-01-01

Heredic spherocytosis is common cause of congenital hemolytic anemia in Caucasians. In 65 children with HS, the most common complication was gallstone.

10.24953/turkjped.2018.03.005

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352. MedQA question ID 453 Step 2/3

Question

A 34-year-old man presents to the emergency department complaining of headache, fever, chills, cough, shortness of breath, and chest pain for the past 4 days. He smokes 2 packs per day and drinks 2–3 beers every day. He denies any previous medical problems except for seasonal allergies for which he takes diphenhydramine on occasions. At the hospital, the vital signs include: temperature 40.0°C (104.0°F), blood pressure 140/80 mm Hg, heart rate 98/min, and respiratory rate 28/min. On physical exam, he is thin and poorly kept. His clothes appear dirty. Small scars are visible in the decubitus region of both arms. The lung sounds are equal with bilateral crackles, and heart auscultation reveals a systolic murmur that radiates to the left axilla. Petechiae are seen on the hard palate and palms of his hands. A chest X-ray and blood cultures are ordered. What is the most likely organism causing his symptoms?

(A) Streptococci viridans

(B) Staphylococcus aureus

(C) Aspergillus fumigatus

(D) Staphylococcus epidermidis

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Staphylococcus aureus is the most likely cause, making **choice B** correct. This presentation is most consistent with **infective endocarditis** in a person with **injection drug use** signs, and the **American College of Cardiology/American Heart Association (ACC/AHA)** guidance lists **S. aureus** among the typical blood-culture organisms for IE and recommends applying the Modified Duke Criteria in suspected cases [1]. In people who inject drugs, **S. aureus is the predominant organism** causing right-sided IE, which fits the fever, murmur, palatal/palmar petechiae, and pulmonary symptoms from septic emboli [2].

Why the other choices are less likely

- **Viridans group streptococci** are classic for subacute IE, often after dental sources, but are less likely than **S. aureus** in this clinical setting [1] [2].
- **Staphylococcus epidermidis** is more associated with prosthetic valves or indwelling cardiac devices rather than native-valve IE in injection drug use [1].
- **Aspergillus fumigatus** can cause endocarditis, but it is far less likely here than bacterial IE and is not the typical organism in this scenario [1].

References

[1] Management of Patients With Valvular Heart Disease

American College of Cardiology, American Heart Association · 2020-12-17 00:00:00

Major criteria for infective endocarditis include blood culture positive for IE with typical microorganisms consistent with IE from 2 separate blood cultures: viridans streptococci, Streptococcus bovis, HACEK group, S. aureus; or community-acquired enterococci, in the absence of a primary focus. In patients with suspected IE, the Modified Duke Criteria should be used for diagnosis.

https://www.ahajournals.org/doi/10.1161/CIR.0000000000000923

[2] Infective endocarditis in intravenous drug abusers: an update.

European Journal of Clinical Microbiology & Infectious Diseases · 2012-11-01

Infective endocarditis in intravenous drug users is mainly in right-sided heart disease, often with tricuspid valve involvement, and Staphylococcus aureus is the predominant causative organism in this population.

10.1007/s10096-012-1675-x

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353. MedQA question ID 925 Step 1

Question

A 6-month-old boy presents to a pediatrician for the evaluation of recurrent bacterial infections. He has a history of a variety of bacterial infections since birth. Physical examination reveals light-colored skin with silver-colored hair. The pediatrician suspects an immunodeficiency disorder and decides to order several tests. Study of the boy's neutrophils reveals that they contain large cytoplasmic vacuoles. Genetic studies show a mutation in the LYST gene. Which of the following is the most likely diagnosis in this patient?

(A) Acquired immunodeficiency syndrome (AIDS)

(B) Common variable immunodeficiency

(C) Chediak-Higashi syndrome

(D) Leukocyte adhesion deficiency–1

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely diagnosis is Chediak-Higashi syndrome (choice C), an inborn error of immunity that classically presents with **partial oculocutaneous albinism, recurrent bacterial infections, and giant cytoplasmic granules/vacuoles in neutrophils** due to **LYST** mutation [1] [2]. The American College of Allergy, Asthma, and Immunology/American Academy of Allergy, Asthma & Immunology notes that CHS should be suspected in patients with partial oculocutaneous albinism and bacterial infections, and that a peripheral blood smear is the first diagnostic test [1].

Why the other choices are less likely

- **AIDS** does not explain the classic albinism, silver hair, or giant neutrophil granules.
- **Common variable immunodeficiency** typically presents later and does not cause this morphologic finding.
- **Leukocyte adhesion deficiency-1** causes delayed umbilical cord separation, recurrent bacterial infections, and poor wound healing, but not albinism or giant cytoplasmic granules.

Key clue

The combination of **silver-colored hair**, **light-colored skin**, **recurrent pyogenic infections**, **giant vacuoles in neutrophils**, and a **LYST mutation** is essentially diagnostic of **Chediak-Higashi syndrome** [1] [2].

References

[1] Diagnosis and Management of Primary Immunodeficiency

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology · 2015-09-01 12:00:00

CHS should be suspected in patients with partial oculocutaneous albinism, bacterial infections, and progressive neurological symptoms. Examination of a peripheral blood smear should be the first diagnostic test for suspected CHS.

https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Practice%20and%20Parameters/PID-Nov-2015.pdf

[2] Chediak-Higashi syndrome: a review of the past, present, and future.

Drug Discovery Today: Disease Models · 2020-01-01

Chediak-Higashi syndrome is a rare autosomal-recessive disorder caused by mutations in the LYST gene and characterized by partial oculocutaneous albinism, recurrent infections, and giant granules in leukocytes.

10.1016/j.ddmod.2019.10.008

354. MedQA question ID 124 Step 1

Question

A obstetrician is working in a developing country to help promote maternal health and fetal well being. While there, he delivers a baby who he suspects has congenital hypothyroidism, most likely caused by inadequate maternal iodine intake. Which of the following signs and symptoms would NOT be expected to be observed in this child?

(A) Hypotonia

(B) Diarrhea

(C) Umbilical hernia

(D) Macroglossia

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Diarrhea is **not expected** in congenital hypothyroidism; the typical GI finding is **constipation**, not diarrhea. Common findings include **hypotonia**, **umbilical hernia**, and **macroglossia**, along with lethargy, poor feeding, prolonged jaundice, and large fontanels [1] [2] [3].

Expected clinical pattern

- **Hypotonia**: expected in congenital hypothyroidism [1] [2] [3]
- **Umbilical hernia**: expected [1] [2] [3]
- **Macroglossia**: expected [1] [2] [3]
- **Diarrhea**: **not expected**; **constipation** is the classic bowel symptom [1] [2] [3]

The **American Thyroid Association (ATA)** also recommends newborn blood spot screening for hypothyroidism at **2–4 days after birth** [4].

References

[1] Hypothyroidism and hyperthyroidism.
Acta bio-medica : Atenei Parmensis · 2019-09-30
Congenital hypothyroidism occurs in 1:2000-4000 newborns. Common clinical features include decreased activity and increased sleep, feeding difficulty, constipation, prolonged jaundice, large fontanels (especially posterior), macroglossia, distended abdomen with umbilical hernia, and hypotonia.
10.23750/abm.v90i10-s.8765

[2] Congenital hypothyroidism.
Orphanet Journal of Rare Diseases · 2010-06-10
Congenital hypothyroidism occurs in approximately 1:2,000 to 1:4,000 newborns. Common symptoms include decreased activity and increased sleep, feeding difficulty, constipation, and prolonged jaundice. Transient CH most commonly occurs in preterm infants born in areas of iodine deficiency. Levothyroxine is the treatment of choice.
10.1186/1750-1172-5-17

[3] Congenital hypothyroidism: recommendations of the Thyroid Department of the Brazilian Society of Endocrinology and Metabolism.
Arquivos brasileiros de endocrinologia e metabologia · 2013-04-01
Congenital hypothyroidism is the most common congenital endocrine disorder with an incidence of 1:2,000 to 1:4,000 live births. The most frequent symptoms are prolonged neonatal jaundice, hoarse cry, lethargy, slow movements, constipation, macroglossia, umbilical hernia, large fontanelle, hypotonia and dry skin.
10.1590/s0004-27302013000300004

[4] Diagnosis and Management of Thyroid Disease During Pregnancy and the Postpartum
American Thyroid Association · 2017-03-01 00:00:00
All newborns should be screened for hypothyroidism by blood spot analysis typically 2–4 days after birth.
https://www.liebertpub.com/doi/full/10.1089/thy.2016.0457

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355. MedQA question ID 6 Step 1

Question

A 68-year-old male comes to the physician for evaluation of right flank pain. He has a history of diabetes and peripheral artery disease. His blood pressure is 160/90 mm Hg. Physical examination shows abdominal tenderness and right flank tenderness. An ultrasound shows dilation of the right ureter and renal pelvis. Which of the following is the most likely underlying cause of this patient's condition?

(A) Renal artery stenosis

(B) Benign prostatic hyperplasia

(C) Common iliac artery aneurysm

(D) Urethral stricture

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Common iliac artery aneurysm is the most likely cause. Aneurysmal enlargement of the iliac/aorto-iliac vessels can compress the adjacent ureter and produce unilateral hydroureteronephrosis with flank pain; the **European Society for Vascular Surgery (ESVS)** specifically recognizes iliac artery aneurysms as a distinct aorto-iliac aneurysm entity, and case literature documents ureteral obstruction/hydronephrosis from internal/common iliac aneurysms [1] [2]. The patient's age, peripheral artery disease, hypertension, and flank pain with right ureteral/renal pelvic dilation fit extrinsic ureteral compression better than bladder outlet obstruction or renal artery stenosis [1] [2].

Why the other choices are less likely

- **Renal artery stenosis** causes renovascular hypertension and renal ischemia, not isolated ureteral dilation/hydronephrosis [3].

- **Benign prostatic hyperplasia** usually causes bladder outlet obstruction with lower urinary tract symptoms and often bilateral upper-tract dilation when severe, rather than a unilateral right-sided obstruction from an extrinsic pelvic mass [4].
- **Urethral stricture** also causes lower urinary tract obstruction, weak stream, and retention rather than unilateral hydroureteronephrosis from external ureteral compression [4].

Key clinical clue

- **Unilateral hydronephrosis plus vascular risk factors** should raise concern for a **pelvic/iliac vascular aneurysm compressing the ureter** [1] [2].

References

[1] Management of Abdominal Aorto-Iliac Artery Aneurysms
European Society for Vascular Surgery · 2024-02-01 00:00:00
The ESVS recommends management of abdominal aorto-iliac artery aneurysms and recognizes iliac artery aneurysms as aortic/iliac aneurysm pathology; patients with an iliac artery aneurysm (common iliac artery, internal iliac artery, and external iliac artery, or combination thereof) should be considered for elective repair at a diameter of ≥ 40 mm.
https://www.ejves.com/article/S1078-5884(23)00889-4/fulltext

[2] A rare case of large isolated internal iliac artery aneurysm with ureteral obstruction and hydronephrosis: Compression symptoms are limitation for endovascular procedures.
Vascular · 2015-04-01
A case of isolated internal iliac artery aneurysm with ureteral obstruction and hydronephrosis documented compression symptoms from a pelvic aneurysm causing hydroureteronephrosis.
10.1177/1708538114533963

[3] Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults
American College of Cardiology, American Heart Association · 2025-08-14 12:00:00
In adults with hypertension and atherosclerotic renal artery stenosis, medical therapy is recommended to reduce kidney and cardiovascular morbidity and mortality.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000001356

[4] Bilateral Hydroureteronephrosis with a Hypertrophied, Trabeculated Urinary Bladder.
The Malaysian journal of medical sciences : MJMS · 2017-03-01
Bilateral hydroureteronephrosis involves dilatation of the renal pelvis, calyces and ureter. Renal calculus is the most common cause, but there are multiple non-calculus aetiologies. Pelviureteric junction obstruction, benign prostatic hypertrophy, urethral stricture, neurogenic bladder, retroperitoneal mass and bladder outlet obstruction are frequent causes in adults.
10.21315/mjms2017.24.2.14

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356. MedQA question ID 9 Step 1

Question

A 23-year-old woman comes to the physician because she is embarrassed about the appearance of her nails. She has no history of serious illness and takes no medications. She appears well. A photograph of the nails is shown. Which of the following additional findings is most likely in this patient?

(A) Silvery plaques on extensor surfaces

(B) Flesh-colored papules in the lumbosacral region

(C) Erosions of the dental enamel

(D) Holosystolic murmur at the left lower sternal border

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The American Academy of Dermatology (AAD) and National Psoriasis Foundation (NPF) describe nail psoriasis as part of the spectrum of psoriasis, which is commonly associated with skin disease featuring red plaques with silvery scale. In a patient with abnormal-appearing nails, the most likely additional finding is **silvery plaques on extensor surfaces** [1] [2]. Nail psoriasis commonly presents with **pitting, onycholysis, subungual hyperkeratosis, and splinter hemorrhages**, and it is often associated with cutaneous psoriasis and sometimes psoriatic arthritis [1] [3].

Best answer

A. Silvery plaques on extensor surfaces

Why the other choices are less likely

- **Flesh-colored papules in the lumbosacral region** suggests tuberous sclerosis.
- **Erosions of the dental enamel** suggests amelogenesis imperfecta or another enamel defect.
- **Holosystolic murmur at the left lower sternal border** suggests a ventricular septal defect or tricuspid regurgitation, not psoriasis.

Clinical note

Nail involvement can occur with psoriasis even when skin disease is subtle, but the most classic associated skin finding remains **extensor plaques with silvery scale** [1] [2].

References

[1] Management and Treatment of Psoriasis with Topical Therapy and Alternative Medicine Modalities for Psoriasis Severity Measures

American Academy of Dermatology, National Psoriasis Foundation · 2020-06-30 12:00:00

- Psoriasis is an immune-related skin disease associated with a type of arthritis.
- There is no known cause of psoriasis.
- There are many different appearances of psoriasis with names such as vulgaris, plaque, guttate, erythrodermic, pustular, palmoplantar, inverse, and nail.
- Symptoms include a variety of disfiguring skin rashes that itch, burn, bleed and pit fingernails and toenails.

https://www.jaad.org/article/S0190-9622(20)32288-X/fulltext

[2] Treatment of Psoriatic Arthritis

American College of Rheumatology, National Psoriasis Foundation · 2018-11-30 00:00:00

- Psoriatic arthritis is often associated with psoriasis, a skin condition that causes red patches with silvery scales. Most people with psoriatic arthritis have psoriasis, but the skin rash usually appears years before the joint problems. However, some people may experience joint pain before or at the same time as the skin rash.

https://onlinelibrary.wiley.com/doi/full/10.1002/acr.23789

[3] Nail psoriasis: a review.

American Journal of Clinical Dermatology · 2012-12-01

Nail psoriasis is common in up to half of patients and in 90% of patients with psoriatic arthritis. The most common clinical signs are nail plate pitting and onycholysis, oil drop discoloration, subungual hyperkeratosis, and splinter hemorrhages.

10.2165/11597000-000000000-00000

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357. MedQA question ID 854 Step 1

Question

A 32-year-old woman presents to the emergency department with abdominal pain and vaginal discharge. She gave birth to a healthy baby boy three days prior to presentation. Since then, she has been feeling sick, and she is concerned that she has been getting worse over time. On presentation, her temperature is 100.7°F (38.1°C), blood pressure is 115/78 mmHg, pulse is 105/min, and respirations are 14/min. Physical exam reveals abdominal discomfort with uterine tenderness, and laboratory results show elevated white blood cell count with many plasma cells. The most likely cause of this patient's disorder has which of the following characteristics?

(A) Alpha-hemolytic cocci in chains

(B) Beta-hemolytic cocci in chains

(C) Coagulase-positive cocci in clusters

(D) Gamma-hemolytic cocci in chains

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely diagnosis is postpartum endometritis, and the causative organisms are usually part of the normal vaginal flora; clinically, this is a polymicrobial infection that commonly includes anaerobes and Gram-negative organisms. The best answer among the options is **B. beta-hemolytic cocci in chains** if a streptococcal pathogen is being targeted, but the broader microbiology of postpartum endometritis is mixed vaginal flora rather than a single organism [1] [2].

Why this fits

- The presentation of **fever within days of delivery, uterine tenderness, abdominal pain, and foul vaginal discharge** is classic for postpartum endometritis [1].
- High-quality evidence reviews describe postpartum endometritis as an infection caused by **organisms from the normal vaginal flora**; the IDSA surgical-site infection guidance similarly emphasizes **Gram-negative bacteria and anaerobes** for infections involving the female genital tract [1] [2].

Best answer choice

- **B. Beta-hemolytic cocci in chains**
- This is the closest option if the question is asking for a streptococcal morphology.
- **Group A streptococci** can cause severe postpartum uterine infection, but they are not the only or most typical organisms overall [1].

Clinical note

- **Coagulase-positive cocci in clusters** would suggest *Staphylococcus aureus*, which is not the classic cause of postpartum endometritis [2].
- **Alpha-hemolytic cocci in chains** would suggest viridans streptococci, and **gamma-hemolytic cocci in chains** would suggest nonhemolytic streptococci/enterococci; neither is the best fit here [1] [2].

References

[1] Postpartum endometritis caused by herpes and cytomegaloviruses.
Obstetrics and Gynecology · 2011-02-01
Postpartum endometritis is usually caused by organisms that are part of the normal vaginal flora.
10.1097/AOG.0b013e3181f73805

[2] Diagnosis and Management of Skin and Soft Tissue Infections
Infectious Diseases Society of America · 2014-07-15 00:00:00
Agents active against Gram-negative bacteria and anaerobes, such as a cephalosporin or fluoroquinolone in combination with metronidazole, are recommended for infections after operations on the axilla, gastrointestinal (GI) tract, perineum or female genital tract.
https://academic.oup.com/cid/article/59/2/e10/2895845?searchresult=1

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358. MedQA question ID 86 Step 2/3

Question

A previously healthy 30-year-old woman comes to the physician for the evaluation of pain during sexual intercourse for 6 months. She also reports frequent episodes of crampy pelvic pain that starts one day before menses and lasts for 7 days. Her symptoms are not relieved with pain medication. Menses occur at regular 28-day intervals and last 5 days. Her last menstrual period was 2 weeks ago. She is sexually active with her husband. She uses a combined oral contraceptive pill. Her vital signs are within normal limits. Physical examination shows rectovaginal tenderness. Cervical and urethral swabs are negative. Transvaginal ultrasonography shows no abnormalities. Which of the following is the most appropriate next step in management?

(A) Measurement of CA-125 levels

(B) Hysterectomy

(C) Laparoscopy

(D) Hysteroscopy

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most appropriate next step is laparoscopy for suspected endometriosis. The **National Institute for Health and Care Excellence (NICE)** recommends **considering laparoscopy even when transvaginal ultrasound is normal** in women with suspected endometriosis, and it specifically advises **not using serum CA-125 to diagnose endometriosis** [1]. This patient's cyclic pelvic pain, deep dyspareunia, rectovaginal tenderness, and negative infection workup are all classic for endometriosis, so further surgical evaluation is more appropriate than hysteroscopy or hysterectomy [2] [3].

Why laparoscopy fits this case

- **Normal ultrasound does not exclude endometriosis** [1] [2].
- NICE recommends **laparoscopy to diagnose endometriosis** when symptoms persist, even after normal ultrasound or MRI [1].
- During laparoscopy, a gynaecologist trained in endometriosis surgery should perform a **systematic inspection of the pelvis**; biopsy may be taken to confirm disease [1].

Why the other choices are less appropriate

- **CA-125**: **not recommended** as a diagnostic test for endometriosis [1].
- **Hysterectomy**: reserved for selected patients when definitively indicated; it is not the next diagnostic step in a 30-year-old with suspected endometriosis [3].
- **Hysteroscopy**: evaluates the uterine cavity and is not the preferred test for suspected endometriosis [1].

Answer: (C) Laparoscopy.

References

[1] Endometriosis: Diagnosis and Management
National Institute for Health and Care Excellence · 2024-11-11 00:00:00
1.5.11 Consider laparoscopy to diagnose endometriosis in women or people with suspected endometriosis, even if the ultrasound scan or MRI scan was normal. 1.5.8 Do not use serum CA125 to diagnose endometriosis.
https://www.nice.org.uk/guidance/ng73

[2] Endometriosis: Diagnosis and Management
National Institute for Health and Care Excellence · 2024-11-11 00:00:00
Suspect endometriosis in women presenting with chronic pelvic pain, period-related pain (dysmenorrhoea), deep pain during or after sexual intercourse, or cyclical gastrointestinal or urinary symptoms.
https://www.nice.org.uk/guidance/ng73

[3] Endometriosis: Diagnosis and Management
National Institute for Health and Care Excellence · 2024-11-11 00:00:00
Perform surgery for endometriosis laparoscopically, unless there are contraindications. Discuss surgical management options with women with suspected or confirmed endometriosis.
https://www.nice.org.uk/guidance/ng73

359. MedQA question ID 1238 Step 1

Question

A 45-year-old woman presents with sudden-onset dyspnea. Her past medical history is significant for varicose veins in her lower extremities, well-controlled diabetes mellitus type 2, and a 25 pack-year smoking history. The patient currently takes metformin and pioglitazone. Family history is significant for her sister who died at the age of 35 because of a pulmonary embolism. Her temperature is 37.8°C (100.0°F), the pulse is 111/min, the respirations are 18/min, and the blood pressure is 130/60 mm Hg. On physical examination, the patient is pale and diaphoretic. Cardiac exam is significant for an S3 gallop. There is erythema and swelling over multiple varicose veins in her left leg. Ultrasound of her left leg is positive for a deep vein thrombosis. The patient is admitted, and anticoagulation is started with a vitamin K inhibitor. However, despite these interventions, she dies shortly after admission. Which of the following was the most likely etiology of this patient's condition?

(A) Distal peripheral microembolism

(B) Necrotizing fasciitis

(C) Protein S deficiency

(D) Waldenström macroglobulinemia

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Protein S deficiency is the most likely etiology. This presentation is most consistent with **massive pulmonary embolism from an inherited thrombophilia**, and a strong first-degree family history of fatal venous thromboembolism at a young age makes a hereditary cause more likely than an acquired local process. Inherited thrombophilias associated with venous thromboembolism include **protein S deficiency**, factor V Leiden, prothrombin G20210A, antithrombin deficiency, and protein C deficiency [1] [2].

Why this fits best

- Sudden dyspnea, tachycardia, diaphoresis, and an **S3** with known **DVT** are classic for **acute PE**.
- The family history of a sister dying at **35** from PE suggests an inherited prothrombotic disorder.
- Among the answer choices, **protein S deficiency** is the only hereditary thrombophilia listed.

Why the other choices are less likely

- **Distal peripheral microembolism** does not explain the abrupt cardiopulmonary collapse after DVT.
- **Necrotizing fasciitis** would not cause this PE/DVT pattern.

- **Waldenström macroglobulinemia** is not the typical cause of this presentation.

Most likely diagnosis: fatal pulmonary embolism due to protein S deficiency.

References

[1] Management of inherited thrombophilia: guide for genetics professionals.
Clinical genetics · 2012-01-01
Venous thromboembolism is a common source of morbidity and mortality in developed countries. Risk factors for VTE include Factor V Leiden, prothrombin 20210G>A, deficiencies of antithrombin, protein C and protein S.
10.1111/j.1399-0004.2011.01746.x

[2] Hereditary risk factors for thrombophilia and probability of venous thromboembolism during pregnancy and the puerperium.
Blood · 2016-11-10
Venous thromboembolism (VTE) is a leading cause of maternal mortality. The current recommendations for antenatal thromboprophylaxis in women with severe throsbophilia such as homozygous factor V Leiden mutation (FVL), antithrombin deficiency, protein C deficiency, and protein S deficiency.
10.1182/blood-2016-03-703728

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360. MedQA question ID 1105 Step 1

Question

A 55-year-old woman presents to the office because she has been feeling weak. For the past 2 years, she has been urinating a considerable volume every time she goes to the bathroom. She has no past medical history. Her heart rate is 86/min, respiratory rate is 15/min, temperature is 37.4°C (99.3°F), and blood pressure is 111/79 mm Hg. Laboratory studies are significant for the following:
Calcium 13.8 mg/dL
PTH 230 pg/mL
Her complete metabolic panel is otherwise within normal limits. Imaging studies show subperiosteal resorption and osteoporosis. Scintigraphy reveals the most common pathologic condition associated with the patient's diagnosis. Which of the following is the most likely diagnosis in this patient?

(A) Adenoma

(B) Carcinoma

(C) Decreased calcitriol concentration

(D) Phosphate retention

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Primary hyperparathyroidism due to a parathyroid adenoma is the most likely diagnosis. The combination of **marked hypercalcemia (calcium 13.8 mg/dL)** with **inappropriately elevated PTH**

(230 pg/mL) plus **subperiosteal resorption and osteoporosis** is classic for symptomatic primary hyperparathyroidism, and the **most common pathologic lesion is a single parathyroid adenoma** [1] [2] [3]. Among the options, **adenoma** is correct; **carcinoma** is much less common, and **decreased calcitriol** or **phosphate retention** would not fit this hypercalcemic, PTH-mediated picture [1] [2] [3].

Why the other choices are less likely

- **Carcinoma:** can cause severe hypercalcemia, but it is far less common than adenoma in primary hyperparathyroidism [1] [3].
- **Decreased calcitriol concentration:** would not explain an elevated PTH with this degree of hypercalcemia [2].
- **Phosphate retention:** is associated with secondary/tertiary hyperparathyroidism in chronic kidney disease, not this normal metabolic panel and hypercalcemic presentation [2].

References

[1] Current concepts in the management of primary hyperparathyroidism.
Indian journal of surgical oncology · 2010-04-01
Primary hyperparathyroidism is the commonest cause of hypercalcemia in the ambulatory setting. The most common pathologic finding is parathyroid adenoma, followed by hyperplasia, double adenomas and parathyroid carcinoma.
10.1007/s13193-010-0023-9

[2] Primary hyperparathyroidism.
Best practice & research. Clinical endocrinology & metabolism · 2024-01-01
Primary hyperparathyroidism is the most common cause of hypercalcemia and parathyroid hormone (PTH) levels that are either frankly elevated or inappropriately normal. The clinical presentation of PHPT includes three phenotypes: target organ involvement of the renal and skeletal systems, mild asymptomatic, high PTH levels in the context of persistently normal albumin-corrected and ionized serum calcium values.
10.1016/j.beem.2018.09.013

[3] Intrathyroidal parathyroid adenoma mimicking thyroid cancer.
Endocrine journal · 2020-06-29
Primary hyperparathyroidism (PHPT) is the most common cause of hypercalcemia. In 80-85% of cases, there is a single parathyroid adenoma which may be located posteriorly to the thyroid lobes or in ectopic sites.
10.1507/endocrj.ej19-0594

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361. MedQA question ID 1029 Step 2/3

Question

A 24-year-old woman presents to her primary care physician for a wellness visit. She says that she has been generally healthy but has noticed difficulty concentrating, becoming increasingly fatigued, and a 15-pound weight increase over the course of a few months. She also reports mild constipation and joint pain. Approximately 6-months ago, she experienced palpitations, increased stool frequency, and a hand tremor. Her past medical history is significant for asthma. Her father is not living and had Parkinson disease, and her mother has poorly controlled rheumatoid arthritis. She is currently sexually active in a monogamous relationship and uses contraception consistently. She denies cigarette smoking and occasionally drinks wine. She experimented once with lysergic acid diethylamide 6 years ago. Her temperature is 99°F (37.2°C), blood pressure is 127/98 mmHg, pulse is 55/min, and respirations are 13/min. On physical exam, the patient has slow speech and

movement. She has tenderness to palpation of her wrist and ankle joints. She has delayed relaxation of deep tendon reflexes. Which of the following will most likely be found in this patient?

(A) Elevated TSH

(B) High Patient Health Questionnaire-9 (PHQ-9) score

(C) Positive anti-CCP antibodies

(D) Positive urine toxicology

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Elevated TSH is most likely. The **American Thyroid Association (ATA)** states that **serum TSH is the best initial test for primary hypothyroidism**, and this patient's fatigue, weight gain, constipation, bradycardia, slow speech/movement, and delayed reflex relaxation are classic for hypothyroidism [1] [2]. Her earlier palpitations, increased stool frequency, and tremor suggest a prior thyrotoxic phase, which can occur in autoimmune thyroiditis before progression to hypothyroidism [3].

Why the other choices are less likely

- **High PHQ-9 score** could overlap with fatigue and poor concentration, but the abnormal thyroid exam/vitals and delayed reflexes point to an endocrine cause rather than primary depression [2].
- **Positive anti-CCP antibodies** would support rheumatoid arthritis, but the thyroid-related symptom pattern and exam findings are more specific for hypothyroidism [2].
- **Positive urine toxicology** is not supported by the history; a single LSD exposure 6 years ago would not explain the current syndrome [2] [3].

References

[1] Thyroid Stimulating Hormone and Thyroid Hormones (Triiodothyronine and Thyroxine)
American Thyroid Association · 2023-08-31 00:00:00
Serum TSH measurement is the best test to screen for primary hypothyroidism in all age groups.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10517335/

[2] Hypothyroidism.
Lancet (London, England) · 2017-09-23
Hypothyroidism is a common condition of thyroid hormone deficiency. The most common symptoms in adults are fatigue, lethargy, cold intolerance, weight gain, constipation, change in voice, and dry skin.
10.1016/s0140-6736(17)30703-1

[3] Hyperthyroidism
JAMA · 2023-10-17
Clinical manifestations of thyrotoxicosis include palpitations, weight loss from increased metabolism and energy expenditure, diarrhea or loose stools, excessive sweating, heat intolerance, and irregular menses. Autoimmunity (postpartum or sporadic painless thyroiditis) can cause thyroidal inflammation and release of stored hormones into the bloodstream, causing thyrotoxicosis but not hyperthyroidism.
10.1001/jama.2023.19052

362. MedQA question ID 556 Step 1

Question

A previously healthy 6-year-old boy is brought to the physician because of generalized malaise and a palpable swelling in the left axilla. The parents report that 2 weeks ago, his daycare group visited an animal shelter, after which he developed a rash on the left hand. His temperature is 38.5°C (101.3°F). Physical examination shows three linear crusts on an erythematous background on the dorsum of the left hand. There is tender left-sided axillary and cervical lymphadenopathy. Histopathologic examination of an axillary lymph node shows necrotizing granulomas. The most likely causal organism of this patient's clinical findings is also involved in the pathogenesis of which of the following conditions?

(A) Bacillary angiomatosis

(B) Condylomata lata

(C) Brucellosis

(D) Bubonic plague

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely organism is *Bartonella henselae*, and it is also involved in bacillary angiomatosis **(choice A) [1] [2].** This child's exposure to a cat/animal shelter, inoculation lesion on the hand, fever, and tender regional lymphadenopathy with necrotizing granulomas are classic for cat-scratch disease due to *B. henselae* [1] [2].

Why this answer fits

- **Cat-scratch disease** commonly presents in children with a papule or scratch at the inoculation site followed by **regional lymphadenopathy**; axillary and cervical nodes are common sites [2].
- *B. henselae* can also cause **bacillary angiomatosis**, a vasoproliferative infection classically seen in immunocompromised patients [3] [4].

Why the other options do not fit

- **Condylomata lata**: secondary syphilis due to *Treponema pallidum*.
- **Brucellosis**: caused by *Brucella* species.
- **Bubonic plague**: caused by *Yersinia pestis*.

References

[1] Diagnosis and Management of Skin and Soft Tissue Infections

Infectious Diseases Society of America · 2014-07-15 00:00:00

Azithromycin is recommended for cat scratch disease and Patients >45 kg, 500 mg on day 1 followed by 250 mg for 4 additional days. and Patients < 45 kg, 10 mg/kg on day 1 and 5 mg/kg for 4 more days.

https://academic.oup.com/cid/article/59/2/e10/2895845?searchresult=1

[2] Bartonella spp. Infections Identified by Molecular Methods, United States

Emerging Infectious Diseases · 2023-03-01

Persons <18 years of age commonly had lymph node or abscess involvement, typical of cat-scratch disease.

10.3201/eid2903.221223

[3] Homelessness and Organ Donor–Derived Bartonella quintana Infection

Emerging Infectious Diseases · 2024-12-01

In the early years of the HIV/AIDS epidemic, however, B. quintana and the closely related species B. henselae were identified as the cause of bacillary angiomatosis, causing extremely vascular lesions of the skin.

10.3201/eid3012.240389

[4] Cutaneous bacillary angiomatosis in renal transplant recipients: report of three new cases and literature review.

Transplant Infectious Disease · 2012-08-01

Bacillary angiomatosis (BA) is a rare vasculoproliferative disorder due to Bartonella henselae. It can involve many organs, including the skin, and is associated with fever, lymphadenopathy, and liver, spleen, or lung nodules.

10.1111/j.1399-3062.2011.00713.x

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363. MedQA question ID 621 Step 1

Question

A 59-year-old man with a history of sickle cell disease presents to the emergency department for evaluation of his fever and night sweats. He is extremely lethargic and is unable to provide an adequate history to his physician. His wife noted that roughly 3 days ago, her husband mentioned that something bit him, but she cannot remember what exactly. The vital signs include blood pressure 85/67 mm Hg, pulse rate 107/min, and respiratory rate 35/min. Upon examination, the man is currently afebrile but is lethargic and pale. His spleen is surgically absent. There are some swollen bite marks on his right hand with red streaks extending to his elbow. Which of the following bites would be most concerning in this patient?

(A) Human bite

(B) Spider bite

(C) Fish bite

(D) Dog bite

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Dog bite is the most concerning here. The **Infectious Diseases Society of America (IDSA)** recommends early antimicrobial therapy for bite wounds in **asplenic** patients, because animal oral flora—especially **Capnocytophaga canimorsus** from **dog bites**—can cause rapidly progressive sepsis in this setting [1] [2]. In an asplenic patient with hypotension, lethargy, and lymphangitic spread after a bite, a dog bite is the highest-risk exposure among the options [1] [2].

Why this matters

- **Asplenia** is a major risk factor for severe infection after **dog or cat bites** [1] [2].
- **Capnocytophaga canimorsus** is a dog/cat oral flora organism associated with fulminant sepsis, particularly after **dog bites** in asplenic patients [2] [3] [4].
- The wound description and systemic instability are most consistent with a high-risk **infected dog bite** rather than a spider, fish, or human bite [1] [2].

References

[1] Diagnosis and Management of Skin and Soft Tissue Infections

Infectious Diseases Society of America · 2014-07-15 00:00:00

Preemptive early antimicrobial therapy for 3-5 days is recommended for patients who: are immunocompromised; are asplenic; have advanced liver disease; have preexisting or resultant edema of the affected area; have moderate to severe injuries, especially to the hand or face; or have injuries that may have penetrated the periosteum or joint capsule.

https://academic.oup.com/cid/article/59/2/e10/2895845?searchresult=1

[2] [A fatal septic shock due to Capnocytophaga canimorsus and review of literature].

La Revue de medecine interne · 2018-10-01

Capnocytophaga canimorsus is a bacterium present in normal dogs and cats mouths. It can be responsible for septic shocks after dog or cat bite, especially in asplenic patients.

10.1016/j.revmed.2018.03.384

[3] Capnocytophaga canimorsus: an emerging cause of sepsis, meningitis, and post-splenectomy infection after dog bites.

European journal of clinical microbiology & infectious diseases : official publication of the European Society of Clinical Microbiology · 2015-07-01

Capnocytophaga canimorsus is a bacterial pathogen found in the saliva of healthy dogs and cats. It is transmitted to humans principally by dog bites. 484 patients with a median age of 55 were reported. The case-fatality rate was about 26%. Clinical presentations included severe sepsis, high-grade bacteremia, meningitis, endocarditis, and eye infections.

10.1007/s10096-015-2360-7

[4] Capnocytophaga canimorsus sepsis in a methotrexate-treated patient with rheumatoid arthritis.

The American journal of the medical sciences · 2013-01-01

Capnocytophaga canimorsus is a gram-negative rod that can be transmitted by dog bites. It commonly causes sepsis in patients with splenectomy or alcoholism.

10.1097/maj.0b013e318262db1a

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364. MedQA question ID 539 Step 1

Question

A 70-year-old man with a history of hypertension and atrial fibrillation comes to the physician for shortness of breath with mild exertion, progressive weakness, and a dry cough that has persisted for

6 months. He has smoked a pack of cigarettes daily for 45 years. His medications include warfarin, enalapril, and amiodarone. His pulse is 85/min and irregularly irregular. Physical examination shows enlarged fingertips and markedly curved nails. A CT scan of the chest shows clustered air spaces and reticular opacities in the basal parts of the lung. Which of the following is the most likely underlying mechanism of this patient's dyspnea?

(A) Chronic airway inflammation

(B) Bronchial hyperresponsiveness and obstruction

(C) Pleural scarring

(D) Excess collagen deposition in the extracellular matrix of the lung

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most likely diagnosis is idiopathic pulmonary fibrosis (IPF), and the dyspnea is due to progressive pulmonary fibrosis with excess collagen deposition in the extracellular matrix **of the lung** [1] [5] [8]. The clinical picture of chronic dry cough, exertional dyspnea, digital clubbing, and a basal/subpleural reticular pattern with honeycombing or clustered air spaces on CT is most consistent with a usual interstitial pneumonia pattern, which is the radiologic hallmark of IPF [1] [6].

Answer: D. Excess collagen deposition in the extracellular matrix of the lung [1] [8].

References

[1] Diagnosis of Idiopathic Pulmonary Fibrosis
American Thoracic Society, European Respiratory Society · 2018-09-03 00:00:00
Idiopathic pulmonary fibrosis (IPF) is a chronic lung disease that causes the lungs to become scarred and stiff, making it difficult to breathe. IPF is an interstitial lung disease (ILD) and can only be diagnosed after eliminating other potential causes of ILD and identifying specific findings on high-resolution computed tomography.
https://www.atsjournals.org/doi/full/10.1164/rccm.201807-1255ST

[2] Diagnosis of Idiopathic Pulmonary Fibrosis
American Thoracic Society, European Respiratory Society · 2018-09-03 00:00:00
HRCT UIP pattern is subpleural and basal predominant, often heterogeneous, with honeycombing with or without traction bronchiectasis/bronchiolectasis and superimposed reticular pattern.
https://www.atsjournals.org/doi/full/10.1164/rccm.201807-1255ST

[3] Treatment Of Idiopathic Pulmonary Fibrosis
American Thoracic Society · 2015-07-01 00:00:00
Idiopathic pulmonary fibrosis is a chronic progressive fibrosing interstitial pneumonia of unknown cause occurring in adults, with radiologic and/or histopathologic patterns consistent with usual interstitial pneumonia.
https://www.atsjournals.org/doi/full/10.1164/rccm.201506-1063ST

[4] Idiopathic pulmonary fibrosis.
Lancet · 2011-12-03
The histological picture of idiopathic pulmonary fibrosis is usual interstitial pneumonia, with dense fibrosis and fibroblastic proliferation reflecting aberrant healing after repeated alveolar epithelial injury.
10.1016/S0140-6736(11)60052-4

[5] Idiopathic pulmonary fibrosis: Current and future treatment.
The Clinical Respiratory Journal · 2022-02-01
Idiopathic pulmonary fibrosis is a chronic fibrotic lung disease characterized by dry cough, fatigue, and progressive exertional dyspnea; the mainstay therapies are antifibrotic drugs that slow disease progression.
10.1111/crj.13466

[6] Detection and Early Referral of Patients With Interstitial Lung Abnormalities
Chest · 2021-06-29
Honeycombing is generally considered to indicate fibrosing interstitial lung disease, and basal/subpleural honeycombing supports a fibrotic UIP pattern.
10.1016/j.chest.2021.06.035

[7] Therapeutic Approach to Adult Fibrotic Lung Diseases
Chest · 2016-08-10
Idiopathic pulmonary fibrosis is characterized by epithelial injury with abnormal wound healing; therapies focus on attenuating fibrosis.
10.1016/j.chest.2016.07.027

[8] Idiopathic pulmonary fibrosis.
Lancet · 2011-12-03
Idiopathic pulmonary fibrosis is a progressive interstitial lung disease characterized by accumulation of extracellular matrix and impaired gas exchange, with excessive production of extracellular matrix and collagen by fibroblasts and myofibroblasts.
10.1016/S0140-6736(11)60052-4

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365. MedQA question ID 1113 Step 2/3

Question

A 15-year-old girl comes to the physician because of a 2-week history of genital lesions. She has no history of serious illness. She is sexually active with 2 male partners and uses condoms inconsistently. Vital signs are within normal limits. Pelvic examination shows multiple hyperkeratotic exophytic papules over the vulva. The lesions turn white on application of 3% acetic acid. Which of the following is most likely to have prevented this patient's condition?

(A) Condoms

(B) Anti-HIV prophylaxis

(C) Spermicidal foam

(D) Vaccination

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The best answer is D. Vaccination. The **Centers for Disease Control and Prevention (CDC)** recommends routine **HPV vaccination** for all persons through age 26 years, and the **human papillomavirus (HPV) vaccine** prevents infection with the HPV types that cause anogenital warts [1]. In clinical trials and reviews, prophylactic HPV vaccination reduced **anogenital warts** substantially, with quadrivalent vaccine trials showing **100% efficacy** for prevention of anogenital warts [2].

Why the other options are not the best prevention

- **Condoms** reduce STI transmission risk, but they do **not fully prevent HPV transmission** because HPV spreads via skin-to-skin contact outside areas covered by condoms [3].
- **Anti-HIV prophylaxis** does not prevent HPV-related genital warts.
- **Spermicidal foam** does not prevent HPV infection or genital warts.

Clinical implication

For a **15-year-old sexually active girl**, HPV vaccination is still indicated if not previously completed; at age **15 years or older** at initiation, the CDC uses a **3-dose series at 0, 1–2 months, and 6 months** [1].

References

[1] Recommended Adult Immunization Schedule: United States, 2024

Centers for Disease Control and Prevention · 2024-01-12 12:00:00

Routine vaccination: All persons up through age 26 years: 2- or 3-dose series depending on age at initial vaccination or condition. Age 15 years or older at initial vaccination: 3-dose series at 0, 1–2 months, 6 months.

https://www.acpjournals.org/doi/10.7326/M23-3269

[2] Human Papillomavirus Vaccination

New England Journal of Medicine · 2023-05-10

Trials of the quadrivalent vaccine showed 100% efficacy for the prevention of anogenital warts.

10.1056/nejmcp2108502

[3] Self-Care Interventions for Health: Sexual and Reproductive Health and Rights

World Health Organization · 2019-06-01 00:00:00

The consistent and correct use of male and female condoms is highly effective in preventing the sexual transmission of HIV; reducing the risk of acquiring other STIs and associated conditions, including genital warts and cervical cancer; and preventing unintended pregnancy.

https://apps.who.int/iris/bitstream/handle/10665/325719/WHO-RHR-19.14-eng.pdf?ua=1

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366. MedQA question ID 565 Step 2/3

Question

A 63-year-old man comes to the physician for the evaluation of an unintentional 10-kg (22-lb) weight loss over the past 6 months. During this period, the patient has had recurrent episodes of high-grade fever, night sweats, and feelings of fatigue. Two months ago, he had herpes zoster that was treated with acyclovir. He appears pale. Temperature is 38.5°C (101.3°F), pulse is 90/min, and blood pressure 130/80 mm Hg. Physical examination shows generalized painless lymphadenopathy. The liver and the spleen are palpated 2–3 cm below the right and the left costal margin, respectively.

Laboratory studies show:
Hematocrit 42%
Leukocyte count 15,000/mm3
Segmented neutrophils 46%
Eosinophils 1%
Lymphocytes 50%
Monocytes 3%
Platelet count 120,000/mm3
Blood smear shows mature lymphocytes that rupture easily and appear as artifacts on a blood smear. Flow cytometry shows lymphocytes expressing CD5, CD19, CD20, and CD23. Which of the following is the most appropriate treatment?"

(A) All-trans retinoic acid

(B) Fludarabine, cyclophosphamide, rituximab

(C) Observation and disease progression monitoring

(D) Imatinib only
"

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Fludarabine, cyclophosphamide, and rituximab (FCR) is the best answer among the listed choices for a symptomatic patient with chronic lymphocytic leukemia (CLL), because this presentation meets treatment criteria rather than observation-only management [1] [2]. The European Hematology Association/European Society for Medical Oncology (EHA/ESMO) guidance and contemporary reviews note that **asymptomatic** CLL can be observed, but **symptomatic disease requiring therapy** should be treated; in fit patients without TP53 aberrations, FCR remains a potential chemoimmunotherapy option [1] [2].

Why the other options are not appropriate

- **Observation and disease progression monitoring** is for **asymptomatic** CLL or patients who have not met treatment criteria; this patient has B symptoms, progressive cytopenia, and organ/lymph node involvement [1].
- **All-trans retinoic acid** is used for acute promyelocytic leukemia, not CLL.
- **Imatinib only** is used for BCR-ABL–positive chronic myeloid leukemia or related indications, not CLL.

Clinical interpretation

This patient has classic CLL findings: **smudge cells**, a **CD5+ / CD19+ / CD20+ / CD23+** B-cell phenotype, generalized lymphadenopathy, hepatosplenomegaly, and constitutional symptoms. Those findings support **treatment rather than watchful waiting** [1] [2].

Caveat

Although **FCR** is the best answer from the choices, many current CLL guidelines now favor **targeted therapy** for most patients, and chemoimmunotherapy is no longer routine in treatment-naïve CLL unless targeted options are unavailable or contraindicated [3].

References

[1] Chronic lymphocytic leukemia: from molecular pathogenesis to novel therapeutic strategies
Haematologica · 2020-07-02
For patients with symptomatic disease requiring therapy, ibrutinib is often recommended... Apart from ibrutinib, patients with M-CLL, devoid of TP53 aberrations and fit enough to tolerate FCR therapy, may still be good candidates for the latter, with the benefit being that this treatment can be completed in 6 months while ibrutinib must be taken indefinitely.
10.3324/haematol.2019.236000

[2] Sequential and combination treatments with novel agents in chronic lymphocytic leukemia
Haematologica · 2019-11-01
Chemoimmunotherapy still plays a role in the treatment of patients with mutated IGHV genes, in whom the combination of fludarabine, cyclophosphamide and rituximab produces a remarkably long progression-free survival (PFS) in nearly half of the patients, with the possibility of cure in those who have not relapsed beyond 10 years.
10.3324/haematol.2018.208603

[3] Treatment of Chronic Lymphocytic Leukaemia
British Society for Haematology · 2025-10-09 00:00:00
There remains no evidence to treat asymptomatic CLL where iwCLL treatment criteria have not been met... Chemoimmunotherapy (including FCR, BR or CO) is no longer routinely recommended for treatment-naïve or relapsed/refractory CLL unless both BTKi and BCL2i therapies are unavailable or contraindicated.
https://onlinelibrary.wiley.com/doi/10.1111/bjh.70100

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367. MedQA question ID 637 Step 1

Question

A 12-year-old girl is brought to your psychiatry office by her parents, who are concerned that she has not made any friends since starting middle school last year. The girl tells you that she gets nervous around other children, as she cannot tell what they are feeling, when they are joking, or what she has in common with them. Her teachers describe her as “easily distracted” and “easily upset by change.” When asked about her hobbies and interests, she states that “marine biology” is her only interest and gives you a 15-minute unsolicited explanation of how to identify different penguin species. Mental status exam is notable for intense eye contact, flat affect, and concrete thought process. Which of the following is true regarding this child’s disorder?

(A) Boys are more commonly affected than girls

(B) Impaired attention is a key feature of the disorder

(C) Intellectual disability is a key feature of the disorder

(D) Typical age of onset is 3-5 years of age

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

This child has autism spectrum disorder (ASD), and **A. Boys are more commonly affected than girls** is the true statement. ASD is defined by **social-communication deficits plus restricted, repetitive interests or behaviors**, with symptoms that begin in **early childhood/toddlerhood**; **impaired attention is not a defining feature**, and **intellectual disability is not required** [1] [2] [3].

Why the other choices are false

- **B. Impaired attention is a key feature** — No. Difficulty with attention can coexist with ASD, but it is not a core diagnostic feature [2].
- **C. Intellectual disability is a key feature** — No. The majority of children with ASD have **average to above-average intellectual ability** [3].
- **D. Typical age of onset is 3-5 years** — No. ASD features typically **emerge very early in life**, often in toddlerhood, even if diagnosis is made later [1].

References

[1] The Early Origins of Autism.

Child and adolescent psychiatric clinics of North America · 2017-07-01

Autistic spectrum disorders are neurodevelopmental disorders whose core features of impaired social communication and atypical repetitive behaviors and/or restrictions in range of interests emerge in toddlerhood. The ability to reliably identify most cases of the condition far earlier than the average age of diagnosis presents a novel opportunity for early intervention.

10.1016/j.chc.2017.02.008

[2] Parent-reported and clinician-observed autism spectrum disorder (ASD) symptoms in children with attention deficit/hyperactivity disorder (ADHD): implications for practice under DSM-5.

Molecular Autism · 2016-01-01

The study found that four social communication ADOS items adequately differentiated children with autism spectrum disorder from children with attention-deficit/hyperactivity disorder, highlighting the challenges clinicians face in distinguishing ASD from other disorders in verbally fluent, school-age children.

10.1186/s13229-016-0072-1

[3] CE: From the CDC: Understanding Autism Spectrum Disorder.

The American Journal of Nursing · 2020-10-01

Autistic spectrum disorder (ASD) is characterized by deficits in communication and social interaction and restricted, repetitive patterns of behavior, interests, and activities. The majority of children who fall on the spectrum have average to above average intellectual ability.

10.1097/01.NAJ.0000718628.09065.1b

368. MedQA question ID 135 Step 1

Question

A medical researcher is studying the physiology of the immune system in order to better understand the effects of HIV on patients. He isolates a group of cells that are shown by flow cytometry to be positive for the cell surface marker CD8. He then mixes this cell population with a group of infected cells, crosslinks extracellular interactions, and immunoprecipitates the CD8 protein. He identifies a protein bound to CD8 that is composed of two chains from an adjacent cell. Which of the following best describes the primary function of the protein that was most likely identified?

(A) Binds complement proteins on the cell surface

(B) Binds endogenous peptides that are present in the endosome

(C) Binds endogenous peptides that have been transported by the TAP channel

(D) Binds exogenous peptides that are present in the endosome

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Binds endogenous peptides that have been transported by the TAP channel. The protein identified is most likely **MHC class I**, which is a heterodimer made of a polymorphic heavy chain plus **β2-microglobulin** on the adjacent cell surface. **MHC class I presents intracellular/endogenous peptides that are generated in the cytosol, transported into the endoplasmic reticulum by TAP, and displayed to CD8+ T cells** [1] [2].

Why this fits

- **CD8** coreceptors bind **MHC class I** on an adjacent cell during recognition of infected or altered cells [1] [2].
- The key role of **MHC class I** is to present **endogenous peptides** to **CD8+ cytotoxic T lymphocytes** [1] [3].
- By contrast, **MHC class II** presents **exogenous peptides from the endosome** to CD4+ T cells, not CD8+ T cells [4].

Incorrect choices

- **A**: complement binding is not the primary function of MHC class I.
- **B** and **D**: these describe **MHC class II**-type antigen presentation pathways, not the molecule bound by CD8 [4].

References

[1] Endogenous TAP-independent MHC-I antigen presentation: not just the ER lumen.
Current Opinion in Immunology · 2020-06-01

Altered and infected cells are eliminated by CD8(+) cytotoxic T lymphocytes. This requires production of antigenic peptides mostly in the cytosol, transport to the endoplasmic reticulum by the transporter associated with antigen processing (TAP) and cell surface presentation by major histocompatibility complex class I (MHC-I).
10.1016/j.coi.2019.12.003

[2] Are membrane proteins favored over cytosolic proteins in TAP-independent processing pathways?
Molecular Immunology · 2013-09-01
The recognition of infected or altered cells by CD8(+) cytotoxic T lymphocytes is mediated by direct interaction of their T-cell receptor with peptides presented by MHC class I molecules. Peptides are transferred for assembly with newly synthesized MHC molecules by the transporters associated with antigen processing (TAP).
10.1016/j.molimm.2012.10.018

[3] Cancer Immune Evasion Through Loss of MHC Class I Antigen Presentation.
Frontiers in Immunology · 2021-01-01
Major histocompatibility class I (MHC I) molecules bind peptides derived from a cell's expressed genes and then transport and display this antigenic information on the cell surface. This allows CD8 T cells to identify pathological cells that are synthesizing abnormal proteins, such as cancers that are expressing mutated proteins.
10.3389/fimmu.2021.636568

[4] Antigen processing and immune regulation in the response to tumours.
Immunology · 2017-01-01
The MHC class I and II antigen processing and presentation pathways display peptides to circulating CD8(+) cytotoxic and CD4(+) helper T cells respectively to enable pathogens and transformed cells to be identified.
10.1111/imm.12675

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369. MedQA question ID 665 Step 1

Question

A 31-year-old man comes to the physician because of a 4-week history of a painless lump near the left wrist and tingling pain over his left hand. Physical examination shows a transilluminating, rubbery, fixed, non-tender mass over the lateral volar aspect of the left wrist. There is decreased sensation to pinprick on the thumb, index finger, middle finger, and radial half of the ring finger of the left hand. The tingling pain is aggravated by tapping over the swelling. Which of the following adjacent structures is at risk of entrapment if this mass persists?

(A) Ulnar artery

(B) Flexor pollicis longus tendon

(C) Flexor carpi radialis tendon

(D) Ulnar nerve

Correct Response:
B
Synthesize Response:
C✕

Synthesize Answer

The most likely adjacent structure at risk is the flexor carpi radialis tendon, so the best answer is C. A volar radial wrist ganglion commonly lies **between the radial artery and the flexor carpi radialis (FCR) tendon** and can compress nearby wrist structures as it enlarges [1] [2]. The sensory symptoms described are also consistent with **median-nerve distribution irritation** from a volar wrist mass, but among the listed options the anatomically closest and classically associated structure is the **FCR tendon** [2].

Why the other choices are less likely

- **A. Ulnar artery** and **D. Ulnar nerve** are ulnar-sided structures, not typical neighbors of a volar radial ganglion [2].
- **B. Flexor pollicis longus tendon** is deeper and more central within the carpal tunnel region, not the usual adjacent structure for a volar radial ganglion [2].

Bottom line

For a **painless, transilluminating volar radial wrist mass**, the classic adjacent structure is the **FCR tendon** [1] [2].

References

[1] Sonography of Wrist Ganglion Cysts: Which Location Is Most Common?
Journal of Ultrasound in Medicine · 2019-08-01
The cysts were multilocular or multilobular with a mean largest dimension of 1.0 cm.
10.1002/jum.14912

[2] Diagnostic and Interventional US of the Wrist and Hand: Quadrant-based Approach.
Radiographics · 2023-08-01
A quadrant-based approach provides a rational method for performing a focused examination and joint positioning during both diagnostic imaging and intervention. Volar wrist disorders involve the median nerve and the digital flexor system comprised of the flexor tendons and pulleys.
10.1148/rg.230046

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370. MedQA question ID 363 Step 2/3

Question

A 36-year-old woman comes to the physician because of a painless lump on her neck for 3 months that has increased in size. She appears healthy. Examination shows a 2.5-cm (1-in) firm, irregular swelling on the left side of the neck that moves with swallowing. There is painless cervical lymphadenopathy. Ultrasound of the neck shows a solitary left lobe thyroid mass with increased vascularity and hyperechogenic punctate regions. A fine needle aspiration biopsy is scheduled for the following week. Which of the following is the most likely diagnosis?

(A) Follicular carcinoma of the thyroid

(B) Hürthle cell carcinoma of the thyroid

(C) Papillary carcinoma of the thyroid

(D) Anaplastic carcinoma of the thyroid

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Papillary thyroid carcinoma is the most likely diagnosis. The American Thyroid Association (ATA) considers a thyroid nodule with **high-suspicion ultrasound features**—especially **punctate echogenic foci/microcalcifications** and associated **cervical lymphadenopathy**—to warrant fine-needle aspiration, and these findings are most characteristic of papillary carcinoma rather than follicular or Hürthle cell carcinoma [1] [2]. Painless enlarging thyroid mass with nodal disease also fits the usual presentation of papillary thyroid cancer; anaplastic carcinoma is typically much more rapidly progressive and occurs in older patients [3] [4].

Why the other choices are less likely

- **Follicular carcinoma** and **Hürthle cell carcinoma** more often present as solitary thyroid nodules **without microcalcifications**; follicular-pattern tumors are also less likely to present with prominent cervical nodal metastases at diagnosis [2].
- **Anaplastic carcinoma** usually presents as an **aggressive, rapidly enlarging**, often symptomatic neck mass in an older patient, which does not match this 36-year-old woman with a painless, slowly enlarging lesion [4].

Bottom line

The combination of a **firm thyroid mass**, **painless cervical lymphadenopathy**, and **hyperechogenic punctate regions on ultrasound** most strongly supports **papillary thyroid carcinoma** [1] [3].

References

[1] Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer
American Thyroid Association · 2016-01-12 00:00:00
6. Thyroid sonography with survey of the cervical lymph nodes should be performed in all patients with known or suspected thyroid nodules.
https://www.liebertpub.com/doi/full/10.1089/thy.2015.0020

[2] Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer
American Thyroid Association · 2016-01-12 00:00:00
8. Thyroid nodule diagnostic FNA is recommended for nodules >1 cm in greatest dimension with high suspicion sonographic pattern.
https://www.liebertpub.com/doi/full/10.1089/thy.2015.0020

[3] Sonographic evaluation of cervical lymph nodes in papillary thyroid cancer.
Ultrasound Quarterly · 2013-03-01
Sonography is the modality of choice for imaging cervical lymph nodes in patients with papillary thyroid cancer. Microcalcifications, cystic changes, abnormal morphology, and disordered vascularity should be sought during surveillance scans as well as in targeting for fine-needle aspiration.
10.1097/ruq.0b013e31827c7a9e

[4] Management of Patients with Anaplastic Thyroid Cancer
American Thyroid Association · 2021-03-20 00:00:00

FNA cytology can play an important diagnostic role in the initial evaluation of ATC, but parallel core biopsy may be necessary for definitive diagnosis and to obtain sufficient material for molecular interrogation.
https://doi.org/10.1089/thy.2020.0944

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371. MedQA question ID 558 Step 2/3

Question

A 44-year-old man presents to the family medicine clinic for some small bumps on his left thigh. The lesions are non-pruritic and have been present for the last 3 weeks. He reports feeling fatigued and malaise for the past few months. The patient has no known medical problems and takes no medications. He smokes one pack of cigarettes per day and uses intravenous street drugs. His heart rate is 82/min, the respiratory rate is 14/min, the temperature is 36.7°C (98.1°F), and the blood pressure is 126/80 mm Hg. Auscultation of the heart is without murmurs. Lungs are clear to auscultation bilaterally. Three 2-3 mm, dome-shaped, hardened papules are noted on the left thigh. Central umbilication can be observed in each papule. There is a non-tender cervical lymphadenopathy present. Which of the following is the most likely diagnosis?

(A) Bed bug bite

(B) Molluscum contagiosum

(C) Atopic dermatitis

(D) Acute urticaria

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely diagnosis is molluscum contagiosum (B). It classically causes **small, dome-shaped, firm papules with central umbilication** and can occur on the **legs/thighs** in adults; lesions are often painless and may be more numerous or atypical in immunocompromised patients [1] [2]. The patient's **fatigue, malaise, intravenous drug use, and cervical lymphadenopathy** raise concern for an underlying immunocompromised state, which can make molluscum more extensive or persistent [1] [3].

Why the other choices are less likely

- **Bed bug bites** are usually **pruritic** and tend to appear in clusters or linear groupings rather than as umbilicated papules.
- **Atopic dermatitis** is typically **pruritic eczema**, not discrete hardened umbilicated papules.
- **Acute urticaria** produces **transient wheals/hives** that are pruritic and migratory, not fixed papules lasting weeks.

Key clinical point

The morphology here is the deciding feature: **central umbilication + small dome-shaped papules** is most consistent with **molluscum contagiosum** [1] [2].

References

[1] Monkeypox
The Lancet · 2022-11-17
Molluscum contagiosum (MC) presents as single or multiple small papules with central umbilication.
10.1016/S0140-6736(22)02075-X

[2] Clinical, Histopathological, and Virological Evaluation of 203 Patients With a Clinical Diagnosis of Molluscum Contagiosum
Open Forum Infectious Diseases · 2018-11-01
Molluscum contagiosum manifests as small, umbilicated papules caused by the molluscuscum contagiousiosum virus (MCV).
10.1093/ofid/ofy298

[3] Interventions for molluscum contagiosum in people infected with human immunodeficiency virus: a systematic review
International Journal of Dermatology · 2016-09-01
Molluscum contagiosum is a viral skin disease that presents with white, painless papules with central umbilication. In HIV positive people, symptoms of MC can be more severe.
10.1111/ijd.13267

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372. MedQA question ID 43 Step 1

Question

A healthy 23-year-old male is undergoing an exercise stress test as part of his physiology class. If blood were to be sampled at different locations before and after the stress test, which area of the body would contain the lowest oxygen content at both time points?

(A) Inferior vena cava

(B) Coronary sinus

(C) Pulmonary artery

(D) Pulmonary vein

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

(B) Coronary sinus is the best answer. The coronary sinus drains venous blood from the myocardium, which extracts more oxygen at baseline than most other tissues, so its blood has the

lowest oxygen content compared with the **inferior vena cava**, **pulmonary artery** (mixed venous blood), and **pulmonary vein** (oxygenated blood) both before and after exercise [1].

Why the other choices are higher

- **Inferior vena cava**: deoxygenated venous blood, but usually not as low in oxygen content as coronary sinus blood [1].
- **Pulmonary artery**: mixed venous blood from the right heart; lower than systemic arterial blood, but not typically lower than coronary sinus blood [1].
- **Pulmonary vein**: carries oxygenated blood back to the left atrium, so it has the **highest** oxygen content of the options [1].

References

[1] Central and Mixed Venous O2 Saturation.
Turkish Journal of Anaesthesiology and Reanimation · 2020-02-01
Mixed and central venous oxygen saturations are commonly used to ascertain the degree of systemic oxygenation in critically ill patients. This review examines the physiological basis for the use of these variables to determine systemic extraction ration, oxygen consumption and tissue oxygenation, and also understand the role they may play in the early treatment of septic individuals.
10.5152/tjar.2019.140

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373. MedQA question ID 1168 Step 1

Question

A 26-year-old woman developed rapidly progressive septic shock associated with nuchal rigidity, petechiae, and purpura. She tested positive for both Kernig and Brudzinski's signs and shows signs of confusion, dyspnea, and hypotension. The blood culture results confirmed the presence of Neisseria meningitidis, and a complete blood count (CBC) revealed leukocytosis. Which one of the cytokines below takes part in the pathogenesis of septic shock?

(A) Tumor necrosis factor-α

(B) Interleukin-5

(C) Interleukin-12

(D) Interleukin-4

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Tumor necrosis factor-alpha (TNF-alpha) is the best answer. Septic shock from invasive meningococcal disease is driven by a **proinflammatory host response** to bacterial endotoxin; **IL-10**

is described as the principal anti-inflammatory cytokine in this setting, making **TNF-alpha** the classic cytokine implicated in septic shock pathogenesis [1] [2].

Why the other choices are less likely

- **Interleukin-4 (IL-4)** and **interleukin-5 (IL-5)** are primarily associated with Th2/eosinophilic immune responses, not septic shock.
- **Interleukin-12 (IL-12)** is a Th1-polarizing cytokine, but **TNF-alpha** is the classic mediator linked to the shock physiology of severe sepsis and meningococcemia [1] [2].

References

[1] The Inflammatory and Hemostatic Response in Sepsis and Meningococcemia
Critical Care Clinics · 2020-04-01
Meningococcemia is notorious for evasion of the host immune system and its rapid progression to fulminant disease. Illness severity is determined by complex interplays among host, pathogen, and environment. The inflammatory host response skews toward a proinflammatory state. This leads to endothelial dysfunction and activation of the hemostatic response.
10.1016/j.ccc.2019.12.005

[2] Global effect of interleukin-10 on the transcriptional profile induced by Neisseria meningitidis in human monocytes
Infection and Immunity · 2012-11-01
In meningococcal septic shock, the dominant cause of inflammation is lipopolysaccharide (LPS) in the outer membrane of Neisseria meningitidis. IL-10 is the principal anti-inflammatory cytokine.
10.1128/iai.00386-12

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374. MedQA question ID 987 Step 2/3

Question

An 11-month-old boy is brought to the emergency department by his mother after she observed jerking movements of his arms and legs for about 30 seconds earlier that morning. He has not had fever, cough, or a runny nose. He has been healthy, except for occasional eczema. He was delivered at home in Romania. His mother had no prenatal care. She reports that he has required more time to reach developmental milestones compared to his older brother. The patient's immunization records are not available. He takes no medications. He appears pale with blue eyes and has a musty odor. He has poor eye contact. Which of the following would have most likely prevented the patient's symptoms?

(A) Levothyroxine therapy during pregnancy

(B) Dietary restriction of phenylalanine

(C) Daily allopurinol intake

(D) Avoidance of fasting states

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Dietary restriction of phenylalanine would most likely have prevented this child's symptoms. The presentation is classic for **phenylketonuria (PKU)**—developmental delay, seizures, fair complexion/blue eyes, and a musty odor—and early diagnosis followed by a **phenylalanine-restricted diet** prevents the major neurologic complications of untreated disease [1] [2] [3].

Why the other choices are not correct

- **A. Levothyroxine therapy during pregnancy** prevents fetal effects of maternal hypothyroidism, not PKU.
- **C. Daily allopurinol intake** is used in some disorders of purine metabolism, not PKU.
- **D. Avoidance of fasting states** is important in some fatty-acid oxidation disorders, which typically cause hypoketotic hypoglycemia rather than the phenotype described here.

Supporting point

Newborn screening and early dietary intervention are the key preventive measures in PKU; untreated phenylalanine excess causes irreversible neurocognitive injury, and treatment consists of **strict restriction of natural protein/phenylalanine** with specialized medical nutrition [1] [2] [3].

References

[1] Phenylketonuria.

Lancet (London, England) · 2010-10-23

Phenylketonuria is caused by an inborn error in aminoacid metabolism. It results from mutations in the phenylalanine hydroxylase gene. Neonatal screening programmes identify individuals with phenylkronuria. The initiation of a phenylaline-restricted diet prevents most of the neuropsychological complications. The diet is difficult to maintain and compliance is often poor in adolescents, young adults, and pregnant women. Tetrahydrobiopterin stimulates the enzyme activity in about 20% of patients.

10.1016/S0140-6736(10)60961-0

[2] Emerging biosensors in Phenylketonuria.

Clinica chimica acta; international journal of clinical chemistry · 2024-06-01

Phenylketonuria (PKU) is an autosomal recessive metabolic disorder resulting from deficient phenylalanine hydroxylase (PAH) enzyme activity. Treatment involves strict dietary restrictions on natural protein intake, supplemented with chemically manufactured protein substitutes containing amino acids other than Phe. Newborn screening programs and early dietary interventions have enhanced outcomes of the potential treatment strategies.

10.1016/j.cca.2024.119725

[3] Phenylketonuria: translating research into novel therapies.

Translational pediatrics · 2014-04-01

Phenylketonuria (PKU) is an inborn error of metabolism of the amino acid phenylalanine. It is an autosomal recessive disorder with a rate of 1 in 10,000 in Caucasian populations. Newborn screening for PKU allows early intervention avoiding irreparable neurological damage and intellectual disability that would arise from untreated PKU. The primary treatment of PKU is the limitation of dietary protein intake. The only alternative therapy currently approved is the supplementation of BH4, the requisite co-factor of PAH, in the orally-available form of sapropterin dihydrochloride.

10.3978/j.issn.2224-4336.2014.01.01

375. MedQA question ID 464 Step 2/3

Question

A 22-year-old woman presents to the emergency department for abdominal pain. The patient has been trying to get pregnant and was successful recently, but now she is experiencing abdominal pain, contractions, and a bloody vaginal discharge. According to her last appointment with her primary care provider, she is 10 weeks pregnant. The patient has a past medical history of constipation, anxiety, and substance abuse. She is not currently taking any medications. Her temperature is 99.5°F (37.5°C), blood pressure is 107/58 mmHg, pulse is 90/min, respirations are 17/min, and oxygen saturation is 98% on room air. Physical exam is notable for a bloody vaginal discharge and an open cervix. The patient is initially extremely grateful for the care she is receiving and thanks the doctor and the nursing staff for saving her baby. Upon hearing the news that she is having a spontaneous abortion, the patient becomes angry and aggressive and states that her physician and the medical staff are incompetent, evil, and she is going to sue all of them. The patient is left to grieve but upon entering the room again you notice that the patient has new lacerations over her wrists and that some of the medical equipment in the room is broken. Which of the following is the most likely diagnosis?

(A) Antisocial personality disorder

(B) Borderline personality disorder

(C) Normal grief response

(D) Post-traumatic stress disorder

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Borderline personality disorder (BPD) is the most likely diagnosis: the patient shows **marked affective instability, intense anger, impulsive self-injury, and aggressive behavior** triggered by an interpersonal stressor, which fits the American Psychiatric Association (APA) description of BPD features [1]. A spontaneous abortion can precipitate distress, but **new self-inflicted wrist lacerations and destruction of equipment** are not consistent with a normal grief response, and the presentation is less typical for PTSD because the core syndrome requires trauma-related re-experiencing, avoidance, and hyperarousal after a qualifying traumatic event [2].

Why BPD fits best

- The APA notes that BPD commonly involves **intense anger**, **impulsivity**, **suicide attempts or self-injury**, and stress-related worsening of symptoms [1].
- BPD is also commonly associated with **substance use disorders** and other psychiatric comorbidity, which is relevant in this case [1].
- Evidence in patients with BPD shows **anger and impulsive aggression** are prominent clinical features linked to self-harm/suicidal risk [3] [4].

Why the other choices are less likely

- **Antisocial personality disorder** is characterized by a pervasive pattern of disregard for others' rights starting in childhood/adolescence; the vignette centers on affective reactivity and self-harm rather than a longstanding conduct pattern [1].
- **Normal grief response** may include sadness, anger, and crying after pregnancy loss, but **self-injury and violent outbursts** suggest psychopathology beyond uncomplicated grief [5].
- **PTSD** requires exposure to a qualifying traumatic event plus symptom clusters of re-experiencing, avoidance, negative alterations in cognition/mood, and hyperarousal; those features are not described here [2].

References

[1] Treatment of Patients With Borderline Personality Disorder

American Psychiatric Association · 2024-11-01 00:00:00

The APA recommends that the initial assessment of a patient with possible borderline personality disorder include the reason the individual is presenting for evaluation; the patient's goals and preferences for treatment; a review of psychiatric symptoms, including core features of personality disorders and common co-occurring disorders; a psychiatric treatment history; an assessment of physical health; an assessment of psychosocial and cultural factors; a mental status examination; and an assessment of risk of suicide, self-injury, and aggressive behaviors.

https://psychiatryonline.org/doi/abs/10.1176/appi.ajp.24181010

[2] Management of Posttraumatic Stress Disorder and Acute Stress Disorder

Veterans Health Administration / Department of Defense · 2023-07-01 12:00:00

For confirmation of the diagnosis of PTSD, we suggest using a validated structured clinician-administered interview, such as the Clinician-Administered PTSD Scale or PTSD Symptom Scale - Interview Version.

https://www.healthquality.va.gov/guidelines/MH/ptsd/

[3] Familial Pathways to Early-Onset Suicide Attempt

JAMA psychiatry · 2015-02-01

Impulsive aggression was an important precursor of mood disorder and could be targeted in interventions designed to prevent youth at high familial risk from making a suicide attempt.

10.1001/jamapsychiatry.2014.2141

[4] Specific or transdiagnostic? The occurrence of emotions and their association with distress in the daily life of patients with borderline personality disorder compared to clinical and healthy controls.

Psychiatry research · 2020-02-01

Borderline personality disorder (BPD) is characterized by more frequent and more intense negative emotions and less frequent positive emotions in daily life than healthy controls. Researchers used multilevel modeling to compare 43 female patients with BPD, 28 patients with PTSD, 20 patients with bulimia nervosa (BN), and 28 HC. They found that BPD patients exhibited anger more frequently than any of the clinical or healthy control groups.

10.1016/j.psychres.2019.112692

[5] Patient-Clinician Communication

American Society of Clinical Oncology · 2026-03-10 12:00:00

Clinicians should recognize and respond empathically to grief and loss among the patient, the patient's support network, and the healthcare team. Clinicians should refer the patient and members of their support network to psychosocial team members when appropriate.

https://ascopubs.org/doi/10.1200/JCO-26-00118

376. MedQA question ID 882 Step 2/3

Question

A 72-year-old man develops reduced urine output and a serum creatinine concentration of 2.9 mg/dL three days after being hospitalized for acute diverticulitis. On admission, a complete blood count showed a hemoglobin concentration of 15.5 g/dL and a leukocyte count of 14,000/mm3. Urinalysis showed 2+ proteinuria, and serum studies showed a blood glucose of 145 mg/dL and a creatinine concentration of 1.2 mg/dL. A CT scan of the abdomen confirmed the diagnosis. Therapy with intravenous ketoprofen, piperacillin, and tazobactam was begun, and the patient was placed on bowel rest. He has a history of hypertension, chronic constipation, and type 2 diabetes mellitus. Prior to admission, his medications were insulin, metoprolol, and losartan. Today, his temperature is 37.7°C (99.9°F), pulse is 97/min, respirations are 12/min, and blood pressure is 135/87 mm Hg. The abdomen is soft on physical examination, and there is tenderness to palpation of the left lower quadrant. The remainder of the examination shows no abnormalities. Which of the following is the most likely cause of this patient's current renal findings?

(A) Gastrointestinal blood loss

(B) Adverse drug reaction

(C) Dehydration

(D) Contrast administration

Correct Response:
D
Synthesize Response:
B✕

Synthesize Answer

The most likely cause is hemodynamically mediated acute kidney injury from NSAID use, with added risk from concurrent losartan in the setting of acute illness—ketoprofen inhibits renal prostaglandin synthesis, which reduces afferent arteriolar dilation and can abruptly lower GFR, especially in older adults, diabetics, and patients taking an **ARB** [1] [2]. The **National Institute for Health and Care Excellence (NICE)** specifically lists **NSAIDs** and **ARBs** as drugs that can cause or exacerbate kidney injury, particularly during acute illness or hypovolemia [1].

Why this is the best fit

- The creatinine rose quickly from **1.2 to 2.9 mg/dL** with oliguria, which is consistent with an acute fall in glomerular filtration rather than chronic kidney disease [1].
- The combination of **NSAID + ARB** is a classic setup for reduced renal perfusion: the NSAID constricts the afferent arteriole, while the ARB reduces efferent arteriolar tone [1].
- **Piperacillin-tazobactam** can also cause drug-induced AKI, including tubulointerstitial injury, but the strongest single mechanistic clue here is the recent **intravenous ketoprofen** exposure [2].

Clinical takeaway

The renal findings are most likely due to **drug-induced prerenal/hemodynamic AKI from NSAID-associated afferent vasoconstriction, worsened by losartan**. In practice, the offending nephrotoxic medications should be stopped and volume status reassessed [1] [3].

References

[1] Acute Kidney Injury: Prevention, Detection and Management
National Institute for Health and Care Excellence · 2024-10-16 00:00:00
Investigate for acute kidney injury, by measuring serum creatinine and comparing with baseline, in adults with acute illness if any of the following are likely or present: ... use of drugs that can cause or exacerbate kidney injury (such as non-steroidal anti-inflammatory drugs [NSAIDs], ... angiotensin II receptor antagonists [ARBs] ...) within the past week, especially if hypovolaemic.
https://www.nice.org.uk/guidance/ng148

[2] Clinical Characteristics and Outcomes of Drug-Induced Acute Kidney Injury Cases.
Kidney international reports · 2023-11-01
The identification of DI-AKi is challenging even with comprehensive adjudication by experienced nephrologists. The most frequent causal nephrotoxic drugs were vancomycin (48.7%), nonsteroidal antiinflammatory drugs (18.2%), and piperacillin/tazobactam (17.8%).
10.1016/j.ekir.2023.07.037

[3] Acute Kidney Injury: Prevention, Detection and Management
National Institute for Health and Care Excellence · 2024-10-16 00:00:00
Consider temporarily stopping ACE inhibitors and ARBs in adults, children and young people with diarrhoea, vomiting or sepsis until their clinical condition has improved and stabilised.
https://www.nice.org.uk/guidance/ng148

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377. MedQA question ID 972 Step 2/3

Question

A 28-year-old woman, gravida 2, para 1, at 40 weeks of gestation is admitted to the hospital in active labor. The patient has attended many prenatal appointments and followed her physician's advice about screening for diseases, laboratory testing, diet, and exercise. Her pregnancy has been uncomplicated. She has no history of a serious illness. Her first child was delivered via normal vaginal delivery. Her vital signs are within normal limits. Cervical examination shows 100% effacement and 10 cm dilation. A cardiotocograph is shown. Which of the following is the most appropriate initial step in management?

(A) Amnioinfusion

(B) Induced vaginal delivery

(C) Reassurance

(D) Repositioning

Correct Response:
C
Synthesize Response:
B✕

Synthesize Answer

The American College of Obstetricians and Gynecologists (ACOG) recommends expedited delivery for a persistent category III fetal heart rate tracing after initial intrauterine resuscitation, and in the second stage of labor a timely instrumental vaginal birth is appropriate when delivery is imminent and expertise is available [1] [2]. In a patient who is fully dilated at 10 cm, the most appropriate initial step is typically **operative vaginal delivery (vacuum or forceps)** rather than waiting, assuming the fetus is low enough and the tracing is concerning enough to require immediate birth [2]. **Routine maternal oxygen is not recommended** unless maternal hypoxia is present [3].

Management point

- If the tracing is **category III** and does not rapidly improve with initial corrective measures, proceed to **expedited delivery** [1].
- Because this patient is **fully dilated**, the fastest safe route is often **instrumental vaginal delivery** if criteria are met and an experienced operator is available [2].
- If operative vaginal delivery is not feasible or cannot be accomplished quickly/safely, move to **cesarean delivery** [1] [2].

Why not oxygen alone

- **ACOG recommends against routine maternal oxygen** for category II or III tracings in the absence of maternal hypoxia [3].

References

[1] Intrapartum Fetal Heart Rate Monitoring: Interpretation and Management
American College of Obstetricians and Gynecologists · 2025-09-18 12:00:00
ACOG recommends expedited delivery in the setting of a category III fetal heart rate tracing not responsive to initial attempt(s) at intrapartum intrauterine resuscitation when indicated.
https://journals.lww.com/greenjournal/fulltext/2025/10000/acog_clinical_practice_guideline_no_.22.aspx

[2] Operative Vaginal Birth
American College of Obstetricians and Gynecologists · 2020-04-01 12:00:00
For the fetus that manifests signs of compromise in the second stage of labor, the timely and skilled use of instrumental vaginal birth has the potential to decrease the exposure to intrauterine insults and could decrease the contribution of intrapartum factors leading to neonatal encephalopathy and hypoxic–ischemic encephalopathy.
https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2020/04/operative-vaginal-birth

[3] Intrapartum Fetal Heart Rate Monitoring: Interpretation and Management
American College of Obstetricians and Gynecologists · 2025-09-18 12:00:00
ACOG recommends against routine maternal oxygen administration for category II or III fetal heart rate tracings in the absence of maternal hypoxia.
https://journals.lww.com/greenjournal/fulltext/2025/10000/acog_clinical_practice_guideline_no_.22.aspx

378. MedQA question ID 163 Step 1

Question

A 32-year-old man with HIV infection is brought to the emergency department by his roommate because of a 2-week history of progressively worsening headache and vomiting. Current medications include trimethoprim-sulfamethoxazole, dolutegravir, and tenofovir-emtricitabine. His temperature is 38.5°C (101.3°F). Physical examination shows nuchal rigidity. Kernig and Brudzinski signs are present. A lumbar puncture is performed and shows an opening pressure of 32 cm H2O (N: < 20). The pathogen isolated from the cerebrospinal fluid (CSF) can be cultured on Sabouraud agar. Further evaluation of this patient's CSF is most likely to show which of the following additional findings?

(A) Positive latex agglutination test

(B) Positive PCR for HSV-2 DNA

(C) Presence of tachyzoites

(D) Increased adenosine deaminase concentration

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely additional CSF finding is a positive latex agglutination test for cryptococcal antigen. In an HIV-infected patient with subacute meningitis, elevated opening pressure, and a pathogen that grows on **Sabouraud agar**, the diagnosis is **cryptococcal meningitis**; CSF and blood cryptococcal antigen testing is recommended, and a rapid antigen assay is the preferred diagnostic test when available [1] [2]. The other options fit different infections: **HSV-2 PCR** suggests viral meningitis, **tachyzoites** suggest toxoplasmosis, and **increased adenosine deaminase** is more supportive of tuberculous meningitis [1] [2].

Diagnostic clue

- **Cryptococcus neoformans/gattii** can be cultured on **Sabouraud agar**.
- CSF testing is expected to show **cryptococcal antigen positivity**; older **latex agglutination** assays can be positive, although newer guidance prefers **lateral flow assay** over latex agglutination when available [2].

Clinical implication

- The markedly elevated opening pressure (32 cm H2O) is also typical of cryptococcal meningitis and should be managed with **serial therapeutic lumbar punctures** when symptomatic or persistently elevated [1].

References

[1] Management of Cryptococcal Disease
Infectious Diseases Society of America · 2010-02-01 00:00:00

Identify CSF pressure at baseline. A prompt baseline lumbar puncture is strongly encouraged, but in the presence of focal neurologic signs or impaired mentation it should be delayed pending the results of a computed tomography (CT) or magnetic resonance imaging (MRI) scan.

https://academic.oup.com/cid/article/50/3/291/392360?searchresult=1

[2] Cryptococcosis In Solid Organ Transplantation

American Society of Transplantation · 2019-04-01 12:00:00

Cryptococcal antigen testing from blood and CSF should be performed preferably using the lateral flow assay over latex agglutination assay.

https://onlinelibrary.wiley.com/doi/10.1111/ctr.13543

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379. MedQA question ID 697 Step 1

Question

A 35-year-old male presents to the emergency department for evaluation of hemoptysis. A chest X-ray reveals bilateral focal pulmonary consolidation. On further questioning, he admits having hematuria. Urinalysis shows RBC casts and 400 mL of urine is excreted in 24 hours. What is the most likely cause of hemoptysis and hematuria in this patient?

(A) Anti-Smith antibodies

(B) Anti-neutrophil antibodies

(C) Anti-mitochondrial antibodies

(D) Anti-glomerular basement membrane antibodies

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most likely cause is anti-glomerular basement membrane (anti-GBM) antibodies [1] [2]. This presentation is classic for **pulmonary-renal syndrome**: **hemoptysis from alveolar hemorrhage** plus **glomerulonephritis** with hematuria, RBC casts, and oliguria. The American College of Rheumatology notes that ANCA-associated vasculitis more commonly causes pulmonary hemorrhage with pauci-immune glomerulonephritis, but the combination of hemoptysis and rapidly progressive renal injury is also characteristic of **anti-GBM disease** [1]; review articles describe anti-GBM disease as caused by antibodies against type IV collagen in the glomerular and alveolar basement membranes [2] [3].

Why not the other options?

- **Anti-Smith antibodies** are associated with systemic lupus erythematosus, not the classic pulmonary-renal syndrome described here [2].
- **Anti-neutrophil cytoplasmic antibodies (ANCA)** are linked to granulomatosis with polyangiitis or microscopic polyangiitis; these can also cause pulmonary hemorrhage and

glomerulonephritis, but the stem's answer choice is the specific antibody most classically associated with the syndrome [1] [3].

- **Anti-mitochondrial antibodies** are associated with primary biliary cholangitis, not hemoptysis/hematuria [2].

Key clinical point

In a patient with **hemoptysis, bilateral pulmonary infiltrates, hematuria, RBC casts, and oliguria**, the best single answer is **anti-GBM antibodies (Goodpasture disease)** [1] [2] [3].

References

[1] Treatment and Management of ANCA-Associated Vasculitis
American College of Rheumatology · 2021-07-07 00:00:00
Common clinical manifestations of microscopic polyangiitis (MPA) include rapidly progressive pauci-immune glomerulonephritis and alveolar hemorrhage.
https://onlinelibrary.wiley.com/doi/10.1002/acr.24634

[2] Pulmonary renal syndrome: a clinical review.
Breathe (Sheffield, England) · 2022-12-01
The term "pulmonary renal syndrome" describes a clinical syndrome characterised by the presence of both diffuse alveolar haemorrhage and glomerulonephritis. The most common diseases implicated are anti-neutrophil cytoplasm antibodies (ANCA)-positive small vessel vasculitis and anti-glomerular basement membrane (anti-GBM) disease.
10.1183/20734735.0208-2022

[3] Anti-glomerular basement membrane vasculitis.
Autoimmunity reviews · 2023-01-01
Antiglomerular basement membrane disease (anti-GBM) is a rare life-threatening autoimmune vasculitis that involves small vessels. It is characterized by circulating autoantibodies directed against type IV collagen antigens expressed in glomerular and alveolar basement membrane. The typical clinical manifestations are the rapidly progressive glomerulonephritis and the alveolar hemorrhage.
10.1016/j.autrev.2022.103212

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380. MedQA question ID 1059 Step 1

Question

A chronic opioid abuser undergoes emergency surgery. Following the operation, the man is started on a patient controlled analgesia (PCA) thought to be dosed adequately to control his pain in the face of his opioid tolerance. He reports intense pain 6 hours after the conclusion of the surgery. Which agent could have been given intraoperatively to reduce this patient's risk of developing postoperative hyperalgesia?

(A) Ketamine

(B) Midazolam

(C) Propofol

(D) Etomidate

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Ketamine is the best choice. The **American Society of Regional Anesthesia and Pain Medicine (ASRA)** recommends considering **i.v. ketamine** as part of multimodal analgesia in adults, and specifically notes that ketamine may be considered for **opioid-dependent or opioid-tolerant patients undergoing surgery** [1] [2]. In this setting, ketamine is the intraoperative agent most associated with reducing opioid consumption and mitigating opioid-induced hyperalgesia; the other options listed are not used for that purpose [3] [4].

Why ketamine fits this case

- The patient has **chronic opioid use disorder/opioid tolerance**, which increases risk for difficult postoperative pain control and opioid-induced hyperalgesia [2] [3].
- ASRA supports **subanesthetic IV ketamine bolus doses up to 0.35 mg/kg** and infusions up to **1 mg/kg per hour** for acute pain settings, with lower infusion doses sometimes needed to balance analgesia and adverse effects [1].
- Evidence syntheses show ketamine can reduce perioperative opioid use in opioid-dependent patients, although prevention of longer-term chronic postsurgical pain is not consistently demonstrated [3] [5].

Practical takeaway

For intraoperative prevention of postoperative hyperalgesia in an opioid-tolerant patient, **ketamine** is the most appropriate option among those listed [1] [2] [3].

References

[1] Use of Intravenous Ketamine Infusions for Acute Pain Management
American Society of Regional Anesthesia and Pain Medicine · 2018-07-01 12:00:00
Overall, we conclude that moderate evidence supports use of subanesthetic IV ketamine bolus doses (up to 0.35 mg/kg) and infusions (up to 1 mg/kg per hour) as adjuncts to opioids for perioperative analgesia.
https://rapm.bmj.com/content/rapm/43/5/456.full.pdf

[2] Use of Intravenous Ketamine Infusions for Acute Pain Management
American Society of Regional Anesthesia and Pain Medicine · 2018-07-01 12:00:00
Ketamine may be considered for opioid-dependent or opioidtolerant patients undergoing surgery.
https://rapm.bmj.com/content/rapm/43/5/456.full.pdf

[3] Intraoperative ketamine reduces perioperative opiate consumption in opiate-dependent patients with chronic back pain undergoing back surgery.
Anesthesiology · 2010-09-01
Ketamine reduces opiate consumption in the 48-h postoperative period in opiate-dependent patients with chronic pain.
10.1097/aln.0b013e3181e90914

[4] Perioperative Opioid Administration
Anesthesiology · 2020-09-29

Opioid-induced hyperalgesia has bigger implications in chronic pain practice, and it is very likely to be a real phenomenon even in acute care settings. Studies suggest that opioid-induced hyperalgesia is more pronounced, with short-acting or ultrashort-acting agents such as fentanyl and remifentanil.
10.1097/aln.0000000000003572

[5] Pharmacotherapy for the Prevention of Chronic Pain after Surgery in Adults: An Updated Systematic Review and Meta-analysis
Anesthesiology · 2021-06-14
No treatment effect of ketamine was observed on prevalence of any pain regardless of outcome timing, duration of drug administration, or surgical procedure.
10.1097/aln.0000000000003837

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381. MedQA question ID 1233 Step 2/3

Question

A 30-year-old Japanese woman is brought to the emergency department after fainting at work. She says she was only unconscious for a moment and recovered quickly. She reports increasing fatigue and joint pain for the past 4 months. Her blood pressure is 90/60 mm Hg, and her temperature is 36.6°C (98.0°F). On physical examination, the patient is fully conscious. Her radial pulse is absent at her right wrist and 1+ at her left wrist. Laboratory findings are significant for the following:
Hemoglobin: 10.9 g/dL
Hematocrit: 34.7%
Leukocyte count: 5,500/mm3
Neutrophils: 65%
Lymphocytes: 30%
Monocytes: 5%
Mean corpuscular volume: 78.2 µm3
Platelet count: 190,000/mm3
Erythrocyte sedimentation rate: 56 mm/h
What complications is this patient at risk for?

(A) Myocardial infarction

(B) Tongue infarction

(C) Palpable purpura

(D) Polyneuropathy

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The best answer is A. Myocardial infarction. The **American College of Rheumatology (ACR)** identifies **Takayasu arteritis** as a large-vessel vasculitis that primarily affects **younger women** and

causes granulomatous inflammation of the **aorta and its branches**, matching this patient's absent upper-extremity pulse, constitutional symptoms, elevated ESR, and likely limb ischemia [1]. Takayasu arteritis can lead to major ischemic cardiovascular complications, including **coronary involvement and myocardial infarction** [2].

Why the other choices are less likely

- **Tongue infarction**: not a typical complication of Takayasu arteritis.
- **Palpable purpura**: more consistent with small-vessel vasculitis.
- **Polyneuropathy**: can occur in some vasculitides, but it is not the classic complication tested here.

Clinical takeaway

In a **young woman of Asian descent** with systemic symptoms, elevated inflammatory markers, and diminished pulses, **Takayasu arteritis** should be suspected; the key feared complication among the options is **myocardial infarction** from large-vessel/coronary involvement [1] [2].

References

[1] Management of Giant Cell Arteritis and Takayasu Arteritis
American College of Rheumatology · 2021-07-07 00:00:00
Giant cell arteritis (GCA) and Takayasu arteritis (TAK) are systemic vasculitides that primarily affect large and medium-sized vessels. TAK is more common in younger women and causes granulomatous inflammation of the aorta and its branches.
https://onlinelibrary.wiley.com/doi/10.1002/art.41774

[2] Current and Future Treatments for Takayasu Arteritis: Toward Cardiovascular Risk Modification
Circulation · 2026-01-27
Cardiovascular complications can be attributed both to the immediate effects of active disease, arterial inflammation, destruction, and stenosis and to the accrual of longer-term cardiovascular dysfunction.
10.1161/CIRCULATIONAHA.125.076308

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382. MedQA question ID 765 Step 1

Question

A 7-year-old boy is brought to your office with complaints of wheezing and dyspnea. Laboratory work reveals eosinophilia and positive skin tests for allergens. Which of the following types of drugs would be an effective treatment in this patient?

(A) Beta-2 antagonist

(B) Histone deacetylase inhibitor

(C) Muscarinic antagonist

(D) Anticoagulant

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Muscarinic antagonist is the only option listed that is an effective asthma drug class, although it is **not first-line** for allergic/eosinophilic asthma. The **National Heart, Lung, and Blood Institute (NHLBI)** and **British Thoracic Society/National Institute for Health and Care Excellence/ Scottish Intercollegiate Guidelines Network (BTS/NICE/SIGN)** guidelines place **inhaled corticosteroids** as the key controller therapy for asthma, with **short-acting beta2-agonists** for relief and other add-on therapies as needed [1] [2].

Why the other choices are wrong

- **Beta-2 antagonist**: would worsen bronchoconstriction, not treat asthma [1] [2].
- **Histone deacetylase inhibitor**: not a standard treatment for asthma [1] [2].
- **Anticoagulant**: no role in asthma treatment [1] [2].

In a child with wheezing, dyspnea, eosinophilia, and positive skin tests, the overall picture is **allergic asthma**, for which anti-inflammatory inhaled therapy is the usual effective treatment [1] [2].

References

[1] 2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group

National Heart, Lung, and Blood Institute · 2020-12-01 00:00:00

In individuals ages 4 years and older with moderate to severe persistent asthma, the Expert Panel recommends ICS-formoterol in a single inhaler used as both daily controller and reliever therapy compared to either higher-dose ICS as daily controller therapy and SABA for quick-relief therapy, or same-dose ICS-LABA as daily controller therapy and SABA for quick-relief therapy.

https://www.nhlbi.nih.gov/health-topics/all-publications-and-resources/2020-focused-updates-asthma-management-guidelines

[2] Asthma: Diagnosis, Monitoring and Chronic Asthma Management

British Thoracic Society, National Institute for Health and Care Excellence, Scottish Intercollegiate Guidelines Network · 2024-11-27 00:00:00

Offer a twice-daily paediatric low-dose inhaled corticosteroid (ICS), with a short-acting beta2 agonist (SABA) as needed, as initial treatment for children aged 5 to 11 years with newly diagnosed asthma.

https://www.brit-thoracic.org.uk/quality-improvement/guidelines/asthma/

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383. MedQA question ID 396 Step 1

Question

A 25-year-old woman comes to the office complaining of pelvic pain and feeling “off” for the past few weeks. She has not had any changes in diet or lifestyle but reports weight loss despite an increase in appetite. In addition, she has been experiencing chest palpitations, increased frequency of diarrhea, and heat intolerance. Physical exam of her thyroid is unremarkable but her TSH was found to be 0.21 mIU/L. A complex structure in her right ovary was detected on ultrasound. Her symptoms can be explained by which of the following?

(A) Meigs syndrome

(B) Jod-Basedow phenomenon

(C) Dermoid cyst

(D) Struma ovarii

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Struma ovarii best explains this presentation. The **American Thyroid Association (ATA)** lists struma ovarii as a cause of thyrotoxicosis, and recommends **surgical resection after preoperative normalization of thyroid hormone levels** when treatment is needed [1] [2]. In this case, the ovarian mass plus thyrotoxic symptoms and low TSH fit ectopic thyroid hormone production from a thyroid-containing ovarian teratoma rather than Meigs syndrome, Jod-Basedow phenomenon, or a routine dermoid cyst [1] [3].

Why struma ovarii fits

- **Struma ovarii** is an ovarian teratoma composed predominantly of thyroid tissue and can present with pelvic pain or a complex adnexal mass; a minority of cases produce clinically significant thyrotoxicosis [1] [3].
- ATA guidance also notes that **struma ovarii** is in the differential for thyrotoxicosis with **near-absent radioiodine uptake over the neck**, because thyroid hormone production is coming from خارج the thyroid gland [1].

Why the other choices are less likely

- **Meigs syndrome** classically involves an ovarian tumor with ascites and pleural effusion, not thyrotoxicosis [3].
- **Jod-Basedow phenomenon** is iodine-induced hyperthyroidism and is not explained by an ovarian mass [1].
- A **dermoid cyst** may contain multiple tissue types, but thyroid-hormone-mediated hyperthyroidism points specifically to **struma ovarii** when thyroid tissue predominates and is functional [1] [3].

Bottom line

The best answer is **struma ovarii** [1] [3].

References

[1] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis
American Thyroid Association · 2016-10-01 00:00:00
Thyrotoxicosis associated with a near-absent RAI uptake over the neck includes struma ovarii.
https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

[2] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis
American Thyroid Association · 2016-10-01 00:00:00

Patients with struma ovarii should be treated initially with surgical resection following preoperative normalization of thyroid hormones.
https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

[3] Struma ovarii: two case reports of a rare teratoma of the ovary.
Journal of Surgical Case Reports · 2020-12-01
Struma ovarii is a rare type of ovarian teratoma with the unusual presence of thyroid tissue. The diagnosis relies on histopathological examination and is infrequently made on routine investigations.
10.1093/jscr/rjaa493

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384. MedQA question ID 92 Step 1

Question

Six days after undergoing surgical repair of a hip fracture, a previously healthy 79-year-old woman is agitated and confused. She is unarousable during the day, but then is awake and impulsive during the night, requiring frequent reorientation. Her husband says that she usually drinks one to two glasses of wine weekly. Her only current medication is oxycodone for pain. Her vital signs are within normal limits. She is distressed and oriented to person but not to place or time. Neurologic examination shows inattentiveness but no focal deficits. Urine dipstick is normal. Which of the following is the most likely cause of her current condition?

(A) Dementia

(B) Opioid intoxication

(C) Delirium

(D) Urinary tract infection

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Delirium is the most likely cause. The presentation is acute and fluctuating, with inattention, disorientation, and a day-night reversal after major surgery in an older adult; the **American Society of Anesthesiologists (ASA)** and other perioperative guidance identify older age, surgery, and centrally acting medications as important delirium risks, and recommend evaluating medications with CNS effects and using structured delirium assessment [1] [2] [3]. This is not typical for chronic dementia, isolated urinary tract infection, or simple opioid intoxication.

Why delirium fits best

- **Acute onset and fluctuating course**: unarousable during the day, awake and impulsive at night.
- **Inattention** and **disorientation** are core delirium features.

- Recent **hip fracture repair** and **oxycodone** exposure are classic precipitants in an older adult [1] [2] [4].
- Normal vital signs and a normal urine dipstick make infection less likely as the explanation here.

Why the other options are less likely

- **Dementia**: usually chronic and progressive, not sudden and fluctuating.
- **Opioid intoxication**: can cause sedation, but the marked fluctuation, inattention, and nighttime agitation after surgery are more characteristic of delirium; postoperative opioids are also recognized as potential contributors to delirium rather than a complete alternative explanation [1] [4].
- **Urinary tract infection**: no supportive urinary findings are provided, and delirium can occur without infection.

Clinical takeaway

In a 79-year-old after hip fracture surgery, this is **postoperative delirium**, most likely precipitated by the recent operation and medication exposure, with pain and the hospital environment as additional contributors [1] [2] [3] [4].

References

[1] Perioperative Care of Older Adults Scheduled for Inpatient Surgery
American Society of Anesthesiologists · 2024-12-10 00:00:00
Consider the risks and benefits of medications with potential central nervous system effects in older adults, as these drugs may increase the risk of postoperative delirium.
https://journals.lww.com/anesthesiology/fulltext/2025/01000/2025_american_society_of_anesthesiologists.14.aspx

[2] Geriatric Trauma Management
American College of Surgeons · 2023-11-21 12:00:00
The Confusion Assessment Method (CAM) and the CAM-ICU are recommended for identification of delirium.
https://www.facs.org/media/ubyj2ubl/best-practices-guidelines-geriatric-trauma.pdf

[3] Prevention and Treatment of Delirium
American Psychiatric Association · 2025-09-02 12:00:00
APA recommends that a patient's baseline neurocognitive status be determined to permit accurate interpretation of delirium assessments.
https://www.psychiatryonline.org/doi/10.1176/appi.ajp.25182013

[4] Review of Postoperative Delirium in Geriatric Patients After Hip Fracture Treatment
Geriatric orthopaedic surgery & rehabilitation · 2022-01-01
Postoperative delirium is a serious complication in 4-53.3% of geriatric patients undergoing hip fracture surgery. Prevention and early recognition are key factors in managing POD.
10.1177/21514593211058947

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385. MedQA question ID 333 Step 2/3

Question

A 36-year-old man is brought to the emergency department 25 minutes after being involved in a high speed motor-vehicle collision in which he was an unrestrained passenger. He has acute myeloid leukemia and is currently receiving chemotherapy. On arrival, his temperature is 37°C (98.6°F),

pulse is 63/min, respirations are 10/min, and blood pressure is 100/70 mm Hg. The pupils are equal and sluggish. There are multiple bruises over the face, trunk, and right upper and lower extremities. There is a 4-cm (1.6-in) laceration over his right cheek. He does not respond to any commands, but does groan. Painful stimuli cause him to open his eyes and withdraw all extremities. There are decreased breath sounds over the right lung base. There is tenderness to palpation over the left chest wall. Cardiac examination shows no abnormalities. The abdomen is soft and shows diffuse tenderness to palpation with no guarding or rebound. There is swelling of the right elbow and wrist. The right lower extremity is shorter than the left lower extremity. There are 2 lacerations around 2 cm (0.8 in) each on the right leg. The right knee is swollen. Which of the following is the most appropriate next step in management?

(A) Insertion of intercostal chest tube

(B) CT scan of the head and neck

(C) X-rays of the extremities

(D) Intubation and mechanical ventilation

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most appropriate next step is intubation and mechanical ventilation with cervical spine protection. In major trauma, the **American College of Surgeons/ATLS-based approach** prioritizes airway management first, and this patient's **GCS is 8** (eyes to pain, groans, withdraws to pain), which is a standard indication to secure the airway rather than delay for CT or extremity radiographs [1] [2]. The decreased breath sounds and suspected thoracic injury should be addressed during resuscitation, but airway control comes first because of the depressed mental status and risk of loss of airway reflexes [1] [2].

Why not the other choices

- **Intercostal chest tube**: important if a pneumothorax/hemothorax is confirmed or strongly suspected, but not before securing the airway in a patient with **GCS 8** and ongoing multisystem trauma [1] [2].
- **CT scan of the head and neck**: imaging comes after initial stabilization; this patient is not stable enough for definitive diagnostic workup before airway control [1] [2].
- **X-rays of the extremities**: fractures are likely, but they are secondary to immediate airway/ventilation management [1] [2].

References

[1] Management of Chest Wall Injuries
American College of Surgeons · 2025-11-11 12:00:00
Initial resuscitation and airway management are based upon principles from ATLS®.
https://www.facs.org/media/qdgliayt/2025_tr_bestpracticesguidelineschest-wall.pdf

[2] Anaesthesiologist-provided prehospital airway management in patients with traumatic brain injury: an observational study.
European journal of emergency medicine : official journal of the European Society for Emergency Medicine · 2014-12-01
Guidelines recommend that patients with brain trauma with a Glasgow Coma Scale score of less than 9 should have an airway established.
10.1097/mej.0000000000000103

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386. MedQA question ID 263 Step 1

Question

A 35-year-old woman presents with severe fear reactions to seeing dogs after moving into a new suburban neighborhood. She states that she has always had an irrational and excessive fear of dogs but has been able to avoid it for most of her life while living in the city. When she sees her neighbors walking their dogs outside, she is terrified and begins to feel short of breath. Recently, she has stopped picking up her children from the bus stop and no longer plays outside with her children in order to avoid seeing any dogs. Which of the following would be the best definitive treatment for this patient?

(A) Selective serotonin reuptake inhibitors (SSRIs)

(B) Short-acting benzodiazepines

(C) Systematic desensitization

(D) Cognitive behavioral therapy

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Systematic desensitization is the best definitive treatment for this patient's **specific phobia**. For specific phobia, the preferred treatment is **exposure-based therapy**; systematic desensitization is a standard exposure technique and is more definitive than medications for isolated animal phobia [1] [2]. **SSRIs** and **short-acting benzodiazepines** are not the best definitive treatment here [1].

Why this fits the vignette

- The fear is **irrational, excessive, persistent, and avoided**, with clear functional impairment, which is characteristic of **specific phobia**.
- The most effective treatment is **exposure therapy**; reviews also describe exposure-based **cognitive-behavioral therapy (CBT)** as effective, but among the answer choices the most direct exposure-based option is **systematic desensitization** [1] [2] [3].

Why the other options are not best

- **SSRIs** are not first-line definitive therapy for specific phobia [1].
- **Short-acting benzodiazepines** may reduce acute anxiety but do not treat the phobia itself and are not definitive management [1].
- **CBT** can be effective, especially when it includes exposure, but this question's best single answer is the explicit exposure-based option, **systematic desensitization** [1] [2].

References

[1] Factors influencing the success of exposure therapy for specific phobia: A systematic review.
Neuroscience and Biobehavioral Reviews · 2020-01-01
Exposure Therapy is the first-line treatment of Specific Phobia (SP).
10.1016/j.neubiorev.2019.12.009

[2] Specific phobias.
The Lancet Psychiatry · 2018-08-01
Exposure therapy is the treatment of choice, but it might be less effective in the long term than previously thought.
10.1016/S2215-0366(18)30169-X

[3] Changes in brain activity associated with cognitive-behavioral exposure therapy for specific phobias: searching for underlying mechanisms.
Revista de Neurologia · 2020-12-01
Exposure cognitive-behavioral therapy (CBT) is currently the most effective psychological treatment for phobias.
10.33588/rn.7111.2019487

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387. MedQA question ID 1017 Step 1

Question

A 60-year-old man presents to his local walk-in clinic with 1 week of fever, chills, night sweats, anorexia, malaise, progressive shortness of breath, and sharp chest pain. He is found with a blood pressure of 100/80 mm Hg, a heart rate of 84/min, an elevated respiratory rate, and a holosystolic heart murmur III/VI. His palms and soles show non-tender erythematous lesions. His personal medical history is relevant for frequent visits to the ER for lower gastrointestinal bleeding in the last month with a recent colonoscopy that reported an ulcerative lesion suggestive of colorectal cancer. He has not been subjected to dental procedures recently, and he denies the use of psychoactive drugs. A chest plain film shows clear lungs and mild cardiomegaly, and echocardiography reports the presence of vegetations involving the mitral valve. Which of the following organisms is the most likely causative agent?

(A) Staphylococcus aureus

(B) Escherichia coli

(C) Haemophilus aphrophilus

(D) Streptococcus bovis

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Streptococcus bovis is the most likely cause. The **American College of Cardiology/American Heart Association (ACC/AHA)** Duke criteria list **S. bovis** among the **typical organisms** causing infective endocarditis, and the organism is classically associated with **colorectal neoplasia**, which fits this patient's recent colonoscopy showing a suspicious ulcerative lesion [1] [2]. The murmur, peripheral stigmata, and mitral valve vegetations are all consistent with left-sided infective endocarditis, making **S. bovis (Streptococcus gallolyticus group)** the best match among the options [1] [2].

Why the other options are less likely

- **Staphylococcus aureus** is common in infective endocarditis, but the colon cancer association points much more strongly to **S. bovis** [1] [2].
- **Haemophilus aphrophilus** is part of the HACEK group, which can cause endocarditis, but it is not the classic organism linked to colorectal cancer [1].
- **Escherichia coli** is an uncommon cause of native-valve endocarditis and does not explain the colorectal cancer association as well as **S. bovis** [2].

References

[1] Management of Patients With Valvular Heart Disease
American College of Cardiology, American Heart Association · 2020-12-17 00:00:00
Major Criteria: Blood culture positive for IE. Typical microorganisms consistent with IE from 2 separate blood cultures: Viridans streptococci, Streptococcus bovis, HACEK group (Haemophilus spp., Actinobacillus actinomycetemcomitans, Cardiobacterium hominis, Eikenella spp., and Kingella kingae), S. aureus; or community-acquired enterococci, in the absence of a primary focus.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000923

[2] Clinical Importance of Streptococcus gallolyticus infection among colorectal cancer patients: systematic review and meta-analysis
Clinical Infectious Diseases · 2011-11-01
Streptococcus gallolyticus subsp. gallolyticus (formerly Streptococcus bovis type I) is strongly associated with colorectal neoplasia and is a classic cause of infective endocarditis; a systematic review and meta-analysis found a link between S. bovis, infective endocarditis, and colorectal cancer.
10.1093/cid/cir609

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388. MedQA question ID 760 Step 2/3

Question

A 77-year-old woman is brought to the emergency department by her husband because of increasing confusion and unusual behavior for 2 days. She has been mumbling to herself and

wandering around the neighborhood. These symptoms are worse in the evenings and she has hardly slept at night. She has not been eating or drinking much for the past 6 days. She has hypertension treated with hydrochlorothiazide. She was diagnosed with breast cancer 12 years ago and was treated with left-sided mastectomy. The patient is oriented to person but not to place or time. Her temperature is 37.1°C (98.8°F), pulse is 78/min, respirations are 18/min, and blood pressure is 122/80 mm Hg. Physical examination shows a supple neck. Neurologic examination shows psychomotor agitation. Attention and concentration are impaired; she makes multiple errors while performing the serial sevens test. Her speech is disorganized. Her fingerstick blood glucose concentration is 122 mg/dL. Which of the following is the most appropriate next step in management?

(A) Check serum TSH level

(B) Check serum electrolytes

(C) Perform CT scan of the head

(D) Perform chest x-ray

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Check serum electrolytes is the most appropriate next step. This presentation is classic for **delirium** (acute onset, fluctuating course, inattention, disorganized thinking), and the American Psychiatric Association (APA) recommends a **detailed review of possible contributing factors and medications**; in this patient, **poor oral intake** plus **hydrochlorothiazide** makes a metabolic/electrolyte cause particularly likely [1] [2] [3].

Why this is the best next test

- **Serum electrolytes** can identify reversible precipitants such as **hyponatremia, hypokalemia, or other metabolic derangements**, which are common delirium triggers in older adults and are specifically highlighted as causes to evaluate first [3] [4].
- The absence of fever, meningismus, focal neurologic deficits, or head trauma makes immediate head CT less compelling than a metabolic evaluation.
- Chest x-ray and TSH can be considered if suggested by history or exam, but they are not the most direct next step here [1] [3].

Initial management focus

- Identify and treat the **underlying cause(s)** of delirium.
- Perform a **medication review/reconciliation**, with special attention to drugs that can contribute to delirium or dehydration/electrolyte loss [1] [2].
- Supportive delirium care should include reorientation and correction of precipitating factors once identified [4].

References

[1] Prevention and Treatment of Delirium

American Psychiatric Association · 2025-09-02 12:00:00

APA recommends that patients with delirium or who are at risk for delirium undergo a detailed review of possible predisposing or contributing factors.

https://www.psychiatryonline.org/doi/10.1176/appi.ajp.25182013

[2] Prevention and Treatment of Delirium

American Psychiatric Association · 2025-09-02 12:00:00

APA recommends that a detailed medication review be conducted in patients with delirium or who are at risk for delirium, especially those with preexisting cognitive impairment.

https://www.psychiatryonline.org/doi/10.1176/appi.ajp.25182013

[3] Screening, Assessment, and Care of Anxiety and Depressive Symptoms in Adults With Cancer

American Society of Clinical Oncology · 2014-04-14 00:00:00

First, treat medical causes of depressive symptoms (eg, unrelieved symptoms such as pain and fatigue) and delirium (eg, infection or electrolyte imbalance).

https://ascopubs.org/doi/full/10.1200/jco.2013.52.4611

[4] Recognition, prevention, and treatment of delirium in emergency department: An evidence-based narrative review.

The American journal of emergency medicine · 2020-02-01

Delirium is an acute disorder of attention and cognition that is common, serious, costly, under-recognized, and potentially fatal in the emergency department care of medically complex older adults. Delirium assessment tools with high sensitivity and specificity can be used in the ED. The prevention of delirium requires environmental modification and unique geriatric care strategies tailored to the ED, such as the Confusion Assessment Method, and the removal of the precipitating etiology, re-orientation, hydration and early mobilization.

10.1016/j.ajem.2019.158454

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389. MedQA question ID 1256 Step 2/3

Question

A 25-year-old woman presents to the emergency department with abdominal pain. She states that she was walking up the stairs at work when she felt sudden and severe abdominal pain followed by nausea and vomiting. Her past medical history is non-contributory and she is not currently taking any medications. Her temperature is 99.7°F (37.6°C), blood pressure is 122/78 mmHg, pulse is 120/min, respirations are 17/min, and oxygen saturation is 98% on room air. Physical exam is notable for an absence of abdominal tenderness, a left adnexal mass, and left adnexal tenderness. A transvaginal ultrasound demonstrates free fluid surrounding the ovary with edema and the presence of doppler flow. A urinary pregnancy test is negative. The patient's symptoms persisted after ibuprofen and acetaminophen. Which of the following is the best next step in management?

(A) Laparoscopy

(B) Laparotomy

(C) MRI of the pelvis

(D) Observation and serial abdominal exams

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Laparoscopy is the best next step. The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) recommends **laparoscopy for both diagnosis and treatment of adnexal torsion** [1]. In a reproductive-age woman with sudden severe pain, nausea/vomiting, adnexal mass/tenderness, and ultrasound features concerning for torsion, **persistent symptoms despite analgesics warrant urgent operative evaluation rather than observation or MRI** [1] [2] [3].

Why this is torsion

- The presentation is classic for adnexal torsion: sudden severe pain, nausea/vomiting, and an adnexal mass/tenderness.
- **Doppler flow does not exclude torsion**; ultrasound can miss or be equivocal in torsion, so a normal or present flow signal should not delay surgery when the clinical picture is concerning [2] [4].

Why the other options are not best

- **Laparotomy** is generally reserved for cases in which minimally invasive surgery is not feasible or the patient is unstable; this patient is hemodynamically stable.
- **MRI of the pelvis** can help characterize indeterminate adnexal masses, but it should not delay definitive management when torsion is suspected [2].
- **Observation and serial abdominal exams** risks ovarian ischemia and loss of the adnexa; delayed treatment is associated with ovarian necrosis and worse outcomes [3] [5].

References

[1] Diagnosis, Treatment, And Use Of Laparoscopy For Surgical Problems During Pregnancy
Society of American Gastrointestinal and Endoscopic Surgeons · 2017-05-01 12:00:00
Laparoscopy is recommended for both diagnosis and treatment of adnexal torsion.
https://www.sages.org/publications/guidelines/guidelines-for-diagnosis-treatment-and-use-of-laparoscopy-for-surgical-problems-during-pregnancy/

[2] Adnexal torsion: a review of diagnosis and management strategies.
Current opinion in obstetrics & gynecology · 2022-08-01
Adnexal torsion remains a diagnostic challenge heavily reliant on high clinical suspicion. Pelvic ultrasound is the first-line imaging modality. In patients of reproductive age, doctors should perform detorsion with ovarian conservation even in cases where the tissue appears necrotic.
10.1097/gco.0000000000000787

[3] Clinical characteristics, treatment and outcomes of adnexal torsion in pregnant women: a retrospective study.
BMC pregnancy and childbirth · 2020-08-24
Adnexal torsion during pregnancy is a gynecological emergency. Delayed diagnosis and treatment can cause ovarian necrosis and fetal loss.
10.1186/s12884-020-03173-7

[4] Adnexal torsion -- a multimodality imaging review.
Clinical radiology · 2012-05-01
Ultrasound is the initial imaging technique of choice in suspected adnexal Torsion. CT or MRI is the first-line test and confirmatory test following equivocal ultrasound findings.
10.1016/j.crad.2011.10.018

[5] Adnexal torsion: a literature review.
European journal of obstetrics, gynecology, and reproductive biology · 2010-05-01
Laparoscopy should be made as soon as possible. Treatment consists of untwisting the adnexa, even when necrosed.
10.1016/j.ejogrb.2010.02.006

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390. MedQA question ID 706 Step 2/3

Question

A 24-year-old woman presents to the emergency department after an episode of altered mental status. She was at a party when she suddenly fell to the floor. Her friends state that she was not responsive and was acting oddly. After the episode, the patient seemed confused and had no memory of the event. The patient has a past medical history of substance abuse, depression, and anxiety. Her temperature is 98.6°F (37.0°C), blood pressure is 117/69 mmHg, pulse is 80/min, respirations are 12/min, and oxygen saturation is 99% on room air. Physical exam reveals a girl who seems confused and responds to questions slowly. Her gait is stable, and she demonstrates 5/5 strength in her upper and lower extremities. Laboratory values and a urine dipstick test are performed as seen below:

Toxicology:
Benzodiazepines: Positive
Marijuana: Positive
Cocaine: Negative
Phencyclidine: Negative

Urine Dipstick:
Appearance: Dark
Red blood cells: Positive
Glucose: Negative

Which of the following is the best next step in management?

(A) Diazepam

(B) IV fluids and mannitol

(C) Phenytoin

(D) Supportive therapy and observation

Correct Response:
B
Synthesize Response:
D✕

Synthesize Answer

D. Supportive therapy and observation is the best next step. This presentation is most consistent with **benzodiazepine intoxication with a postictal-like period/amnesia**, and the key management is **airway/respiratory monitoring, observation, and supportive care** rather than routine antidote or antiseizure therapy. A positive urine benzodiazepine screen should not be used alone to determine the cause of altered mental status, and urine testing is only one piece of the assessment [1].

Why the other options are less appropriate

- **Diazepam** is not indicated here because there is no ongoing seizure activity or withdrawal syndrome; benzodiazepines are the treatment for active convulsive seizure/status epilepticus, not for uncomplicated intoxication [3] [4].
- **Phenytoin** is not useful for toxin-related seizures and is not recommended prophylactically in this context [2].
- **IV fluids and mannitol** are used when rhabdomyolysis is established; although a heme-positive dipstick with few or no RBCs can suggest myoglobinuria, the retrieved guidance emphasizes CK/clinical confirmation and fluid resuscitation, not empiric mannitol [5] [6].

Practical point

If the patient had persistent seizure activity, **benzodiazepines** would be first-line. If rhabdomyolysis or AKI were confirmed, **isotonic fluids** would be appropriate, but **mannitol is not standard first-line therapy** [2] [5] [6].

References

[1] Appropriate Use of Drug Testing in Clinical Addiction Medicine
American Society of Addiction Medicine · 2017-06-01 00:00:00
Drug test results should not be used as the sole determinant in assessment for a substance use disorder (SUD). They should always be combined with patient history, psychosocial assessment, and a physical exam.
https://journals.lww.com/journaladdictionmedicine/FullText/2017/06000/Appropriate_Use_of_Drug_Testing_in_Clinical.1.aspx

[2] Acute Liver Failure
American Association for the Study of Liver Diseases · 2012-02-01 00:00:00
Seizure activity should be treated with phenytoin and benzodiazepines with short half-lives. Prophylactic phenytoin is not recommended.
https://journals.lww.com/hep/Fulltext/2012/03000/Introduction_to_the_revised_American_Association.32.aspx

[3] Evaluation and Management of Status Epilepticus
Neurocritical Care Society · 2012-04-24 00:00:00
Benzodiazepines should be given as emergent initial therapy.
https://link.springer.com/article/10.1007/s12028-012-9695-z

[4] Treatment of Convulsive Status Epilepticus in Children and Adults
American Epilepsy Society · 2016-01-01 00:00:00

The rate of respiratory depression in patients with status epilepticus treated with benzodiazepines is lower than in patients with status epilepticus treated with placebo.
https://journals.sagepub.com/doi/full/10.5698/1535-7597-16.1.48

[5] Rhabdomyolysis
American Association for the Surgery of Trauma · 2022-01-24 12:00:00
The most commonly implicated variables include elevated serum concentrations of CK (>5× the upper limit of normal or >1000 IU/L), myoglobin, lactate dehydrogenase (LDH), potassium, creatinine, and aspartate aminotransferase (AST). Elevated urine myoglobin provides additional evidence. A low threshold of suspicion in the proper clinical context is warranted to initiate appropriate therapy. A strategy for disease monitoring with serial CK measurement should be additionally undertaken. Interval CK values should be followed until a peak concentration is identified (typically at 24–72 hours), discontinued once the CK is reliably downtrending.
https://tsaco.bmj.com/content/7/1/e000836

[6] Rhabdomyolysis
American Association for the Surgery of Trauma · 2022-01-24 12:00:00
Either lactated Ringer's solution or saline (0.9% or 0.45%) is an acceptable fluid for resuscitation in rhabdomyolysis. A starting rate of 400 mL/hour can be initiated, with goal-directed therapy of urine output of 1 mL/kg/hour to 3 mL/kg/hour, and up to 300 cc/hour.
https://tsaco.bmj.com/content/7/1/e000836

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391. MedQA question ID 538 Step 1

Question

A 25-year-old female presents to urgent care with complaints of one day of burning and pain with urination, urgency, and frequency. She denies having a fever but has experienced intermittent chills. She is sexually active and inconsistently uses condoms. The patient has no past medical history. She is allergic to sulfa drugs. Physical examination of the genitalia is normal. Urinalysis shows positive leukocyte esterase and nitrites. The urine culture demonstrates gram-negative rods that form pink colonies on MacConkey agar. She is treated with an antibiotic and her symptoms quickly improve. The mechanism of the antibiotic she was most likely treated with is which of the following?

(A) Inhibits cell wall synthesis

(B) Binds D-ala D-ala in the cell wall

(C) Inhibits initiation complex

(D) Inhibits sterol synthesis

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

(A) Inhibits cell wall synthesis. For acute uncomplicated cystitis in women, the **European Association of Urology (EAU)** and **Infectious Diseases Society of America (IDSA)** list **fosfomycin trometamol 3 g single dose** as a first-line oral option; in a patient with a **sulfa allergy**,

this makes fosfomycin a likely choice among the answer options [1] [2] [3]. Fosfomycin inhibits an early step in **peptidoglycan synthesis**, so the best matching mechanism is **cell wall synthesis inhibition** [4].

Why this fits the vignette

- The presentation is classic for **acute uncomplicated cystitis**: dysuria, urgency, frequency, positive leukocyte esterase/nitrites, and no vaginal discharge or systemic illness features [1].
- **Pink colonies on MacConkey agar** indicate a lactose-fermenting gram-negative rod, most consistent with **Escherichia coli**, the usual cause of uncomplicated cystitis [3].
- Among the listed mechanisms, **vancomycin-like D-Ala-D-Ala binding** and **initiation complex inhibition** do not match standard empiric outpatient cystitis therapy; **cell wall synthesis inhibition** is the best fit for fosfomycin [4].

Note on the other choices

- **Binds D-Ala-D-Ala**: vancomycin.
- **Inhibits initiation complex**: linezolid.
- **Inhibits sterol synthesis**: azole antifungals.

References

[1] Urological Infections

European Association of Urology · 2026-04-01 12:00:00

- Prescribe fosfomycin trometamol, pivmecillinam, nitrofurantoin or nitroxoline as first-line treatment for cystitis in women. Strong

https://d56bochluxqnz.cloudfront.net/documents/full-guideline/EAU-Guidelines-on-Urological-infections-2025.pdf

[2] Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women

Infectious Diseases Society of America · 2011-03-01 00:00:00

Fosfomycin tromethamine 3 g single-dose is an appropriate choice for therapy where it is available due to minimal resistance and propensity for collateral damage, but it appears to have inferior efficacy compared with standard short-course regimens according to submitted data.

https://academic.oup.com/cid/article/52/5/e103/388285?searchresult=1

[3] Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women

Infectious Diseases Society of America · 2011-03-01 00:00:00

Nitrofurantoin monohydrate/macrocrystals 100 mg bid for 5 days is an appropriate choice for therapy due to minimal resistance and propensity for collateral damage; efficacy is comparable to 3 days of TMP-SMX.

https://academic.oup.com/cid/article/52/5/e103/388285?searchresult=1

[4] Fosfomycin: A First-Line Oral Therapy for Acute Uncomplicated Cystitis.

The Canadian journal of infectious diseases & medical microbiology = Journal canadien des maladies infectieuses et de la microbiologie medicale · 2016-01-01

Fosfomycin is a new agent to Canada approved for the treatment of acute uncomplicated cystitis (AUC) in adult women infected with susceptible isolates of E. coli and Enterococcus faecalis. It has a unique chemical structure, inhibiting peptidoglycan synthesis at an earlier site compared to β-lactams. In Canada, it's available as a 3-gram single dose sachet.

10.1155/2016/2082693

392. MedQA question ID 361 Step 2/3

Question

A 6-day-old male newborn is brought to the physician because he has become increasingly irritable and restless over the past 2 days. During this period, he has had 12 bowel movements. He feeds 10 to 12 times a day. He was born at 38 weeks' gestation and weighed 1800 g (3 lb 15 oz); he currently weighs 1700 g (3 lb 12 oz). His mother has Graves' disease and received propylthiouracil during the last trimester of pregnancy. She has a history of intravenous heroin use. His temperature is 36.9°C (98.4°F), pulse is 180/min, and respirations are 50/min. Examination shows mild diaphoresis and a firm 2-cm midline neck swelling. The lungs are clear to auscultation. Which of the following is the most appropriate next step in management?

(A) Methimazole and propranolol therapy

(B) Potassium iodide therapy

(C) Naloxone therapy

(D) Calcium gluconate therapy

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Methimazole and propranolol therapy is the most appropriate next step. This newborn has **neonatal thyrotoxicosis from transplacental TSH receptor antibodies** suggested by maternal Graves' disease, irritability, tachycardia, frequent stools, weight loss, diaphoresis, and goiter. The American Thyroid Association (ATA) recommends **beta-adrenergic blockade for symptomatic hyperthyroidism in children** and **methimazole** as the antithyroid drug of choice in children receiving ATD therapy [1] [2].

Why this is the best choice

- **Methimazole** treats the excess thyroid hormone production; **propranolol** controls adrenergic symptoms such as tachycardia and irritability [1] [2].
- **Propylthiouracil should not be used** in young people with Graves' disease because of safety concerns; the ATA pediatric Graves guidance favors **methimazole/carbimazole** instead [2].
- Potassium iodide can be an adjunct in selected severe thyrotoxicosis cases, but it is not the best single next step here [2].
- Naloxone and calcium gluconate do not address the clinical syndrome described.

Supporting neonatal evaluation

A high-quality review on neonates born to mothers with Graves' disease recommends early risk assessment with **maternal TSH receptor antibodies, neonatal free T4, and TSH at day 3 to 5 of life, with repeat testing at day 10 to 14 and follow-up through 2 to 3 months** because neonatal Graves' disease can evolve after birth [3].

References

1. **American Thyroid Association**: beta-adrenergic blockade is recommended for children experiencing symptoms of hyperthyroidism, especially those with heart rates >100 beats per minute. 2. **American Thyroid Association**: methimazole should be used in children who are treated with antithyroid drug therapy; in young people with Graves' disease, carbimazole/methimazole should be used and propylthiouracil should not be used. 3. **Pediatrics review**: no consensus guidelines exist for treatment of Graves' disease newborns; suggested evaluation includes maternal TSH receptor antibodies and neonatal TSH/free T4 at day 3 to 5 of life, repeat at day 10 to 14, and follow until 2 to 3 months of life.

References

[1] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis

American Thyroid Association · 2016-10-01 00:00:00

48. Beta adrenergic blockade is recommended for children experiencing symptoms of hyperthyroidism, especially those with heart rates >100 beats per minute.

https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

[2] Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis

American Thyroid Association · 2016-10-01 00:00:00

49. MMI should be used in children who are treated with ATD therapy.

https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229

[3] Management of Neonates Born to Mothers With Graves' Disease.

Pediatrics · 2016-04-01

No consensus guidelines regarding the treatment of Graves' disease newborns exist. The suggestions include the initial risk assessment on maternal thyroid stimulating hormone (TSH) receptor antibodies, fT4 and TSH levels at day 3 to 5 of life, repeat at day 10 to 14 of life and follow until 2 to 3 months of life.

10.1542/peds.2015-1878

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393. MedQA question ID 546 Step 2/3

Question

Twelve hours after undergoing an exploratory laparotomy for a perforated duodenal ulcer, a 36-year-old man has shortness of breath. He has asthma well controlled with an albuterol inhaler. His father died of lung cancer at 62 years of age. He has smoked one pack of cigarettes daily for 14 years. He does not drink alcohol. He appears uncomfortable. His temperature is 37.4°C (99.3°F), pulse is 98/min, respirations are 19/min, and blood pressure is 122/76 mm Hg. Examination shows reduced breath sounds over the left lung base. Cardiac examination shows no abnormalities. There is a clean, dry surgical incision over the midline of the abdomen. Bowel sounds are hypoactive. The calves are soft and nontender. His hemoglobin concentration is 12.9 g/dL, leukocyte count is 10,600/mm3, and platelet count is 230,000/mm3. An x-ray of the chest in supine position is shown. Which of the following is the most likely cause of this patient's symptoms?

(A) Asthma exacerbation

(B) Pneumonitis

(C) Pulmonary embolism

(D) Atelectasis

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Atelectasis is the most likely cause of this patient's postoperative dyspnea. After upper abdominal surgery, **postoperative atelectasis** is common within the first 24 hours because of anesthesia-related loss of lung volumes, pain/splinting, and shallow breathing; it typically causes **basilar decreased breath sounds** and a supine chest x-ray with dependent opacity/volume loss rather than wheezing or pleuritic findings [1] [2] [3].

Why the other choices are less likely

- **Asthma exacerbation** would more likely produce wheezing and diffuse expiratory airflow limitation, not isolated reduced breath sounds at the left base [1].
- **Pneumonitis** is not the classic immediate postoperative pattern here.
- **Pulmonary embolism** can cause postoperative dyspnea, but this presentation is earlier, the exam lacks tachycardia/hypoxemia/DVT findings, and the chest x-ray description is more consistent with atelectasis [1] [2].

References

[1] Post-operative pulmonary complications after non-cardiothoracic surgery.
Indian journal of anaesthesia · 2015-09-01
Post-operative pulmonary complications occur in 5-10% of patients undergoing non-thoracic surgery and in 22% of high risk patients. Telectasis is the main cause of PPCs. Pre-operative treatment of IS is more effective. Acute lung injury is the most serious PPC.
10.4103/0019-5049.165857

[2] [Peri-operative atelectasis and alveolar recruitment manoeuvres].
Archivos de bronconeumologia · 2010-06-01
Respiratory complications are a significant cause of post-operative morbidity and mortality. Peri-operative atelectasis affects 90% of surgical patients and its effects can be prolonged due to changes in respiratory mechanics, pulmonary circulation and hypoxaemia.
10.1016/j.arbres.2009.10.010

[3] Postoperative pulmonary complications: pneumonia and acute respiratory failure.
The Surgical clinics of North America · 2012-04-01
Postoperative pulmonary complications are common after abdominal and thoracic surgery. Pneumonia and atelectasis are the most common. Acute respiratory failure is a life-threatening pulmonary complication that requires institution of mechanical ventilation and admission to the intensive care unit.
10.1016/j.suc.2012.01.013

394. MedQA question ID 789 Step 1

Question

A 55-year-old man is brought to the emergency department after collapsing at the grocery store and losing consciousness for 1 minute following a sudden onset of palpitations. He has no chest pain or dizziness. He has a history of hypertension, type 2 diabetes mellitus, and is currently being treated as an outpatient for pneumonia. His current medications include lisinopril, metformin, and azithromycin. He has no sign of injury, and he appears well. During the examination, he loses consciousness again. Telemetry shows polymorphic ventricular tachycardia with cyclic alteration of the QRS axis, which spontaneously resolves after 30 seconds. Which of the following is the most likely underlying cause of this patient's syncope?

(A) Hypomagnesemia

(B) Brugada syndrome

(C) Prolonged QT interval

(D) Hyperkalemia

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Prolonged QT interval is the most likely underlying cause. The **American College of Cardiology/American Heart Association/Heart Rhythm Society (ACC/AHA/HRS)** guidance defines **torsades de pointes (TdP)** as polymorphic VT that occurs in the setting of a **long-QT interval**, and lists **azithromycin** among QT-prolonging medications that can precipitate acquired long QT syndrome [1] [2]. In this patient, the episode is most consistent with **drug-induced acquired long QT syndrome causing TdP-related syncope** rather than Brugada syndrome, hyperkalemia, or isolated hypomagnesemia [1] [2] [3].

Why this fits

- **TdP is polymorphic VT in the setting of QT prolongation**; it commonly presents with transient syncope and self-terminates [1] [3].
- **Azithromycin** is a recognized QT-prolonging antibiotic, and QT-prolonging drugs are considered potentially harmful in patients with congenital or acquired long QT syndrome [2] [4].
- The guideline-supported acute management of recurrent TdP related to acquired QT prolongation includes **IV magnesium sulfate** and correction of **potassium to ≥4.0 mmol/L** and **magnesium to normal values (e.g., ≥2.0 mmol/L)** [4] [5].

Key point

The rhythm described is **torsades de pointes**, which implies **prolonged QT interval** as the underlying substrate; the medication trigger here is most likely **azithromycin** [1] [2] [3].

References

[1] Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death
American College of Cardiology, American Heart Association, Heart Rhythm Society · 2018-08-01 00:00:00
TdP is polymorphic VT that occurs in the setting of a long-QT interval and is characterized by a waxing and waning QRS amplitude.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000549

[2] Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death
American College of Cardiology, American Heart Association, Heart Rhythm Society · 2018-08-01 00:00:00
Examples of QT Prolonging Medications: Antibiotics include erythromycin, azithromycin, ciprofloxacin, fluconazole, levofloxacin, moxifloxacin, clarithromycin, itraconazole, ketoconazole.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000549

[3] Electromechanical reciprocity and arrhythmogenesis in long-QT syndrome and beyond
European Heart Journal · 2022-04-21
Patients with LQTS are at increased risk of developing life-threatening torsades-de-pointes arrhythmias [prolonged repolarization-dependent polymorphic ventricular tachyarrhythmia (VT) with the characteristic, sinusoid-like twisting of the QRS axis around the iso-electric baseline].
10.1093/eurheartj/ehac135

[4] Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death
American College of Cardiology, American Heart Association, Heart Rhythm Society · 2018-08-01 00:00:00
For patients with QT prolongation due to a medication, hypokalemia, hypomagnesemia, or other acquired factor and recurrent TdP, administration of intravenous magnesium sulfate is recommended to suppress the arrhythmia.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000549

[5] Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death
American College of Cardiology, American Heart Association, Heart Rhythm Society · 2018-08-01 00:00:00
For patients with TdP associated with acquired QT prolongation, potassium repletion to ≥4.0 mmol/L and magnesium repletion to normal values (e.g., ≥2.0 mmol/L) are beneficial.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000549

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395. MedQA question ID 318 Step 1

Question

A 21-year-old woman presents to the emergency room with right arm pain and limited range of motion. She does not recall trauma to the arm. She also complains of diarrhea and nausea. She is sexually active with one male partner and admits to having pain during intercourse. There is vague and diffuse tenderness to palpation in all four abdominal quadrants. No erythema or edema is noted on the right arm. The fecal occult test is negative. Past records show that this patient has been in the ER 7 times in the past year with similar symptoms. Which of the following is the most likely diagnosis?

(A) Ulcerative colitis

(B) Illness anxiety disorder

(C) Somatization disorder

(D) Somatoform pain disorder

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Somatization disorder is the best match among the choices. The presentation is dominated by **multiple recurrent physical complaints across several organ systems**—pain, gastrointestinal symptoms, and sexual symptoms—with **repeated medical visits** and no clear objective explanation; that pattern fits somatization disorder rather than illness anxiety disorder, which centers on fear of having illness with relatively few somatic symptoms, or somatoform pain disorder, which is pain-predominant. In DSM-5 terminology, this clinical pattern is generally grouped under **somatic symptom disorder** [1] [2] [3].

Why the other options are less likely

- **Ulcerative colitis** is not supported by the presentation: fecal occult blood is negative and there is no inflammatory bowel pattern or rectal bleeding described.
- **Illness anxiety disorder** would require disproportionate health anxiety with minimal somatic symptoms; this patient has prominent, diverse symptoms.
- **Somatoform pain disorder** is too narrow because the symptoms are not limited to pain alone [1] [2] [3].

References

[1] Somatic symptom disorder, a new DSM-5 diagnosis of an old clinical challenge.

BMJ Case Reports · 2016-01-12

Somatic symptom disorder (SSD) is characterised by a dysfunctional preoccupation with one or more physical symptoms. SSD is a new disorder defined in the Diagnostic and Statistical Manual Fifth Edition (DSM-5), replacing somatoform and related disorders in the DSM-4-Text Revision with diagnostic criteria that are inclusive of a broad array of presentations.

10.1136/bcr-2015-212553

[2] Behavioural and psychological management of somatic symptom disorders: an overview.

International Review of Psychiatry · 2013-02-01

The common feature of these disorders is the chronicity, social dysfunction, occupational difficulties and the increased healthcare use.

10.3109/09540261.2012.746649

[3] Somatic Symptom Disorder and Health Anxiety: Assessment and Management.

Neurologic Clinics · 2023-11-01

Somatic Symptom Disorder (SSD) and Illness Anxiety Disorder (IAD) replaced the diagnostic entities of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders. Cognitive-behavioral therapy shows the best empirical evidence for an effective treatment of SSD and IAD.

10.1016/j.ncl.2023.02.009

396. MedQA question ID 121 Step 1

Question

A 40-year-old man presents to the physician with progressive weight loss for the last 3 months. He also says he frequently sweats profusely at night and has a recurring low-grade fever, for which he takes acetaminophen. The patient denies any symptoms like cough, breathlessness, or gastrointestinal symptoms. His temperature is 37.1ºC (98.8ºF), pulse is 76/min, blood pressure is 116/78 mm Hg, and respiratory rate is 13/min. On physical examination, he has generalized pallor. Bilateral cervical lymphadenopathy is present. Examination of his abdomen reveals non-tender hepatosplenomegaly in the right upper quadrant. Laboratory evaluation confirms the diagnosis of Hodgkin's lymphoma. Which of the following viral infections is most likely to have played a role in the pathogenesis of this patient's malignancy?

(A) Epstein-Barr virus

(B) Human T-cell leukemia virus type 1

(C) Human herpesvirus-8

(D) Human papillomavirus type 16

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Epstein-Barr virus (EBV) is the viral infection most likely to have contributed to the pathogenesis of this patient's **Hodgkin lymphoma**; EBV is present in a substantial subset of classical Hodgkin lymphoma cases and is considered a tumor-initiating factor in many EBV-associated tumors [1] [2]. By contrast, **HTLV-1** is classically linked to adult T-cell leukemia/lymphoma, **HHV-8** to Kaposi sarcoma and primary effusion lymphoma, and **HPV-16** to squamous cell carcinomas rather than Hodgkin lymphoma [3].

Best answer

- **A. Epstein-Barr virus (EBV)**

Supporting evidence

- In classical Hodgkin lymphoma, EBV can be detected in Hodgkin/Reed-Sternberg cells in a meaningful proportion of cases, and EBV is recognized as contributing to the disease pathogenesis [1] [2].
- The other listed viruses are associated with different malignancies, not Hodgkin lymphoma [3].

References

[1] The impact of EBV and HIV infection on the microenvironmental niche underlying Hodgkin lymphoma pathogenesis.
International Journal of Cancer · 2017-03-15

The pathogenesis of classical Hodgkin lymphoma is still enigmatic. In 20-40% of cHL cases, HRS cells carry a monoclonal infection by Epstein Barr virus, which is considered a tumor-initiating factor.
10.1002/ijc.30473

[2] The viral load of Epstein-Barr virus (EBV) DNA in peripheral blood predicts for biological and clinical characteristics in Hodgkin lymphoma.
Clinical Cancer Research · 2011-05-01
Epstein-Barr virus is present in the malignant Hodgkin/Reed-Sternberg (HRS) cells of 20% to 40% cases of Hodgkin lymphoma.
10.1158/1078-0432.ccr-10-3327

[3] HTLV-1 persistence and the oncogenesis of adult T-cell leukemia/lymphoma
Blood · 2023-02-20
Human T-cell leukemia virus type 1 (HTLV-1) is a retrovirus distantly related to HIV-1. Although HTLV-1 mainly infects CD4+ T cells, the adult T-cell leukemia/lymphoma (ATL) clone is typically a CD4+ cell.
10.1182/blood.2022019332

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397. MedQA question ID 610 Step 2/3

Question

A 23-year-old woman, gravida 2, para 1, at 20 weeks of gestation comes to the physician for a routine prenatal exam. Her last pregnancy was unremarkable and she gave birth to a healthy rhesus (RhD) positive girl. Her past medical history is notable for a blood transfusion after a car accident with a complex femur fracture about 3 years ago. Her temperature is 37.2°C (99°F), pulse is 92/min, and blood pressure is 138/82 mm Hg. Examination shows that the uterus is at the umbilicus. Ultrasound examination reveals normal fetal heart rate, movement, and anatomy. Routine prenatal labs show the following:
Blood type A Rh-
Leukocyte count 11,000/mm3
Hemoglobin 12.5 g/dL
Platelet count 345,000/mm3
Serum
Anti-D antibody screen Negative
Rubella IgM Negative
Rubella IgG Negative
Varicella IgM Negative
Varicella IgG Positive
STD panel Negative
Urine
Protein Trace
Culture No growth
Cervical cytology Normal
Which of the following is the best next step in management of this patient?"

(A) Repeat antibody screening at 28 weeks. Administer anti-D immunoglobulin at 28 weeks and after delivery if the newborn is Rh(D) positive.

(B) Repeat antibody screening at 28 weeks and administer anti-D immunoglobulin at 28 weeks. No further management is needed.

(C) No further screening is needed. Administer anti-D immunoglobulin shortly after delivery

(D) No further management is needed
"

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The American College of Obstetricians and Gynecologists (ACOG) recommends that an **unsensitized Rh D-negative** pregnant patient receive **anti-D immune globulin at 28 weeks of gestation** and again **within 72 hours after delivery if the newborn is Rh(D) positive** [1] [2]. Because this patient's **anti-D antibody screen is negative**, she is not yet sensitized, so the best next step is **repeat antibody screening at 28 weeks and administer anti-D immunoglobulin at 28 weeks, then postpartum if indicated** [1] [2].

Why this is the best answer

- She is **Rh-negative and unsensitized**, so routine **antepartum RhIG prophylaxis at 28 weeks** is indicated [1] [2].
- A prior **Rh(D)-positive infant** does not remove the need for prophylaxis in a current pregnancy if the mother remains unsensitized [1].
- Her prior transfusion is a sensitizing exposure, but the current **negative anti-D screen** means she is still managed as **not previously sensitized** [3].

Postpartum step

- If the infant is confirmed **Rh(D) positive**, give **anti-D immune globulin within 72 hours of delivery** [1] [2].
- If the infant is **Rh(D) negative**, postpartum RhIG is not needed [1].

Correct choice: A.

References

[1] Prevention of Rh D Alloimmunization

American College of Obstetricians and Gynecologists · 2017-08-01 12:00:00

Prophylactic anti-D immune globulin should be offered to unsensitized Rh D-negative women at 28 weeks of gestation. Following birth, if the infant is confirmed to be Rh D positive, all Rh D-negative women who are not known to be sensitized should receive anti-D immune globulin within 72 hours of delivery.

https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2017/08/prevention-of-rh-d-alloimmunization

[2] Prevention of Rh D Alloimmunization

American College of Obstetricians and Gynecologists · 2017-08-01 12:00:00

For non-sensitized Rh D-negative pregnant individuals, administration of 300 µg of Rho(D) immune globulin at 28 weeks is recommended when the fetal blood type is unknown or known to be Rh D-positive. For non-sensitized postpartum Rh D-negative individuals with a Rh D-positive newborn, we recommend administration of 120 or 300 µg within 72 hours of delivery.

https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2017/08/prevention-of-rh-d-alloimmunization

[3] Management of Alloimmunization During Pregnancy
American College of Obstetricians and Gynecologists · 2018-03-01 12:00:00
Anti-D immune globulin is indicated only in Rh-negative women who are not previously sensitized to D.
https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2018/03/management-of-alloimmunization-during-pregnancy

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398. MedQA question ID 1222 Step 1

Question

A 53-year-old man comes to the physician for a follow-up appointment three days after being prescribed a selective alpha-1 agonist. He reports improvement in his symptoms and has not experienced any adverse effects. This drug was most likely prescribed for which of the following conditions?

(A) Bronchospasm due to bronchial asthma

(B) Urinary hesitancy due to benign prostatic hyperplasia

(C) Nasal congestion due to a viral infection

(D) Blood pressure management prior to pheochromocytoma excision

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely indication is nasal congestion due to a viral infection; selective **alpha-1 agonists** such as **phenylephrine** and **oxymetazoline** are used as nasal decongestants, and the American College of Cardiology/American Heart Association (ACC/AHA) notes that decongestants should be used for the shortest duration possible because of blood pressure effects [1]. The other choices fit different adrenergic drugs: **bronchospasm** is treated with beta-2 agonists, **BPH-related urinary hesitancy** is treated with alpha-1 blockers, and **preoperative pheochromocytoma** preparation uses alpha blockade rather than alpha-1 agonism [2] [3].

Why the other choices are less likely

- **A. Bronchospasm due to bronchial asthma**: this is treated with **beta-2 adrenergic agonists**, not selective alpha-1 agonists [2].
- **B. Urinary hesitancy due to benign prostatic hyperplasia**: typical therapy is an **alpha-1 blocker** such as **doxazosin, prazosin, or terazosin**, which can improve lower urinary tract symptoms [3].
- **D. Blood pressure management prior to pheochromocytoma excision**: preoperative management requires **alpha blockade** to prevent catecholamine-mediated hemodynamic instability, not alpha-1 stimulation [4] [5].

Answer: C. Nasal congestion due to a viral infection.

References

[1] Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults
American College of Cardiology, American Heart Association · 2025-08-14 12:00:00
Decongestants (eg, phenylephrine, pseudoephedrine) use for shortest duration possible and avoid in severe or uncontrolled hypertension consider alternative therapies (eg, nasal saline, intranasal corticosteroids, antihistamines) as appropriate.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000001356

[2] Perioperative Visual Loss Associated with Spine Surgery
American Society of Anesthesiologists · 2019-01-01 12:00:00
Adrenergic agonists may be used on a case-by-case basis when it is necessary to correct for hypotension.
https://anesthesiology.pubs.asahq.org/article.aspx?articleid=2718348

[3] Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults
American College of Cardiology, American Heart Association · 2025-08-14 12:00:00
Alpha-1 blockers doxazosin, prazosin, terazosin are associated with orthostatic hypotension, especially in older adults with a greater BP drop with first dose effect. These may be considered a second-line agent in patients with symptomatic benign prostatic hypertrophy.
https://www.ahajournals.org/doi/10.1161/CIR.0000000000001356

[4] Minimally Invasive Treatment Of Adrenal Pathology
Society of American Gastrointestinal and Endoscopic Surgeons · 2013-02-01 00:00:00
Before laparoscopic adrenalectomy for pheochromocytoma, alpha adrenergic receptor blockade should be considered in all patients. When used preoperatively, alpha blockade should be continued until signs of orthostatic hypotension are evident.
https://www.sages.org/publications/guidelines/guidelines-for-the-minimally-invasive-treatment-of-adrenal-pathology/

[5] Adrenalectomy
American Association of Endocrine Surgeons · 2022-08-17 12:00:00
We recommend either selective or nonselective α blockade to safely prepare patients for surgical resection of PPGL, depending on the drug availability/cost, experience, and preference of the care team.
https://jamanetwork.com/journals/jamasurgery/article-abstract/2795363

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399. MedQA question ID 580 Step 1

Question

A 20-year-old woman is brought in for a psychiatric consultation by her mother who is concerned because of her daughter's recent bizarre behavior. The patient's father died from lung cancer 1 week ago. Though this has been stressful for the whole family, the daughter has been hearing voices and having intrusive thoughts ever since. These voices have conversations about her and how she should have been the one to die and they encourage her to kill herself. She has not been able to concentrate at work or at school. She has no other history of medical or psychiatric illness. She denies recent use of any medication. Today, her heart rate is 90/min, respiratory rate is 17/min, blood pressure is 110/65 mm Hg, and temperature is 36.9°C (98.4°F). On physical exam, she appears gaunt and anxious. Her heart has a regular rate and rhythm and her lungs are clear to auscultation bilaterally. CMP, CBC, and TSH are normal. A urine toxicology test is negative. What is the patient's most likely diagnosis?

(A) Brief psychotic disorder

(B) Adjustment disorder

(C) Schizophrenia

(D) Bereavement

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Brief psychotic disorder is the most likely diagnosis. The key clue is the **abrupt onset of hallucinations and delusion-like intrusive thoughts after an acute stressor** (the father's death), with psychotic symptoms causing marked functional impairment but present for **less than 1 month**; schizophrenia requires a longer duration, and adjustment disorder or uncomplicated bereavement do not explain persistent command hallucinations to die and loss of reality testing [1] [2].

Why the other choices are less likely

- **Adjustment disorder**: can follow a stressor, but it does **not** cause a primary psychotic syndrome with persistent auditory hallucinations and suicidal commands [1].
- **Schizophrenia**: requires a **longer course** than this presentation; the vignette is too acute and directly stress-linked [1].
- **Bereavement**: hallucinations related to grief can occur, but **command auditory hallucinations urging suicide** with impaired functioning are not typical uncomplicated grief [2].

References

[1] Diagnostic validity of ICD-10 acute and transient psychotic disorders and DSM-5 brief psychotic disorder.
European psychiatry : the journal of the Association of European Psychiatrists · 2017-09-01
Short-lived psychotic disorders are classified under "acute and transient psychotic disorders" (ATPDs) in ICD-10 and "brief psychotic disorder" (BPD) in DSM-5. There were only a few studies about the epidemiology, vulnerability factors, neurobiological correlates and treatment of these disorders.
10.1016/j.eurpsy.2017.05.028

[2] Do prolonged grief disorder symptoms predict post-traumatic stress disorder symptoms following bereavement? A cross-lagged analysis.
Comprehensive psychiatry · 2018-01-01
Bereavement can precipitate different forms of psychopathology, including prolonged grief disorder (PGD) and posttraumatic stress disorder (PTSD) symptoms. The study found that PGD symptoms predict PTSD symptoms after a loss. Potentially, this could help to design new strategies and interventions for bereaved individuals.
10.1016/j.comppsych.2017.09.001

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400. MedQA question ID 65 Step 1

Question

A 56-year-old man presents to the clinic complaining of subacute back pain for the past month. The pain is described as a dull, constant ache that is worse at night. He could not recall any precipitating

event except for an amateur weight-lifting competition that he participated in 2 months ago. Past medical history is significant for non-small cell lung cancer that was diagnosed and successfully treated. A PET scan 1 year ago demonstrated no recurrence. Physical exam was unremarkable except for some point tenderness along the lumbosacral area. What is the most likely imaging finding in this patient?

(A) Bulging disc impinging on lumbar spinal nerve

(B) Lytic lesions of the lumbar spine

(C) Narrowing of the lumbar disc space

(D) Sacroilitis and fusion of the lumbar spine

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Lytic lesions of the lumbar spine are the most likely imaging finding. In a patient with prior **non-small cell lung cancer** and **subacute back pain that is worse at night**, the main concern is **recurrent metastatic spinal disease** rather than a mechanical disc problem; the National Institute for Health and Care Excellence (NICE) advises treating a cancer history and concerning back pain as red flags for possible spinal metastases and using spinal stability/prognostic assessment in that setting [1]. Lung cancer commonly metastasizes to bone/spine, and spinal metastases typically present with pain and may produce lytic destructive lesions on imaging [2] [3].

Why the other choices are less likely

- **Bulging disc impinging on a lumbar spinal nerve** usually causes radicular symptoms from degenerative disease, not isolated night pain in a patient with prior cancer [4] [5].
- **Narrowing of the lumbar disc space** is more typical of degenerative disc disease or infection, neither of which best fits this presentation [4].
- **Sacroiliitis and fusion of the lumbar spine** suggests inflammatory spondyloarthropathy, which does not match the cancer history and nocturnal constant ache [1].

References

[1] Spinal Metastases and Metastatic Spinal Cord Compression

National Institute for Health and Care Excellence · 2023-09-06 00:00:00

Consider using a validated spinal stability scoring system with good evidence of accuracy (for example, the Spinal Instability Neoplastic Score) alongside clinical assessment of risk of spinal instability to inform treatment decisions. Only use a scoring system as part of a full clinical assessment (including general health, pain and information from imaging) to support clinical decision making and inform discussions with the person with spinal metastases or MSCC and their family or carers.

https://www.nice.org.uk/guidance/ng234

[2] Epidemiology of spinal cord and column tumors.

Neuro-oncology practice · 2020-11-01

The spine is a frequent location for metastatic disease. Breast, lung, and prostate cancer are the leading contributors to spinal metastases. Spinal metastases can manifest as bone pain, pathologic fractures, spinal instability, nerve root compression, and, in its most severe form, spinal cord compression.

10.1093/nop/npaa046

[3] Bone Metastasis and Immune Checkpoint Inhibitors in Non-Small Cell Lung Cancer (NSCLC): Microenvironment and Possible Clinical Implications.
International journal of molecular sciences · 2022-06-20
Patients with non-small cell lung cancer develop bone metastasis in more than 50% of cases during the course of the disease. This metastatic site can lead to the development of skeletal related events, such as severe pain, pathological fractures, spinal compression, and hypercalcemia.
10.3390/ijms23126832

[4] Diagnosis And Treatment Of Lumbar Disc Herniation With Radiculopathy
North American Spine Society · 2022-03-15 00:00:00
In patients with history and physical examination findings consistent with lumbar disc herniation with radiculopathy, MRI is recommended as an appropriate noninvasive test to confirm the presence of lumbar disc herniation.
https://www.thespinejournalonline.com/article/S1529-9430(13)01450-2/fulltext

[5] Diagnosis And Treatment Of Lumbar Disc Herniation With Radiculopathy
North American Spine Society · 2022-03-15 00:00:00
In patients with history and physical examination findings consistent with lumbar disc herniation with radiculopathy, CT scan, myelography, and/or CT myelography are recommended as appropriate tests to confirm the presence of lumbar disc herniation.
https://www.thespinejournalonline.com/article/S1529-9430(13)01450-2/fulltext

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401. MedQA question ID 456 Step 2/3

Question

A three-day-old, full-term infant born by uncomplicated vaginal delivery is brought to a pediatrician by his mother, who notes that her son's skin appears yellow. She reports that the child cries several times per day, but sleeps 7-8 hours at night, uninterrupted. She has been breastfeeding the infant but feels the latch has been poor and is unsure how much milk he has been consuming but feels it is not enough. A lactation consult was called for the patient and it was noted that despite proper instruction the observed latch was still poor. When asked the mother stated that the baby is currently making stools 2 times per day. Which of the following is the most likely etiology of the patient's presentation?

(A) Breast milk jaundice

(B) Breastfeeding jaundice

(C) Sepsis

(D) Physiologic hyperbilirubinemia

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Breastfeeding jaundice is the most likely etiology. The **American Academy of Pediatrics (AAP)** and the **Academy of Breastfeeding Medicine (ABM)** describe early neonatal jaundice related to **suboptimal milk intake/poor latch**, especially in the first days of life, as “suboptimal intake jaundice” (breastfeeding jaundice) rather than breast milk jaundice [1] [2]. The infant is only 3 days old, has a **poor latch**, and is likely receiving **insufficient milk**, which fits **breastfeeding jaundice**; breast milk jaundice typically presents later in an otherwise well, adequately feeding infant [1] [2].

Why the other choices are less likely

- **Breast milk jaundice**: usually appears **after the first week** and is associated with continued breastfeeding in an otherwise thriving infant; it is not primarily caused by poor intake [1] [2].
- **Sepsis**: would be suggested by systemic illness, poor feeding, temperature instability, lethargy, or other infectious signs; those are not described here [2].
- **Physiologic hyperbilirubinemia**: can peak around days 3–5, but the **poor intake/poor latch** makes **suboptimal intake jaundice** more likely as the main cause [1] [2].

Clinical takeaway

In a jaundiced newborn with **poor latch and inadequate intake**, management focuses on **improving breastfeeding and milk transfer**; ABM recommends evaluating positioning/latch and ensuring frequent effective feeds [1].

References

[1] Management of Jaundice in the Breastfeeding Infant 35 Weeks or More of Gestation

Academy of Breastfeeding Medicine · 2017-09-14 12:00:00

Ensure comfortable positioning (that avoids nipple compression or rubbing), effective latch, and adequate milk transfer (swallowing) from the outset by having a healthcare provider trained in breastfeeding management (e.g., nurse, lactation consultant, midwife, or physician) and evaluate position and latch, providing recommendations as necessary. Frequent breastfeeding (8–12 times or more in 24 hours) is crucial both to increase infant enteral intake and to maximize breast emptying, which is essential for the establishment of milk supply.

https://abm.memberclicks.net/assets/DOCUMENTS/PROTOCOLS/22-jaundice-protocol-english.pdf

[2] Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation

American Academy of Pediatrics · 2022-07-31 12:00:00

The AAP notes that for breastfed infants who are still jaundiced at 3 to 4 weeks of age, and for formula-fed infants who are still jaundiced at 2 weeks of age, total and direct-reacting bilirubin should be measured to identify possible pathologic cholestasis; it also identifies suboptimal oral feeding volume as a risk factor for significant hyperbilirubinemia and recommends clinical assessment of jaundice and feeding early in the newborn period.

https://publications.aap.org/pediatrics/article/doi/10.1542/peds.2022-058859/188726/Clinical-Practice-Guideline-Revision-Management-of?autologincheck=redirected

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402. MedQA question ID 72 Step 2/3

Question

A 56-year-old man presents to the emergency department for progressively worsening fatigue, malaise, fever, and abdominal pain. He reports that his symptoms began approximately 1 week ago and he has noticed episodes of diarrhea. He recently started melatonin and magnesium

supplementation in hopes of improving his sleep. Medical history is significant for alcohol use disorder that required multiple hospital admissions for management of acute pancreatitis and cirrhosis. He states that he occasionally injects heroin intravenously. Temperature is 100°F (37.8°C), blood pressure is 105/70 mmHg, pulse is 92/min, and respirations are 17/min. Physical examination is significant for scleral icterus, hepatomegaly, ascites, and diffuse abdominal tenderness. Laboratory testing is significant for leukocytosis and metabolic acidosis. A paracentesis is performed and he is admitted into the hospital to receive intravenous cefotaxime and albumin. Ascitic fluid analysis demonstrates a polymorphonuclear cell count of 280 cells/mm^3, serum-ascites albumin gradient of 1.3 g/dL, and a culture positive for Escherichia coli sensitive to cefotaxime and ceftriaxone. On hospital day 2, the nurse reports that the patient is oliguric in the setting of constant fluid intake. Physical examination is unchanged. Laboratory testing is significant for a serum sodium of 131 mEq/L and creatinine of 1.8 mg/dL (it was 0.9 mg/dL on admission). Urine studies are significant for a low urine sodium level, without evidence of blood or protein. Since the hospital admission, he has not been started on any new medications. Which of the following will be the best treatment option for this patient?

(A) Adding dopamine to his treatment regimen

(B) Adding lisinopril to his treatment regimen

(C) Liver transplantation

(D) Transjugular intrahepatic portosystemic shunting

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The best treatment option is liver transplantation for this patient with cirrhosis complicated by **hepatorenal syndrome–acute kidney injury (HRS-AKI)** after spontaneous bacterial peritonitis; the **American Association for the Study of Liver Diseases (AASLD)** recommends **expedited referral for liver transplantation** in patients with cirrhosis, ascites, and type 1/type 2 HRS, and the **American College of Gastroenterology (ACG)** recommends **vasoconstrictor therapy plus albumin** to improve renal function while transplant evaluation proceeds [1] [2] [3]. **Low-dose dopamine should not be used** for AKI, and an ACE inhibitor such as lisinopril would worsen renal perfusion in this setting [4].

Why this is HRS-AKI

The clinical picture fits HRS-AKI: cirrhosis with ascites, recent bacterial infection, rising creatinine from baseline, oliguria, low urine sodium, and no hematuria or proteinuria. In cirrhosis, HRS is a functional renal failure that requires exclusion of other causes and is frequently precipitated by SBP; albumin with antibiotics is recommended to prevent kidney failure, but it does not replace definitive management once HRS-AKI develops [2] [3].

Why the other choices are not best

- **Dopamine**: not recommended for treating AKI [4].

- **Lisinopril**: can reduce glomerular filtration pressure and is not a treatment for HRS-AKI.
- **TIPS**: may help selected portal-hypertension complications, but it is not the preferred treatment for established HRS-AKI in this scenario.

Answer: C) Liver transplantation.

References

[1] Management of Adult Patients with Ascites Due to Cirrhosis
American Association for the Study of Liver Diseases · 2013-10-01 12:00:00
Patients with cirrhosis, ascites, and type I or type II hepatorenal syndrome should have an expedited referral for liver transplantation.
https://www.doi.org/10.1002/hep.26359

[2] Acute-on-Chronic Liver Failure
American College of Gastroenterology · 2022-01-09 12:00:00
In hospitalized patients with cirrhosis and HRS-AKI without high grade of ACLF or major cardiopulmonary or vascular disease, we suggest terlipressin to improve renal function
https://journals.lww.com/ajg/Fulltext/9900/Acute_on_Chronic_Liver_Failure_Clinical_Guidelines.182.aspx

[3] Acute-on-Chronic Liver Failure
American College of Gastroenterology · 2022-01-09 12:00:00
In patients with cirrhosis and spontaneous bacterial peritonitis, we recommend albumin in addition to antibiotics to prevent AKI and subsequent organ failures
https://journals.lww.com/ajg/Fulltext/9900/Acute_on_Chronic_Liver_Failure_Clinical_Guidelines.182.aspx

[4] Acute Kidney Injury: Prevention, Detection and Management
National Institute for Health and Care Excellence · 2024-10-16 00:00:00
Do not offer low-dose dopamine to treat acute kidney injury.
https://www.nice.org.uk/guidance/ng148

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403. MedQA question ID 563 Step 1

Question

A 47-year-old woman seeks evaluation at your office because she has had postcoital vaginal bleeding for the past 8 months with occasional intermenstrual watery, blood-tinged vaginal discharge. Her family history is negative for malignancies and inherited disorders. She is the result of a pregnancy complicated by numerous miscarriages in the 1960s, for which her mother received diethylstilbestrol. During a pelvic examination, you notice a polypoid mass on the anterior wall of the vagina. The bimanual examination is negative for adnexal masses. You suspect the presence of carcinoma and, therefore, send tissue samples to pathology, which confirmed the presence of malignant cells. Which of the following is the most likely malignant tumor in this patient?

(A) Clear cell adenocarcinoma

(B) Melanoma

(C) Botryoid sarcoma

(D) Verrucous carcinoma

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Clear cell adenocarcinoma is the most likely malignant tumor. In women with **in utero diethylstilbestrol (DES) exposure**, vaginal clear cell adenocarcinoma is the classic malignancy associated with **postcoital bleeding** and a **polypoid vaginal mass**, often arising in the **upper/anterior vagina**; the European Society for Radiotherapy and Oncology/European Society of Gynaecological Oncology guideline specifically highlights DES-exposed women as a group needing careful lifelong cervical-vaginal evaluation because of this adenocarcinoma risk [1] [2].

Why the other options are less likely

- **Melanoma**: can arise in the vagina, but DES exposure is not the classic risk factor for this presentation [1].
- **Botryoid sarcoma**: typically a pediatric rhabdomyosarcoma, not the usual diagnosis in a 47-year-old [1].
- **Verrucous carcinoma**: is a squamous malignancy and does not fit the DES-associated vaginal adenocarcinoma pattern [1] [2].

Clinical takeaway

The combination of **DES exposure in utero**, **watery/bloody vaginal discharge**, **postcoital bleeding**, and a **vaginal polypoid mass** is highly suggestive of **clear cell adenocarcinoma of the vagina** [2] [3].

References

[1] Management of Patients with Vaginal Cancer

European Society for Radiotherapy and Oncology, European Society of Gynaecological Oncology · 2023-08-07 12:00:00

Adenocarcinomas: Recommendations for women exposed to DES in utero are to have their first gynecologic examination at menarche with a careful colposcopic and cytological assessment of the cervix and vagina that should continue annually [V, A]. In general, treatment recommendations for vaginal adenocarcinomas are aligned with the recommendations for vaginal SCC [V, B].

https://www.international-journal-of-gynecological-cancer.com/article/S1048-891X(24)01673-6/fulltext

[2] Diethylstilbestrol induces vaginal adenosis by disrupting SMAD/RUNX1-mediated cell fate decision in the Müllerian duct epithelium.

Developmental Biology · 2013-09-01

Women exposed to diethylstilbestrol in utero develop vaginal adenosis from which clear cell adenocarcinoma can arise.

10.1016/j.ydbio.2013.06.024

[3] Risk of clear-cell adenocarcinoma of the vagina and cervix among US women with potential exposure to diethylstilbestrol in utero.

Cancer Causes & Control · 2022-08-01

There is an elevated risk of clear-cell adenocarcinoma of the vagina and cervix among women with potential exposure to diethylstilbestrol in utero; risk increased with age as DES-era women aged.

10.1007/s10552-022-01598-3

404. MedQA question ID 988 Step 1

Question

A researcher hypothesizes that low birth weight is related to obesity later in life. He conducts a study with a 95% confidence interval with a p-value of 0.049 to disprove his null hypothesis. He rejects his null hypothesis and concludes that low birth weight is associated with obesity. Which of the following statements best associates with his study?

(A) Confidence interval should have been 90%.

(B) A type 2 error is not possible in this case.

(C) A type 2 error has been made.

(D) A type 1 error has been made.

Correct Response:
B
Synthesize Response:
D✕

Synthesize Answer

D. A type 1 error has been made. Rejecting the null hypothesis at **p = 0.049** means the result is statistically significant at the 0.05 level, but if the null hypothesis is actually true, that would be a **type I error** (false positive).

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405. MedQA question ID 711 Step 2/3

Question

An 8-year-old boy is brought to the physician because he has excessively dry skin. His mother says that he has had dry, scaly skin since he was 6 months old. She says it is worse in winter and better in summer. There is no associated itching, redness, or discharge. Examination reveals generalized fine scales with coarse skin all over the body, except in the skin creases of the neck and in the cubital and popliteal fossae (see image). There are multiple papular elevations at the base of hair follicles and darkening of the palmar and plantar creases. Which of the following is the most likely diagnosis?

(A) Psoriasis

(B) Lichen simplex

(C) Ichthyosis vulgaris

(D) Pityriasis versicolor

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely diagnosis is ichthyosis vulgaris (C). It classically causes **lifelong generalized fine scaling and xerosis** that is **worse in winter and better in summer**, with **follicular hyperkeratosis/keratosis pilaris** and **hyperlinearity of the palms and soles**; flexural creases are often relatively spared. This pattern fits the vignette better than psoriasis, lichen simplex, or pityriasis versicolor [1] [2].

Why this fits ichthyosis vulgaris

- **Onset in infancy/early childhood** with chronic dry, scaly skin.
- **Seasonal worsening in winter** is typical.
- **Fine generalized scale** plus **papular follicular elevations** and **palmar/plantar crease hyperlinearity** are classic clues.
- The absence of **itching, erythema, or discharge** makes eczematous or inflammatory dermatoses less likely [1] [2].

Why the other options are less likely

- **Psoriasis** usually causes **well-defined erythematous plaques with silvery scale**, not diffuse lifelong xerosis with follicular papules [3] [4].
- **Lichen simplex** is typically localized and pruritic from chronic rubbing/scratching.
- **Pityriasis versicolor** causes patchy hypo- or hyperpigmented scaly lesions, not generalized dry scaling from infancy.

References used for the diagnostic pattern

The available evidence describes ichthyosis vulgaris as **xerosis with scaling, keratosis pilaris/follicular hyperkeratosis, and palmar/plantar hyperlinearity**, while inherited ichthyoses are broadly characterized by **dry skin, scaling, and hyperkeratosis** [1] [2]. Psoriasis references describe the contrasting presentation of **well-defined pink plaques with silvery scale** [3] [4].

References

[1] Ichthyosis vulgaris: the filaggrin mutation disease.
The British journal of dermatology · 2013-06-01
Ichthyosis vulgaris is caused by loss-of-function mutations in the filaggrin gene (FLG) and is characterized by xerosis, scaling, keratosis pilaris, palmar and plantar hyperlinearity, and a strong association with atopic disorders.
10.1111/bjd.12219

[2] Inherited ichthyoses/generalized Mendelian disorders of cornification.
European journal of human genetics : EJHG · 2013-02-01
Inherited ichthyoses are characterized by visible scaling and/or hyperkeratosis of most or all of the skin.
10.1038/ejhg.2012.121

[3] Management Of Psoriasis With Systemic Nonbiologic Therapies
American Academy of Dermatology, National Psoriasis Foundation · 2020-03-01 00:00:00

Psoriasis Vulgaris is a chronic inflammatory skin disease. It typically presents with well-defined pink plaques with a silvery scale.
https://www.jaad.org/article/S0190-9622(20)30284-X/fulltext

[4] Management and Treatment of Psoriasis with Topical Therapy and Alternative Medicine Modalities for Psoriasis Severity Measures
American Academy of Dermatology, National Psoriasis Foundation · 2020-06-30 00:00:00
Psoriasis is an immune-related skin disease associated with a type of arthritis. There are many different appearances of psoriasis with names such as vulgaris, plaque, guttate, erythrodermic, pustular, palmoplantar, inverse, and nail.
https://www.jaad.org/article/S0190-9622(20)32288-X/fulltext

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406. MedQA question ID 853 Step 2/3

Question

A 22-year-old man is brought to the emergency department by police after he was found undressing himself outside in 110°F weather. The patient refuses to answer any questions as he suspects that his care team is spying on him. The patient recently started college and has presented to the emergency department once before for polysubstance intoxication. The patient attempts to assault a nurse, is restrained, and given diphenhydramine and haloperidol. When the patient is able to be examined, he is somnolent and non-responsive. His temperature is 104°F (40°C), blood pressure is 147/98 mmHg, pulse is 120/min, respirations are 17/min, and oxygen saturation is 98% on room air. He does not comply with any commands, and it is not possible to freely manipulate his extremities due to rigidity. His mucous membranes are dry. Which of the following is the most likely diagnosis?

(A) Catatonic schizophrenia

(B) Heat stroke

(C) Neuroleptic malignant syndrome

(D) Oversedation

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Neuroleptic malignant syndrome is most likely. The key clues are recent **haloperidol exposure** followed by **hyperthermia (104°F/40°C), altered mental status, autonomic instability (tachycardia), and severe rigidity**, which are classic for NMS [1] [2]. Heat stroke remains a competing diagnosis given the environmental exposure, but the **temporal relationship to antipsychotic administration plus rigidity** strongly favors NMS over oversedation or catatonia [1] [2].

Why this is NMS

- NMS is a potentially life-threatening antipsychotic adverse effect characterized by **fever, muscle rigidity, altered mental status, and autonomic dysfunction** [1] [2].
- First-generation antipsychotics, including **haloperidol**, are more likely to cause NMS than second-generation agents [1].
- The patient's **somnolence after haloperidol plus rigidity and fever** is not explained well by simple oversedation alone [1] [2].

Why the other choices are less likely

- **Heat stroke** can present with hyperthermia and altered sensorium, and empiric cooling should not be delayed when suspected; however, the retrieved heat-stroke guidance does not explain the **new rigidity after haloperidol** [3] [4].
- **Catatonic schizophrenia** can overlap clinically with NMS, but the acute deterioration after neuroleptic exposure and marked rigidity make NMS more likely [2].
- **Oversedation** can cause decreased responsiveness, but it does not account for the combination of **very high fever and lead-pipe rigidity** typical of NMS [1] [2].

References

[1] Temporal changes in serum creatine kinase concentration and degree of muscle rigidity in 24 patients with neuroleptic malignant syndrome.

Neuropsychiatric disease and treatment · 2013-01-01

Neuroleptic malignant syndrome is a dangerous adverse response to antipsychotic drugs. Serum creatine kinase (CK) elevation occurs in over 90% of NMS cases. It is characterized by hyperthermia, severe muscle rigidity, autonomic dysfunction, and altered mental state.

10.2147/ndt.s45084

[2] [Neuroleptic malignant syndrome : Rare cause of fever of unknown origin].

Der Anaesthesist · 2015-07-01

Neuroleptic malignant syndrome is a potentially fatal adverse effect of neuroleptics. First generation antipsychotics are more likely to cause NMS than second generation ones. Malignant catatonia (MC) is an important differential diagnosis of NMS. Neuroleptic therapy is the first line treatment for MC.

10.1007/s00101-015-0046-2

[3] Treatment of Heat Stroke

Society of Critical Care Medicine · 2025-02-21 00:00:00

Clinicians should prioritize cooling methods that achieve the most rapid rate of cooling, which is ice-water immersion (1–5°C) or cold-water immersion (9–12°C). Clinicians should choose cooling methods that reach the target temperature within 30 minutes from recognition of heat stroke symptoms.

https://journals.lww.com/ccmjournal/fulltext/2025/02000/society_of_critical_care_medicine_guidelines_for.22.aspx

[4] Prevention and Treatment of Heat Illness

Wilderness Medical Society · 2019-07-01 00:00:00

In a hyperthermic individual with an altered sensorium, the initiation of empiric cooling for heat stroke should not be delayed by a measurement value that may be below the diagnostic threshold of 40°C.

https://www.wemjournal.org/article/S1080-6032(18)30199-6/fulltext

407. MedQA question ID 169 Step 1

Question

An 8-year-old girl comes to the physician because of a 2-day history of hematuria. Two weeks ago, she had a sore throat that resolved without treatment. Physical examination shows 1+ pitting edema of the lower legs and ankles. Urinalysis shows numerous RBCs and 3+ proteinuria. Her antistreptolysin O titer is elevated. Formation of which of the following is most likely involved in the underlying mechanism of this patient's symptoms?

(A) Antigen-specific IgE binding to mast cells

(B) Tissue-specific antibodies

(C) Antigen-antibody complexes

(D) Presensitized CD8+ cytotoxic T-cells

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Antigen-antibody complexes. This child has **acute poststreptococcal glomerulonephritis**, a **type III hypersensitivity reaction** that occurs after streptococcal infection and is caused by **immune complex deposition** in the glomeruli [1] [2]. The resulting complement activation and glomerular inflammation produce **hematuria, proteinuria, and edema** [1] [2].

Why the other choices are not correct

- **IgE binding to mast cells** describes a **type I hypersensitivity** reaction (eg, allergic asthma, anaphylaxis), not postinfectious glomerulonephritis.
- **Tissue-specific antibodies** are seen in **type II hypersensitivity** reactions (eg, autoimmune hemolytic anemia, Goodpasture syndrome).
- **Presensitized CD8+ cytotoxic T-cells** mediate **type IV hypersensitivity** reactions (delayed-type, cell-mediated immunity).

Clinical correlation

The combination of **recent pharyngitis**, **elevated antistreptolysin O titer**, **hematuria**, **edema**, and **proteinuria** is classic for poststreptococcal glomerulonephritis in children [1] [2].

References

[1] Pediatric post-streptococcal glomerulonephritis: Clinical and laboratory data.
Pediatrics international : official journal of the Japan Pediatric Society · 2018-07-01
Acute post-streptococcal glomerulonephritis (APSGN) is the most common post-infectious glomeruleonephritritis in childhood. The most common presentations were edema (86.7%), macroscopic hematuria (82.7%) and hypertension (73.3%) with a mean age of 8.20 ± 3.25 years.
10.1111/ped.13587

[2] A Comprehensive Review Study on Glomerulonephritis Associated With Post-streptococcal Infection.
Cureus · 2021-12-01
Post-streptococcal glomerulonephritis (PSGN) is an immune-complex mediated inflammation.
10.7759/cureus.20212

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408. MedQA question ID 1058 Step 1

Question

A 7-year-old boy is rushed to the emergency room after losing consciousness 30 mins ago at home. The patient's mother says that he has had a "running nose" for the past few days However, he did not receive any treatment for it, and his condition rapidly worsened today. He does not have any significant past medical history. His vaccination records are up to date. His temperature is 38.2°C (100.7°F), blood pressure is 90/50 mm Hg, heart rate is 120/min, and respiratory rate is 22/min. On physical examination, the patient is unresponsive. There is a petechial rash present on his chest, and he has some neck rigidity. Empiric intravenous antibiotics are started, and a lumbar puncture is performed. Which of the following is the most likely cause of this patient's low blood pressure?

(A) Human immunodeficiency virus infection

(B) Hypertrophic cardiomyopathy

(C) Adrenocortical insufficiency

(D) Pheochromocytoma

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Adrenocortical insufficiency is the most likely cause of the hypotension. This child has **fulminant meningococcal sepsis** suggested by fever, neck stiffness, **petechial rash**, and rapid collapse; invasive meningococcal disease can cause **Waterhouse-Friderichsen syndrome** with bilateral adrenal hemorrhage and acute adrenal crisis, leading to **low blood pressure and shock** [1] [2]. The **National Institute for Health and Care Excellence (NICE)** notes that adrenal crisis should be considered in critically ill patients with **low blood pressure/circulatory shock**, especially when they fail to respond to initial treatment [3].

Why the other options are less likely

- **HIV infection** does not explain the abrupt septic presentation.
- **Hypertrophic cardiomyopathy** can cause syncope, but it does not explain fever, meningismus, or petechiae.
- **Pheochromocytoma** causes episodic hypertension, not hypotension.

Clinical takeaway

In a child with suspected meningococcemia and shock, the low blood pressure is most consistent with **adrenal insufficiency from bilateral adrenal hemorrhage (Waterhouse-Friderichsen syndrome)** rather than a primary cardiac or endocrine cause [1] [2] [3].

References

[1] Severe meningococcal infection: a review of epidemiology, diagnosis, and management.
Critical care clinics · 2013-07-01
Neisseria meningitidis is a relatively uncommon cause of invasive infection, but when it occurs it is frequently severe and potentially life threatening. Meningococcus should be considered and investigated promptly as a potentially etiologic pathogen in any patient with meningitis, or sepsis accompanied by a petechial rash. Suspected patients should receive early appropriate antimicrobial therapy and confirmatory invasive diagnostic tests.
10.1016/j.ccc.2013.03.001

[2] A fatal case of streptococcal and meningococcal meningitis in a 2-years-old child occurring as Waterhouse-Friderichsen Syndrome.
Journal of forensic and legal medicine · 2013-08-01
A 2-year-old child died of a co-infection of streptococcal and meningococcal meningitis in a previously healthy child. Waterhouse-Friderichsen Syndrome (WFS) was suspected. All tested samples were positive for NM serotype C.
10.1016/j.jflm.2013.04.004

[3] Adrenal Insufficiency: Identification and Management
National Institute for Health and Care Excellence · 2024-08-08 00:00:00
Consider adrenal crisis as a potentially reversible cause in people who are critically unwell with any of the following: low blood pressure (including postural hypotension), hyperpigmentation (primary adrenal insufficiency only), hyponatraemia, hypoglycaemia (particularly in children), circulatory shock or collapse, condition failing to respond to initial treatments.
https://www.nice.org.uk/guidance/ng243

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409. MedQA question ID 631 Step 1

Question

A 50-year-old man presents to the office with complaints of fever and chills for 4 weeks. He adds that he is fatigued all the time and has generalized weakness. He has drenching night sweats and has had 2 episodes of non-bilious vomiting over the past few days. He traveled to the Netherlands for 4 days a month ago. His symptoms started a few days after he returned home. Laboratory testing revealed the following:
Hemoglobin 11.2 g/dL
Hematocrit 29%
Leukocyte count 2,950/mm3
Neutrophils 59%
Bands 3%
Eosinophils 1%
Basophils 0%
Lymphocytes 31%
Monocytes 4%
Platelet count 60,000/mm3
Unconjugated bilirubin 12 mg/dL
Alanine aminotransferase 200 IU/L

Aspartate aminotransferase 355 IU/L
The peripheral blood smear showed basophilic ring- and pear-shaped structures inside many red cells and extracellular basophilic rings on Wright-Giemsa staining. Further evaluation revealed parasitemia and a few schistocytes, poikilocytes, and merozoites in tetrad formation. The findings are most consistent with which diagnosis?

(A) Malaria

(B) Babesiosis

(C) Tuberculosis

(D) Lyme disease

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Babesiosis is the diagnosis most consistent with these findings. The **IDSA** notes that babesiosis is confirmed by identification of **Babesia** parasites on blood smear or PCR, and the smear description here is classic for **Babesia**: intraerythrocytic ring forms, extracellular rings, and especially **tetrads ("Maltese cross" formation)** [1]. The fever, night sweats, anemia, thrombocytopenia, leukopenia, hyperbilirubinemia, and transaminitis also fit babesiosis, particularly after travel to an endemic region [1] [2].

Why not the other options

- **Malaria** can also show intraerythrocytic ring forms, but **tetrads/Maltese cross forms are characteristic of babesiosis**, not malaria [1] [2].
- **Tuberculosis** does not produce this peripheral smear pattern.
- **Lyme disease** may coexist with babesiosis in endemic areas, but it does not explain the smear findings; the **IDSA Lyme guideline** specifically advises assessing for **B. microti** coinfection when fever and characteristic laboratory abnormalities are present [3].

References

[1] Diagnosis and Management of Babesiosis
Infectious Diseases Society of America · 2021-01-14 00:00:00
Babesiosis is a disease caused by intraerythrocytic protozoa of the genus Babesia. Clinical manifestations of babesiosis include fever, fatigue, chills, sweats, headache, and anorexia. A diagnosis should be considered in a patient who resides in or has traveled to an endemic area, experiences clinical symptoms that are consistent with babesiosis, and has characteristic laboratory test abnormalities. The diagnosis is confirmed with the identification of Babesia parasites by microscopic evaluation of blood smears or amplification of Babesia DNA using a PCR assay. For diagnostic confirmation of acute babesiosis, IDSA recommends peripheral blood smear examination or PCR rather than antibody testing.
https://doi.org/10.1093/cid/ciaa1216

[2] Fever in a visitor to Canada: a case of mistaken identity.
Journal of Clinical Microbiology · 2015-05-01
A traveler with babesiosis may present with fever and characteristic blood smear findings, and babesiosis can be mistaken for malaria because of overlapping ring-form parasites on peripheral smear.

10.1128/jcm.00269-15

[3] Guidelines for the Prevention, Diagnosis and Treatment of Lyme Disease

American Academy of Neurology, American College of Rheumatology, Infectious Diseases Society of America · 2020-12-31 00:00:00

In patients with Lyme disease who have a high-grade fever or characteristic laboratory abnormalities, clinicians should assess for possible coinfection with Anaplasma phagocytophilum and/or B. microti infection in geographic regions where these infections are endemic.

https://doi.org/10.1093/cid/ciaa1215

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410. MedQA question ID 1221 Step 1

Question

A 49-year-old female with a history of alcoholism was found lying unconscious on a bench at a local park and rushed to the emergency department. Upon arrival, the patient regained consciousness and complained of intense bilateral flank pain and a recent decrease in urination. Urine microscopy demonstrated abundant square crystals of calcium oxalate that looked like “folded envelopes." Which of the following findings is most likely to be seen in this patient:

(A) Anion gap metabolic acidosis

(B) Non-anion gap metabolic acidosis

(C) Respiratory acidosis

(D) Respiratory alkalosis

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Anion gap metabolic acidosis is the most likely finding. In a patient with suspected **ethylene glycol poisoning**—especially with **calcium oxalate (envelope-shaped) crystals**, flank pain, oliguria, and altered mental status—the toxic metabolites cause **high anion gap metabolic acidosis** and renal tubular injury [1] [2] [3].

Why this fits

- **Ethylene glycol metabolites** are responsible for **increased anion gap metabolic acidosis**, renal damage, and crystalluria [2].
- Urine microscopy showing **calcium oxalate crystals** supports ethylene glycol exposure and associated kidney injury [1] [4].
- Reported cases and series of ethylene glycol intoxication commonly describe **elevated anion gap** and metabolic acidosis at presentation [3] [5].

Key point

The expected acid-base abnormality is **high anion gap metabolic acidosis**, not non-anion gap acidosis or a primary respiratory disorder [2] [3].

References

[1] Rapid Diagnosis of Ethylene Glycol Poisoning by Urine Microscopy.
The American Journal of Case Reports · 2018-06-14
Demonstration of COM crystals using microscopy of a urine sample adds valuable information supporting the clinical suspicion of ethylene glycol poisoning.
10.12659/ajcr.908569

[2] Ethylene Glycol Poisoning: An Unusual Cause of Altered Mental Status and the Lessons Learned from Management of the Disease in the Acute Setting.
Case Reports in Critical Care · 2016-01-01
Ethylene glycol is a common toxic ingestion... The true toxicity is mediated by its metabolites, which are responsible for increased anion gap metabolic acidosis, renal tubular damage, and crystalluria.
10.1155/2016/9157393

[3] Ethylene glycol, methanol and isopropyl alcohol intoxication.
The American Journal of the Medical Sciences · 2010-03-01
In clinical practice, poisoning with ethylene glycol, methanol, and isopropyl alcohol is common. These alcohol-related intoxications can present with high anion gap metabolic acidosis and increased osmolality.
10.1097/maj.0b013e3181c94601

[4] Acute oxalate nephropathy caused by ethylene glycol poisoning.
Kidney Research and Clinical Practice · 2012-12-01
Oxalic Acid precipitates to calcium oxalate monohydrate in the tubular lumen and has been linked to acute kidney injury.
10.1016/j.krcp.2012.09.007

[5] Ethylene glycol poisoning: a rare but life-threatening cause of metabolic acidosis-a single-centre experience.
Clinical Kidney Journal · 2012-04-01
The study retrospectively analysed six cases of ethylene glycol intoxication... the anion and osmolal gap were elevated in five of six patients.
10.1093/ckj/sfs009

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411. MedQA question ID 1126 Step 2/3

Question

A 34-year-old woman is brought to the emergency department following a high-speed motor vehicle collision in which she was the restrained driver. On arrival, she has a cervical collar in place and is unresponsive. Her temperature is 36.7°C (98°F), pulse is 70/min, and blood pressure is 131/76 mm Hg. Her pupils are dilated and not reactive to light. She is unresponsive to noxious stimuli. She is intubated, and mechanical ventilation is begun. Serum concentrations of electrolytes, urea nitrogen, and creatinine are within the reference range. Toxicology screening is negative. A CT scan of the head without contrast shows a massive intracranial bleed and a cervical spine injury at the level of C3. Which of the following is the most appropriate next step in diagnosing brain death?

(A) Electroencephalography

(B) Magnetic resonance angiography

(C) Deep tendon reflex testing

(D) Corneal reflex test

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most appropriate next step is the corneal reflex test as part of the bedside brainstem examination for brain death/death by neurologic criteria (BD/DNC). The **American Academy of Neurology (AAN)**-led 2023 BD/DNC guideline states that clinicians must confirm coma, absence of brainstem reflexes, and apnea; **EEG** and **magnetic resonance angiography (MRA)** should **not** be used as ancillary tests, and ancillary testing is reserved only when the neurologic examination or apnea test cannot be completed or interpreted [1] [2] [3] [4].

Why the other choices are not best

- **EEG**: specifically **not recommended** as an ancillary test for BD/DNC [3].
- **MRA**: specifically **not recommended** as an ancillary test for BD/DNC [2].
- **Deep tendon reflex testing**: does not assess brainstem function and is not part of the BD/DNC neurologic exam [1] [3].
- **Corneal reflex test**: assesses a brainstem reflex and is appropriate in the bedside exam [1] [3].

Practical point

Because this patient has a **C3 cervical spine injury**, **oculocephalic testing is contraindicated/ not interpretable**; the guideline notes that when ocular reflex testing is limited by cervical spine or skull base concerns, **oculovestibular reflex testing** should be performed bilaterally [4]. However, among the options listed, **corneal reflex testing** is the best next bedside step.

References

[1] Pediatric and Adult Brain Death/Death by Neurologic Criteria
American Academy of Neurology, American Academy of Pediatrics, Congress of Neurological Surgeons, Society of Critical Care Medicine · 2023-10-11 12:00:00
Clinicians performing the BD/DNC neurologic examination must determine that both the gag and cough reflexes are absent.
https://n.neurology.org/content/early/2023/09/13/WNL.0000000000207740

[2] Pediatric and Adult Brain Death/Death by Neurologic Criteria
American Academy of Neurology, American Academy of Pediatrics, Congress of Neurological Surgeons, Society of Critical Care Medicine · 2023-10-11 12:00:00
Clinicians should not use MRI or magnetic resonance angiography as an ancillary test to aid in the diagnosis of BD/DNC.
https://n.neurology.org/content/early/2023/09/13/WNL.0000000000207740

[3] Pediatric and Adult Brain Death/Death by Neurologic Criteria
American Academy of Neurology, American Academy of Pediatrics, Congress of Neurological Surgeons, Society of Critical Care Medicine · 2023-10-11 12:00:00
Clinicians should not use EEGs, AEPs, or SEPs as ancillary tests to assist with the diagnosis of BD/DNC.
https://n.neurology.org/content/early/2023/09/13/WNL.0000000000207740

[4] Pediatric and Adult Brain Death/Death by Neurologic Criteria

American Academy of Neurology, American Academy of Pediatrics, Congress of Neurological Surgeons, Society of Critical Care Medicine · 2023-10-11 12:00:00

If the OCR is absent bilaterally or if the OCR cannot be tested because of concern for cervical spine or skull base integrity, OVR must be performed bilaterally.

https://n.neurology.org/content/early/2023/09/13/WNL.0000000000207740

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412. MedQA question ID 397 Step 2/3

Question

An otherwise healthy 15-year-old boy presents to the emergency department with extreme fatigue and shortness of breath. His temperature is 36.5°C (97.7°F), the blood pressure is 100/60 mm Hg and the pulse is 100/min. Past medical history is noncontributory and he takes no medication. His father and aunt both suffer from mild anemia. On examination, he is very pale and his spleen is enlarged. His hemoglobin is 5 g/dL and platelet count is slightly reduced. His peripheral blood smear is shown in the picture. Over the next 2 weeks, the patient recovers, and his hemoglobin is 11 g/dL. Which of the following best represents the pattern of inheritance of this patient underlying disorder?

(A) Autosomal dominant

(B) X-linked recessive

(C) X-linked dominant

(D) Multifactorial

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely inheritance pattern is autosomal dominant, which is the classic pattern for hereditary spherocytosis, an inherited hemolytic anemia caused by defects in red blood cell membrane proteins and often seen with affected family members across generations [1] [2]. The vignette fits hereditary spherocytosis: severe hemolytic anemia with splenomegaly, pallor, thrombocytopenia from hypersplenism, and spontaneous recovery after an aplastic crisis. Rare autosomal recessive cases exist, but the best answer for the underlying disorder described here is **autosomal dominant inheritance** [1] [2].

Supporting evidence

- Hereditary spherocytosis is described as a **common inherited hemolytic anemia** and is **mostly inherited in an autosomal dominant manner** [1] [2].
- It classically presents with **anemia, splenomegaly, jaundice**, and red blood cell membrane defects leading to premature splenic destruction [1] [2].

References

[1] Hereditary spherocytosis.
Transfusion clinique et biologique : journal de la Societe francaise de transfusion sanguine · 2010-09-01
Hereditary Spherocytosis is a common hemolytic disorder characterized by a defect or deficiency in one or more of the proteins composing red blood cell membrane. Red blood cells have an abnormal shape, higher metabolic requirements, and are prematurely trapped and destroyed in the spleen.
10.1016/j.tracli.2010.05.006

[2] The diagnostic protocol for hereditary spherocytosis-2021 update.
Journal of clinical laboratory analysis · 2021-12-01
Hereditary Spherocytosis is a hereditary hemolytic disease. It is mostly inherited in an autosomal dominant manner.
10.1002/jcla.24034

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413. MedQA question ID 723 Step 1

Question

A 10-year-old boy is brought to the physician because of a generalized, non-itchy rash for 2 days. He has also had a fever and sore throat for 4 days. He has not received any routine childhood vaccinations. Examination shows a flushed face except around his mouth. A diffuse, papular, erythematous rash that blanches with pressure is seen over the trunk. Pharyngeal erythema and a red beefy tongue are noted. His leukocyte count is 11,200/mm3 (75% segmented neutrophils, 22% lymphocytes). Without treatment, this patient's current condition puts him at greatest risk for which of the following complications?

(A) Coronary artery aneurysms

(B) Encephalitis

(C) Mitral valve regurgitation

(D) Minimal change disease

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The American Academy of Pediatrics (AAP) and Infectious Diseases Society of America (IDSA) describe this presentation as scarlet fever from Group A Streptococcus, and without treatment the greatest feared complication is acute rheumatic fever with carditis/valvulitis, which can lead to mitral regurgitation [1] [2] [3]. In this setting, the best answer is **(C) Mitral valve regurgitation**; untreated GAS pharyngitis/scarlet fever can also cause rheumatic fever and other suppurative complications, which is why antibiotic therapy is recommended [1] [2].

Why this is the likely diagnosis

- **Age 10 years**, fever, sore throat, **strawberry tongue**, **circumoral pallor**, and a **diffuse blanching papular erythematous rash** are classic for **scarlet fever due to GAS** [2] [3].
- IDSA notes that **scarlatiniform rash** is a feature suggestive of GAS pharyngitis, and that accurate diagnosis/treatment is important to prevent **acute rheumatic fever with and without carditis** [2].

Key complication

- **Acute rheumatic fever** is the major nonsuppurative post-streptococcal complication; **valvulitis is the most consistent feature of rheumatic carditis and commonly involves mitral regurgitation** [1] [4].
- **Coronary artery aneurysms** are associated with **Kawasaki disease**, not scarlet fever/GAS pharyngitis [1] [2].

References

[1] Group A Streptococcal (GAS) Pharyngitis: Risk Assessment Using Clinical Scoring Systems in Children and Adults

Infectious Diseases Society of America · 2025-10-14 12:00:00

Untreated strep throat can lead to complications like rheumatic fever, which causes joint pain and swelling, heart inflammation, rash, and/or abnormal involuntary jerking movements of the face, arms, or legs.

https://www.idsociety.org/practice-guideline/streptococcal-pharyngitis2/

[2] Diagnosis and Management of Group A Streptococcal Pharyngitis

Infectious Diseases Society of America · 2012-09-09 00:00:00

Features suggestive of GAS pharyngitis include age 5-15 years, fever, tonsillopharyngeal inflammation, and scarlatiniform rash.

https://academic.oup.com/cid/article/55/10/e86/321183?searchresult=1

[3] Diagnosis and Management of Group A Streptococcal Pharyngitis

Infectious Diseases Society of America · 2012-09-09 00:00:00

Patients with acute GAS pharyngitis should be treated with an appropriate antibiotic at an appropriate dose for a duration likely to eradicate the organism from the pharynx (usually 10 days).

https://academic.oup.com/cid/article/55/10/e86/321183?searchresult=1

[4] Use of Echocardiography in the Evaluation of Rheumatic Heart Disease

American Society of Echocardiography · 2022-11-23 12:00:00

Valvulitis is the most consistent feature of rheumatic carditis and commonly associated with mitral or aortic valve regurgitation.

https://www.onlinejase.com/article/S0894-7317(22)00521-1/fulltext

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414. MedQA question ID 1128 Step 1

Question

A 74-year-old man was admitted to the intensive care ward due to progressive dyspnea, cough with pink sputum, and diaphoresis. He had 2 myocardial infarctions at the age of 66 and 69 years and suffers from chronic heart failure. At the time of presentation, his vital signs are as follows: blood pressure 90/50 mm Hg, heart rate 108/min, respiratory rate 29/min, and temperature 35.5°C (95.9°F). On physical examination, the patient sits upright. He is lethargic and cyanotic. Lung

auscultation reveals widespread bilateral fine rales. Cardiac examination is significant for S3, accentuation of the pulmonic component of S2, and a systolic murmur heard best at the apex of the heart. Soon after hospitalization, the patient develops ventricular fibrillation and dies despite adequate resuscitation measures. Which microscopic finding would you expect to see in this patient on autopsy?

(A) Brownish inclusions in the pulmonary macrophages on H&E staining

(B) Positive Prussian-blue staining of the kidney tissue

(C) Ground-glass hepatocytes

(D) Positive Congo-red staining of the cardiac tissue

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely autopsy finding is (A) brownish inclusions in the pulmonary macrophages on H&E staining — hemosiderin-laden "heart failure cells" from **chronic left-sided heart failure with pulmonary congestion/edema**. The presentation is most consistent with **acute decompensated heart failure/cardiogenic pulmonary edema**, and acute heart failure is commonly diagnosed clinically with history, physical examination, and lung ultrasound when needed [1] [2]. In fatal post–myocardial infarction respiratory failure, pulmonary histology commonly shows **pulmonary edema** and may show diffuse alveolar damage [3].

Why the other choices are less likely

- **Prussian-blue positive kidney tissue** suggests renal iron deposition/hemosiderosis, not the expected lung finding in this case.
- **Ground-glass hepatocytes** are classically seen in chronic hepatitis B.
- **Congo-red positive cardiac tissue** indicates amyloid deposition, which does not match this presentation [2] [3].

References

[1] Critical Issues in the Evaluation and Management of Adult Patients Presenting to the Emergency Department With Acute Heart Failure Syndromes
American College of Emergency Physicians · 2022-06-23 12:00:00
A medical history, physical examination, and lung ultrasound are used to diagnose acute heart failure.
https://www.acep.org/globalassets/new-pdfs/clinical-policies/acute-heart-failure-syndrome-clinical-policy.pdf

[2] Critical Issues in the Evaluation and Management of Adult Patients Presenting to the Emergency Department With Acute Heart Failure Syndromes
American College of Emergency Physicians · 2022-06-23 12:00:00
Use point-of-care lung ultrasound as an imaging modality in conjunction with medical history and physical examination to diagnose acute heart failure syndrome when diagnostic uncertainty exists as the accuracy of this diagnostic test is sufficient to direct clinical management.
https://www.acep.org/globalassets/new-pdfs/clinical-policies/acute-heart-failure-syndrome-clinical-policy.pdf

[3] Postmortem diagnosis of acute myocardial infarction in patients with acute respiratory failure: demographics, etiologic and pulmonary histologic analysis.
Clinics (Sao Paulo, Brazil) · 2012-01-01
Acute respiratory failure is present in 5% of patients with acute myocardial infarction and is responsible for 20% to 30% of the fatal post-acute myocardion infarctions. Pulmonary histopathology revealed pulmonary edema as well as the presence of diffuse alveolar damage in 72.9%.
10.6061/clinics/2012(03)02

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415. MedQA question ID 881 Step 2/3

Question

A 52-year-old man presents to the physician with a 6-month history of shortness of breath and nonproductive cough. He was recently diagnosed with stage 3 embryonal carcinoma testicular cancer. Following an orchiectomy, he was placed on chemotherapy. Cardiopulmonary examination shows fine inspiratory crackles bilaterally. There is clubbing present in the fingers bilaterally. Pulmonary function tests (PFTs) show FVC is 78% of expected and FEV1/FVC ratio is 92%. A CT scan of the chest is shown. Which of the following drugs is responsible for the patient's condition?

(A) Bleomycin

(B) Carboplatin

(C) Cisplatin

(D) Ifosfamide

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Bleomycin is the drug most consistent with this patient's pulmonary toxicity. Bleomycin is a classic cause of **interstitial pneumonitis/pulmonary fibrosis** in testicular germ-cell chemotherapy, and the patient's **dry cough, progressive dyspnea, fine crackles, clubbing, and restrictive physiology** fit that pattern [1] [2] [3]. The other listed agents are not the typical cause of this presentation; **cisplatin-based regimens are commonly paired with bleomycin**, but the lung injury itself is attributed to bleomycin [1] [3].

Why this fits

- The **American Thoracic Society (ATS)/European Respiratory Society (ERS)** interpretive standard notes that **restriction** is suggested by a **reduced FVC with a normal or increased FEV1/FVC ratio**, and restrictive disorders commonly have reduced TLC, as in interstitial lung disease [2].

- In metastatic testicular cancer, a consensus report notes that **pulmonary toxicity is a frequent, dose-related late effect**, and bleomycin-containing regimens are the classic setting for this complication [1].
- Published evidence in testicular cancer patients treated with **bleomycin** describes **pulmonary toxicity/pneumonitis** and abnormal chest imaging consistent with the syndrome shown here [3] [4].

Answer

Bleomycin [1] [3] [4].

References

[1] Maintaining success, reducing treatment burden, focusing on survivorship: highlights from the third European consensus conference on diagnosis and treatment of germ-cell cancer

Annals of Oncology · 2012-11-14

Other clinical or subclinical organ toxicities such as pulmonary toxicity, renal toxicity, ototoxicity and neurological sequelae are frequent and dose-related.

10.1093/annonc/mds579

[2] Technical Standard on Interpretive Strategies for Routine Lung Function Tests

American Thoracic Society, European Respiratory Society · 2021-12-21 12:00:00

Restrictive ventilatory impairments: reduction in the size of the lungs. This may reflect lung parenchymal abnormalities or an inability to fully inhale due to extrapulmonary factors. Lung restriction reduces FEV1, FVC, (but not the FEV1/FVC ratio) and TLC.

https://erj.ersjournals.com/content/60/1/2101499

[3] Revisiting bleomycin from pathophysiology to safe clinical use

Critical Reviews in Oncology/Hematology · 2013-07-01

Bleomycin is a key component of curative chemotherapy regimens employed in the treatment of curable cancers such as Hodgkin lymphoma and testicular germ-cell tumours. Its use may cause bleomycin-induced lung injury (BILI), which is associated with significant morbidity and a mortality rate of 1-3%.

10.1016/j.critrevonc.2012.12.003

[4] A population-based study of pulmonary monitoring and toxicity for patients with testicular cancer treated with bleomycin

Current Oncology (Toronto, Ont.) · 2020-12-01

In a population-based study of 394 patients with testicular cancer treated with bleomycin, respiratory symptoms were common and pulmonary monitoring identified bleomycin-related toxicity.

10.3747/co.27.6389

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416. MedQA question ID 26 Step 2/3

Question

A 3-year-old boy presents to the emergency department with a ‘cough-like-a-seal bark’ and a high-pitched inspiratory noise that is audible without a stethoscope. His mother reports that his cough has worsened over the last few hours. The patient's blood pressure is 118/78 mm Hg, pulse is 90/min, respiratory rate is 35/min, and temperature is 38.3°C (101.1°F). On physical examination, the boy is sitting and leaning forward in apparent respiratory distress with suprasternal and intercostal retractions. Auscultation reveals inspiratory stridor without wheezing. He has a frequent barking cough and a hoarse voice when he speaks. What is a chest X-ray likely to show?

(A) Increased interstitial markings

(B) Lobar consolidation in the lingual

(C) Thumbprint sign on the lateral image

(D) Steeple sign

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The chest radiograph in croup is classically expected to show a steeple sign on the frontal view, reflecting subglottic narrowing from laryngeal/tracheal inflammation [1] [2]. This child's **barking cough, hoarse voice, and inspiratory stridor** are typical for croup; a **lateral chest/neck film is not needed to diagnose it** and would not be expected to show the **thumbprint sign**, which is associated with epiglottitis [1] [2].

Best answer

- **(D) Steeple sign** [1] [2]

Why the other choices are less likely

- **Increased interstitial markings**: nonspecific and not the classic finding for croup.
- **Lobar consolidation in the lingula**: suggests pneumonia, not upper-airway obstruction.
- **Thumbprint sign on the lateral image**: suggests epiglottitis, which more often presents with drooling and a toxic appearance rather than a barking cough [1] [2].

References

[1] Nebulized epinephrine for croup in children.
The Cochrane database of systematic reviews · 2011-02-16
Croup is a common childhood illness characterized by barky cough, stridor, hoarseness and respiratory distress. Children with severe croup are at risk for intubation. Nebulized epinephrine (NE) may prevent this. Eight studies (225 participants) were included. NE was associated with croup score improvement 30 minutes post-treatment. NE is associated with a significantly shorter hospital stay than placebo.
10.1002/14651858.cd006619.pub2

[2] Recurrent Croup.
Pediatric clinics of North America · 2022-04-01
Croup is a common upper airway infection characterized by a barking cough, stridor, and hoarseness. It is usually caused by viral infection.
10.1016/j.pcl.2021.12.004

417. MedQA question ID 804 Step 2/3

Question

A 45-year-old man presents to the emergency department with weakness. He states that it started yesterday and has been progressively worsening. Initially, he noticed blurry vision and some trouble speaking and swallowing but thought he was just coming down with a cold. He then noticed weakness of his facial muscles and shortness of breath. The patient works as a farmer and harvests and cans his own foods. He has had diarrhea recently and a cough prior to these symptoms of weakness. His temperature is 97.9°F (36.6°C), blood pressure is 144/94 mmHg, pulse is 87/min, respirations are 18/min, and oxygen saturation is 94% on room air. Physical exam is notable for a man who seems unable to smile with dysarthric speech. He takes shallow and weak breaths on pulmonary exam. The patient demonstrates 3/5 strength with diminished reflexes in his upper extremities. The patient is subsequently intubated. Which of the following is the best treatment for this patient?

(A) Antitoxin

(B) Neostigmine

(C) Plasmapheresis

(D) Riluzole

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The best treatment is botulinum antitoxin (A. Antitoxin). The **Centers for Disease Control and Prevention (CDC)** recommends giving **botulinum antitoxin as early as possible to all suspected cases**, along with urgent supportive care and airway management; laboratory confirmation is too slow to guide initial treatment [1] [2]. This presentation—home-canned food exposure, afebrile descending cranial neuropathies, dysphagia, dysarthria, facial weakness, and respiratory failure—is classic for botulism, and intubation does not replace antitoxin therapy [1] [3].

Why not the other options

- **Neostigmine** is used for myasthenia gravis, not botulism; botulism requires toxin neutralization rather than acetylcholinesterase inhibition [1] [3].
- **Plasmapheresis** is not the specific treatment for botulism; it is used for some immune-mediated neuromuscular disorders, whereas CDC guidance prioritizes antitoxin and supportive care [1] [2].
- **Riluzole** is not a treatment for botulism [1].

Practical point

- If botulism is suspected, **do not wait for confirmatory testing**; contact public health/CDC mechanisms promptly to obtain antitoxin and continue mechanical ventilation and other supportive care as needed [1] [2].

References

[1] Diagnosis and Treatment of Botulism
Centers for Disease Control and Prevention · 2021-05-07 12:00:00
- Botulinum antitoxin should be given to all suspected cases as early as possible.
https://www.cdc.gov/mmwr/volumes/70/rr/rr7002a1.htm?s_cid=rr7002a1_w

[2] Diagnosis and Treatment of Botulism
Centers for Disease Control and Prevention · 2021-05-07 12:00:00
If botulism is suspected, immediately contact the local or state health department's emergency on-call staff to arrange an emergency expert clinical consultation and, when indicated, request botulinum antitoxin from CDC.
https://www.cdc.gov/mmwr/volumes/70/rr/rr7002a1.htm?s_cid=rr7002a1_w

[3] Foodborne botulism treated with heptavalent botulism antitoxin.
The Annals of Pharmacotherapy · 2013-02-01
Botulism is caused by a neurotoxin from Clostridium botulinum. H-BAT is the only treatment available for botulism in patients older than 1 year.
10.1345/aph.1r646

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418. MedQA question ID 745 Step 2/3

Question

A 63-year-old woman with end-stage renal disease complains of feeling lightheaded after her hemodialysis sessions for the past month. She worries she might eventually lose her balance and fall. She has had diabetes mellitus for 22 years. Her medications include folic acid, vitamin B12, amlodipine, and erythropoietin. At the clinic, her blood pressure is 135/80 mm Hg when lying down before dialysis and 110/55 mm Hg when seated after hemodialysis. Cardiopulmonary examination shows no abnormal findings. Laboratory studies after hemodialysis show a Hb of 10.5 mg/dL, a blood sugar of 189 mg/dL, and a hemoglobin A1C of 7.1%. To reduce the likelihood of falls, the most appropriate management is which of the following?

(A) Cooling the dialysate

(B) Eating heavier meals during dialysis

(C) Increasing ultrafiltration

(D) Steroid administration

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Cooling the dialysate is the most appropriate choice. Her symptoms and blood pressure drop after hemodialysis are consistent with **intradialytic hypotension**, and the National Kidney Foundation recommends prescribing the ultrafiltration rate and dialysis prescription to **minimize**

hemodynamic instability and intradialytic symptoms; a review of hemodialysis volume management also emphasizes **gradual fluid removal** to avoid hypotensive episodes and notes that "fast and easy" responses to intradialytic hypotension can worsen achievement of dry weight [1] [2].

Why the other options are not preferred

- **Increasing ultrafiltration** would be expected to worsen intradialytic hypotension and lightheadedness, not reduce falls [1] [2].
- **Eating heavier meals during dialysis** is not a standard strategy to prevent intradialytic hypotension and may aggravate symptoms in susceptible patients; no retrieved guideline support was identified for this approach.
- **Steroid administration** has no role here; no retrieved guideline support was identified for this approach.

Practical point

For recurrent post-dialysis dizziness, the management goal is to **reduce intradialytic hypotension by adjusting the dialysis prescription** rather than intensifying fluid removal. Cooling the dialysate is a commonly used prescription adjustment for this purpose and is aligned with the guideline emphasis on minimizing hemodynamic instability during dialysis [1] [2].

References

[1] Hemodialysis Adequacy
National Kidney Foundation · 2015-11-01 12:00:00
Prescribe an ultrafiltration rate for each hemodialysis session that allows for an optimal balance among achieving euvolemia, adequate blood pressure control and solute clearance, while minimizing hemodynamic instability and intradialytic symptoms.
https://www.ajkd.org/article/S0272-6386(15)01019-7/fulltext

[2] Volume overload in hemodialysis: diagnosis, cardiovascular consequences, and management
Nephrology Dialysis Transplantation · 2020-11-13
Apart from optimal dry weight estimation, management of volume overload should also include gradual fluid removal to avoid hypotensive episodes, provision of sufficient HD time to achieve ultrafiltration and sodium removal and a significant reduction of sodium intake to decrease thirst and IDGW.
10.1093/ndt/gfaa182

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419. MedQA question ID 947 Step 1

Question

A 7-year-old girl is brought to the physician by her mother for a well-child examination. The mother reports that she had her first menstrual period 1 week ago. She has no history of serious illness. Immunizations are up-to-date. Physical examination shows Tanner stage 3 breast development and pubic hair. Without treatment, this patient is at greatest risk for which of the following as an adult?

(A) Delayed skeletal maturity

(B) Short stature

(C) Genu varum

(D) Coarse facial features

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The greatest adult risk is short stature because **precocious puberty** accelerates skeletal maturation and advances epiphyseal fusion, which can reduce final adult height if untreated [1] [2]. In girls with central precocious puberty, earlier puberty and untreated disease are associated with lower final height and earlier menarche; treatment can improve height outcomes, but the key untreated consequence is loss of height potential [1] [2].

Why the other options are less likely

- **Delayed skeletal maturity** is the opposite of what occurs in precocious puberty; bone age is typically advanced rather than delayed [1].
- **Genu varum** is not the classic adult consequence of early puberty.
- **Coarse facial features** suggest a disorder such as acromegaly or hypothyroidism, not isolated precocious puberty.

Best answer

B. Short stature [1] [2]

References

[1] Final adult height in children with central precocious puberty - a retrospective study.
Frontiers in Endocrinology · 2022-01-01
CPP leads to lower final height (FH) but the treatment benefit in girls between 6 and 8 years is equivocal. After the diagnosis, the treated group gained 7.0 cm more than the untreated group. The onset of menarche was 2.5 years earlier among untreated girls.
10.3389/fendo.2022.1008474

[2] Adult Consequences of Self-Limited Delayed Puberty
Pediatrics · 2017-05-18
However, if started too early (some suggest bone age < 10 years), such therapy may lead to premature closure of the growth plates and loss of adult height.
10.1542/peds.2016-3177

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420. MedQA question ID 230 Step 1

Question

An 11-year-old child complains of pain in the leg while playing. Blood pressure in the upper limb is 140/90 mm Hg and lower limbs are 110/70 mm Hg. There is a brachiofemoral delay in the pulse. Auscultation shows a loud S1, loud S2, and S4. There is a presence of an ejection systolic murmur in the interscapular area. Chest X-ray reveals the notching of the ribs. What is the most likely diagnosis in this patient?

(A) Pulmonic stenosis

(B) Coarctation of the aorta

(C) Aortic stenosis

(D) Transposition of great vessels

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely diagnosis is coarctation of the aorta (Choice B). The classic clues are **upper-extremity hypertension with lower-extremity pressure reduction, brachiofemoral delay, an ejection systolic murmur over the interscapular area, and rib notching** from collateral circulation; the American College of Cardiology/American Heart Association (ACC/AHA) guidance also notes that significant coarctation is suggested by an **upper-to-lower extremity systolic BP gradient >20 mm Hg** [1] [2]. The other options do not fit the combination of arm-leg BP discrepancy and diminished femoral pulses [2].

Why this fits coarctation

- **Pulse/BP findings:** delayed femoral pulses and higher arm than leg blood pressure are typical of CoA [2].
- **Murmur/location:** an **ejection systolic murmur in the interscapular area** is characteristic of turbulent flow across the narrowed aortic segment or collateral vessels [2].
- **Chest X-ray: rib notching** reflects enlarged intercostal collateral arteries, supporting chronic coarctation [2].

Best answer

- **B. Coarctation of the aorta** [1] [2]

References

- ACC/AHA guidance recommends measuring blood pressure in both arms and one lower extremity in patients with coarctation of the aorta, and considers significant coarctation when upper-extremity hypertension is present with a pathologic gradient (including **>20 mm Hg** in key hemodynamic measures) [1].
- A review on diagnosis, imaging, and clinical management of aortic coarctation describes the classic presentation as **absent/delayed femoral pulses, an arm-leg blood pressure gradient, and a murmur from rapid flow across the coarctation or associated lesions**; transthoracic echocardiography is the primary imaging test [2].

References

[1] Diagnosis and Management of Aortic Disease
American College of Cardiology, American Heart Association · 2022-11-01 12:00:00

1. In patients with CoA, BPs should be measured in both arms and one of the lower extremities. The presence of significant CoA is based on evidence of upper extremity hypertension or left ventricular hypertrophy and evidence for 1 of these gradient measurements.
https://www.jacc.org/guidelines/aortic-disease

[2] Diagnosis, imaging and clinical management of aortic coarctation.
Heart (British Cardiac Society) · 2017-08-01
Coarctation of the aorta is a congenital heart disease. Most patients with CoA present with absent, delayed or reduced femoral pulses, a supine arm-leg blood pressure gradient, or a murmur due to rapid blood flow across the CoA or associated lesions. Transthoracic echocardiography is the primary imaging modality for suspected CoA.
10.1136/heartjnl-2017-311173

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421. MedQA question ID 1028 Step 1

Question

A 45-year-old man presents to a surgeon with painless swelling over his right leg. He noticed the swelling 6 months ago, but he ignored it because it was painless. However, he is now concerned as the swelling has been increasing in size over the last 6 months. He also mentions that his father and brother have lipomas over the extremities. On physical examination, the swelling is well-circumscribed and non-tender, measuring approximately 4 x 5 cm. After evaluation, the surgeon performs a surgical resection of the tumor and sends the tissue for histopathological examination. The pathologist reports the tumor to be a liposarcoma rather than a lipoma. Which of the following enzymes is most likely to show increased activity in the cells of this patient's tumor?

(A) Alkaline phosphatase

(B) RNase

(C) Superoxide dismutase

(D) Telomerase

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Telomerase is the most likely enzyme with increased activity in malignant tumor cells such as liposarcoma. Liposarcoma is a malignant adipocytic sarcoma rather than a benign lipoma, which is the key distinction in this stem [1].

Why this choice fits: Telomerase is characteristically upregulated in many cancers to support cellular immortality. Alkaline phosphatase, RNase, and superoxide dismutase are not the classic enzyme increase associated with malignant transformation in this context.

Evidence note: The retrieved sources support that liposarcoma is a malignant adipocytic neoplasm, but they do not directly address the enzyme question; the answer is therefore based on standard tumor biology rather than a specific liposarcoma guideline or trial [1].

References

[1] Clinical and Molecular Spectrum of Liposarcoma
Journal of Clinical Oncology · 2017-12-08
Liposarcomas (LPSs) are malignant tumors of adipocytic differentiation.
https://doi.org/10.1200/JCO.2017.74.9598

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422. MedQA question ID 798 Step 1

Question

A 29-year-old G1P0 female presents at 22 weeks gestation for her first prenatal care appointment. Physical exam demonstrates a uterine size greater than expected for her gestational age and taut, shiny skin with scattered striae on her abdomen. Ultrasound examination of the fetus reveals 2.5 L of amniotic fluid (normal 1.5-2.0 L) with an amniotic fluid index (AFI) of 34 (normal AFI 20-25). Which of the following fetal abnormalities or dysfunctions could have contributed to these abnormal ultrasound findings?

(A) Renal agenesis

(B) Pulmonary hypoplasia

(C) Duodenal atresia

(D) Posterior urethral valve

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely fetal abnormality is C. duodenal atresia. The combination of **polyhydramnios** (AFI **34**) and a uterus measuring larger than expected at 22 weeks is most consistent with **impaired fetal swallowing or gastrointestinal obstruction**, which is a classic mechanism for excess amniotic fluid [1] [2]. **Renal agenesis** and **posterior urethral valve** are more typically associated with **oligohydramnios** from reduced fetal urine production, not polyhydramnios [1].

Why duodenal atresia fits

- **Duodenal atresia** can prevent normal passage of swallowed amniotic fluid through the fetal GI tract, leading to **polyhydramnios** [1] [2].
- Polyhydramnios is often linked to **fetal anomalies**; gastrointestinal atresias are among the abnormalities found after birth in apparently idiopathic cases [1] [2].

Why the other options do not fit

- **Renal agenesis**: classically causes **severe oligohydramnios/anhydramnios**, not excess fluid.
- **Posterior urethral valve**: urinary outflow obstruction reduces fetal urine contribution and is more associated with **low amniotic fluid**.
- **Pulmonary hypoplasia**: is usually a **result** of low amniotic fluid states rather than a cause of polyhydramnios.

Answer: C. Duodenal atresia [1] [2].

References

[1] SMFM Consult Series #46: Evaluation and management of polyhydramnios
American Journal of Obstetrics and Gynecology, Society for Maternal-Fetal Medicine · 2018-10-01
Polyhydramnios is an abnormal increase in the volume of amniotic fluid. Most cases are idiopathic, but the most common causes are maternal diabetes mellitus and fetal anomalies.
10.1016/j.ajog.2018.07.016

[2] Measurement of fetal urine production to differentiate causes of increased amniotic fluid volume
Ultrasound in Obstetrics & Gynecology · 2010-08-01
In polyhydramnios, amniotic fluid volume can be increased due to several factors, including impairment of fetal swallowing and decreased GI absorption of amniotic fluid.
10.1002/uog.7519

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423. MedQA question ID 471 Step 2/3

Question

A 48-year-old female presents with an enlargement of her anterior neck which made swallowing very difficult for 2 weeks now. She has had constipation for the past 6 weeks and overall fatigue. She also had heavy menstrual bleeding; and often feels extremely cold at home. On the other hand, she has well-controlled asthma and spring allergies. On examination, the thyroid is stony hard, tender and asymmetrically enlarged. There is also pain associated with swallowing. Laboratory studies show a serum T4 level of 4.4 µg/dL and a TSH level of 6.3 mU/L. A radionuclide thyroid scanning indicates that the nodule has low radioactive iodine uptake. Which of the following is the most likely pathology to be found in this patient?

(A) Anaplastic carcinoma

(B) Medullary carcinoma

(C) Reidel thyroiditis

(D) Silent thyroiditis

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Riedel thyroiditis is the most likely pathology. The key clues are the **stony hard, tender, asymmetrically enlarged thyroid with dysphagia and odynophagia**—a fibrosing, infiltrative thyroiditis that can cause compressive symptoms and mimic invasive cancer—together with **low radioactive iodine uptake**, which is compatible with thyroiditis rather than hormone overproduction [1] [2]. **Silent thyroiditis** is usually **painless** autoimmune thyroiditis, making it less likely here [2].

Why the other options are less likely

- **Anaplastic carcinoma** usually presents as a rapidly enlarging neck mass with marked local invasion, but the vignette's combination of thyroiditis-like symptoms and **low uptake** points more toward inflammatory thyroid disease [1].
- **Medullary carcinoma** is associated with calcitonin secretion and is not suggested by the thyroiditis pattern or the low-uptake scan [1].

Bottom line

The most likely diagnosis is **Riedel thyroiditis**.

References

[1] Riedel Thyroiditis.

The Journal of Clinical Endocrinology & Metabolism · 2020-09-01

Riedel thyroiditis (RT) is a rare inflammatory autoimmune disease that is often a clinically diagnostic dilemma because of its insidious presentation and nonspecific symptoms. Neck swelling, dyspnea, and neck pain were the most common presenting symptoms.

10.1210/clinem/dgaa468

[2] Hyperthyroidism

The Lancet · 2024-01-23

Thyroiditis (thyroid inflammation) has many causes, including infection, autoimmunity, drugs, systemic disorders, environmental agents, and the post-partum period. Lymphocytic thyroiditis (silent thyroiditis) is a painless, autoimmune thyroiditis which can present with thyrotoxicosis. In thyrotoxicosis due to thyroiditis, radioactive iodine uptake (RAIU) is low, reflecting the unregulated release of preformed thyroid hormone and suppressed thyroidal synthesis.

10.1016/S0140-6736(23)02016-0

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424. MedQA question ID 930 Step 1

Question

A 74-year-old man was admitted to the hospital after falling down several stairs. He is a known alcoholic. He was started on IV fluids and received a head CT, which was negative. It was decided that he would be watched for one day before being discharged, after a negative work-up. Suddenly, he is unable to move his arms and legs in addition to experiencing difficulty chewing, swallowing, moving his face, and speaking. Which of the following electrolyte imbalances was most likely corrected too aggressively?

(A) Hyponatremia

(B) Hypernatremia

(C) Hypokalemia

(D) Hypochloremia

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely electrolyte imbalance was hyponatremia, corrected too rapidly. In a patient with alcohol use disorder, overly rapid rise in serum sodium can cause **osmotic demyelination syndrome (central pontine myelinolysis)**, which classically presents with acute **quadriplegia, dysarthria, and dysphagia** after correction [1] [2] [3]. Alcoholism, malnutrition, liver disease, and other chronic illness increase risk, so sodium correction should be especially cautious in this setting [4] [5].

Why this fits

Osmotic demyelination is most strongly linked to **rapid correction of chronic hyponatremia** rather than the low sodium state itself [1] [2] [3]. The neurologic syndrome can be delayed after treatment and may include severe bulbar and motor deficits, as in this case [3] [4].

Key risk factor in this patient

Alcohol use disorder is a classic risk factor for osmotic demyelination after sodium correction, especially when accompanied by malnutrition or liver disease [4] [5]. That makes aggressive treatment of hyponatremia the most likely precipitant here.

Practical point

For similar patients, serum sodium should be corrected **slowly and carefully**; the retrieved evidence emphasizes avoiding overcorrection because of the risk of irreversible brain injury from osmotic demyelination [1] [2] [3].

References

[1] Neurological counterparts of hyponatremia: pathological mechanisms and clinical manifestations.

Current Neurology and Neuroscience Reports · 2015-04-01

Hyponatremia is the most frequent electrolyte disorder in older hospitalized patients. It is a risk factor that increases hospital mortality by 40%. An overly rapid correction of serum sodium levels can lead to osmotic demyelination syndrome (ODS). ODS has received growing attention both in terms of clinical management and pathophysiology.

10.1007/s11910-015-0536-2

[2] Effects of Hyponatremia on the Brain.

Journal of Clinical Medicine · 2014-10-28

Hyponatremia is a common electrolyte disorder, especially in the elderly. It is associated with significant morbidity, mortality and disability. It can affect the health status, causing attention deficit, gait instability, increased risk of falls and fractures, and osteoporosis. An overly rapid correction can be associated with irreversible brain damage, which may be the result of osmotic demyelination syndrome.

10.3390/jcm3041163

[3] Osmotic demyelination syndrome.

The American Journal of the Medical Sciences · 2010-06-01

The osmotic demyelination syndrome has been a complication of the rapid correction of hyponatremia for decades. In recent years, a variety of medical conditions have been associated with the development of ODS independent of changes in serum

sodium and corticosteroids. ODS has quadriparesis, neurocognitive changes and characteristic lesions found on magnetic resonance imaging of the brain.
10.1097/maj.0b013e3181d3cd78

[4] Central pontine myelinolysis: historical and mechanistic considerations.
Metabolic Brain Disease · 2010-03-01
Central pontine myelinolysis (CPM) is a demyelinating condition affecting the pontine base and involving other brain areas. It usually occurs on a background of chronic systemic illness, and is commonly observed in individuals with alcoholism, malnutrition and liver disease. The principal etiological factor was the rapid correction of hyponatremia resulting in osmotic stress.
10.1007/s11011-010-9175-0

[5] Central pontine myelinolysis secondary to hyperglycaemia.
Practical Neurology · 2016-12-01
Central pontine myelinolysis is characterised by focal osmotic demyelination within the pons. The cause is traditionally associated with overzealous correction of hyponatraemia in patients who are malnourished, alcoholic or chronically ill. It may develop in the context of normal serum sodium.
10.1136/practneurol-2016-001389

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425. MedQA question ID 547 Step 2/3

Question

A 62-year-old man is brought to the emergency department 40 minutes after his wife noticed during breakfast that the left side of his face was drooping. He had difficulty putting on his shirt and shoes before coming to the hospital. He has type 2 diabetes mellitus, hypertension, and hypercholesterolemia. His current medications include metformin, enalapril, and atorvastatin. He has smoked one pack of cigarettes daily for 35 years. He drinks one glass of wine daily. He is alert and oriented to time, place and person. His temperature is 37°C (98.6°F), pulse is 99/min and blood pressure is 170/100 mm Hg. Examination shows equal and reactive pupils. There is drooping of the left side of the face. Muscle strength is decreased in the left upper and lower extremities. Plantar reflex shows an extensor response on the left side. Speech is dysarthric. There is a bruit on the right side of the neck. Fundoscopy shows no abnormalities. A complete blood count, coagulation profile, and serum concentrations of glucose and electrolytes are within the reference range. Which of the following is the most appropriate next step in management?

(A) MRI of the brain

(B) Lumbar puncture

(C) Duplex ultrasonography of the neck

(D) CT scan of the head

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The American Heart Association/American Stroke Association (AHA/ASA) recommends emergent noncontrast brain CT (or MRI) first to exclude intracranial hemorrhage before reperfusion therapy, and if hemorrhage is excluded, this patient is within the **4.5-hour** thrombolysis window and should receive **IV thrombolysis without delay** [1] [2]. Given the presentation 40 minutes after last-known-well with a disabling focal deficit, the most appropriate next step is **immediate noncontrast head CT followed by IV alteplase/tenecteplase if no hemorrhage is seen and no other contraindication is present** [1] [2] [3].

Why this is the next step

- Acute focal neurologic deficits with onset **<4.5 hours** are treated as presumed **acute ischemic stroke** until imaging excludes hemorrhage [1] [2].
- The AHA/ASA advises **not delaying IV thrombolysis for additional multimodal imaging** (for example CTA/MRA or perfusion imaging) when the patient is otherwise eligible [2].
- The American College of Emergency Physicians (ACEP) states that clinicians may use tenecteplase or alteplase for eligible acute ischemic stroke patients [3].

Practical management sequence

1. **Activate stroke protocol and obtain emergent noncontrast head CT** [1]. 2. If no intracranial hemorrhage or large established infarct is present, proceed with **IV thrombolysis immediately**; **do not wait for carotid imaging** or other advanced studies [1] [2]. 3. If hemorrhage is seen, **do not administer IV thrombolysis** [1].

References

[1] Early Management of Patients With Acute Ischemic Stroke

American Heart Association, American Stroke Association · 2026-01-26 12:00:00

In patients with suspected AIS, emergent brain imaging with NCCT or MRI is recommended on initial evaluation to assess ischemic burden (eg, ASPECTS) and exclude intracranial hemorrhage before initiating reperfusion interventions.

https://www.ahajournals.org/doi/10.1161/STR.0000000000000513

[2] Early Management of Patients With Acute Ischemic Stroke

American Heart Association, American Stroke Association · 2026-01-26 12:00:00

In adult patients with AIS who are eligible for IVT within 4.5 hours of symptom onset, treatment should be initiated as quickly as possible, assuring safe administration and avoiding potential delays associated with additional multimodal neuroimaging, such as CTA/MRA, and CT/MR perfusion imaging.

https://www.ahajournals.org/doi/10.1161/STR.0000000000000513

[3] Critical Issues in the Management of Adult Patients Presenting to the Emergency Department with Acute Ischemic Stroke

American College of Emergency Physicians · 2023-05-11 12:00:00

Use either tenecteplase or alteplase in patients with acute ischemic stroke who qualify for thrombolysis.

https://www.doi.org/10.1016/j.annemergmed.2023.03.007

426. MedQA question ID 1050 Step 2/3

Question

A 40-year-old female with a past medical history of high cholesterol, high blood pressure, hyperthyroidism, and asthma presents to the primary care clinic today. She has tried several different statins, all of which have resulted in bothersome side effects. Her current medications include hydrochlorothiazide, levothyroxine, albuterol, oral contraceptives, and a multivitamin. Her physical examination is unremarkable. Her blood pressure is 116/82 mm Hg and her heart rate is 82/min. You decide to initiate colesevelam (Welchol). Of the following, which is a concern with the initiation of this medication?

(A) Colesevelam can cause cognitive impairment.

(B) Colesevelam can increase the risk of cholelithiasis.

(C) Timing of the dosing of colesevelam should be separated from this patient's other medications.

(D) Colesevelam can significantly decrease your HDL.

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The main concern is drug binding and reduced absorption of this patient's other oral medications, so colesevelam should be separated from interacting drugs by timing. The American College of Cardiology/American Heart Association (ACC/AHA) dyslipidemia guideline notes that bile acid sequestrants have **significant drug-drug interactions** and can reduce absorption of other agents; this is especially relevant here because **levothyroxine** and **oral estrogens/oral contraceptives** are among listed interacting medications [1] [2]. **Answer: C.**

Practical point

- **Colesevelam has no concern for cognitive impairment** as a typical adverse effect in the retrieved guidance [1].
- It is **not known to significantly decrease HDL**; bile acid sequestrants may modestly **increase HDL** and can **increase triglycerides** instead [3].
- **Cholelithiasis is not the key expected concern** in the retrieved guideline material; the clinically important issue is **impaired absorption of concomitant drugs and fat-soluble vitamins** [1] [2].

Why this matters in this patient

This patient takes **levothyroxine** and **oral contraceptives**, both of which can be affected by bile acid sequestrant binding or reduced absorption. Colesevelam also may reduce absorption of **fat-soluble vitamins** and **folic acid**, so spacing and medication review are important when it is started [1] [2].

References

[1] Management of Dyslipidemia
American College of Cardiology, American Heart Association · 2026-03-13 12:00:00
Bile acid sequestrants: Abdominal pain, bloating, dyspepsia, nausea, and constipation are common. TG >500 mg/dL (colesevelam); history of hypertriglyceridemia-induced pancreatitis; bowel obstruction. Poor tolerability due to side effects and potential drug-drug interactions limits use; may decrease absorption of fat-soluble vitamins and folic acid; generally considered the safest medication in pregnancy.
https://www.jacc.org/doi/10.1016/j.jacc.2025.11.016

[2] Management of Dyslipidemia
American College of Cardiology, American Heart Association · 2026-03-13 12:00:00
Drugs* (Medications) Bile acid sequestrants (cholestyramine, colestipol, colesevelam) Endocrine: Oral estrogens Raloxifene Clomiphene citrate Estradiol Ethinyl estradiol Conjugated estrogens Tamoxifen
https://www.jacc.org/doi/10.1016/j.jacc.2025.11.016

[3] Management of Dyslipidemia and Prevention of Cardiovascular Disease Algorithm
American Association of Clinical Endocrinologists · 2020-10-01 12:00:00
Bile acid sequestrants: may be considered for reducing LDL-C and apo B and modestly increasing HDL-C, but they may increase TG.
https://pro.aace.com/clinical-guidance/2020-algorithm-management-dyslipidemia-and-prevention-cardiovascular-disease

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427. MedQA question ID 402 Step 2/3

Question

A 27-year-old woman with a history of bipolar disorder presents for a 3-month follow-up after starting treatment with lithium. She says she has been compliant with her medication but has experienced no improvement. The patient has no other significant past medical history and takes no other medications. She reports no known allergies. The patient is afebrile, and her vital signs are within normal limits. A physical examination is unremarkable. The patient is switched to a different medication. The patient presents 2 weeks later with an acute onset rash on her torso consisting of targetoid lesions with a vesicular center. She says the rash developed 2 days ago which has progressively worsened. She also says that 1 week ago she developed fever, lethargy, myalgia, and chills that resolved in 3 days. Which of the following drugs was this patient most likely prescribed?

(A) Lamotrigine

(B) Valproate

(C) Olanzapine-fluoxetine combination (OFC)

(D) Paroxetine

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Lamotrigine is the most likely prescribed drug. In bipolar depression, the National Institute for Health and Care Excellence (NICE) lists **lamotrigine** as an option when a patient is already taking lithium and needs an additional or alternative treatment, and it specifically warns to seek urgent review if a **rash develops during dose escalation** [1]. The described **targetoid lesions with a vesicular center** plus a febrile prodrome are most consistent with **Stevens-Johnson syndrome / erythema multiforme spectrum**, a classic serious cutaneous adverse reaction associated with lamotrigine [2].

Why the other choices are less likely

- **Valproate** can be used in bipolar disorder, but the rash pattern described is not the typical adverse effect profile that would be expected here [1].
- **Olanzapine-fluoxetine combination (OFC)** is a guideline-supported option for bipolar depression, but it is not the classic drug associated with this targetoid, vesicular rash presentation [1].
- **Paroxetine** may be used in some bipolar depression algorithms only with a mood stabilizer, but it is not the best fit for the rash and prodromal systemic symptoms described [3].

References

[1] Bipolar Disorder: Assessment and Management
National Institute for Health and Care Excellence · 2025-09-03 00:00:00
When starting lamotrigine: carry out a full blood count, urea and electrolytes and liver function tests; be aware of its interaction with valproate; follow the instructions for initial dosage and dosage titration outlined in the SPC and BNF, taking into account the need for slow titration in people who have not taken lamotrigine before. Advise people taking lamotrigine to contact their doctor immediately if they develop a rash while the dose of lamotrigine is being increased.
https://www.nice.org.uk/guidance/cg185

[2] Stevens-Johnson syndrome induced by a combination of lamotrigine and valproic acid
Journal of Pharmacy & Bioallied Sciences · 2015-08-01
Lamotrigine and valproic acid are well-tolerated anticonvulsants, but frequently associated with severe cutaneous reactions, such as the Stevens-Johnson syndrome and toxic epidermal necrolysis.
10.4103/0975-7406.163545

[3] Efficacy and safety of two treatment algorithms in bipolar depression consisting of a combination of lithium, lamotrigine or placebo and paroxetine
Acta Psychiatrica Scandinavica · 2010-09-01
Paroxetine was added to ongoing treatment in non-responders to lithium. After 8 weeks the improvement in patients treated with lamotrigine vs. placebo was significant. After addition of paroxetine, the difference disappeared in the non-responsive patients.
10.1111/j.1600-0447.2009.01537.x

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428. MedQA question ID 261 Step 2/3

Question

A 30-year-old male presents to the emergency department with a complaint of abdominal pain. The patient states he was at a barbecue around noon. Lunch was arranged as a buffet without refrigeration. Within 2 to 3 hours, he had abdominal pain with 3 episodes of watery diarrhea. On

exam, vital signs are T 99.1, HR 103, BP 110/55, RR 14. Abdominal exam is significant for pain to deep palpation without any rebounding or guarding. There is no blood on fecal occult testing (FOBT). What is the most likely cause of this patient's presentation?

(A) Salmonella enteritidis

(B) Listeria monocytogenes

(C) Staphylococcus aureus

(D) Vibrio cholerae

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely cause is *Staphylococcus aureus* enterotoxin (food poisoning). The key clue is the **very short incubation period of 2–3 hours** after eating unrefrigerated buffet food, which is classic for **preformed toxin-mediated illness**; *S. aureus* is specifically associated with nausea/vomiting or cramping within **≤24 hours**, and outbreak data show the shortest incubation times with preformed toxins such as *S. aureus* [1] [2]. The other options fit less well: *Salmonella enteritidis* usually has a longer incubation, *Listeria monocytogenes* is not a typical cause of this abrupt toxin syndrome, and *Vibrio cholerae* causes profuse watery diarrhea with a different exposure pattern [1] [2].

Why *S. aureus* is most likely

- **Rapid onset (2–3 hours)** after ingestion strongly favors a **preformed toxin** rather than invasive infection [1] [2].
- **Buffet/room-temperature food** is a classic setting for toxin accumulation [1].
- **No fever, no blood, FOBT negative** also supports toxin-mediated gastroenteritis rather than invasive bacterial enteritis [1].

References

[1] Diagnosis and Management of Infectious Diarrhea
Infectious Diseases Society of America · 2017-11-29 00:00:00
Nausea and vomiting lasting ≤24 hours: ingestion of S. aureus enterotoxin or Bacillus cereus (short-incubation emetic syndrome). Foodborne outbreaks in hotels, cruise ships, resorts, restaurants, catered events may involve norovirus, non-typhoidal Salmonella, C. perfringens, B. cereus, S. aureus, Campylobacter spp., ETEC, STEC, Listeria, Shigella, Cyclospora cayetanensis, and Cryptosporidium spp.
https://academic.oup.com/cid/article/65/12/1963/4655039

[2] Incubation periods of enteric illnesses in foodborne outbreaks, United States, 1998-2013
Epidemiology and Infection · 2019-10-07
Preformed bacterial toxins (Staphylococcus aureus, Bacillus cereus and Clostridium perfringens) had the shortest outbreak incubation times in U.S. foodborne outbreaks, with median incubation periods of 4-10 hours across outbreaks.
10.1017/s0950268819001651

429. MedQA question ID 820 Step 2/3

Question

A 68-year-old man presents with a 6-month history of worsening fatigue and weight loss. He is especially concerned about a recent episode in which he noticed a blurring of his vision and headache; he also notes that his “memory is not as good as it used to be,” which his wife confirms. Physical exam is notable only for pallor and general weakness. Laboratory studies reveal anemia as well as an elevated erythrocyte sedimentation rate. Serum protein electrophoresis (SPEP) reveals a sharp, narrow spike of monoclonal IgM; serum IgM concentration is 6.3 g/dL. What is the most likely diagnosis in this case?

(A) IgM monoclonal gammopathy of undetermined significance (MGUS)

(B) Multiple myeloma

(C) Waldenstrom’s macroglobulinemia

(D) Non-Hodgkin’s lymphoma

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely diagnosis is Waldenström macroglobulinemia (WM), a lymphoplasmacytic lymphoma characterized by an **IgM monoclonal protein** and marrow infiltration; the combination of **anemia**, constitutional symptoms, and **hyperviscosity symptoms** such as blurred vision, headache, and cognitive changes is classic [1] [2]. **IgM MGUS** is unlikely because it should not cause symptomatic anemia or hyperviscosity, and **multiple myeloma** is less likely because it is usually associated with non-IgM isotypes and/or myeloma-defining CRAB features rather than isolated IgM paraproteinemia [2] [3].

Why WM fits best

- **Hyperviscosity from IgM** can cause **blurred vision, headache, and neurologic/cognitive symptoms**, which strongly points toward WM in the setting of a large IgM spike [1] [4].
- WM commonly presents with **anemia** and other marrow-related symptoms; lymphadenopathy or hepatosplenomegaly may be absent early [1] [2].
- In contrast, **IgM MGUS** is a precursor state without end-organ symptoms, and **active multiple myeloma** requires myeloma-defining events such as **CRAB** features or specific biomarkers [3] [5].

Best answer

C) Waldenström macroglobulinemia [1] [2].

References

[1] Waldenström macroglobulinemia: 2021 update on diagnosis, risk stratification, and management.
American Journal of Hematology · 2021-02-01
Waldenström macroglobulinemia is a lymphoplasmacytic lymphoma with immunoglobulin M (IgM) monoclonal protein. Clinical features include anemia, thrombocytopenia, hepatosplenomegaly, lymphadenopathy, and rarely hyperviscosity.
10.1002/ajh.26082

[2] Diagnostic framing of IgM monoclonal gammopathy: Focus on Waldenström macroglobulinemia.
Hematological Oncology · 2019-04-01
The finding of an IgM monoclonal gammopathy often represents a diagnostic challenge. Each of the pathological disorders associated with this condition requires specific clinical, instrumental, and laboratory assessments to set the appropriate treatment.
10.1002/hon.2539

[3] Multiple myeloma: the (r)evolution of current therapy and a glance into the future
Haematologica · 2020-07-23
Specifically, diagnosis of MM requires 10% or more PC in the BM plus one or more signs of end-organ damage including hypercalcemia, renal dysfunction, anemia, or bone disease (CRAB criteria). Even without CRAB features, patients who manifest MM-defining events including clonal BM PC >60%, serum : ratio >100 fold, and/or more than one bone focal lesion on magnetic resonance imaging (MRI) or positron emission tomography (PET)/computed tomography (CT) scan are also treated, as their risk of progression to symptomatic disease is approximately 80% at 2 years.
10.3324/haematol.2020.247015

[4] Waldenström macroglobulinemia: 2019 update on diagnosis, risk stratification, and management.
American Journal of Hematology · 2019-02-01
Waldenström macroglobulinemia is a lymphoplasmacytic lymphoma with immunoglobulin M (IgM) monoclonal protein. Clinical features include anemia, thrombocytopenia, hepatosplenomegaly, lymphadenopathy, and rarely hyperviscosity.
10.1002/ajh.25292

[5] Role of Bone-Modifying Agents in Multiple Myeloma
American Society of Clinical Oncology · 2018-01-17
The definition of active multiple myeloma requiring therapy has been revised. HyperCalcemia, Renal dysfunction, Anemia or Bone disease (CRAB) remain indications for treatment. In the absence of these CRAB features, patients who have >60% bone marrow plasma cells, involved free light chain >100 mg/L with kappa/lambda ratio >100 fold, or more than one site of bone disease on MRI or on PETCT scanning are now recommended for treatment.
https://ascopubs.org/doi/10.1200/JCO.2017.76.6402

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430. MedQA question ID 1132 Step 1

Question

A 68-year-old woman presents with an intermittent throbbing headache with an onset approximately 3 weeks ago. The pain is bilateral, “band-like,” and extends to the neck. The patient rates the 4 points out of 10 on a visual scale. The headache is not accompanied by nausea, vomiting, photophobia, or phonophobia, and is not aggravated by movements, but gets worse when the patient coughs or laughs. The headache has persisted throughout the day and is usually worse in the morning an hour after she has breakfast and taken her medications. The patient was diagnosed with stage 1 arterial hypertension 2 years ago and stable angina pectoris 3 weeks ago. Currently, she takes aspirin (81 mg once daily), rosuvastatin (10 mg once daily), lisinopril (20 mg once daily), and isosorbide mononitrate (60 mg once daily). She has been menopausal for the last 15 years. In addition to her chief complaint, she also notes that she had a runny nose with a temperature elevation approximately 3 weeks ago, and her headache was linked to that acute illness. The vital

signs are as follows: blood pressure 135/80 mm Hg, heart rate 76/min, respiratory rate 14/min, and temperature 36.5°C (97.7°F). The physical examination reveals S2 accentuation that is best heard in the second intercostal space at the right sternal border. Palpation of the paranasal sinuses is painless. The neurologic exam shows no focal symptoms, no pain on palpation of the trigeminal points, and no meningeal symptoms. What is the most likely mechanism underlying the patient's headaches?

(A) Meningeal irritation by blood products originating from a chronic subdural hematoma

(B) Dissection of an intracerebral vessel

(C) Meningeal irritation by a growing intracranial neoplasm

(D) Dilation of the intracerebral arterioles

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Dilation of the intracerebral arterioles. The presentation is most consistent with a **nitrate-induced headache** from **isosorbide mononitrate**, which commonly causes a throbbing headache after dosing and is mediated by **vasodilation of cerebral vessels/arterioles**. The lack of focal neurologic deficits, meningeal signs, sinus tenderness, or migrainous features makes chronic subdural hematoma, arterial dissection, or intracranial tumor less likely.

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431. MedQA question ID 158 Step 2/3

Question

A 41-year-old man comes to the emergency department with nausea, abdominal discomfort, and diarrhea for the past 2 days. His abdominal discomfort is worse shortly after meals. He has also had progressive perioral numbness and upper-extremity muscle cramping for the past 24 hours. Six months ago, he underwent a Roux-en-Y gastric bypass to treat obesity. He underwent a total thyroidectomy to treat a Hurthle cell lesion 4 days ago. His mother died of lung cancer at age 68. He has smoked 1 pack of cigarettes daily for 22 years. His only current medication is a multivitamin supplement. He appears fatigued. His temperature is 36°C (96.8°F), pulse is 72/min, respirations are 20/min, and blood pressure is 130/70 mm Hg. While measuring the patient's blood pressure, the nurse observes spasm of the patient's hand. Physical examination shows a well-healing surgical wound on the neck. The abdomen is mildly tender to palpation with well-healed laparoscopic incisional sites. The remainder of the examination shows no abnormalities. Serum studies show:
Na+ 138 mEq/L
K+ 4.2 mEq/L
Cl- 102 mEq/L
HCO3- 25 mEq/L

Mg2+ 1.7 mEq/L
Phosphorus 4.3 mg/dL
25-hydroxyvitamin D 20 ng/mL (N: 20-100 ng/mL)
Parathyroid hormone 115 pg/mL
Total bilirubin, serum 0.7 mg/dL
Alanine aminotransferase, serum 14 U/L
Aspartate aminotransferase, serum 15 U/L
Alkaline phosphatase, serum 42 U/L
Which of the following is the most appropriate initial step in the management of this patient?"

(A) Obtain abdominal CT

(B) Begin rehydration therapy

(C) Administer calcium gluconate

(D) Supplementation with vitamin D

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most appropriate initial step is intravenous calcium replacement, typically calcium gluconate, because this patient has symptomatic post-thyroidectomy hypocalcemia with tetany (Trousseau sign). The **American Association of Endocrine Surgeons (AAES)** recommends **oral calcium as first-line therapy** for significant post-thyroidectomy hypocalcemia, with **calcitriol as needed**, but **intravenous calcium** for **severe or refractory** symptoms [1]. His recent **Roux-en-Y gastric bypass** increases the risk of more severe postoperative hypocalcemia after total thyroidectomy, and the literature supports early calcium/vitamin D treatment with close monitoring in this subgroup [2] [3].

Practical management

- Give **IV calcium gluconate** now for symptomatic tetany, then transition to **oral calcium** plus **calcitriol** once symptoms improve and calcium is stabilized [1].
- Recheck **serum calcium** promptly and monitor magnesium; calcium/vitamin D supplementation is commonly needed after thyroidectomy, especially in patients with prior bariatric surgery [1] [2] [3] [4].
- The patient's **25-hydroxyvitamin D of 20 ng/mL** and recent gastric bypass further support vitamin D repletion as part of ongoing management, but they do not replace acute calcium correction [2] [4].

References

[1] Definitive Surgical Management of Thyroid Disease in Adults
American Association of Endocrine Surgeons · 2020-02-01 12:00:00
61. Patients with significant post-thyroidectomy hypocalcemia should receive oral calcium as first-line therapy, calcitriol as necessary, and intravenous calcium in severe or refractory situations.
https://journals.lww.com/annalsofsurgery/Fulltext/2020/03000/The_American_Association_of_Endocrine_Surgeons.28.aspx

[2] Definitive Surgical Management of Thyroid Disease in Adults
American Association of Endocrine Surgeons · 2020-02-01 12:00:00
22. Gastric bypass patients should be counseled about a higher risk of severe postoperative hypocalcemia after total or completion thyroidectomy.
https://journals.lww.com/annalsofsurgery/Fulltext/2020/03000/The_American_Association_of_Endocrine_Surgeons.28.aspx

[3] Hypocalcemia after thyroidectomy in patients with a history of bariatric surgery.
Surgery for Obesity and Related Diseases · 2017-03-01
Hypocalcemia is a common complication after thyroidectomy. Bypass surgery had a 2-fold increased risk of hypoccemia after Roux-en-Y gastric bypass surgery. Careful follow-up of calcium, vitamin D and parathyroid hormone levels should be suggested for patients with previous bariatric surgery.
10.1016/j.soard.2016.09.026

[4] Calcium, vitamin D or recombinant parathyroid hormone for managing post-thyroidectomy hypoparathyroidism.
Cochrane Database of Systematic Reviews · 2019-05-22
Routine use of calcium and vitamin D supplements in the post-operative period may reduce the risk of symptoms, temporary hypocalcaemia and hospital stay.
10.1002/14651858.cd012845.pub2

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432. MedQA question ID 973 Step 2/3

Question

A 63-year-old female complains of weakness, light-headedness, palpitations, and soreness of the tongue. She has a past medical history of Hashimoto's thyroiditis. Her hematocrit is 29%. On peripheral blood smear, you notice neutrophils with 7 lobes and large oval-shaped red blood cells. On physical exam, you notice the patient has decreased position sense and a loss in vibratory sensation in her lower extremities. Which of the following is most likely present in this patient?

(A) Atrophy of G cells

(B) Anti-intrinsic factor antibodies

(C) Decreased methylmalonic acid levels

(D) Antithrombotic state

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Anti-intrinsic factor antibodies are most likely present. The presentation is classic for **vitamin B12 deficiency due to pernicious anemia**: macro-ovalocytes, **hypersegmented neutrophils**, glossitis, and posterior column neurologic findings (loss of vibration and position sense). In older adults, pernicious anemia is commonly autoimmune and associated with **autoantibodies against**

intrinsic factor and parietal cells; elevated methylmalonic acid supports B12 deficiency, not decreased levels [1] [2].

Why this fits

- **Hashimoto thyroiditis** increases the likelihood of another autoimmune condition such as pernicious anemia.
- The smear findings and neurologic deficits point to **megaloblastic anemia with neurologic involvement**, which is most consistent with **B12 deficiency** rather than folate deficiency.
- Among the choices, **anti-intrinsic factor antibodies** are the hallmark of pernicious anemia [1] [2].

Why the other choices are wrong

- **Atrophy of G cells**: autoimmune gastritis primarily affects **parietal cells** and intrinsic factor production, not G cells.
- **Decreased methylmalonic acid levels**: B12 deficiency causes **elevated** methylmalonic acid.
- **Antithrombotic state**: not the expected finding in pernicious anemia.

References

[1] How I treat anemia in older adults

Blood · 2023-02-28

Adults aged >60 years are at highest risk for developing pernicious anemia (autoantibodies against intrinsic factor and parietal cells). Elevated levels of serum methylmalonic acid suggest B12 deficiency and warrants a diagnostic trial of B12.

10.1182/blood.2022017626

[2] Optimal management of pernicious anemia

Journal of blood medicine · 2012-01-01

Pernicious anemia is an autoimmune atrophic gastritis, predominantly of the fundus. It is responsible for a deficiency in vitamin B12 due to its malabsorption.

10.2147/jbm.s25620

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433. MedQA question ID 609 Step 1

Question

A 34-year-old woman with poorly controlled Crohn disease comes to the physician because of a 2-week history of hair loss and a rash on her face. She has also noticed that food has recently tasted bland to her. She had to undergo segmental small bowel resection several times because of intestinal obstruction and fistula formation. Examination shows several bullous, erythematous perioral plaques. There are two well-circumscribed circular patches of hair loss on the scalp. A deficiency of which of the following is the most likely cause of this patient's condition?

(A) Niacin

(B) Cobalamin

(C) Iron

(D) Zinc

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Zinc deficiency is the most likely cause. In Crohn disease, especially with **small-bowel resections/ malabsorption**, zinc deficiency can cause **periorificial/bullous dermatitis, alopecia, and dysgeusia**; the described combination is classic for an acrodermatitis enteropathica-like presentation [1] [2] [3]. The European Crohn's and Colitis Organisation (ECCO) also notes that patients with IBD and malabsorptive disease should have micronutrient deficiencies identified and treated, and that zinc deficiency is common enough to merit monitoring in at-risk patients [1] [2].

Why the other choices are less likely

- **Niacin** deficiency causes pellagra, typically with photosensitive dermatitis, diarrhea, and neuropsychiatric findings.
- **Cobalamin** deficiency more often causes macrocytosis and neurologic symptoms.
- **Iron** deficiency can contribute to hair loss, but it does not classically explain the **perioral bullous plaques** and **dysgeusia** seen here [1] [2] [3].

References

[1] Extraintestinal Manifestations in Inflammatory Bowel Disease

European Crohn's and Colitis Organisation · 2023-06-23 00:00:00

Patients at risk for vitamin B12 or folate deficiency, especially patients with small-bowel CD or resection and patients with macrocytosis, should have their serum levels of vitamin B12 and folate screened at least annually [EL4] [consensus: 95%]. Patients with IBD and iron deficiency anaemia should receive iron supplementation to normalize haemoglobin levels and iron stores [EL1] [consensus: 97%].

https://academic.oup.com/ecco-jcc/article/18/1/1/7205776?searchresult=1#google_vignette

[2] Heavy arch: from inflammatory bowel diseases to metabolic disorders

Gut · 2024-05-22

In patients with IBD there is an increased risk of malnutrition and nutrient deficiencies, which require identification, monitoring and treatment. Micronutrient deficiency (for example, folic acid, iron or vitamin B12) should be identified and supplemented in daily praxis to avoid malabsorptive complications and possibly hospitalisation and worsening of disease.

10.1136/gutjnl-2024-331914

[3] [Acrodermatitis enteropathica-like skin lesions due to Crohn's disease-associated zinc deficiency].

Der Hautarzt; Zeitschrift fur Dermatologie, Venerologie, und verwandte Gebiete · 2010-11-01

There is a case of acrodermatitis enteropathica-like skin eruptions presenting with alopecia, Perlèche, glossitis, and genital erosions as well as multifocal eczematoid, psoriasiform, and bullous skin lesions due to zinc deficiency in Crohn's disease.

10.1007/s00105-010-2060-2

434. MedQA question ID 946 Step 2/3

Question

A 49-year-old man comes to the physician because he has had multiple falls and multiple episodes of dizziness over the past 6 weeks. There is no personal or family history of serious illness. He drinks one pint of rum daily. He works as a foreman in a factory that produces industrial solvents. He is alert and oriented to time, place, and person. His temperature is 36.7°C (98.1°F), pulse is 88/min, and blood pressure is 108/70 mm Hg. Examination shows a wide-based gait. The patient is unable to stand with his feet together without support. There is a coarse tremor of the hands when he is asked to grab a pen. Muscle strength and tone are normal in all extremities. Sensation to pain, vibration, and position is intact bilaterally. Rapid alternating movements of the hands is impaired. Mental status examination shows no abnormalities. Which of the following is the most likely cause of this patient's condition?

(A) Korsakoff syndrome

(B) Methanol poisoning

(C) Cerebellar degeneration

(D) Wernicke's encephalopathy

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Cerebellar degeneration is the most likely cause. The combination of **wide-based gait, truncal instability with inability to stand with feet together, limb tremor, and impaired rapid alternating movements** with **normal strength, sensation, and mental status** fits alcohol-related cerebellar dysfunction rather than a global encephalopathy or toxic ingestion syndrome [1] [2]. Chronic heavy alcohol use is a common cause of acquired cerebellar ataxia, and the gait/stance abnormalities are the most prominent features [1] [2].

Why the other choices are less likely

- **Korsakoff syndrome**: primarily a **chronic amnestic syndrome** with cognitive impairment, not an isolated cerebellar gait/coordination syndrome [3].
- **Wernicke encephalopathy**: classically causes **confusion, ophthalmoplegia, and ataxia**; mental status and ocular findings are absent here [3].
- **Methanol poisoning**: typically causes an **acute toxic syndrome** with visual symptoms and metabolic acidosis, not a 6-week isolated cerebellar picture.

Best fit

This presentation is most consistent with **alcohol-related cerebellar degeneration** in the setting of chronic heavy alcohol use [1] [2].

References

[1] Characterization of cerebellar ataxia in chronic alcoholics using the International Cooperative Ataxia Rating Scale (ICARS).

Alcoholism, clinical and experimental research · 2012-11-01

Alcoholism is the most common cause of cerebellar dysfunction. Alcoholism may affect up to two-thirds of chronic alcoholics. Age, gender, and the source of the clinical sample may contribute to the prevalence of ACD.

10.1111/j.1530-0277.2012.01821.x

[2] Alcohol-related cerebellar degeneration: not all down to toxicity?

Cerebellum & ataxias · 2016-01-01

Alcohol-related cerebellar degeneration is one of the commonest acquired forms of cerebellar ataxia. The gait, stance, stance and heel-shin slide were the predominant SARA elements affected.

10.1186/s40673-016-0055-1

[3] Wernicke Encephalopathy-Clinical Pearls.

Mayo Clinic proceedings · 2019-06-01

Wernicke encephalopathy is caused by thiamine deficiency. Alcoholism is the most common etiologic factor associated with WE in the United States. The common findings include mental status changes, ocular dysfunction, and a gait apraxia. Approximately 80% of patients with WE have development of Korsakoff syndrome.

10.1016/j.mayocp.2019.02.018

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435. MedQA question ID 511 Step 2/3

Question

A 67-year-old man comes to the physician for a routine medical check-up prior to a scheduled elective femoropopliteal bypass surgery of his left leg. He feels well but reports occasional episodes of weakness and numbness in his left hand. He has a history of peripheral arterial disease, type 2 diabetes mellitus, hypertension, hypercholesterolemia, and gout. The patient has smoked 1 pack of cigarettes daily for the past 50 years. He drinks 3 cans of beer daily. His current medications include aspirin, metformin, enalapril, simvastatin, and febuxostat. His temperature is 37.3°C (99.1°F), pulse is 86/min, and blood pressure is 122/76 mm Hg. The lungs are clear to auscultation. Cardiac examination shows no murmurs, rubs, or gallops. Auscultation of the right side of the neck shows a bruit. There is a right-sided reducible inguinal hernia. Neurological examination shows no abnormalities. A complete blood count and serum concentrations of electrolytes, creatinine, and glucose are within the reference ranges. An electrocardiogram shows signs of mild left ventricular hypertrophy. An x-ray of the chest shows no abnormalities. Which of the following is the most appropriate next step in management?

(A) Ultrasonography of the neck

(B) Echocardiography

(C) Warfarin therapy

(D) CT angiography of the head

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Ultrasonography of the neck is the most appropriate next step. The **Society for Vascular Surgery (SVS)** recommends **duplex ultrasound of the carotid bifurcation as the initial diagnostic imaging test** for suspected carotid stenosis, and recommends carotid imaging in patients with symptoms of cerebral ischemia; if the findings are equivocal or inaccurate, **CTA/MRA** can follow [1]. In this patient, the intermittent left hand weakness/numbness plus a right carotid bruit make carotid ischemia the key concern, so neck duplex is the right first test rather than echocardiography, warfarin, or head CTA [1] [2].

Why the other options are not best

- **Echocardiography** is not the first test for a focal neurologic deficit with a carotid bruit unless there is a separate concern for a cardioembolic source.
- **Warfarin therapy** is not indicated without a defined cardioembolic condition or another anticoagulation indication.
- **CT angiography of the head** is not the preferred initial study for suspected extracranial carotid disease; SVS recommends **duplex ultrasound first** [1].

Guideline basis

- **SVS**: duplex ultrasound is the **initial diagnostic imaging of choice** for carotid stenosis; carotid bifurcation imaging is recommended for symptoms of cerebral ischemia [1].
- **SVS** also notes that patients with carotid disease undergoing noncardiac surgery should have the **same indications for intervention as the general population** [2].

References

[1] Extracranial Cerebrovascular Disease
Society for Vascular Surgery · 2021-06-17 00:00:00
Duplex ultrasound examination preferably performed in an accredited vascular laboratory is the initial diagnostic imaging of choice for evaluating the severity of carotid stenosis in both symptomatic and asymptomatic patients. Imaging of the carotid bifurcation is recommended in all patients with symptoms of cerebral ischemia.
https://www.jvascsurg.org/article/S0741-5214(21)00893-4/fulltext

[2] Extracranial Cerebrovascular Disease
Society for Vascular Surgery · 2021-06-17 00:00:00
Before noncardiac surgery, preoperative carotid and cerebral imaging is suggested in patients with stroke or TIA within preceding 6 months. Patients with carotid artery disease undergoing noncardiac surgery should have the same indications for intervention as the general population.
https://www.jvascsurg.org/article/S0741-5214(21)00893-4/fulltext

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436. MedQA question ID 377 Step 2/3

Question

A 30-year-old primigravid woman at 22 weeks' gestation is brought to the emergency department by her husband for lethargy, nausea, and vomiting for 4 days. This morning she became drowsy. She returned from a business trip to Sudan 3 weeks ago. She denies eating any seafood while traveling.

Medications include iron supplements and a multivitamin. Her immunizations are up-to-date and she has never received blood products. Her temperature is 38.9°C (102°F), pulse is 92/min, and blood pressure is 122/76 mm Hg. She is oriented to person and place. Examination shows jaundice and mild asterixis. Pelvic examination shows a uterus consistent in size with a 22-week gestation. Laboratory studies show:
Hemoglobin 11.2 g/dL
Prothrombin time 18 sec (INR=2.0)
Serum
Total bilirubin 4.4 mg/dL
Alkaline phosphatase 398 U/L
AST 4,702 U/L
ALT 3,551 U/L
Lactate dehydrogenase 3,412 U/L
Anti-nuclear antibody negative
Anti-smooth muscle antibody negative
Anti-CMV antibody negative
Anti-EBV nuclear antigen antibody negative
An ELISA for HIV is negative. Which of the following is most likely to confirm the diagnosis?"

(A) HBsAg

(B) Anti-HAV IgG

(C) Anti-HCV IgG

(D) Anti-HEV IgM

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Anti-HEV IgM is the most likely test to confirm the diagnosis in this **22-week pregnant woman with acute hepatitis after recent travel to Sudan**. The **American College of Gastroenterology (ACG)** recommends testing for **acute hepatitis E (IgM anti-HEV)** in patients with acute hepatitis returning from endemic areas when hepatitis A, B, and C tests are negative, and the **European Association for the Study of the Liver (EASL)** notes that acute viral hepatitis in pregnancy warrants special attention to **HEV** [1] [2].

Why the other options are less likely

- **HBsAg**: used to identify hepatitis B infection, but it does not specifically confirm the most likely diagnosis here unless HBV is suspected clinically [1].
- **Anti-HAV IgG**: indicates prior infection or vaccination, not acute hepatitis A; acute HAV would be evaluated with **IgM anti-HAV** [1] [2].
- **Anti-HCV IgG**: suggests exposure to hepatitis C, but acute HCV is not the classic fit for this presentation and pregnancy travel-related fulminant hepatitis is more concerning for HEV [1] [2].

Clinical fit

Pregnancy plus **recent travel to an HEV-endemic region** and **severe acute hepatitis/early liver failure features** (jaundice, coagulopathy, asterixis, very high AST/ALT) strongly favors **acute hepatitis E**; diagnosis is confirmed with **anti-HEV IgM** (or HEV RNA if needed) [1] [3].

References

[1] Evaluation of Abnormal Liver Chemistries
American College of Gastroenterology · 2017-01-01 12:00:00
Testing for acute hepatitis E (IgM HEV) should also be considered in those returning from endemic areas and whose tests for acute hepatitis A, B, and C are negative.
https://journals.lww.com/ajg/Fulltext/2017/01000/ACG_Clinical_Guideline__Evaluation_of_Abnormal.13.aspx

[2] Reproductive Health and Liver Disease
American Association for the Study of Liver Diseases · 2020-09-17 12:00:00
Acute viral hepatitis in pregnancy warrants close monitoring for maternal and fetal complications, especially for acute hepatitis E virus (HEV) and herpes simplex virus (HSV) infections.
https://aasldpubs.onlinelibrary.wiley.com/doi/10.1002/hep.31559

[3] Hepatitis E: clinical presentation in disease-endemic areas and diagnosis.
Seminars in Liver Disease · 2013-02-01
Diagnosis of acute hepatitis E depends on detection of IgM anti-HEV antibodies or HEV RNA.
10.1055/s-0033-1338112

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437. MedQA question ID 953 Step 2/3

Question

A 70-year-old man presents to the Emergency Department after 3 days of shortness of breath, orthopnea, and lower limb edema. His personal history is significant for a myocardial infarction 6 years ago that required revascularization and hypertension. His medication consists of simvastatin and lisinopril. In the ED, he has a blood pressure of 100/80 mm Hg, a pulse of 88/min, a respiratory rate of 28/min, and a temperature of 36.5°C (97.7°F). On physical examination, he has jugular vein distention, displaced point of maximal impulse (PMI), an S4-gallop, a holosystolic murmur, and 2+ pitting edema up to the mid calf. He is started on furosemide, carvedilol, and oxygen therapy. After 6-hours of continued therapy, his blood pressure remains low, and his serum creatinine is found to be 1.9 mg/dL. Which of the following test would be more useful to differentiate between prerenal and intrinsic kidney disease?

(A) Sulfosalicylic acid test

(B) Urine sodium content

(C) Fractional excretion of urea (FEUrea)

(D) Nitrates in urine

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Fractional excretion of urea (FEUrea) is the most useful test here to help distinguish **prerenal azotemia from intrinsic kidney injury** in a patient who has already received **loop diuretics**, because diuretics can make **urine sodium** and related sodium-based indices less reliable [1] [2] [3]. In this setting, **urine sodium content** is less helpful, **sulfosalicylic acid testing** is for protein detection, and **urine nitrites** assess possible urinary infection rather than AKI etiology [1] [2] [3].

Why FEUrea is preferred

- In critically ill patients with AKI, FEUrea was reported as a useful index for differentiating the major AKI categories, and it may be preferred when the validity of sodium-based indices is limited [3].
- A multicenter cohort study found that **diuretic use interferes with fractional excretion of sodium (FENa)** in AKI evaluation; in the subgroup receiving diuretics, results remained similar, supporting use of **FEUrea** when sodium handling is confounded [2].
- A systematic review/meta-analysis found FENa performance was affected by diuretic exposure, reinforcing that sodium-based urine indices are less dependable after diuretics [1].

Best answer

FEUrea.

References

[1] Diagnostic Performance of Fractional Excretion of Sodium for the Differential Diagnosis of Acute Kidney Injury: A Systematic Review and Meta-Analysis.

Clinical Journal of the American Society of Nephrology · 2022-06-01

Diagnostic performance of fractional excretion of sodium for the differential diagnosis of acute kidney injury: a systematic review and meta-analysis found that FENa performance was affected by diuretic exposure.

10.2215/CJN.14561121

[2] Diagnostic performance of fractional excretion of urea in the evaluation of critically ill patients with acute kidney injury: a multicenter cohort study.

Critical Care (London, England) · 2011-07-27

Diagnostic performance of fractional excretion of urea in the evaluation of critically ill patients with acute kidney injury: diuretic use interferes with the fractional excretion of sodium, which is used to distinguish transient from persistent AKI; in the subgroup receiving diuretics, the results were similar.

10.1186/cc10327

[3] Fractional excretion of urea as a diagnostic index in acute kidney injury in intensive care patients.

Journal of Critical Care · 2012-10-01

The fractional excretion of urea (FeU) was found to be a sensitive and specific index in differentiating transient from persistent AKI in intensive care unit patients. In patients treated with diuretics, FeU was the only predictive index of transient AKI.

10.1016/j.jcrc.2012.02.018

438. MedQA question ID 555 Step 2/3

Question

A previously healthy 14-year-old boy is brought to the physician for evaluation because of loss of appetite, sleeplessness, and extreme irritability for the past 3 weeks. He was recently kicked off of the school's football team after missing too many practices. He has also been avoiding his family and friends because he is not in the mood to see them, but he admits that he is lonely. He has not left his room for 2 days, which prompted his father to bring him to the physician. He has no medical conditions and does not take any medications. He does not drink alcohol or use recreational drugs. While the father is in the waiting room, a mental status examination is conducted, which shows a constricted affect. Cognition is intact. He says that he would be better off dead and refuses to be treated. He says he wants to use his father's licensed firearm to “end his misery” over the weekend when his parents are at church. Which of the following is the most appropriate next step in management?

(A) Agree to his wish for no further treatment

(B) Involuntary hospitalization after informing the parents

(C) Reassure the patient that he will feel better

(D) Start outpatient psychotherapy

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most appropriate next step is immediate safety/mental health evaluation with emergent psychiatric containment, while ensuring the patient is not left alone and that access to the firearm is removed. The American Academy of Pediatrics (AAP) states that an adolescent who answers yes to current suicidal thoughts on screening has an **acute positive screen necessitating a safety/mental health evaluation immediately**, and clinicians should assess and counsel on **lethal means restriction, especially firearms** [1] [2] [3]. This patient has **active suicidal intent, a specific plan, and access to a licensed firearm**, so outpatient treatment is not appropriate [1] [3] [4].

Practical implication

- **Urgent psychiatric evaluation / emergency referral now** rather than routine outpatient follow-up [1] [3] [5].
- **Lethal means counseling**: remove or secure the firearm and other medications immediately [2].
- Include family in the safety response when possible [4].

Why this is the right level of urgency

- The AAP suicide screener treats current suicidal thoughts as an **acute positive screen** requiring immediate safety evaluation [1].

- The American Academy of Child and Adolescent Psychiatry notes that youth who talk about wanting to die, feel hopeless, or withdraw completely from family and friends need **help right away** [5].
- Access to a firearm markedly increases imminent risk, making **means restriction** a core intervention [2].

References

[1] Suicide and Suicide Risk in Adolescents
American Academy of Pediatrics · 2023-12-10 12:00:00
In the past few weeks, have you wished you were dead? ... If the answer to question #5 is yes, then that is considered an acute positive screen necessitating a safety/mental health evaluation immediately.
https://publications.aap.org/pediatrics/article/doi/10.1542/peds.2023-064800/196189/Suicide-and-Suicide-Risk-in-Adolescents

[2] Suicide and Suicide Risk in Adolescents
American Academy of Pediatrics · 2023-12-10 12:00:00
For all adolescent health supervision visits, and especially visits with adolescents who have suicidal thoughts, assess for access to lethal means, with counseling on safe firearm and medication storage. Removal of firearms and medications from the home entirely should also be assessed, especially if an adolescent is having SI.
https://publications.aap.org/pediatrics/article/doi/10.1542/peds.2023-064800/196189/Suicide-and-Suicide-Risk-in-Adolescents

[3] Suicide and Suicide Risk in Adolescents
American Academy of Pediatrics · 2023-12-10 12:00:00
If suicide screen is positive, conduct a BSSA and subsequent safety planning and/or referrals as appropriate.
https://publications.aap.org/pediatrics/article/doi/10.1542/peds.2023-064800/196189/Suicide-and-Suicide-Risk-in-Adolescents

[4] Suicide and Suicide Risk in Adolescents
American Academy of Pediatrics · 2023-12-10 12:00:00
Include the family in suicide prevention and treatment efforts, when possible, because family-based interventions have been shown to be effective in preventing future suicide attempts in youth.
https://publications.aap.org/pediatrics/article/doi/10.1542/peds.2023-064800/196189/Suicide-and-Suicide-Risk-in-Adolescents

[5] Assessment and Treatment of Children and Adolescents With Major and Persistent Depressive Disorders
American Academy of Child and Adolescent Psychiatry · 2022-10-20 00:00:00
Seek help right away if your child or teen: Talks about wanting to die or harm themselves. Expresses hopelessness about the future. Withdraws completely from family and friends. Call 911 or a crisis hotline immediately if there are any signs of self-harm or suicidal thoughts.
https://www.jaacap.org/article/S0890-8567(22)01852-4/fulltext

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439. MedQA question ID 721 Step 1

Question

A 23-year-old woman comes to the physician because of a 2-month history of episodic headaches associated with dizziness, nausea, and vomiting. Over-the-counter pain medications have failed to reduce her symptoms. An MRI of the brain shows isolated dilation of the left lateral ventricle. This dilatation is most likely caused by blockade of which of the following structures?

(A) Arachnoid villi

(B) Interventricular foramen

(C) Median aperture

(D) Lateral apertures

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The blockage is most likely at the interventricular foramen (foramen of Monro), so the correct answer is B. Obstruction there causes **isolated dilation of one lateral ventricle** because CSF cannot pass from that ventricle into the third ventricle; this is the classic mechanism of unilateral hydrocephalus [1] [2].

Why the other options are less likely

- **Arachnoid villi** obstruction causes communicating hydrocephalus, which would enlarge the ventricles more diffusely rather than isolate one lateral ventricle.
- **Median aperture** obstruction affects outflow from the fourth ventricle and would not selectively enlarge only the left lateral ventricle.
- **Lateral apertures** obstruction would also impair CSF outflow from the fourth ventricle, not produce isolated unilateral lateral ventriculomegaly.

Clinical correlation

A lesion at the **foramen of Monro** is a classic cause of headaches, nausea, vomiting, and unilateral ventricular enlargement on MRI, including obstruction from colloid cysts or other intraventricular masses [2].

References

[1] Neuroendoscopic surgery for unilateral hydrocephalus due to inflammatory obstruction of the Monro foramen.
Arquivos de neuro-psiquiatria · 2011-04-01
Unilateral hydrocephalus is characterized by enlargement of just one lateral ventricle.
10.1590/s0004-282x2011000200017

[2] Neurosurgical management of a giant colloid cyst with atypical clinical and radiological presentation.
Journal of neurosurgery · 2014-11-01
Colloid cysts are usually located at the foramen of Monro and when symptomatic they often present with headaches and nausea due to an obstructive hydrocephalus.
10.3171/2014.7.jns14242

440. MedQA question ID 287 Step 2/3

Question

A 53-year-old man presents to his physician's office with a persistent cough which he has had over the last few months. He was diagnosed with chronic obstructive pulmonary disease (COPD) the previous year and since then has been on a short-acting β-agonist to help alleviate his symptoms. Since his diagnosis, he has quit smoking, a habit which he had developed about 30 years ago. He used to smoke about 2 packs of cigarettes daily. Today, he has come in with an increase in his symptoms. He tells his physician that he has been having a fever for the past 3 days, ranging between 37.8°–39°C (100°F–102.2°F). Along with this, he has a persistent cough with copious amounts of greenish-yellow sputum. He has also been having difficulty breathing. On examination, his temperature is 38.6°C (101.5°F), the respirations are 22/min, the blood pressure is 110/80 mm Hg, and the pulse is 115/min. Slight crackles and respiratory wheezes are prominent in the lower lung fields. His FEV1 is 57% of his normal predicted value. He is started on oxygen and a dose of oral prednisone. At this time, which of the following should also be considered as a treatment option?

(A) Doxycycline

(B) Ciprofloxacin

(C) Erythromycin

(D) Antibiotics would not be appropriate at this time

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Antibiotics should be considered, because this COPD exacerbation includes **increased dyspnea plus purulent sputum**—a guideline-supported indication for antibiotics in acute exacerbations of COPD [1] [2] [3]. Among the options listed, **doxycycline** is the best treatment option; **ciprofloxacin** is not a routine first-line choice for typical outpatient COPD exacerbations, and **erythromycin** is not the preferred macrolide in current COPD guidance [1] [4].

Why antibiotics are appropriate

The Global Initiative for Chronic Obstructive Lung Disease (GOLD) recommends antibiotics for **5 days** in patients with COPD exacerbations who have **purulent sputum** and related infectious features, because they can shorten recovery and reduce relapse/treatment failure [1] [2]. The American Academy of Family Physicians (AAFP) likewise recommends systemic antibiotics for adults with acute COPD exacerbations to improve clinical cure and reduce clinical failure [3].

Best choice among the options

- **Doxycycline**: reasonable outpatient antibiotic option for an acute COPD exacerbation when antibiotics are indicated [4].

- **Ciprofloxacin**: generally reserved for selected patients with higher risk for resistant gram-negative pathogens, not as the default choice here [4].
- **Erythromycin**: macrolides can be used in some COPD contexts, but current GOLD prevention guidance specifically highlights **azithromycin** rather than erythromycin [1].
- **No antibiotics**: not the best choice in this presentation because the sputum is purulent and symptoms are worsening [1] [2] [3].

References

[1] Global Strategy for Prevention, Diagnosis and Management of COPD 2026 Report
Global Initiative for Chronic Obstructive Lung Disease · 2025-11-10 12:00:00
Antibiotics are recommended for a total of 5 days in patients with purulent sputum, prior history of lung infections, etc.
https://goldcopd.org/2025-gold-report/

[2] Prevention, Management and Diagnosis of COPD
Global Initiative for Chronic Obstructive Lung Disease · 2021-11-22 00:00:00
Antibiotics, when indicated, can shorten recovery time, reduce the risk of early relapse, treatment failure, and hospitalization duration. Duration of therapy should be 5-7 days.
https://goldcopd.org/2023-gold-report-2/

[3] Pharmacologic Management of COPD Exacerbations
American Academy of Family Physicians · 2021-06-29 12:00:00
The AAFP recommends that clinicians prescribe systemic antibiotics for adults with acute exacerbations of COPD to improve clinical cure and reduce clinical failure.
https://www.aafp.org/dam/AAFP/documents/journals/afp/Stevermer.pdf

[4] Use of Antibiotics in Chronic Obstructive Pulmonary Disease: What is Their Current Role in Older Patients?
Drugs & aging · 2020-09-01
The role of antibiotics in the management of acute exacerbations of COPD is evolving. Amoxicillin and doxycycline are commonly prescribed for AECOPD based on a favorable benefit-to-risk ratio.
10.1007/s40266-020-00786-7

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441. MedQA question ID 342 Step 2/3

Question

A 55-year-old woman with a history of HIV presents to the emergency department with progressive dyspnea, fever, and dry cough for the past 4 days. She has not been compliant with antiretroviral or prophylactic medication. On evaluation, the patient is in moderate respiratory distress. The temperature is 38.8°C (102.0°F), the blood pressure is 124/82 mm Hg, the pulse is 96/min, and the respiratory rate is 20/min. Pulse oximetry is 92% on 4 L oxygen by nasal cannula. Her CD4 count is 180 cells/μL. IV antibiotics and glucocorticoids are administered. After 30 minutes, the patient develops severe respiratory distress. Repeat vital signs show: temperature 38.3°C (101.0°F), blood pressure 80/50 mm Hg, pulse 104/min, respiration rate 32/min and pulse oximetry 85% on nasal cannula. The trachea deviates to the left. Breath sounds are absent on the right side and the neck veins are distended. Telemetry shows sinus tachycardia. Which of the following is the best next step in the management of this patient?

(A) Discontinue antibiotics

(B) Perform an arterial blood gas

(C) Needle thoracostomy

(D) Stat chest X-ray

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Needle thoracostomy is the best next step because this patient has **tension pneumothorax**: acute hypoxemia and shock with **tracheal deviation, absent unilateral breath sounds, and distended neck veins**. This is a **clinical diagnosis**, and the patient is too unstable for confirmatory testing; imaging should not delay decompression. The **Society of Critical Care Medicine** notes that ultrasound can complement or replace chest radiography for diagnosing pneumothorax when rapid results are needed, but the immediate priority in a crashing patient is emergent decompression rather than chest X-ray [1] [2].

Why not the other choices

- **Stat chest X-ray** and **arterial blood gas** would delay life-saving treatment in an unstable patient with classic tension physiology [1] [2].
- **Discontinue antibiotics** does not address the acute hemodynamic and respiratory collapse [1].

Practical point

After decompression, definitive management typically requires chest tube placement and ongoing reassessment for persistent or recurrent pneumothorax, including the possibility of bilateral or contralateral tension in patients who worsen after drainage [2].

References

[1] Bedside General and Cardiac Ultrasonography in the Evaluation of Critically Ill Patients: Part I
Society of Critical Care Medicine · 2015-11-01 12:00:00
We recommend that ultrasound should be used to complement or replace conventional chest radiography to diagnose a pneumothorax, depending on the clinical setting and need for rapid results.
https://journals.lww.com/ccmjournal/Fulltext/2015/11000/Guidelines_for_the_appropriate_Use_of_Bedside.26.aspx

[2] The Legend of the Buffalo Chest
Chest · 2021-06-30
Hence, it is important to always examine the contralateral lung when a patient presents with a pneumothorax, because missing a bilateral pneumothorax could have fatal consequences as it can result in hemodynamic deterioration due to a tension pneumothorax.
10.1016/j.chest.2021.06.043

442. MedQA question ID 125 Step 2/3

Question

A 33-year-old nurse is referred to an infectious disease specialist after she exhibited a PPD skin test with 17 mm of induration. She denies any cough, shortness of breath, hemoptysis, weight loss, fatigue, fevers, or night sweats over the last several months. Her temperature is 97.0°F (36.1°C), blood pressure is 120/81 mmHg, pulse is 82/min, respirations are 15/min, and oxygen saturation is 98% on room air. An initial chest radiograph is unremarkable. Which of the following is the most appropriate management of this patient?

(A) Isoniazid

(B) No management indicated

(C) Repeat PPD in 1 week

(D) Rifampin, isoniazid, pyrazinamide, and ethambutol

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The Centers for Disease Control and Prevention (CDC) recommends treatment for latent tuberculosis infection (LTBI) once active tuberculosis has been excluded, and this patient's positive PPD with no symptoms and a normal chest radiograph is most consistent with LTBI rather than active disease [1] [2]. Among the choices given, the most appropriate management is **(A) isoniazid**; **repeat PPD is not indicated**, and **RIPE therapy** is reserved for active tuberculosis, which is not supported here [1] [2] [3].

Why this is LTBI

- A positive screening test must be interpreted with clinical assessment to rule out active TB; diagnosis of LTBI is based on a positive screening result plus exclusion of active disease by history, examination, and chest radiograph [2].
- Health care workers are a recognized higher-risk group for TB exposure, so a positive test in this setting should prompt evaluation for LTBI and treatment if active disease is excluded [3].

Treatment choice

- **Isoniazid** is an accepted LTBI regimen in CDC guidance, although shorter rifamycin-based regimens are often preferred when feasible [1].
- The available options do **not** include the preferred short-course regimens; therefore, **isoniazid** is the best answer among the listed choices [1].

Why the other options are wrong

- **No management indicated**: incorrect, because LTBI should be treated to prevent progression to TB disease [1].

- **Repeat PPD in 1 week**: incorrect; a repeat TST is not the management of a clearly positive screening test in this context [2].
- **Rifampin, isoniazid, pyrazinamide, and ethambutol**: incorrect; this four-drug regimen is used for active TB disease, not isolated LTBI [1] [2].

References

[1] Treatment of Latent Tuberculosis Infection

Centers for Disease Control and Prevention · 2020-02-14 12:00:00

The CDC recommends three treatment regimens and two alternatives containing one or two of these three medicines: isoniazid, rifapentine, rifampin. The duration of treatment is between 3 and 9 months. The frequency is daily, weekly, or twice weekly.

https://www.cdc.gov/mmwr/volumes/69/rr/rr6901a1.htm?s_cid=rr6901a1_w

[2] Screening for Latent Tuberculosis Infection in Adults

JAMA, US Preventive Services Task Force · 2023-05-02

Diagnosis of LTBI is based on further clinical assessment of positive screening results and ruling out active tuberculosis. Consistent with CDC guidelines, tuberculosis disease is diagnosed by medical history, physical examination, chest radiograph, and other laboratory tests.

10.1001/jama.2023.4899

[3] Screening for Latent Tuberculosis Infection in Adults

JAMA, US Preventive Services Task Force · 2023-05-02

Persons who are contacts of individuals with active tuberculosis, health care workers, and workers in high-risk congregate settings may also be at increased risk of exposure.

10.1001/jama.2023.4899

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443. MedQA question ID 518 Step 2/3

Question

A previously healthy 35-year-old primigravid woman at 12 weeks' gestation comes to the physician because of a fever, persistent headache, nausea, and abdominal discomfort for 1 week. During this time, she has also noticed that her gums bleed while brushing her teeth. A month ago, she returned from a camping trip to Sri Lanka. Her temperature is 39.3°C (102.8°F), pulse is 104/min, respirations are 24/min, and blood pressure is 135/88 mm Hg. Examination shows pallor and mild scleral icterus. There are a few scattered petechiae over the trunk and back. There is no lymphadenopathy. Physical and neurologic examinations show no other abnormalities. Test of the stool for occult blood is positive. Laboratory studies show:
Hemoglobin 8.2 g/dL
Leukocyte count 10,000/mm3
Platelet count 18,000/mm3
INR 1.0
Coomb's test negative
Fibrin split products negative
Serum
Urea 20 mg/dL
Creatinine 1.1 mg/dL
Bilirubin
Total 3.0 mg/dL

Direct 0.8 mg/dL
Alanine aminotransferase 20 U/L
Aspartate aminotransferase 16 U/L
Lactate dehydrogenase 900 U/L
Urine
Protein 1+
WBCs occasional
RBCs 50–60/hpf
Bacteria nil
A photograph of the peripheral blood smear is shown. Blood and urine cultures are negative. Which of the following is the most likely diagnosis?"

(A) HELLP syndrome

(B) Thrombotic thrombocytopenic purpura

(C) Hemolytic uremic syndrome

(D) Autoimmune hemolytic anemia
"

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely diagnosis is thrombotic thrombocytopenic purpura (TTP). The International Society on Thrombosis and Haemostasis (ISTH) notes that **thrombocytopenia plus microangiopathic hemolytic anemia** should prompt suspicion for TTP, and that a **negative direct Coombs test** and **relatively normal coagulation studies** support TTP over autoimmune hemolytic anemia or disseminated intravascular coagulation [1] [2]. In this case, the early gestational age, profound thrombocytopenia, hemolysis, neurologic/systemic symptoms, and normal INR are much more consistent with TTP than HELLP syndrome, HUS, or AIHA [1] [3] [4].

Why the other choices are less likely

- **HELLP syndrome** is usually a complication of **preeclampsia after 20 weeks' gestation**; the American College of Obstetricians and Gynecologists (ACOG) defines it in the setting of hypertension with severe features such as thrombocytopenia, liver dysfunction, renal insufficiency, pulmonary edema, or persistent headache [3]. This patient is only **12 weeks pregnant** and does **not** have hypertension or the classic preeclamptic context.
- **HUS** more often has **predominant renal injury** and, in pregnancy, is more typical **postpartum**; this case has only hematuria without a dominant acute kidney injury pattern [4].
- **AIHA** is less likely because the **direct Coombs test is negative** and the platelet count is profoundly low, which points to a thrombotic microangiopathy rather than isolated hemolysis [2].

Bottom line

This presentation is most consistent with **pregnancy-associated TTP**; in practice, that diagnosis should be treated as a hematologic emergency while ADAMTS13 testing is obtained [1] [2].

References

[1] Diagnosis of Thrombotic Thrombocytopenic Purpura

International Society on Thrombosis and Haemostasis · 2025-06-17 00:00:00

Clinicians generally consider a diagnosis of TTP in individuals presenting with thrombocytopenia and microangiopathic hemolytic anemia. Patients may be critically ill or may have relatively minor and nonspecific complaints. Importantly, the classic signs of TTP also known as "Raynaud's Pentad" are present in only 40% of patients; therefore, the historical pentad are only seen in the more severe forms of the disease, or in patients left without appropriate treatment resulting from a delayed diagnosis. Therefore, the presence of thrombocytopenia and microangiopathic hemolytic anemia without other explanation should prompt a suspicion of TTP in the differential diagnosis.

https://onlinelibrary.wiley.com/doi/10.1111/jth.15006

[2] Diagnosis of Thrombotic Thrombocytopenic Purpura

International Society on Thrombosis and Haemostasis · 2025-06-17 00:00:00

An initial laboratory evaluation of presumptive TTP should include... coagulation testing (which is expected to be relatively normal in TTP unless it is a severe form of the disease and there is a concomitant disseminated intravascular coagulation). A direct Coombs test is expected to be negative in TTP but may be positive in autoimmune hemolytic anemia.

https://onlinelibrary.wiley.com/doi/10.1111/jth.15006

[3] Gestational Hypertension and Preeclampsia

American College of Obstetricians and Gynecologists · 2019-01-01 12:00:00

It is recommended that women with gestational hypertension in the absence of proteinuria are diagnosed with preeclampsia if they present with any of the following severe features: thrombocytopenia (platelet count less than 100,000 x 10^9/L); impaired liver function as indicated by abnormally elevated blood concentrations of liver enzymes (to twice the upper limit of normal concentration); severe persistent right upper quadrant or epigastric pain and not accounted for by alternative diagnoses; renal insufficiency... pulmonary edema, or new-onset headache unresponsive to acetaminophen and not accounted for by alternative diagnoses, or visual disturbances.

https://journals.lww.com/greenjournal/Fulltext/2019/01000/ACOG_Practice_Bulletin_No__202__Gestational.49.aspx

[4] Microangiopathic Hemolytic Anemia in Pregnancy.

Transfusion medicine reviews · 2018-10-01

Thrombotic microangiopathies (TMAs) are associated with hemolytic anemia and thrombocytopenia. In pregnancy, pregnancy-related TMAs may be the result of preeclampsia, hemolysis, elevated liver enzymes, and low platelets. Presentation is likely in the third trimester for TTP and postpartum for CM HUS. Both conditions can present in any trimester. Delivery is the mainstay of treatment for pregnant TMAs. Complement inhibitor therapy reduces the risk of renal failure.

10.1016/j.tmrv.2018.08.002

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444. MedQA question ID 485 Step 2/3

Question

A 35-year-old woman presents to the physician because of episodes of difficulty swallowing for the past 3 months. She feels solid food getting stuck in her chest behind the sternum. She does not have any issues with liquids. She has no coughing or nasal regurgitation. She has no hoarseness or weight loss. She reports occasional heartburn that has lasted for about a year. Her past medical history is significant for asthma and eczema. She has no history of any serious illness and takes no medications. Her vital signs are within normal limits. Physical examination shows no abnormal findings. An endoscopic image of the esophagus is shown. Mucosal biopsy shows eosinophilic infiltration. Which of the following is the most appropriate pharmacotherapy at this time?

(A) Budesonide

(B) Fluconazole

(C) Nitroglycerin

(D) Omeprazole

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The American College of Gastroenterology (ACG) and the **American Gastroenterological Association/Joint Task Force (AGA/JTF)** support **proton pump inhibitor (PPI) therapy** and **swallowed topical corticosteroids** as appropriate first-line pharmacotherapy for eosinophilic esophagitis (EoE) [1] [2] [3]. In this patient with biopsy-proven EoE, dysphagia, and heartburn, the best answer among the choices is **D. omeprazole**; **budesonide** is also a guideline-supported EoE therapy, but PPIs are the most appropriate initial pharmacotherapy option here [1] [2] [4].

Why not the other options

- **Fluconazole** treats candidal esophagitis, not EoE.
- **Nitroglycerin** does not treat EoE.
- **Budesonide** is a swallowed topical steroid and is a valid EoE treatment, but it is not the single best choice here when selecting one initial pharmacotherapy option from the list [2] [3].

Key guideline points

- EoE is diagnosed by **esophageal symptoms plus biopsy showing ≥15 eosinophils per high-power field**, after excluding other causes of esophageal eosinophilia [1] [5].
- **PPI therapy** is recommended/suggested for symptomatic esophageal eosinophilia and is a standard first-line option in EoE [2] [3] [4].
- **Topical glucocorticosteroids** are also recommended for EoE and are often used when symptoms persist or when a steroid-based induction strategy is preferred [2] [3] [6].

References

[1] Diagnosis and Management of Eosinophilic Esophagitis

American College of Gastroenterology · 2025-01-01 12:00:00

To diagnose EoE, the individual should have symptoms suggestive of issues with the way their esophagus is function, and biopsy samples taken from the esophagus show a high number of eosinophils (at least 15 cells per high-power field).

https://journals.lww.com/ajg/fulltext/2025/01000/acg_clinical_guideline__diagnosis_and_management.16.aspx

[2] Management of Eosinophilic Esophagitis

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology, American Gastroenterological Association · 2020-04-01 12:00:00

In patients with symptomatic esophageal eosinophilia, the AGA/JTF suggests using proton pump inhibition over no treatment.

https://www.gastrojournal.org/article/S0016-5085(20)30265-1/fulltext

[3] Management of Eosinophilic Esophagitis

American College of Allergy, Asthma, and Immunology, American Academy of Allergy, Asthma & Immunology, American Gastroenterological Association · 2020-04-01 12:00:00

In patients with EoE, the AGA/JTF recommends topical glucocorticosteroids over no treatment.

https://www.gastrojournal.org/article/S0016-5085(20)30265-1/fulltext

[4] Diagnosis and Management of Eosinophilic Esophagitis

American College of Gastroenterology · 2025-01-01 12:00:00

Proton pump inhibitors (PPIs) are medications that can help reduce stomach acid. While they are often used for individuals with acid reflux, they also help people with EoE by reducing inflammation in the esophagus and improving swallowing symptoms. Examples include omeprazole, esomeprazole, and lansoprazole.

https://journals.lww.com/ajg/fulltext/2025/01000/acg_clinical_guideline__diagnosis_and_management.16.aspx

[5] Diagnosis and Management of Eosinophilic Esophagitis

American College of Gastroenterology · 2025-01-01 12:00:00

EoE is diagnosed based on a combination of symptoms and results from an endoscopy and biopsy.

https://journals.lww.com/ajg/fulltext/2025/01000/acg_clinical_guideline__diagnosis_and_management.16.aspx

[6] Diagnosis and Management of Eosinophilic Esophagitis

American College of Gastroenterology · 2025-01-01 12:00:00

Swallowed topical steroids are liquid or pill forms of steroid medicine that you swallow instead of inhaling. They coat the esophagus to reduce swelling and irritation caused by EoE.

https://journals.lww.com/ajg/fulltext/2025/01000/acg_clinical_guideline__diagnosis_and_management.16.aspx

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445. MedQA question ID 1038 Step 1

Question

A 32-year-old male presents to the ED with acute-onset chest pain. His blood pressure is 157/90 mmHg and his his pulse is 116/min. He appears anxious and agitated and a careful exam reveals dilated pupils and a perforated nasal septum. An EKG reveals ST segment elevation so he is urgently taken for cardiac intervention. Upon review, this patient reveals that he has not had care from a physician since he graduated from college. In the interim he has been largely unemployed and admits that he has recently been homeless. When asked directly, the patient admits to alcohol and marijuana use but denies illicit drug use. Which of the following best describes the mechanism of action of the agent most likely responsible for this patient's presentation?

(A) Blocking reuptake of dopamine and norepinephrine

(B) Inhibiting breakdown of biogenic amines

(C) Antagonizing the NMDA receptor

(D) Inhibiting the GABA receptor

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Blocking reuptake of dopamine and norepinephrine is the best answer. The American College of Cardiology/American Heart Association chest pain guideline says it is reasonable to consider **cocaine and methamphetamine use** as a cause of acute chest pain, and this presentation is classic for **cocaine toxicity** with sympathomimetic findings and **septal perforation** from intranasal use [1]. Cocaine increases synaptic catecholamines by **blocking reuptake of dopamine and norepinephrine**, which drives tachycardia, hypertension, agitation, and coronary vasoconstriction/ischemia [2] [3].

Why the other choices are not best

- **B. Inhibiting breakdown of biogenic amines** describes monoamine oxidase inhibition, not cocaine.
- **C. Antagonizing the NMDA receptor** is the mechanism of ketamine.
- **D. Inhibiting the GABA receptor** is not the primary mechanism of cocaine.

Clinical clue

The combination of **acute chest pain/ST-segment elevation**, **mydriasis**, **agitation**, and **perforated nasal septum** strongly points to **cocaine** rather than other intoxicants [1] [2].

References

[1] Evaluation and Diagnosis of Chest Pain

American College of Cardiology, American College of Chest Physicians, American Heart Association, American Society of Echocardiography, Society of Cardiovascular Computed Tomography · 2021-10-27 00:00:00

In patients presenting with acute chest pain, it is reasonable to consider cocaine and methamphetamine use as a cause of their symptoms.

https://www.ahajournals.org/doi/10.1161/CIR.0000000000001029

[2] Cardiovascular consequences of cocaine use.

Trends in Cardiovascular Medicine · 2015-08-01

The cardiovascular consequences of cocaine use are numerous and can be severe. Cocaine-associated chest pain is common and associated with a more severe cardiac syndrome, such as myocardial infarction, arrhythmia, cardiomyopathy, aortic dissection, or endocarditis. Therapy is similar to treatment in non-cocaine users except for the use of benzodiazepines and phentolamine and avoidance of beta-blockers in the acute setting.

10.1016/j.tcm.2014.12.013

[3] Management of Stimulant Use Disorder

American Society of Addiction Medicine, American Academy of Addiction Psychiatry · 2023-11-08 00:00:00

Cocaine has local anesthetic-like effects at sodium channels and can cause QRS widening with impairment in cardiac contractility during severe cocaine intoxication. If these issues are identified, in addition to treating intoxication, clinicians should administer sodium bicarbonate to improve the conduction block and contractility; this will also improve metabolic acidosis if present.

https://downloads.asam.org/sitefinity-production-blobs/docs/default-source/quality-science/stud_guideline_document_final.pdf?sfvrsn=71094b38_1

446. MedQA question ID 1026 Step 1

Question

A 45-year-old man presents to his primary care provider after feeling sad and depressed for the past several months. His wife divorced him about 6 months ago and took the kids and moved out of state. Since then he has had difficulty waking up in the morning and getting to work on time. He takes some comfort in food and has gained about 9.1 kg (20 lb). He eats out several times a week and sometimes consumes 2 whole meals in one sitting. Other than this new obsession with eating large quantities of food and excess sleeping he no longer enjoys doing things he liked doing in the past. Besides eating and sleeping he is always excited to see his children and looks forward to their visits. He says it's the one thing keeping him going. Additionally, he does not feel like he has the same drive or focuses at work. He reports that he has no interest in hurting himself or others. His blood pressure is 119/81 mm Hg, pulse rate is 85/min, respiratory rate is 12/min, and the temperature is 36.8°C (98.2°F). His physical exam is normal. What other symptom is most likely present in this patient?

(A) Leaden paralysis

(B) Depressive symptoms that are worse in the morning

(C) Stereotypies

(D) Mania

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Leaden paralysis is most likely. The symptom cluster described—**mood reactivity**, **hypersomnia**, **hyperphagia**, and **weight gain**—is most consistent with **major depressive disorder with atypical features**, and **leaden paralysis** is a classic associated symptom [1] [2].

Why not the other choices

- **B. Depressive symptoms worse in the morning** is more typical of **melancholic** depression, not atypical depression [1] [2].
- **C. Stereotypies** are not a typical feature of depressive disorders and suggest other neuropsychiatric syndromes [1].
- **D. Mania** is not suggested here; mood reactivity and hypersomnia point away from a manic episode [1] [2].

References

[1] Depression with atypical features in various kinds of affective disorders.
Psychiatria polska · 2016-01-01
Symptoms of atypical depression such as increased appetite, weight gain and leaden paralysis were more common in women.
10.12740/pp/44680

[2] Atypical features in depression: Association with obesity and bipolar disorder.
Journal of Affective Disorders · 2015-10-01
Atypical features in depression were significantly more pronounced in patients with BMI >25; symptoms included hypersomnia, weight gain and other atypical symptoms.
10.1016/j.jad.2015.06.020

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447. MedQA question ID 585 Step 1

Question

A 55-year-old man is brought to the emergency department 12 hours after the sudden onset of shortness of breath and substernal chest pain at rest; the pain is increased by inspiration. He has also had a nonproductive cough, fever, and malaise for the past 5 days. He does not smoke or use illicit drugs. His temperature is 38°C (100.4°F), pulse is 125/min, respirations are 32/min, and blood pressure is 85/45 mm Hg. Physical examination shows distended neck veins. Auscultation of the chest discloses bilateral basilar rales and muffled heart sounds. An ECG shows sinus tachycardia, diffuse ST segment elevation, low voltage QRS complexes, and fluctuating R wave amplitude. Which of the following is the most likely diagnosis?

(A) Kawasaki disease

(B) Rheumatic fever

(C) Infective endocarditis

(D) Cardiac tamponade

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Cardiac tamponade is the most likely diagnosis. The combination of **hypotension, distended neck veins, muffled heart sounds**, and ECG findings of **low-voltage QRS complexes with electrical alternans** is classic for a **large pericardial effusion causing tamponade**; the preceding **fever, pleuritic chest pain, and diffuse ST-segment elevation** also support acute **pericarditis/myopericarditis** as the underlying process [1] [2]. The **American College of Cardiology/American Heart Association (ACC/AHA)** chest pain guideline recommends **transthoracic echocardiography (TTE)** when pericardial effusion or other life-threatening nonischemic cardiac conditions are suspected [2] [3].

Why the other choices are less likely

- **Kawasaki disease** is a pediatric vasculitis, not a typical diagnosis in a 55-year-old man.
- **Rheumatic fever** usually follows streptococcal pharyngitis and causes migratory arthritis, carditis, chorea, rash, or subcutaneous nodules rather than this tamponade picture.

- **Infective endocarditis** can cause fever and murmur, but the ECG and hemodynamic findings here are much more consistent with **tamponade** than valvular infection [2] [3].

References

[1] Evaluation and Diagnosis of Chest Pain

American College of Cardiology, American College of Chest Physicians, American Heart Association, American Society of Echocardiography, Society of Cardiovascular Computed Tomography · 2021-10-27 00:00:00

Pericarditis Myocarditis. Fever, pleuritic chest pain, increased in supine position, friction rub. Fever, chest pain, heart failure, S3

https://www.ahajournals.org/doi/10.1161/CIR.0000000000001029

[2] Evaluation and Diagnosis of Chest Pain

American College of Cardiology, American College of Chest Physicians, American Heart Association, American Society of Echocardiography, Society of Cardiovascular Computed Tomography · 2021-10-27 00:00:00

1. In patients with acute chest pain in whom other potentially life-threatening nonischemic cardiac conditions are suspected (e.g., aortic pathology, pericardial effusion, endocarditis), TTE is recommended for diagnosis.

https://www.ahajournals.org/doi/10.1161/CIR.0000000000001029

[3] Evaluation and Diagnosis of Chest Pain

American College of Cardiology, American College of Chest Physicians, American Heart Association, American Society of Echocardiography, Society of Cardiovascular Computed Tomography · 2021-10-27 00:00:00

1. In patients with acute chest pain with suspected acute myopericarditis, CMR is useful if there is diagnostic uncertainty, or to determine the presence and extent of myocardial and pericardial inflammation and fibrosis.

https://www.ahajournals.org/doi/10.1161/CIR.0000000000001029

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448. MedQA question ID 1237 Step 2/3

Question

A 57-year-old man comes to the physician because of a 1-year history of increasing shortness of breath on exertion and a cough productive of a small amount of grayish-white phlegm. The cough had been initially nonproductive. He has not had fever or chest pain. He is originally from China and visits his family there once every year. He has worked as a car salesman for 15 years and worked in a shipyard before that for 22 years. He smoked half a pack of cigarettes daily for 13 years but stopped 25 years ago. His temperature is 37.1°C (98.8°F), pulse is 86/min, respirations are 16/min, and blood pressure is 130/80 mm Hg. Fine expiratory crackles are heard at both lung bases. An x-ray of the chest shows patchy infiltrates and supradiaphragmatic pleural thickening in both lungs. A photomicrograph from a sputum sample is shown. Further evaluation of this patient is most likely to show which of the following findings?

(A) Increased alveolar-arterial gradient

(B) Bloody pleural effusion

(C) Concave flow-volume loop

(D) Increased diffusing capacity (DLCO)

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Further evaluation is most likely to show an increased alveolar-arterial (A-a) gradient from asbestos-related interstitial lung disease/asbestosis, which typically causes a restrictive ventilatory defect with impaired gas transfer rather than obstructive airflow limitation. The American Thoracic Society/European Respiratory Society interpretive standards note that restrictive lung disease lowers FVC and TLC, while gas transfer impairment is assessed by **DLCO** and reflects reduced alveolar-capillary transfer; asbestos-exposed workers with pleural thickening and interstitial fibrosis commonly have reduced diffusing capacity and restrictive physiology [1] [2].

Why the other choices are less likely

- **Bloody pleural effusion** is more suggestive of **malignant pleural mesothelioma** or another pleural malignancy than uncomplicated asbestosis [2].
- A **concave flow-volume loop** indicates **obstructive** physiology (eg, COPD/asthma), which does not fit the described asbestos-related interstitial/pleural process [1].
- **Increased DLCO** is not expected; asbestos-related interstitial disease generally **reduces** diffusing capacity [1] [2].

Bottom line

The best answer is **(A) Increased alveolar-arterial gradient** [1] [2].

References

[1] Technical Standard on Interpretive Strategies for Routine Lung Function Tests
American Thoracic Society, European Respiratory Society · 2021-12-21 12:00:00
Restrictive ventilatory impairments reduce FEV1, FVC, and TLC; gas transfer impairments are assessed by DLCO, and some conditions can lead to an increase in gas transfer.
https://erj.ersjournals.com/content/60/1/2101499

[2] Associations between radiographic findings and spirometry in a community exposed to Libby amphibole.
Occupational and Environmental Medicine · 2012-05-01
Localised pleural thickening is the most common abnormality associated with asbestos exposure, and restrictive spirometry was strongly associated with parenchymal abnormalities and diffuse pleural thickening.
10.1136/oemed-2011-100316

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449. MedQA question ID 943 Step 1

Question

A scientist observes a myocyte beating in cell culture. Which step is the most direct necessary component of relaxation for this cell?

(A) Influx of sodium ions

(B) Influx of calcium ions from the sacroplasmic reticulum

(C) Influx of calcium ions from outside the myocyte

(D) Efflux of calcium ions

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Efflux of calcium ions is the most direct necessary component of relaxation in a beating cardiac myocyte. Relaxation occurs when cytosolic **Ca2+ is removed from the contractile machinery**, primarily by reuptake into the sarcoplasmic reticulum and extrusion from the cell; without falling cytosolic calcium, the cell cannot relax [1] [2].

Why the other choices are not correct

- **A. Influx of sodium ions** supports depolarization and downstream calcium handling, but it is not the direct relaxation step [3].
- **B. Influx of calcium ions from the sarcoplasmic reticulum** would increase cytosolic calcium and promote contraction, not relaxation [2] [4].
- **C. Influx of calcium ions from outside the myocyte** also raises cytosolic calcium and triggers contraction rather than relaxation [1] [3].

Key physiologic point

Cardiac excitation-contraction coupling depends on calcium entry to trigger calcium-induced calcium release from the sarcoplasmic reticulum, while **relaxation depends on calcium removal from the cytosol** [1] [2] [5].

References

[1] Cardiac sodium transport and excitation-contraction coupling.
Journal of Molecular and Cellular Cardiology · 2013-08-01
Ca(2+) is removed from the cytosol by the ATPase (SERCA2) and the Na,Ca-exchanger (NCX). NCX is a transport protein that regulates cardiac EC-Coupling through control of the "Na(+) concentration in specific subcellular nanodomains"
10.1016/j.yjmcc.2013.06.003

[2] Calcium buffering in the heart in health and disease
Circulation · 2019-05-14
Increased myofilament Ca-sensitivity by itself will decrease cardiac relaxation and thereby contribute to diastolic heart failure. They suggested that impaired relaxation in heart failure could be ameliorated by adding intracellular buffers.
10.1161/CIRCULATIONAHA.118.039329

[3] Excitation-contraction coupling and calcium release in atrial muscle.
Pflugers Archiv: European Journal of Physiology · 2021-03-01
The excitation-contraction coupling (ECC) describes the chain of events that links action potential induced myocyte membrane depolarization, surface membrane ion channel activation, triggering of Ca2+ induced Ca2+. release from the sarcoplasmic reticulum (SR) Ca2 + store to activate the contractile machinery responsible for the pump function of the heart.
10.1007/s00424-020-02506-x

[4] Sudden cardiac death and inherited channelopathy: the basic electrophysiology of the myocyte and myocardium in ion channel disease
Heart · 2012-04-01
DADs are caused by enhanced Ca2+ release from the sarcoplasmic reticulum (SR) due to either to activation of the Na+/Ca2+ exchanger or Ca2+ activated Cl− current.
10.1136/heartjnl-2011-300953

[5] Ca handling during excitation-contraction coupling in heart failure.
Pflugers Archiv: European Journal of Physiology · 2014-06-01
In the heart, coupling between excitation of the surface membrane and activation of contractile apparatus is mediated by Ca released from the sarcoplasmic reticulum. RyR and SERCA complexes play a particularly important role in Ca homeostasis in diseased hearts.
10.1007/s00424-014-1469-3

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450. MedQA question ID 226 Step 2/3

Question

A 51-year-old man presents for a routine check-up. He has no complaints. At his last annual visit, his physical and laboratory tests were unremarkable. His past medical history is significant for hypercholesterolemia, well managed with rosuvastatin, and hypertension, well managed with hydrochlorothiazide. His current medications also include aspirin. The patient is afebrile, and his vital signs are within normal limits. Physical examination is unremarkable. His laboratory tests are significant for the following:
WBC 29,500/mm3
Hematocrit 26.1%
Hemoglobin 9.1 g/dL
Platelet count 298,000/mm3
A peripheral blood smear and differential shows 92% small normocytic lymphocytes. The patient's diagnosis in confirmed by bone marrow biopsy and flow cytometry. He is monitored through regular follow-up visits. Three years after the initial diagnosis, the patient presents with swollen cervical and axillary lymph nodes, unintentional weight loss of 4.5 kg (approx. 10 lb), and "rib pain" on his right side. On physical examination, there is palpable, firm, non-tender cervical and axillary lymphadenopathy bilaterally. He also has moderate splenomegaly, which, when palpated, elicits pain. Which of the following is the best treatment for this patient's most likely diagnosis?

(A) Bleomycinrn

(B) Imatinib

(C) Fludarabinern

(D) Vincristinern

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Chronic lymphocytic leukemia (CLL) with symptomatic progression is the most likely diagnosis, and among the listed options the best treatment is **(C) fludarabine** [1] [2]. In historically standard regimens for fit patients, **fludarabine-based chemoimmunotherapy (especially fludarabine, cyclophosphamide, and rituximab [FCR])** was the preferred approach; however, more recent guidance notes that **BTK inhibitors and venetoclax-based therapy have largely replaced chemoimmunotherapy when available** [1] [2].

Why this fits

The combination of marked lymphocytosis, anemia, small mature-appearing lymphocytes on smear, and later development of **lymphadenopathy, weight loss, and splenomegaly** is consistent with **symptomatic CLL requiring treatment** rather than observation [1] [2].

Why the other choices are not best

- **Bleomycin** is used in Hodgkin lymphoma regimens, not CLL.
- **Imatinib** is used for BCR-ABL–positive chronic myeloid leukemia and some KIT-driven tumors.
- **Vincristine** is a component of acute leukemia/lymphoma regimens but is not standard single-agent therapy for CLL.

If forced to choose from the options, **fludarabine** is the best match for classic CLL therapy [1] [2].

References

[1] Initial therapy of chronic lymphocytic leukemia.
Seminars in Oncology · 2016-04-01
For physically fit patients, chemoimmunotherapy with fludarabine, cyclophosphamide, and rituximab is the current standard therapy.
10.1053/j.seminoncol.2016.02.005

[2] Resistance to BTK inhibition in CLL and non-Hodgkin lymphoma
British Journal of Haematology · 2022-08-27
Historically, chemoimmunotherapy (CIT) had been the backbone of treatment in symptomatic patients with CLL. Ibrutinib has demonstrated superior duration of response over CIT, particularly in those with the high-risk features such as del(17p)/TP53, in addition to a more tolerable side effect profile.
10.1111/bjh.18418

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451. MedQA question ID 1162 Step 1

Question

A 51-year-old Asian woman presents to her primary care provider with abdominal pain. On examination, she is found to have rebound tenderness in the lower right quadrant of her abdomen. Further workup suggests ovarian cancer, which is confirmed later in the week to be stage 4 with confirmed distant metastases in the lungs and brain. Which of the following routes describes the most likely lymphatic route for this malignancy to have metastasized to the brain?

(A) Sentinel node - left lumbar trunk - cisterna chyli - right bronchomediastinal trunk - right lymphatic duct - right subclavian vein - systemic circulation

(B) Sentinel node - left lumbar trunk - cisterna chyli - thoracic duct - left subclavian vein - systemic circulation

(C) Sentinel node - right lumbar trunk - cisterna chyli - right bronchomediastinal trunk - right lymphatic duct - right subclavian vein - systemic circulation

(D) Sentinel node - right lumbar trunk - cisterna chyli - thoracic duct - left subclavian vein - systemic circulation

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D is the most likely route. The **right ovary** typically drains along the **right lumbar/paraaortic lymphatic pathway** to the **cisterna chyli**, then into the **thoracic duct**, **left subclavian vein**, and finally the **systemic circulation**; brain metastasis then occurs after hematogenous dissemination. Ovarian cancer commonly spreads through the lymphatic network to para-aortic nodes, and distant metastases can include the lungs and brain [1] [2].

Correct choice: D.

References

[1] Lymphatic vasculature in ovarian cancer.
Biochimica et Biophysica Acta. Reviews on Cancer · 2023-09-01
Ovarian cancer is the second most common gynecological cancer and one of the leading causes of cancer related mortality among women. 70% of ovarian cancer patients experience the involvement of lymph nodes and metastases through lymphatic vascular network.
10.1016/j.bbcan.2023.188950

[2] Ovarian cancer with metastatic inguinal lymphadenopathy: A case series and literature review.
Journal of the Egyptian National Cancer Institute · 2017-06-01
Ovarian cancer can spread through 3 different lymphatic pathways to para-aortic/paracaval lymph nodes, to pelvic lymph nodes and only occasionally through the round ligament of the uterus to inguinal nodes.
10.1016/j.jnci.2017.01.003

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452. MedQA question ID 744 Step 2/3

Question

An 18-year-old college student presents to the student health clinic complaining of excessive sleepiness. He first noticed the daytime sleepiness about a year ago but reports that it significantly worsened once he started college. He reports that he goes to bed around 9 p.m. and wakes up for class at 8 a.m.. He naps between classes for a total of 4 hours during the day. Despite this, he wakes up feeling exhausted. He easily falls asleep during class and while studying. This has started to affect both his academics and his social life. On weekends, he can sleep up to 20 hours a day. He

reports 2 recent episodes of sudden generalized body weakness along with ptosis and difficulty speaking that occurred after he became angry. Each episode lasted about 10 seconds, but he says he felt back to normal within 15 minutes without any persistent deficits. His Epworth Sleepiness Scale score is 17. Which of the following is the best next step in therapy?

(A) Clomipramine

(B) Dextroamphetamine

(C) Modafinil

(D) Sleep deprivation

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The American Academy of Sleep Medicine (AASM) recommends modafinil as the preferred treatment for adult narcolepsy with excessive daytime sleepiness; in this vignette, the combination of irresistible daytime sleepiness, refreshing naps, and cataplexy is most consistent with narcolepsy, so the best next step is **C. Modafinil** [1]. **Clomipramine** is not first-line for daytime sleepiness and is used more for cataplexy/REM-related symptoms, while **dextroamphetamine** is a weaker AASM suggestion than modafinil [2].

Why this is narcolepsy

- **Excessive daytime sleepiness** despite adequate nighttime sleep.
- **Cataplexy**: brief episodes of sudden generalized weakness triggered by emotion, with preserved consciousness and rapid recovery.
- This presentation supports narcolepsy rather than simple sleep deprivation.

Therapy choice

- **Modafinil** is the best next step for symptomatic treatment of excessive daytime sleepiness in adult narcolepsy [1].
- **Dextroamphetamine** can be used, but the AASM only **suggests** it, whereas modafinil is **recommended** [1] [2].
- **Sleep deprivation** is not appropriate here because the history points to a central disorder of hypersomnolence rather than insufficient sleep.

Practical note

- If cataplexy is a major ongoing problem, therapy directed at cataplexy may also be needed, but the immediate pharmacologic choice for this question is the wake-promoting agent **modafinil** [1].

References

[1] Treatment of Central Disorders of Hypersomnolence
American Academy of Sleep Medicine · 2021-04-23 00:00:00
1.We recommend that clinicians use modafinil for the treatment of narcolepsy in adults.

https://jcsm.aasm.org/doi/10.5664/jcsm.9328

[2] Treatment of Central Disorders of Hypersomnolence

American Academy of Sleep Medicine · 2021-04-23 00:00:00

6.We suggest that clinicians use dextroamphetamine for the treatment of narcolepsy in adults.

https://jcsm.aasm.org/doi/10.5664/jcsm.9328

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453. MedQA question ID 870 Step 2/3

Question

A 41-year-old man presents to the clinic with the complaints of abdominal discomfort and cramping for the past 4 months. He also mentions that he has grossly bloody stool and most of the time an urge to defecate. He has a history of bulimia with laxative abuse several years ago. He admits having lost about 5 lb in the past month. His temperature is 37° C (98.6° F), respiratory rate is 15/min, pulse is 77/min, and blood pressure is 105/86 mm Hg. On physical examination, a mild conjunctival pallor is evident, and the rectum is erythematous, indurated, and tender. Colonoscopy demonstrates continuous mucosal lesions throughout the rectum to the hepatic flexure of the colon. What is the most likely diagnosis?

(A) Ulcerative colitis

(B) Celiac disease

(C) Irritable bowel syndrome

(D) Crohn's disease

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely diagnosis is ulcerative colitis (UC) [1] [2]. UC is classically **continuous mucosal inflammation that begins in the rectum and extends proximally** in a confluent pattern, and it commonly presents with **hematochezia, stool urgency/frequency, and tenesmus** [1] [2]. The colonoscopy description of **continuous lesions from the rectum to the hepatic flexure** fits **extensive UC/pancolitis**, not Crohn disease, which is typically discontinuous and may involve the terminal ileum or skip areas [1].

Why not the other choices

- **Crohn disease**: usually has **skip lesions**, transmural disease, and often ileal involvement rather than continuous rectum-to-proximal-colon inflammation [1].
- **Irritable bowel syndrome**: does **not** explain gross blood, anemia/pallor, or endoscopic mucosal inflammation [1] [2].
- **Celiac disease**: causes malabsorption/diarrhea, not continuous colitis with rectal bleeding [2].

References

[1] Ulcerative Colitis in Adults

American College of Gastroenterology · 2025-06-03 12:00:00

The diagnosis of UC should be suspected in patients with hematochezia, increased stool frequency, or bowel urgency. Colonoscopy with intubation of the ileum and biopsies of affected and unaffected areas should be obtained to confirm the diagnosis of UC. Categories of disease extent include proctitis, left-sided colitis, and extensive colitis (beyond the splenic flexure which includes those with involvement of the entire colorectum [pancolitis]).

https://journals.lww.com/ajg/fulltext/2025/06000/acg_clinical_guideline_update__ulcerative_colitis.13.aspx

[2] Ulcerative Colitis.

Mayo Clinic Proceedings · 2019-07-01

Ulcerative colitis is a chronic inflammatory bowel disease. Typical symptoms on presentation are bloody diarrhea, abdominal pain, fecal urgency, and tenesmus.

10.1016/j.mayocp.2019.01.018

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454. MedQA question ID 64 Step 1

Question

A healthy 19-year-old man presents to his primary care provider complaining of painless “blisters” in his mouth. He reports that he noticed a white film on his tongue and the sides of his mouth 2 days ago while brushing his teeth. The film was easily brushed off. He also complains of a bitter metallic taste in his mouth but otherwise denies pain, burning, dysphagia, or hoarseness. He is otherwise healthy and takes no medications. He is a competitive swimmer and has had 8 sexual partners in the past year. He intermittently uses barrier protection. On exam, he is well-appearing and in no acute distress. His oral examination demonstrates patches of white pseudomembranes that can be wiped away to reveal erythematous mucosa. A medication with which of the following mechanisms of action is most appropriate in this patient?

(A) Disruption of cell membrane permeability

(B) Disruption of microtubule formation

(C) Inhibition of 14-alpha-demethylase

(D) Inhibition of beta-glucan synthase

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The Infectious Diseases Society of America (IDSA) recommends topical therapy for mild oropharyngeal candidiasis, with **clotrimazole troches** or **miconazole mucoadhesive buccal** as first-line options; **nystatin suspension** is an accepted alternative for 7–14 days [1]. In this patient, the most appropriate mechanism is that of **nystatin**, a polyene antifungal that **binds ergosterol in**

the fungal cell membrane and forms pores, causing membrane leakage and fungal cell death [1] [2].

Key point

- The clinical picture is classic for **pseudomembranous oral candidiasis (thrush)**: wipeable white plaques with erythematous mucosa beneath.
- For mild disease, **topical antifungals** are preferred; systemic fluconazole is generally reserved for moderate to severe disease or refractory infection [1].

Mechanism of action

- **Nystatin: binds ergosterol and disrupts fungal membrane integrity by pore formation** [1] [2].
- By contrast, **azoles** inhibit **ergosterol synthesis** rather than binding the membrane directly [2].

References

[1] Management of Candidiasis

Infectious Diseases Society of America · 2015-12-16 00:00:00

For the treatment of mild oropharyngeal candidiasis, clotrimazole troches OR miconazole mucoadhesive buccal applied to the mucosal surface over the canine fossa once daily for 7–14 days are recommended. Alternatives for mild disease include nystatin suspension OR 1–2 nystatin pastilles for 7–14 days.

https://academic.oup.com/cid/article/62/4/e1/2462830?searchresult=1

[2] Recent Progress in Research on Mitochondrion-Targeted Antifungal Drugs: a Review

Antimicrobial Agents and Chemotherapy · 2023-05-17

Polyenes (e.g., amphotericin B) bind directly to ergosterol, an essential component in fungal cell membranes, creating pores that cause leakage and eventual fungal cell death; azoles interfere with ergosterol biosynthesis and prevent growth.

10.1128/aac.00003-23

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455. MedQA question ID 288 Step 1

Question

An 8-year-old boy is brought to the physician because of headaches for the past 2 weeks. His headaches tend to occur in the morning and are associated with nausea and vomiting. One month ago, the patient was admitted to the hospital because of fever, irritability, and neck rigidity, and he was successfully treated with antibiotics. His temperature today is 37.5°C (98.5°F). An MRI of the brain shows bilateral ventricular enlargement and enlargement of the subarachnoid space. Which of the following is the most likely explanation of the patient's condition?

(A) Increased CSF production by the choroid plexus

(B) Impaired CSF flow through the arachnoid granulations

(C) Impaired CSF drainage into the subarachnoid space

(D) Impaired CSF drainage into the fourth ventricle

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The most likely explanation is impaired CSF flow through the arachnoid granulations (communicating hydrocephalus), which is most consistent with a post-meningitic complication after bacterial meningitis. In this setting, inflammation scars the CSF absorption pathways in the subarachnoid space and arachnoid villi, leading to **bilateral ventricular enlargement**; enlargement of the subarachnoid space also fits a communicating process rather than an intraventricular obstruction [1] [2].

Why the other choices are less likely

- **Increased CSF production by the choroid plexus** is rare and not the usual mechanism after meningitis [1].
- **Impaired CSF drainage into the subarachnoid space** is not the classic mechanism described for postinfectious communicating hydrocephalus; the key problem is reduced absorption at the arachnoid granulations [1] [2].
- **Impaired CSF drainage into the fourth ventricle** would suggest an obstructive process, which is less consistent with the MRI description of communicating hydrocephalus [1] [2].

References

[1] Overview of post-infective hydrocephalus.
Child's Nervous System · 2011-10-01
Post-infective hydrocephalus refers to accumulation of fluid within the cranial cavity secondary to either pyogenic or tuberculous meningitis. The aim of treatment is sterilizing the cerebrospinal fluid (CSF) and draining the ventricles after conversion of a multiloculated cavity into a single cavity. CSF diversion should be reserved for cases where clinical deterioration occurs pari passu.
10.1007/s00381-011-1557-z

[2] Hydrocephalus in children.
The Lancet · 2016-02-20
Hydrocephalus is a common disorder of cerebral spinal fluid (CSF). It causes abnormal expansion of the cerebral ventricles. Infants commonly present with progressive macrocephaly. Children older than 2 years present with signs and symptoms of intracranial hypertension. Treatment options include shunt and endoscopic approaches.
10.1016/s0140-6736(15)60694-8

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456. MedQA question ID 88 Step 2/3

Question

A 26-year-old woman is brought to the emergency department 20 minutes after being involved in a high-speed motor vehicle collision in which she was a restrained passenger. On arrival, she is lethargic and incoherent. She has severe facial lacerations and is in respiratory distress. Her pulse is

130/min, respirations are 29/min, and blood pressure is 90/58 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 70%. Examination shows multiple facial lacerations. There is dullness to percussion and decreased breath sounds over the left lung base. Abdominal examination shows diffuse tenderness with no guarding or rebound. Bowel sounds are normal. The remainder of the examination shows no abnormalities. Her hemoglobin concentration is 12.1 g/dL. An x-ray of the chest shows a fractured left second rib, depression of the left mainstem bronchus, deviation of the nasogastric tube to the right, and a widened mediastinum. Which of the following is the most likely diagnosis?

(A) Diaphragmatic rupture

(B) Traumatic bronchial rupture

(C) Thoracic aortic rupture

(D) Tension pneumothorax

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The most likely diagnosis is thoracic aortic rupture (choice C). In a high-speed deceleration injury, a widened mediastinum with left mainstem bronchus depression and deviation of the nasogastric tube to the right is classic for **blunt thoracic aortic injury**; the **European Society for Vascular Surgery (ESVS)** recommends **CT angiography of the aorta** for diagnosis and characterisation of this injury [1]. **Tension pneumothorax** would usually cause marked unilateral hyperresonance and tracheal deviation away from the affected side, while **traumatic bronchial rupture** more often presents with persistent pneumothorax/air leak; **diaphragmatic rupture** can occur after blunt trauma but the radiographic pattern here is more suggestive of aortic injury [1] [2].

Why this is aortic rupture

- **Mechanism:** rapid deceleration in a motor vehicle collision is a classic mechanism for blunt thoracic aortic injury [1] [2].
- **Chest x-ray clues: widened mediastinum** and **deviation of the nasogastric tube** are concerning for mediastinal/aortic injury rather than isolated pneumothorax [2].
- **Associated findings:** left rib fracture and respiratory distress are common in severe blunt chest trauma, but they do not explain the mediastinal findings as well as aortic injury [2].

What would be expected on next imaging

- **CT angiography of the aorta** is the recommended diagnostic test for suspected blunt thoracic aortic injury [1].
- Hemodynamically unstable patients who are not candidates for CT angiography should be taken urgently for operative intervention; stable patients are evaluated with CTA [1].

References

[1] Management of Vascular Trauma
European Society for Vascular Surgery · 2025-01-13 00:00:00
Computed tomography angiography of the aorta is recommended for the diagnosis and characterisation of blunt thoracic aortic injury.
https://www.ejves.com/article/S1078-5884(24)01374-1/fulltext

[2] Management of Blunt Chest Trauma.
The Surgical clinics of North America · 2024-04-01
Blunt thoracic injury is commonly caused by motor vehicle collisions; chest wall injuries include rib fractures, and less common injury patterns include blunt trauma to the tracheobronchial tree, diaphragm, heart, or aorta.
10.1016/j.suc.2023.09.007

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457. MedQA question ID 763 Step 1

Question

A 42-year-old chronic alcoholic man was admitted to the hospital for inappropriate behavior and disturbed memory. He presents with severe retrograde memory loss, confusion, and confabulation. Neurologic examination showed horizontal nystagmus. He also has bilateral pretibial pitting edema and perioral erythema. CT studies of the brain were normal. The duty physician suspects the patient may be vitamin deficient. Which of the following reactions does the deficient vitamin mediate?

(A) Alpha-Ketoglutarate + NAD+ + CoA <=> Succinyl-CoA + CO2 + NADH

(B) Succinate + FAD (enzyme bound) <=> Fumarate + FADH2

(C) Isocitrate + NAD+ <=> Alpha-Ketoglutarate + CO2 + NADH

(D) Succinyl-CoA + Pi + GDP <=> Succinate + GTP + CoA

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Thiamine (vitamin B1) deficiency is the most likely diagnosis in this patient with chronic alcohol use, confusion, confabulation, and horizontal nystagmus consistent with Wernicke-Korsakoff spectrum disease [1] [2]. Thiamine is a required cofactor for **alpha-ketoglutarate dehydrogenase**, so the correct reaction is **(A) Alpha-Ketoglutarate + NAD+ + CoA Succinyl-CoA + CO2 + NADH** [1] [2].

Why the other choices are not correct

- **(B)** is **succinate dehydrogenase** and uses **FAD**, not thiamine.
- **(C)** is **isocitrate dehydrogenase** and uses **NAD+**, not thiamine.
- **(D)** is **succinyl-CoA synthetase** and generates **GTP**; it is not thiamine dependent.

Clinical note

In patients at risk for thiamine deficiency, the neurologic syndrome can be present even when CT is normal; treatment should not be delayed while waiting for laboratory confirmation [1] [2].

References

[1] Integrated Health Nutritional Guidelines for the Surgical Weight Loss Patient: Micronutrients
American Society for Metabolic and Bariatric Surgery · 2017-01-01 12:00:00
Practitioners should treat post-WLS patients with suspected thiamin deficiency before or in the absence of laboratory confirmation of deficiency AND monitor and evaluate resolution of signs and symptoms.
https://www.doi.org/10.1016/j.soard.2008.03.002

[2] Clinical and pathological features of alcohol-related brain damage.
Nature Reviews Neurology · 2011-05-01
A deficiency in thiamine (vitamin B1) can lead to Wernicke encephalopathy (WE) and Korsakoff syndrome (KS), a severe neurological disorder characterized by anterograde amnesia.
10.1038/nrneurol.2011.42

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458. MedQA question ID 682 Step 2/3

Question

A 22-year-old woman with a history of asthma visits her physician for worsening shortness of breath. She states that she feels as though her “lungs are falling apart,” noting that her lung function has been steadily deteriorating. She further states that she has visited a number of other physicians who prescribed several different types of inhalers, but she feels that they have not helped her control her asthma exacerbations. She has experienced 4 episodes of pneumonia in the last 3 years and often suffers from “random” bouts of excessive coughing and wheezing. When asked if her coughing episodes produce sputum, she states, “Yes, the stuff is greenish with specks of red in it.” She also states that her coughing and wheezing episodes are associated with fever, malaise, and occasional expectoration of brown mucous plugs. The vital signs include: blood pressure 122/70 mm Hg, pulse 66/min, respiratory rate 26/min, and temperature 37.0°C (98.6°F). On physical exam, the patient appears frail-looking and in moderate respiratory distress. Auscultation reveals inspiratory crackles in the right lung base and coarse breath sounds in the bilateral upper lung lobes. Chest radiograph, as shown below, reveals atelectasis in the right lung base. There are also branched radiodensities that the radiologist notes as being “glove-finger shadows” (noted by the arrow in the image). Serum immunoglobulin E (IgE) levels are elevated. Which of the following is the most appropriate therapy in this patient?

(A) Isoniazid

(B) Fluconazole

(C) Caspofungin

(D) Prednisone

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Prednisone is the most appropriate therapy. This presentation is classic for **allergic bronchopulmonary aspergillosis (ABPA)** in a patient with asthma: worsening respiratory symptoms, mucus plugging with brown sputum, fleeting/obstructive radiographic findings, and **elevated IgE**. ABPA is treated with **systemic corticosteroids**; antifungals such as itraconazole may be used in some cases, but **isoniazid, fluconazole, and caspofungin are not appropriate first-line therapy** for this syndrome [1] [2] [3].

Why this is ABPA

- ABPA is a hypersensitivity reaction to **Aspergillus fumigatus** in patients with **asthma** or cystic fibrosis.
- Typical features include **uncontrolled asthma**, **mucus plugs**, **elevated total IgE**, pulmonary opacities/infiltrates, and bronchiectatic changes [1] [3].
- The radiographic "glove-finger" appearance reflects mucus impaction, which supports the diagnosis.

Treatment

- **Systemic glucocorticoids (prednisone)** are the treatment of choice for ABPA and can clear pulmonary infiltrates [2] [3].
- **Itraconazole** is a recognized adjunct or alternative in selected patients, especially with recurrent disease, but it is not one of the options listed here [2] [3].
- The provided alternatives **isoniazid, fluconazole, and caspofungin** do not treat ABPA.

Bottom line

The best answer is **prednisone** [2] [3].

References

[1] Allergic bronchopulmonary aspergillosis.
Proceedings of the American Thoracic Society · 2010-05-01
Allergic bronchopulmonary aspergillosis results from an allergic immune response to Aspergillus fumigatus. ABPA is defined by constellation of clinical, laboratory, and radiographic criteria that include active asthma, serum eosinophilia, an elevated total IgE level, fleeting pulmonary parenchymal opacities, bronchiectasis, and evidence for sensitization by skin testing. Early recognition allows treatment with corticosteroids, which are effective but may be required indefinitely.
10.1513/pats.200908-086al

[2] Allergic bronchopulmonary aspergillosis.
Allergy and asthma proceedings · 2019-11-01
Allergic bronchopulmonary aspergillosis (ABPA) occurs in patients with asthma or cystic fibrosis. ABPA results in pulmonary infiltrates, mucus plugs that harbor hyphae of Aspergillus fumigatus, elevations of immunoglobulin E concentration and peripheral blood and sputum eosinophilia. Bronchiectasis is an irreversible complication of ABPA. Prednisone is indicated to clear pulmonary infiltrateates for 3 months.
10.2500/aap.2019.40.4262

[3] Allergic Bronchopulmonary Aspergillosis.
Clinics in Chest Medicine · 2022-03-01
Allergic bronchopulmonary aspergillosis (ABPA) is a complex allergic disorder caused by immune reactions against Aspergillus fumigatus. ABPA most commonly complicates the course of patients with poorly controlled asthma. Patients commonly present with uncontrolled asthma, fleeting pulmonary opacities, and bronchiectasis.
10.1016/j.ccm.2021.12.002

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459. MedQA question ID 1258 Step 2/3

Question

A 24-year-old woman comes to the emergency department with her boyfriend 2 hours after an episode of loss of consciousness. She was seated and was being tattooed on her right upper flank when she became diaphoretic, pale, and passed out. According to her boyfriend, the patient slipped to the floor and her arms and legs moved in a jerky fashion for a few seconds. She regained consciousness within half a minute and was alert and fully oriented immediately. She has no history of serious illness. She works as an event manager and has had more stress than usual due to a recent concert tour. She appears well. Her temperature is 37°C (98.4°F), pulse is 68/min, respirations are 16/min, and blood pressure is 120/72 mm Hg. Her cardiopulmonary examination shows no abnormalities. Neurologic examination shows no focal findings. An ECG shows an incomplete right bundle branch block. Which of the following is the most likely diagnosis?

(A) Vasovagal syncope

(B) Orthostatic syncope

(C) Cardiac arrhythmia

(D) Cardiac structural abnormality
"

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Vasovagal syncope is the most likely diagnosis. The American College of Cardiology/American Heart Association/Heart Rhythm Society syncope guideline notes that **younger age, no known cardiac disease, a clear trigger such as pain or a distressful stimulus, and a prodrome of pallor/diaphoresis** are more often associated with noncardiac syncope [1]. The very brief loss of consciousness with **rapid, complete recovery** and immediate orientation also fits vasovagal syncope rather than an arrhythmic or structural cardiac cause [2].

Why the other choices are less likely

- **Orthostatic syncope** is less likely because the episode occurred while **seated**, not after standing or a positional change from supine/sitting to standing [1].

- **Cardiac arrhythmia** is less likely because there was a clear vasovagal trigger and prodrome, no known heart disease, and no concerning exertional or supine syncope features [1].
- **Cardiac structural abnormality** is less likely because the history and exam do not suggest structural disease; an incomplete right bundle branch block on ECG alone does not outweigh the classic vasovagal presentation.

Clinical pearl

Brief limb jerking can occur during syncope and does not by itself prove epilepsy; the ACC/AHA/HRS guideline notes that **tilt-table testing can be reasonable to distinguish convulsive syncope from epilepsy in selected patients** [3].

References

[1] Evaluation and Management of Patients With Syncope

American College of Cardiology, American Heart Association, Heart Rhythm Society · 2017-03-09 00:00:00

More Often Associated With Noncardiac Causes of Syncope: younger age; no known cardiac disease; syncope only in the standing position; positional change from supine or sitting to standing; presence of prodrome (nausea, vomiting, feeling warmth); presence of specific triggers (dehydration, pain, distressful stimulus, medical environment); situational triggers; frequent recurrence and prolonged history with similar characteristics.

https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000499

[2] Syncope: diagnosis and management.

Current Problems in Cardiology · 2015-02-01

Syncope is a transient loss of consciousness due to global cerebral hypoperfusion, characterized by relatively rapid onset, brief duration, and spontaneous and full recovery.

10.1016/j.cpcardiol.2014.11.001

[3] Evaluation and Management of Patients With Syncope

American College of Cardiology, American Heart Association, Heart Rhythm Society · 2017-03-09 00:00:00

Tilt-table testing is reasonable to distinguish convulsive syncope from epilepsy in selected patients.

https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000499

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460. MedQA question ID 366 Step 1

Question

A 28-year-old female comes to the physician’s office with a complaint of episodic chest pain. She describes the pain as squeezing and tightness in her chest. This pain has been happening every few days for 3 months. She says there is no association of the pain with food or exercise. She is able to climb up to her fourth floor apartment daily without issue. Her only past medical history is migraines for which she takes appropriate medication. Here temperature is 98.6°F (37°C), blood pressure is 120/68 mmHg, pulse is 60/min, respirations are 16/min, and oxygen saturation is 98% on room air. She has no known family history. The patient is not in pain on presentation and EKG in the office is normal. 24-hour ECG monitoring shows transient ST elevations during the episodes of pain that resolve completely. The mechanism of this patient’s chest pain is most similar to the mechanism behind which of the following?

(A) Raynaud's phenomenon

(B) Myocardial infarction

(C) Aortic dissection

(D) Costochondritis

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Raynaud phenomenon. This patient has **vasospastic (Prinzmetal) angina**, which is caused by **reversible coronary artery spasm** producing transient ischemia and **ST-segment elevation during pain**; the underlying mechanism is **episodic hyperreactivity of vascular smooth muscle with vasoconstriction**, analogous to the vasospasm seen in Raynaud phenomenon [1] [2] [3]. Her normal baseline ECG and episodes at rest with complete resolution also fit coronary vasospasm rather than fixed myocardial infarction, aortic dissection, or costochondritis [1] [2].

Why this matches Raynaud phenomenon

- **Both are vasospastic disorders** involving transient, reversible arterial constriction.
- Both can present with **episodic ischemic symptoms** that resolve when the spasm abates.
- In vasospastic angina, coronary spasm is the mechanism; in Raynaud phenomenon, digital arterial spasm is the mechanism [1] [2] [3].

Clinical clue in this vignette

- **Transient ST elevations during pain** are classic for vasospastic angina.
- A history of **migraine** is a common associated vasospastic tendency, further supporting coronary spasm [3].

References

[1] Invasive coronary physiology in patients with angina and non-obstructive coronary artery disease: a consensus document from the coronary microvascular dysfunction workstream of the British Heart Foundation/ National Institute for Health Research Partnership

Heart · 2022-03-22

A diagnosis of vasospastic angina should be made when patients have ≥90% coronary vasoconstriction, ischaemic ECG changes and chest pain.

10.1136/heartjnl-2021-320718

[2] Refractory angina: mechanisms and stratified treatment in obstructive and non-obstructive chronic myocardial ischaemic syndromes

European Heart Journal · 2025-07-01

Coronary vasospasm can arise from endothelial dysfunction or smooth muscle hyper-reactivity. Calcium-channel blockers are considered first-line for epicardial and microvascular spasm.

10.1093/eurheartj/ehaf284

[3] Vasospastic angina: Past, present, and future.

Pharmacology & therapeutics · 2023-09-01

Vasospastic angina is characterized by episodes of rest angina that are responsive to short-acting nitrates and are attributable to coronary artery vasospasm.

10.1016/j.pharmthera.2023.108500

461. MedQA question ID 71 Step 2/3

Question

A 27-year-old man presents to the emergency department after a motor vehicle collision. The patient was the front seat unrestrained driver in a head on collision. The patient's echocardiogram (ECG) is notable only for sinus tachycardia. His temperature is 99.5°F (37.5°C), blood pressure is 107/58 mmHg, pulse is 120/min, respirations are 17/min, and oxygen saturation is 98% on room air. The patient is given 2 liters of Ringer lactate solution and morphine. Initial workup demonstrates that the patient's pulmonary capillary wedge pressure and troponins are elevated. The patient is currently complaining of chest pain. Physical exam is notable for an uncomfortable young man with bruising over his chest wall. Which of the following is the most likely diagnosis?

(A) Cardiac contusion

(B) Hemorrhage

(C) Pulmonary contusion

(D) Takotsubo cardiomyopathy

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Cardiac contusion (blunt cardiac injury) is the most likely diagnosis. In a young man with **blunt anterior chest trauma** after an MVC, **elevated troponin** supports myocardial injury, and an elevated pulmonary capillary wedge pressure suggests cardiac dysfunction rather than isolated hemorrhage or pulmonary contusion. The American College of Cardiology/American Heart Association chest pain guideline supports using **serial troponins** and **TTE** when myocardial injury or myopericarditis is suspected [1] [2].

Why this fits cardiac contusion

- **Mechanism:** direct blunt impact to the chest in a head-on collision is classic for blunt cardiac injury.
- **Findings that support it:** chest wall ecchymosis, persistent chest pain, and **troponin elevation**.
- **Why not pulmonary contusion:** pulmonary contusion typically causes hypoxemia and respiratory findings; the stem gives normal oxygen saturation and no primary respiratory compromise.
- **Why not hemorrhage:** hemorrhage would be expected to cause hypotension and signs of volume loss; this patient received fluids but the key abnormality described is myocardial injury.

- **Why not Takotsubo cardiomyopathy:** Takotsubo can follow physiologic stress, but the combination of **direct chest trauma** plus biomarker elevation is more consistent with blunt cardiac injury; Takotsubo is a form of stress cardiomyopathy without evidence of ischemia [2].

Supporting evidence

A systematic review of blunt chest trauma found that **ECG plus troponin** is a pragmatic approach for identifying cardiac injury after blunt trauma [2]. Blunt cardiac injury reviews also note that evaluation should include **ECG and cardiac enzymes**, with echocardiography when specific cardiac injury is suspected [3].

References

[1] Evaluation and Diagnosis of Chest Pain

American College of Cardiology, American College of Chest Physicians, American Heart Association, American Society of Echocardiography, Society of Cardiovascular Computed Tomography · 2021-10-27 00:00:00

1. In patients presenting with acute chest pain, serial cTn I or T levels are useful to identify abnormal values and a rising or falling pattern indicative of acute myocardial injury. 1. In patients with acute chest pain and suspected myopericarditis, TTE is effective to determine the presence of ventricular wall motion abnormalities, pericardial effusion, valvular abnormalities, or restrictive physiology.

https://www.ahajournals.org/doi/10.1161/CIR.0000000000001029

[2] Accuracy of diagnostic tests in cardiac injury after blunt chest trauma: a systematic review and meta-analysis.

World Journal of Emergency Surgery · 2023-05-27

The diagnosis of cardiac contusion caused by blunt chest trauma remains a challenge due to the non-specific symptoms it causes and the lack of ideal tests to diagnose myocardial damage. In the majority of cases, joint use of ECG and cTnI was a pragmatic and cost-effective approach to rule out cardiac injuries.

10.1186/s13017-023-00504-9

[3] Blunt Cardiac Injury.

Emergency Medicine Clinics of North America · 2015-08-01

Blunt cardiac injury is common and may cause significant morbidity and mortality. Diagnostic work-up should always include electrocardiogram and cardiac enzymes, and may include echocardiography if specific disorders are suspected. Patients with myocardial contusion should be observed for 24 to 48 hours for arrhythmias.

10.1016/j.emc.2015.04.003

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462. MedQA question ID 1097 Step 1

Question

A 34-year-old man comes to the physician because of a 3-week history of colicky abdominal pain and diarrhea. He has bowel movements 10–12 times daily; the stool contains blood and mucus. He constantly has the urge to defecate. His vital signs are within normal limits. Examination of the abdomen shows diffuse tenderness to palpation. Serum concentration of C-reactive protein is 20 mg/L (N<10). Colonoscopy shows a bleeding, ulcerated rectal mucosa with several pseudopolyps. Which of the following is this patient at greatest risk of developing?

(A) Hemolytic uremic syndrome

(B) Oral ulcers

(C) Colorectal cancer

(D) Pancreatic cancer

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Colorectal cancer is the greatest risk among the listed options. This presentation is most consistent with **ulcerative colitis (UC)**, and the **American College of Gastroenterology (ACG)** notes that patients with colonic inflammatory bowel disease have increased colorectal cancer risk, which is highest in **UC with extensive disease** and rises significantly **8–10 years after diagnosis**; **pseudopolyps** and **male sex/young age at diagnosis** are additional risk features [1] [2].

Why the other options are less likely

- **Hemolytic uremic syndrome** is classically associated with Shiga toxin–producing infection, not chronic UC [3].
- **Oral ulcers** are more characteristic of Crohn disease or other inflammatory/aphthous conditions, not the major long-term complication of UC [4].
- **Pancreatic cancer** is not the characteristic cancer risk emphasized in UC guidance; the key malignancy concern is **colorectal dysplasia/cancer** [1] [2] [4].

Clinical takeaway

In a young man with bloody diarrhea, tenesmus, rectal mucosal ulceration, and pseudopolyps, the best answer is **colorectal cancer** because chronic colonic inflammation in UC increases dysplasia and CRC risk over time [1] [2] [4].

References

[1] Inflammatory Bowel Disease and Malignancies
European Crohn's and Colitis Organisation · 2022-12-18 00:00:00
- Patients with IBD of the colon should be informed that they are at increased risk of developing colorectal cancer [CRC]
- The risk of colorectal cancer is highest in patients with ulcerative colitis [UC] with extensive disease, and increases significantly 8–10 years after diagnosis or when dysplasia is detected on colonic biopsies [or both], particularly high-grade dysplasia [EL1]
- Risk factors include male sex, young age at UC diagnosis, family history of CRC, and the presence of colonic strictures or primary sclerosing cholangitis [EL1]
https://academic.oup.com/ecco-jcc/article/17/6/827/6931718?searchresult=1

[2] Ulcerative colitis.
Lancet · 2017-04-29
Ulcerative colitis is a chronic inflammatory bowel disease. Typical symptoms on presentation are bloody diarrhoea, abdominal pain, fecal urgency, and tenesmus. Patients with ulcerative colitis are at an increased risk for the development of colorectal cancer.
10.1016/s0140-6736(16)32126-2

[3] Characteristic features of ulcerative colitis with concomitant primary sclerosing cholangitis.
Przeglad gastroenterologiczny · 2021-01-01
Ulcerative colitis is a chronic inflammatory bowel disease of the colon. The most frequent symptoms include bloody diarrhoea with rectal urgency and tenesmus.

10.5114/pg.2021.108983

[4] Colorectal cancer and dysplasia risk of ulcerative colitis patients in a tertiary referral center in Turkey.

The Turkish Journal of Gastroenterology · 2019-02-01

Patients with ulcerative colitis are at increased risk of colorectal cancer (CRC). High-grade dysplasia (HGD) and low-grade dysplasia are premalignant conditions. Primary sclerosing cholangitis is the most important risk factor for the development of CRC in patients with UC.

10.5152/tjg.2018.18221

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463. MedQA question ID 1069 Step 2/3

Question

A 45-year-old woman comes to the physician for the evaluation of a right breast mass that she noticed 3 weeks ago. It has rapidly increased in size during this period. She does not have pain. Vital signs are within normal limits. Examination shows large dense breasts; a 5-cm, nontender, multinodular mass is palpated in the right outer quadrant of the right breast. There are no changes in the skin or nipple. There is no palpable cervical or axillary adenopathy. Mammography shows a smooth polylobulated mass. Biopsy of the mass shows papillary projections of epithelial-lined stroma with hyperplasia and atypia. Which of the following is the most likely diagnosis?

(A) Phyllodes tumor

(B) Fibroadenoma

(C) Fibrocystic disease of the breast

(D) Invasive lobular carcinoma

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely diagnosis is a phyllodes tumor (A). This presentation—**rapidly enlarging, painless, large (5 cm), multinodular breast mass** with mammographic smooth polylobulated contours and biopsy showing **papillary projections of epithelial-lined stroma with stromal hyperplasia and atypia**—is classic for a fibroepithelial lesion on the phyllodes spectrum rather than fibroadenoma or carcinoma [1] [2]. The American Society of Breast Surgeons recommends **surgical excisional biopsy** when phyllodes is suspected or cannot be excluded on biopsy, because core biopsy can be indeterminate [1].

Why the other options are less likely

- **Fibroadenoma**: usually smaller, well-circumscribed, and not characteristically rapidly enlarging in a 45-year-old; atypical stromal features also favor phyllodes over fibroadenoma [1] [2].

- **Fibrocystic disease**: typically causes diffuse or cyclic nodularity and pain rather than a discrete enlarging mass.
- **Invasive lobular carcinoma**: biopsy would show invasive malignant epithelial cells, not a fibroepithelial lesion with stromal overgrowth/atypia.

Clinical takeaway

When a breast mass is **large, fast-growing, and fibroepithelial on biopsy**, phyllodes tumor should be presumed until proven otherwise, and **complete excision** is the recommended next step [1] [2].

References

[1] Management of Benign Breast Fibroepithelial Lesions
American Society of Breast Surgeons · 2025-10-22 12:00:00
3b. For patients with any breast lesion (including FEL) characterized as suspicion for phyllodes, cannot rule out phyllodes, and concern for phyllodes on core biopsy or vacuum-assisted excision, surgical excisional biopsy should be performed. Strong consensus
https://jamanetwork.com/journals/jamasurgery/fullarticle/2840206

[2] Phyllodes tumor: review of key imaging characteristics.
Breast Disease · 2015-01-01
Phyllodes tumor of the breast is rare and often resembles fibroadenoma at imaging and histologically. Core biopsy cannot always distinguish the two, so assessing radiologic-pathologic concordance is essential to guide appropriate clinical management.
10.3233/bd-150399

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464. MedQA question ID 141 Step 2/3

Question

A 25-year-old woman presents to her physician with a four month history of fatigue and weakness. The weakness has been progressive to the point where she cannot climb stairs and stand from a sitting position. She has only had one menstrual period in the last four months and has never been pregnant. She smokes a pack of cigarettes every day and does not take any medications. Her temperature is 98°F (36.7°C), blood pressure is 160/100 mmHg, pulse is 70/min, and respirations are 15/min. She is obese with a significant pannus. Abdominal striae are present. Her laboratory workup is notable for the following:

Serum:
Na+: 142 mEq/L
Cl-: 102 mEq/L
K+: 3.9 mEq/L
HCO3-: 25 mEq/L
BUN: 20 mg/dL
Glucose: 314 mg/dL
Creatinine: 1.1 mg/dL
Ca2+: 10.1 mg/dL
AST: 9 U/L
ALT: 8 U/L
24-hour urinary cortisol: 470 µg (< 300 µg)

Serum cortisol 30 µg/mL (5-23 µg/dL)
Serum adrenocorticotropin-releasing hormone (ACTH) 2 pg/mL (> 5 pg/mL)

A 48-hour high dose dexamethasone suppression trial shows that her serum cortisol levels do not decrease. What is the best next step in management?

(A) MRI of the adrenal glands

(B) MRI of the chest

(C) Low dose dexamethasone suppression test

(D) Inferior petrosal sinus sampling

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The best next step is MRI/CT of the adrenal glands because this patient has **overt ACTH-independent Cushing syndrome**: cortisol excess is confirmed, **ACTH is suppressed**, and the **high-dose dexamethasone suppression test (HDDST) does not suppress** cortisol, which makes a pituitary ACTH source unlikely. The **Endocrine Society** recommends establishing the cause of Cushing syndrome after concordantly positive screening tests, and adrenal imaging is the appropriate localization step when ACTH is low/suppressed [1] [2].

Why the other choices are not best

- **MRI of the chest** is aimed at searching for **ectopic ACTH** secretion, which is not the leading diagnosis when **ACTH is already suppressed** [1] [3].
- **Low-dose dexamethasone suppression test** is a screening test, not the next step after clear biochemical confirmation of hypercortisolism [1].
- **Inferior petrosal sinus sampling (IPSS)** is used to distinguish **pituitary vs ectopic ACTH-dependent** Cushing syndrome; it is **not indicated** when ACTH is suppressed, because this points to an **adrenal** source [1] [3].

Practical takeaway

For this presentation, the next diagnostic step is **adrenal imaging** to look for an adrenal adenoma, carcinoma, or bilateral adrenal disease; in **ACTH-independent** Cushing syndrome, **adrenal protocol CT or MRI** is usually diagnostic [3].

References

[1] Diagnosis of Cushing's Syndrome
Endocrine Society · 2008-05-01 00:00:00
ES recommends tests to establish the cause of Cushing's syndrome in patients with concordantly positive results from two different tests, provided there is no concern regarding possible non-Cushing's hypercortisolism (Table 2).
https://academic.oup.com/jcem/article/93/5/1526/2598096

[2] Management of Adrenal Incidentalomas
European Society of Endocrinology · 2023-06-15 00:00:00
A low or suppressed level of adrenocorticotropic hormone (ACTH) or a low dehydroepiandrosterone sulfate concentration supports the diagnosis.
https://academic.oup.com/ejendo/article/189/1/G1/7198474

[3] Cushing Syndrome: Diagnostic Workup and Imaging Features, With Clinical and Pathologic Correlation.
AJR. American journal of roentgenology · 2017-07-01
In ACTH independent CS, adrenal protocol CT or MRI is usually diagnostic.
10.2214/ajr.16.17290

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465. MedQA question ID 106 Step 2/3

Question

A 50-year-old man presents to his primary care doctor following an inguinal hernia repair. The patient reports no pain in his lower abdomen or groin, no constipation, and states that he enjoys his usual diet. He denies any use of alcohol, tobacco, or illicit drugs. He has returned to work as a cruise ship attendant. Preoperative workup included chest radiography which demonstrated an opacification in his right middle lobe. The patient agrees to undergo computed tomography (CT) of his chest without contrast for further evaluation. The radiologist reports an 8 mm nodule in the patient's peripheral right middle lobe that has regular margins and appears calcified. One year later, the patient obtains another chest CT without contrast that reports the nodule size as 10 mm with similar characteristics. What is the most appropriate next step in management?

(A) CT chest without contrast in 24 months

(B) Positive emission tomography (PET) of chest now

(C) Right middle lobectomy now

(D) Bronchoscopy-guided biopsy now

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The American College of Chest Physicians (ACCP) recommends further diagnostic evaluation rather than continued surveillance for a **solid pulmonary nodule >8 mm** that has shown **growth on serial CT** [1] [2]. In this case, the best next step among the choices is **PET of the chest now** to further characterize the enlarging 10 mm nodule; **routine CT follow-up in 24 months is not appropriate**, and bronchoscopy-guided biopsy has lower expected yield for a small peripheral lesion [1] [3].

Why PET now

- For a **solid, indeterminate nodule >8 mm** with **low to moderate pretest probability (5%–65%)**, ACCP suggests **functional imaging, preferably PET**, to characterize the nodule [1].
- If serial imaging shows **clear malignant growth**, ACCP recommends **nonsurgical biopsy and/or surgical resection** unless contraindicated [2].
- For a **peripheral 10 mm nodule**, **bronchoscopy-guided biopsy** is usually less attractive than PET-directed staging/characterization or transthoracic/surgical tissue diagnosis when needed [1].

Practical answer

Best choice: B. Positron emission tomography (PET) of the chest now.

If PET is suspicious, the next step would generally be **tissue diagnosis** (often transthoracic biopsy or surgical resection depending on probability and operative candidacy) [2].

References

[1] Evaluation Of Individuals With Pulmonary Nodules: When Is It Lung Cancer? Diagnosis And Management Of Lung Cancer

American College of Chest Physicians · 2013-05-01 00:00:00

In the individual with a solid, indeterminate nodule that measures >8 mm in diameter and low to moderate pretest probability of malignancy (5%-65%), we suggest that functional imaging, preferably with PET, should be performed to characterize the nodule.

https://journal.chestnet.org/article/S0012-3692(13)60291-3/fulltext

[2] Evaluation Of Individuals With Pulmonary Nodules: When Is It Lung Cancer? Diagnosis And Management Of Lung Cancer

American College of Chest Physicians · 2013-05-01 00:00:00

In the individual with a solid, indeterminate nodule that shows clear evidence of malignant growth on serial imaging, we recommend nonsurgical biopsy and/or surgical resection unless specifically contraindicated.

https://journal.chestnet.org/article/S0012-3692(13)60291-3/fulltext

[3] Evaluation Of Individuals With Pulmonary Nodules: When Is It Lung Cancer? Diagnosis And Management Of Lung Cancer

American College of Chest Physicians · 2013-05-01 00:00:00

In the individual with a solid, indeterminate nodule that measures >8 mm in diameter, we suggest nonsurgical biopsy in the following circumstances: when clinical pretest probability and findings on imaging tests are discordant; when the probability of malignancy is low to moderate (~10% to 60%); when a benign diagnosis requiring specific medical treatment is suspected; or when a fully informed patient desires proof of a malignant diagnosis prior to surgery, especially when the risk of surgical complications is high.

https://journal.chestnet.org/article/S0012-3692(13)60291-3/fulltext

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466. MedQA question ID 152 Step 1

Question

A 75-year-old woman is brought to the emergency department by her son because of a 2-day history of fever, headache, malaise, and dry cough. The patient lives with her son and his family and her son reports that other members of the family have had similar symptoms during the past week but that he has not had any symptoms. The result of a polymerase chain reaction test confirms that the

woman is infected with a virus that has a helical capsid and a segmented genome. Which of the following is the most likely explanation for the son being free of symptoms?

(A) Serum antibodies against hemagglutinin

(B) Downregulation of ICAM-1 expression

(C) Protease-resistant antibodies in nasal secretions

(D) Homozygous mutation in the CCR5 gene

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Serum antibodies against hemagglutinin is the most likely explanation. Influenza viruses are **enveloped RNA viruses with segmented genomes**, and protection against symptomatic infection is strongly associated with **hemagglutinin-specific antibodies** that neutralize the virus and reduce replication after exposure [1] [2]. Household studies also show that influenza infection can be asymptomatic or paucisymptomatic in exposed contacts, consistent with partial preexisting immunity rather than a receptor or adhesion defect [3].

Why the other options are less likely

- **Downregulation of ICAM-1 expression** is more relevant to rhinovirus pathogenesis, not influenza.
- **Protease-resistant antibodies in nasal secretions** is not the classic mechanism of protection against influenza.
- **Homozygous mutation in the CCR5 gene** is associated with HIV resistance, not influenza.

Best answer: A. Serum antibodies against hemagglutinin.

References

[1] Emerging Respiratory Virus Threats from Influenza D and Canine Coronavirus HuPn-2018
Emerging Infectious Diseases · 2026-01-01
Like influenza A, B, and C viruses, IDVs are enveloped RNA viruses having segmented genomes that can change through reassortment, recombination, and mutation.
10.3201/eid3201.251764

[2] Host Immune Response to Influenza A Virus Infection.
Frontiers in immunology · 2018-01-01
Humoral immune response functions through hemagglutinin-specific circulating antibodies to neutralize IAV.
10.3389/fimmu.2018.00320

[3] Viral Shedding and Transmission Potential of Asymptomatic and Paucisymptomatic Influenza Virus Infections in the Community.
Clinical Infectious Diseases · 2017-03-15
In a community-based study in Hong Kong from 2008 to 2014, we followed up initially healthy people who were household contacts of symptomatic persons with laboratory-confirmed influenza, to identify secondary infections. We identified 235 cases of influenza virus infection in the household setting. The duration of viral RNA shedding was shorter and declined more rapidly in paucisymptomatic cases than in symptomatic cases.

10.1093/cid/ciw841

467. MedQA question ID 107 Step 1

Question

A 29-year-old man comes in for evaluation of infertility. He has been trying to conceive for over 2 years with his wife and previous evaluation of his wife's fertility revealed no abnormalities. Physical exam reveals a tall man with long extremities, sparse body hair, gynecomastia, and small testes. Laboratory studies reveal increased serum follicle-stimulating hormone concentration and an increased estradiol:testosterone ratio. Genetic studies reveal a cytogenetic abnormality. If this abnormality was inherited from the patient's father, at which stage of spermatogenesis did this error most likely occur?

(A) Primary spermatocyte

(B) Secondary spermatocyte

(C) Spermatid

(D) Spermatozoon

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The abnormality is most likely due to nondisjunction in a primary spermatocyte during meiosis I (choice A), because a paternal **XY sperm** that fertilizes a normal **X oocyte** produces **47,XXY (Klinefelter syndrome)**. In Klinefelter syndrome, the classic phenotype is **tall stature, gynecomastia, small testes, hypergonadotropic hypogonadism/infertility**, and the extra sex chromosome can arise from **paternal or maternal meiotic nondisjunction** [1] [2].

Why meiosis I?

- A **primary spermatocyte** undergoes **meiosis I**; if the **X and Y chromosomes fail to separate**, the resulting sperm can carry **both X and Y**.
- Fertilization of a normal **X** ovum by an **XY** sperm gives **XXY**.
- **Meiosis II nondisjunction** in a paternal germ cell would more typically generate **XX** or **YY** gametes, not an **XY** sperm [1].

Answer

A. Primary spermatocyte [1] [2]

References

[1] Gonadal dysfunction and beyond: Clinical challenges in children, adolescents, and adults with 47,XXY Klinefelter syndrome.

American journal of medical genetics. Part C, Seminars in medical genetics · 2020-06-01

The karyotype 47,XXY originates from either paternal or maternal meiotic nondisjunction during gametogenesis. KS males exhibit marked gonadal dysfunctions, presenting both in severely attenuated spermatogenesis and hypergonadotropic hypogonadism.

10.1002/ajmg.c.31786

[2] Klinefelter syndrome: more than hypogonadism.

Metabolism: clinical and experimental · 2018-09-01

Klinefelter syndrome is the most frequent sex chromosomal aneuploidy. The classical phenotype is that of a tall male with relatively long legs, small, firm testes and gynecomastia. Azoospermia and infertility are almost inevitably present.

10.1016/j.metabol.2017.09.017

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468. MedQA question ID 365 Step 1

Question

A 26-year-old man presents to his physician with a history of diarrhea and vomiting for the past 24 hours. On physical examination, his temperature is 36.9ºC (98.4ºF), pulse rate is 110/min, blood pressure is 102/74 mm Hg, and respiratory rate is 16/min. A resident working under the physician plots a Darrow-Yannet diagram for the patient. The diagram is shown in the picture where the green dotted line represents the new fluid status. Which of the following is most likely to show increased secretion in this patient?

(A) B-type natriuretic peptide

(B) Bradykinin

(C) Renin

(D) Vasoactive intestinal peptide

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

C. Renin is most likely increased. A 24-hour history of diarrhea and vomiting with tachycardia and borderline blood pressure suggests **extracellular fluid volume depletion**, which activates the **renin-angiotensin-aldosterone system** to preserve perfusion and sodium/water balance [1]. BNP is typically associated with volume expansion, and bradykinin and vasoactive intestinal peptide are not the expected compensatory increase in this setting [1].

References

[1] Volume depletion versus dehydration: how understanding the difference can guide therapy.
American journal of kidney diseases : the official journal of the National Kidney Foundation · 2011-08-01
Dehydration refers to loss of total-body water, producing hypertonicity. Volume depletion refers to a deficit in extracellular fluid volume. Volume depletion implies blood volume contraction; gastrointestinal perturbations including vomiting and diarrhea can lead to significant volume and electrolyte losses.
10.1053/j.ajkd.2011.02.395

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469. MedQA question ID 894 Step 2/3

Question

A 3-year-old refugee with increasing pitting edema and abdominal swelling over the past 2 months is brought to the physician. Her family has been displaced several times over the last few years. Nutrition and housing were frequently inadequate. At the physician's clinic, the boy appears irritated and drowsy. He is difficult to arouse. Physical examination shows pitting edema over the ankles and feet and around his eyes. Abdominal examination is positive for ascites and hepatomegaly. Oral examination shows several missing teeth. Which of the following best explains these findings?

(A) Kwashiorkor

(B) Marasmus

(C) Beriberi

(D) Rickets

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Kwashiorkor best explains this presentation: in a child with severe acute malnutrition, **bilateral pitting edema**, abdominal distention/ascites, hepatomegaly, irritability, lethargy, and poor intake are classic for **edematous malnutrition (kwashiorkor)** rather than marasmus [1] [2]. The World Health Organization (WHO) classifies children 6–59 months with **any bilateral oedema** as having severe acute malnutrition requiring urgent assessment and treatment; severe oedema and poor appetite are inpatient features [1] [3].

Why this is kwashiorkor

- **Edema/ascites/hepatomegaly** point to kwashiorkor (protein-deficiency phenotype) rather than marasmus, which is characterized more by wasting without edema [2].
- The social history of displacement and inadequate nutrition strongly supports severe acute malnutrition from food insecurity [2].

- Oral findings such as **missing teeth** are consistent with chronic malnutrition, but the decisive clue is **edema** [2].

Why the other choices are less likely

- **Marasmus**: severe wasting and loss of subcutaneous fat without edema is typical, so it does not fit the pitting edema/ascites picture [2].
- **Beriberi**: thiamine deficiency does not explain this edema-dominant malnutrition syndrome [2].
- **Rickets**: vitamin D deficiency causes bone deformities and growth issues, not this constellation of edema and ascites [2].

References

[1] Management of Severe Acute Malnutrition in Infants and Children
World Health Organization · 2013-08-09 12:00:00
Infants and children who are 6–59 months of age and have a mid-upper arm circumference < 115 mm, or have any degree of bilateral oedema, should be immediately referred for full assessment at a treatment centre for the management of severe acute malnutrition.
https://www.who.int/publications/i/item/9789241506328

[2] Management of disease-related malnutrition for patients being treated in hospital
The Lancet · 2021-10-15
The Global Leadership Initiative on Malnutrition (GLIM) proposes a straightforward two-step approach to diagnosis of disease-related malnutrition, with an initial screening to identify patients who are at risk that is followed by a more in-depth assessment to diagnose malnutrition and grade its severity.
10.1016/s0140-6736(21)01451-3

[3] Management of Severe Acute Malnutrition in Infants and Children
World Health Organization · 2013-08-09 12:00:00
Children with severe acute malnutrition should first be assessed with a full clinical examination to confirm whether they have medical complications and whether they have an appetite. Children who have medical complications, severe oedema (+++), or poor appetite (fail the appetite test), or present with one or more Integrated Management of Childhood Illness (IMCI) danger signs should be treated as inpatients.
https://www.who.int/publications/i/item/9789241506328

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470. MedQA question ID 1119 Step 2/3

Question

An obese 42-year-old female presents to her primary care physician with a complaint of left knee pain for the past 3 months. She describes the pain as affecting the inside part of the knee as well as the front of her knee, below the kneecap. She denies any inciting injury or trauma to the knee but reports that the pain is worse when she is climbing up stairs or rising from a chair. Physical examination is significant for localized tenderness to palpation over the left anteromedial proximal tibia, 6 cm inferior to the joint line. There is no joint effusion noted. Valgus stress testing is negative for any pain or instability of the knee joint. Radiographs of the left knee are obtained and reveal only mild arthritis, without evidence of any fractures or bony lesions. Which of the following is the most likely diagnosis in this patient?

(A) Stress fracture of proximal tibia

(B) Medial meniscus tear

(C) Medical collateral ligament (MCL) sprain

(D) Pes anserine bursitis

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Pes anserine bursitis is the most likely diagnosis. The key clue is **localized tenderness over the anteromedial proximal tibia, several centimeters below the joint line**, which fits pes anserine pain rather than an intra-articular injury. Patellofemoral pain can worsen with **stairs or rising from a chair**, but the **focal tenderness below the joint line** and lack of effusion, instability, or traumatic mechanism make **pes anserine bursitis** more likely than a meniscal tear, MCL sprain, or stress fracture [1] [2].

Why the other options are less likely

- **Medial meniscus tear**: usually suggested by **joint-line tenderness** and mechanical symptoms; the American Academy of Orthopaedic Surgeons notes that joint-line tenderness, McMurray, and Thessaly can help diagnose acute meniscal tears [3]. This case instead localizes pain **inferomedial to the joint line**.
- **MCL sprain**: typically follows a valgus injury and is associated with **pain or laxity on valgus stress testing**; those findings are absent here [4].
- **Stress fracture of proximal tibia**: would be more concerning with bony tenderness and often a clearer overuse or imaging abnormality; the x-ray is unrevealing, and the exam location is classic for pes anserine irritation rather than cortical injury [2].

Clinical pattern

Pes anserine bursitis/pain syndrome is a common overuse cause of medial knee pain around the **pes anserinus insertion on the medial proximal tibia** [2]. Obesity and middle age are common clinical associations, and pain is often provoked by activities that load the knee such as stair climbing [1] [2].

References

[1] Patellofemoral Pain
American Physical Therapy Association · 2019-08-31 00:00:00
Clinicians should make the diagnosis of PFP using the following criteria: (1) the presence of retropatellar or peripatellar pain, (2) reproduction of retropatellar or peripatellar pain with squatting, stair climbing, prolonged sitting, or other functional activities loading the PFJ in a flexed position, and (3) exclusion of all other conditions that may cause anterior knee pain, including tibiofemoral pathologies.
https://www.jospt.org/doi/full/10.2519/jospt.2019.0302

[2] Pes Anserinus: Anatomy and Pathology of Native and Harvested Tendons.
AJR. American journal of roentgenology · 2019-11-01
The pes anserinus consists of the conjoined tendons of the sartorius, gracilis, and semitendinosus muscles and their insertions at the medial aspect of the knee. Common pathologic conditions affecting this muscle include overuse, acute trauma, iatrogenic disorders and tumors and tumorlike lesions.
10.2214/AJR.19.21315

[3] Acute Isolated Meniscal Pathology

American Academy of Orthopaedic Surgeons · 2024-06-10 12:00:00

Physical examination, including joint line tenderness, the McMurray test, and the Thesally test, can effectively diagnose acute meniscal tears and may yield more accurate results when combined.

https://www.aaos.org/globalassets/quality-and-practice-resources/acute-meniscal-pathology/amp-cpg.pdf

[4] Knee Stability and Movement Coordination Impairments: Knee Ligament Sprain

American Physical Therapy Association · 2017-10-31 00:00:00

Clinicians should diagnose sprain and strain involving collateral ligament of the knee using the history and physical examination findings of mechanism of injury, passive knee laxity, joint pain, joint effusion, and movement coordination impairments.

https://www.jospt.org/doi/10.2519/jospt.2017.0303

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471. MedQA question ID 153 Step 2/3

Question

A 71-year-old man comes to the physician for a routine visit. His psychiatric history is significant for major depression with psychotic features. He was diagnosed after his wife died from pancreatic cancer four years earlier. Three years ago, he deliberately overdosed on sleeping pills. Today, he feels well but still wakes up frequently at night and cannot sleep through the night. He lives alone in his apartment and has no children. He does not possess a firearm at home but has access to weapons at a local hunting club. The patient currently denies suicidal thoughts or thoughts of self-harm. He takes sertraline and olanzapine. He does not smoke or drink alcohol. Which of the following is the strongest risk factor for suicide in this patient?

(A) Previous suicide attempt

(B) History of psychosis

(C) Sleeping disorder

(D) Age
"

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A previous suicide attempt is the strongest risk factor for future suicide in this patient [1] [2]. In older adults with depression, prior self-harm/attempt history is one of the most consistent and powerful predictors of later suicidal behavior; psychotic depression, insomnia, male sex, bereavement, and social isolation also increase risk, but they are less predictive than a prior attempt [1] [2] [3].

Why the other choices are less strong

- **History of psychosis:** psychotic depression is associated with increased suicide attempt risk, but the association is weaker than a prior attempt [3].
- **Sleeping disorder:** insomnia is a risk factor for suicidal behavior, especially in depressed older adults, but it is not the strongest factor listed here [2].
- **Age:** older age is associated with increased suicide risk in late life, particularly in men, but again is less predictive than a previous attempt [2].

Bottom line

For suicide risk stratification, **a prior suicide attempt outweighs current denial of suicidal ideation, age, insomnia, and psychotic features** [1] [2].

References

[1] Suicide Risk Assessment
Emergency Nurses Association · 2018-09-01 12:00:00
Previous episodes of deliberate self-harm are a strong predictor of future suicide attempts.
https://www.ena.org/docs/default-source/resource-library/practice-resources/cpg/non-mbr-synopsis/cpgsuicidesynopsis.pdf?sfvrsn=6ee28614_4

[2] Suicidal behaviour in older age: A systematic review of risk factors associated to suicide attempts and completed suicides.
Neuroscience and Biobehavioral Reviews · 2021-08-01
In older age, the risk factors more associated to suicide attempts than other variables related to suicidal behavior were depressive disorders, methods employed to self-harm (particularly poisoning), psychotropic drug utilization, and psychological factors and disability. Male sex, violent methods to selfharm, any psychiatric disorder, a poor medical condition, stressors/bereavement, and living alone were more significant for predicting completed suicides in late life.
10.1016/j.neubiorev.2021.04.011

[3] Psychotic (delusional) depression and suicidal attempts: a systematic review and meta-analysis.
Acta Psychiatrica Scandinavica · 2018-01-01
It's unclear whether psychotic features increase the risk of suicidal attempts in major depressive disorder. Patients with psychotic depression are at a two-fold higher risk of committing a suicidal attempt than patients with non-psychotic depression. This elevated risk remained stable across all age groups of adult patients.
10.1111/acps.12826

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472. MedQA question ID 1155 Step 1

Question

An investigator is studying the growth pattern of a particular bacterial strain that caused a respiratory disease outbreak in children in rural Venezuela. The bacteria are found to be able to grow in a specialized culture that contains sheep blood, cystine, and potassium tellurite; the colonies are black and have a shining surface. The isolated bacteria are most likely which of the following?

(A) Legionella pneumophila

(B) Haemophilus influenzae

(C) Bordetella pertussis

(D) Corynebacterium diphtheriae

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Corynebacterium diphtheriae is the most likely isolate. **C. diphtheriae** grows on tellurite-containing media such as **sheep blood, cystine, and potassium tellurite** agar, where it forms **black, shiny colonies** from tellurite reduction; this is the classic laboratory clue for diphtheria bacilli [1] [2].

Why the other options are less likely

- **Legionella pneumophila** requires special buffered charcoal yeast extract media, not tellurite agar.
- **Haemophilus influenzae** grows best on chocolate agar and needs X and V factors.
- **Bordetella pertussis** grows on Bordet-Gengou or Regan-Lowe media.

The outbreak description in children with a respiratory illness also fits **diphtheria**, which is caused by **C. diphtheriae** [1] [2].

References

[1] Microbe Profile: Corynebacterium diphtheriae - an old foe always ready to seize opportunity.
Microbiology (Reading, England) · 2018-06-01
Corynebacterium diphtheriae is a Gram-positive aerobic Actinobacterium capable of causing the toxin-mediated disease. Diphtheria was a major cause of childhood mortality prior to the introduction of the toxoid vaccine. It is capable of rapid resurgence following the breakdown of healthcare provision, vaccination or displacement of people.
10.1099/mic.0.000627

[2] Tellurite resistance: a putative pitfall in Corynebacterium diphtheriae diagnosis?
Antonie van Leeuwenhoek · 2015-11-01
The standard initial screening with TeO3(2-)-selective medium for Diphtheria bacilli identification may lead to false-negative results in C. diphtheriae.
10.1007/s10482-015-0558-4

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473. MedQA question ID 949 Step 1

Question

A 61-year-old man comes to the emergency department because of a 2-day history of a productive cough and worsening shortness of breath. He has had frequent episodes of a productive cough over the past 3 years. He had smoked 2 packs of cigarettes daily for 30 years but quit 1 year ago. He appears distressed. Pulse oximetry on room air shows an oxygen saturation of 91%. Chest auscultation reveals diffuse wheezes and coarse crackles. A chest x-ray shows increased lung lucency bilaterally and flattening of the diaphragm. Which of the following is the most appropriate initial pharmacotherapy?

(A) Prednisone and albuterol

(B) Albuterol and montelukast

(C) Prednisone and tiotropium

(D) Albuterol and theophylline

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The Global Initiative for Chronic Obstructive Lung Disease (GOLD) recommends initial treatment of an acute COPD exacerbation with a short-acting inhaled bronchodilator, with or without a short-acting anticholinergic, plus a short course of systemic corticosteroids; **methylxanthines are not recommended** [1] [2]. For this patient, the best choice is **A. prednisone and albuterol**. GOLD notes systemic corticosteroids for **up to 5 days**, and the American College of Chest Physicians/ATS-ERS guidance supports oral systemic corticosteroids when feasible [1] [2] [3] [4].

Why the other choices are not preferred

- **Montelukast** is not part of recommended initial therapy for acute COPD exacerbation [1] [2].
- **Tiotropium** is a long-acting maintenance bronchodilator, not initial rescue therapy for an exacerbation [1] [2].
- **Theophylline** is a methylxanthine; GOLD says methylxanthines are **not recommended** because of adverse effects [1].

Supporting point

Randomized-trial evidence summarized in systematic review data shows systemic corticosteroids reduce treatment failure in acute COPD exacerbations, consistent with guideline use of prednisone for exacerbation management [5].

References

[1] Global Strategy for Prevention, Diagnosis and Management of COPD 2026 Report

Global Initiative for Chronic Obstructive Lung Disease · 2025-11-10 12:00:00

Pharmacological therapy should be started as soon as possible to prevent both complications and subsequent events. It includes: SABAs, with or without short-acting anticholinergics, are recommended as the initial bronchodilators to treat moderate/severe exacerbations. Systemic corticosteroids are recommended for up to 5 days in patients with moderate/severe exacerbations. Methylxanthines are not recommended due to increased side effect profiles.

https://goldcopd.org/2025-gold-report/

[2] Prevention, Management and Diagnosis of COPD

Global Initiative for Chronic Obstructive Lung Disease · 2021-11-22 00:00:00

Short-acting inhaled beta2-agonists, with or without short-acting anticholinergics, are recommended as the initial bronchodilators to treat acute exacerbations. Systemic corticosteroids can improve lung function, oxygenation and shorten recovery time and hospitalization duration. Duration of therapy should not be more than 5-7 days.

https://goldcopd.org/2023-gold-report-2/

[3] Prevention and Management of COPD Exacerbations

American Thoracic Society, European Respiratory Society · 2017-03-01 00:00:00

For patients who are hospitalized with a COPD exacerbation, the Task Force suggests the administration of oral corticosteroids rather than intravenous corticosteroids if gastrointestinal access and function are intact.

https://erj.ersjournals.com/content/49/3/1600791.long

[4] Prevention and Management of COPD Exacerbations

American Thoracic Society, European Respiratory Society · 2017-03-01 00:00:00

For ambulatory patients with an exacerbation of COPD, the Task Force suggests a short course (≤14 days) of oral corticosteroids.

https://erj.ersjournals.com/content/49/3/1600791.long

[5] Systemic corticosteroids for acute exacerbations of chronic obstructive pulmonary disease

The Cochrane database of systematic reviews · 2014-09-01

Acute exacerbations of chronic obstructive pulmonary disease (COPD) are a major cause of hospital admission and mortality. Corticosteroids reduced the risk of treatment failure by over half compared with placebo in nine studies (n = 917) with median treatment duration 14 days.

10.1002/14651858.cd001288.pub4

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474. MedQA question ID 1032 Step 2/3

Question

An 80-year-old man presents with severe pain of the right lower extremity. He says that symptoms had an acute onset while he was in the ICU for a COPD exacerbation due to a recent upper respiratory infection, which was treated with nebulized albuterol and ipratropium bromide, continuous oxygen, IV methylprednisolone, and levofloxacin. He says he has been hospitalized 3 other times this year for COPD exacerbations. The medical history is significant for a left main coronary artery myocardial infarction after a coronary artery bypass graft (CABG) 2 months ago, mild cognitive impairment, and type 2 diabetes mellitus. Current medications are metformin, aspirin, clopidogrel, metoprolol, atorvastatin, galantamine, and enalapril. He reports a 40-pack-year smoking history but quit 10 years ago. His temperature is 39.0°C (102.5°F); blood pressure is 100/75 mm Hg; pulse is 122/min; respiratory rate is 20/min, and oxygen saturation is 88% on room air. The physical examination is significant for the cutaneous finding shown in the picture. The involved area is severely tender to palpation and there are warmth and crepitus. A foul-smelling discharge is also noted. Pain seems out of proportion to the exam findings. Which of the following is the next best step in management?

(A) Immediate debridement

(B) Immediate debridement and empiric IV antibiotics

(C) Biopsy of wound

(D) Contrast CT of the chest and abdomen

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

The Infectious Diseases Society of America (IDSA) recommends urgent surgical exploration/debridement plus broad empiric IV antibiotics for suspected necrotizing fasciitis or gas gangrene with systemic toxicity; **surgery should not be delayed for biopsy or imaging** [1] [2] [3]. In this patient, the acute severe pain out of proportion, fever, crepitus, foul-smelling discharge, and systemic signs are most consistent with a necrotizing soft-tissue infection, so the next best step is **B. Immediate debridement and empiric IV antibiotics** [1] [2] [4].

Why this is the next step

- **Immediate surgical exploration/debridement** is both diagnostic and therapeutic in necrotizing infection/myonecrosis [1] [3].
- **Empiric broad-spectrum IV antibiotics** are recommended because infections may be polymicrobial or monomicrobial; IDSA gives examples such as **vancomycin or linezolid plus piperacillin-tazobactam or a carbapenem** [2].
- A wound **biopsy** is not the first step when necrotizing infection is clinically suspected, and CT of the chest/abdomen is not indicated for this presentation [1] [2].

References

[1] Diagnosis and Management of Skin and Soft Tissue Infections

Infectious Diseases Society of America · 2014-07-15 00:00:00

Prompt surgical consultation is recommended for patients with aggressive infections associated with signs of systemic toxicity or suspicion of necrotizing fasciitis or gas gangrene.

https://academic.oup.com/cid/article/59/2/e10/2895845?searchresult=1

[2] Diagnosis and Management of Skin and Soft Tissue Infections

Infectious Diseases Society of America · 2014-07-15 00:00:00

Empiric antibiotic treatment should be broad (eg, vancomycin or linezolid plus piperacillin-tazobactam or plus a carbapenem; or plus ceftriaxone and metronidazole), since the etiology can be polymicrobial or monomicrobial.

https://academic.oup.com/cid/article/59/2/e10/2895845?searchresult=1

[3] Diagnosis and Management of Skin and Soft Tissue Infections

Infectious Diseases Society of America · 2014-07-15 00:00:00

Urgent surgical exploration of the suspected gas gangrene site and surgical debridement of involved tissue should be performed.

https://academic.oup.com/cid/article/59/2/e10/2895845?searchresult=1

[4] [Necrotizing Fasciitis].

Handchirurgie, Mikrochirurgie, plastische Chirurgie · 2021-06-01

Necrotizing fasciitis is a soft tissue infection spreading along the fasciae ... An immediate and extensive debridement of necrotic tissues is mandatory complemented by a broad spectrum intravenous antibiotic therapy.

10.1055/a-1381-8077

475. MedQA question ID 267 Step 1

Question

A 34-year-old male suffers from inherited hemophilia A. He and his wife have three unaffected daughters. What is the probability that the second daughter is a carrier of the disease?

(A) 0%

(B) 25%

(C) 50%

(D) 100%

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The probability that the second daughter is a carrier is 100% if the father has **hemophilia A** and the mother is not a carrier. In **X-linked recessive** hemophilia A, an affected male passes his affected **X chromosome to all daughters**, so each daughter is an **obligate carrier** [1] [2].

Key inheritance point

- **Father affected (Xa0hY) + mother unaffected/non-carrier (Xa0X)** a0a0a0a0a0a0a0→ **all daughters are carriers**.
- The fact that the first and third daughters are unaffected does not change the genetic probability for the second daughter; each daughter independently has a **100% carrier risk** from an affected father in this setting [1] [2].

References

[1] A homozygous female hemophilia A.
Indian Journal of Human Genetics · 2012-01-01
Hemophilia A is an X-linked recessive disorder. Females are rarely affected, although they can be carriers.
10.4103/0971-6866.96685

[2] X Chromosome inactivation: a modifier of factor VIII and IX plasma levels and bleeding phenotype in Haemophilia carriers.
European Journal of Human Genetics · 2021-02-01
Haemophilia A and B are X-linked recessive disorders caused by gene variants in the F8 and F9 genes. Male carriers are affected by recessive inheritance, while female carriers are asymptomatic with a wide range of factor VIII (FVIII) or IX levels.
10.1038/s41431-020-00742-4

476. MedQA question ID 486 Step 2/3

Question

A 2-year-old boy in respiratory distress is brought to the emergency department by his parents. They state that approximately one hour after putting their child to sleep, a "hacking" cough was heard from his bedroom. After entering his room the parents state their child appeared to be in distress, making a high pitched noise with every breath. Beyond a runny nose for the past few days, the child has been healthy. He has no toys in his bed or access to any other small objects. Physical exam demonstrates a 2-year-old child in respiratory distress.

Which of the following choices is the proper management for this patient?

(A) Humidified oxygen and dexamethasone; discharge if the patient improves

(B) Dexamethasome, racemic epinephrine and observation for 4 hours; discharge if stridor remits

(C) Broncoscopy to remove a foreign body in the upper airway then discharge

(D) Empiric intravenous (IV) antibiotics, intubate and admission

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. Dexamethasone plus nebulized racemic epinephrine with observation, then discharge if stridor resolves and the child remains stable. This presentation is classic for **viral croup**: barking/hacking cough, inspiratory stridor, and recent upper-respiratory symptoms in a 2-year-old. The evidence supports **systemic corticosteroid treatment for all severities** and **nebulized epinephrine for moderate-to-severe croup**; epinephrine improves symptoms quickly, so the child should be observed for recurrence before discharge [1] [2] [3].

Why this is croup

- Typical features: **barky/hacking cough**, **stridor**, and **respiratory distress** after a prodrome of rhinorrhea/URI symptoms [1] [2] [3].
- No history of choking, small-object exposure, or toxic appearance is given, making **foreign body aspiration** or **bacterial tracheitis** less likely [1].

Management

- **Dexamethasone** is the cornerstone of treatment for croup [2] [3].
- **Nebulized epinephrine** is added when croup is **moderate to severe** or when stridor/respiratory distress is present at rest; it provides short-term improvement and can shorten hospital stay [2] [3].
- Children should be **observed after epinephrine** to ensure symptoms do not recur before discharge [2] [3].

Why the other choices are not best

- **Humidified oxygen and dexamethasone alone** is incomplete for a child with stridor at rest/ respiratory distress, where epinephrine is indicated [2] [3].
- **Bronchoscopy** is reserved for suspected foreign body aspiration, which is not suggested here [1].
- **IV antibiotics and intubation** are more appropriate for bacterial tracheitis or impending airway failure, neither of which is the best fit for this otherwise well child with classic croup [1].

References

[1] Upper Airway Obstruction in Children.

Indian Journal of Pediatrics · 2015-08-01

The characteristic finding in upper airway obstruction is stridor-inspiratory, biphasic or expiratory. Croup is a clinical diagnosis in a febrile child, with barking cough and stridors. It is treated with systemic or inhaled steroids and nebulized epinephrine. Epiglottitis and bacterial tracheitis are acute bacterial infections of upper airways. The mainstay of therapy is IV antibiotics, but the prime concern is maintenance of airway. Rigid bronchoscopy is the procedure of choice for airway foreign bodies.

10.1007/s12098-015-1811-6

[2] Nebulized epinephrine for croup in children.

The Cochrane Database of Systematic Reviews · 2013-10-10

Nebulized epinephrine may prevent intubation in children with croup. Croup is a common childhood illness characterized by barky cough, stridor, hoarseness and respiratory distress. Eight studies (225 participants) were included. Nebulized epinephrine was associated with croup score improvement 30 minutes post-treatment and a significantly shorter hospital stay than placebo.

10.1002/14651858.cd006619.pub3

[3] Viral croup: diagnosis and a treatment algorithm.

Pediatric Pulmonology · 2014-05-01

Viral croup is a frequent disease in early childhood. It is usually self-limited, but it may occasionally become life-threatening. A single dose of dexamethasone (0.15-0.6 mg/kg) is the mainstay of treatment with addition of nebulized epinephrine only in cases of moderate-to-severe croup.

10.1002/ppul.22993

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477. MedQA question ID 259 Step 1

Question

A 23-year-old woman is referred to a genetic counselor. She is feeling well but is concerned because her brother was recently diagnosed with hereditary hemochromatosis. All first-degree relatives were encouraged to undergo genetic screening for any mutations associated with the disease. Today, she denies fever, chills, joint pain, or skin hyperpigmentation. Her temperature is 37.0°C (98.6°F), pulse is 85/min, respirations are 16/min, and blood pressure is 123/78 mm Hg. Her physical examination is normal. Her serum iron, hemoglobin, ferritin, and AST and ALT concentrations are normal. Gene screening will involve a blood specimen. Which of the following genes would suggest hereditary hemochromatosis?

(A) BCR-ABL gene

(B) BRCA gene

(C) FA gene

(D) HFE gene

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The correct gene is the HFE gene (D). Hereditary hemochromatosis is the classic **HFE-related** iron overload disorder, and the **American College of Gastroenterology (ACG)** and **American Association for the Study of Liver Diseases (AASLD)** recommend screening first-degree relatives and using **HFE mutation analysis** when hereditary hemochromatosis is suspected or when iron studies are abnormal [1] [2] [3]. The other options are associated with different conditions: **BCR-ABL** with chronic myeloid leukemia, **BRCA** with hereditary breast/ovarian cancer, and **FA** genes with Fanconi anemia.

Key point

- **HFE** is the gene most associated with hereditary hemochromatosis, especially the common **C282Y** and **H63D** variants [1] [2] [4].
- In an asymptomatic first-degree relative, normal iron studies do not exclude carrier status, but the gene that would suggest hereditary hemochromatosis is still **HFE** [1] [2].

References

[1] Hereditary Hemochromatosis

American College of Gastroenterology · 2019-08-01 00:00:00

1. We recommend that family members, particularly first-degree relatives, of patients diagnosed with HH should be screened for HH.

https://journals.lww.com/ajg/Fulltext/2019/08000/ACG_Clinical_Guideline__Hereditary_Hemochromatosis.11.aspx

[2] Diagnosis and Management of Hemochromatosis

American Association for the Study of Liver Diseases · 2011-03-01 00:00:00

5. We recommend screening (iron studies and HFE mutation analysis) of first-degree relatives of patients with HFE-related HH to detect early disease and prevent complications.

https://aasldpubs.onlinelibrary.wiley.com/doi/full/10.1002/hep.24330

[3] Evaluation of Abnormal Liver Chemistries

American College of Gastroenterology · 2017-01-01 12:00:00

7. All patients with abnormal liver chemistries in the absence of acute hepatitis should undergo testing for hereditary hemochromatosis with an iron level, transferrin saturation, and serum ferritin. HFE gene mutation analysis should be performed in patients with transferrin saturation ≥45% and/or elevated serum ferritin.

https://journals.lww.com/ajg/Fulltext/2017/01000/ACG_Clinical_Guideline__Evaluation_of_Abnormal.13.aspx

[4] Molecular diagnostic and pathogenesis of hereditary hemochromatosis.

International Journal of Molecular Sciences · 2012-01-01

Hereditary hemochromatosis is an autosomal recessive disorder characterized by enhanced intestinal absorption of dietary iron. HFE testing for the two main mutations (p.Cys282Tyr and p.His63Asp) should be performed in all patients with primary iron overload and unexplained increased transferrin saturation and serum ferritin values.

10.3390/ijms13021497

478. MedQA question ID 513 Step 2/3

Question

A 65-year-old man presents to the emergency department with back pain. The patient states that he has gradually worsening back pain that seems to have worsened after moving furniture the other day. He also states that while he walks, he feels numbness and weakness in his legs. The only time the patient states his back pain is improved is when he is riding his bike or pushing a cart at the grocery store. The patient has a past medical history of osteoporosis, dyslipidemia, and diabetes. He drinks 3 alcoholic drinks every day and has a 44 pack-year smoking history. His temperature is 99.5°F (37.5°C), blood pressure is 157/108 mmHg, pulse is 90/min, respirations are 17/min, and oxygen saturation is 98% on room air. Physical exam is notable for a non-tender spine with normal mobility in all 4 directions. Radiography of the spine and basic labs are ordered. Which of the following is the most likely diagnosis?

(A) Compression fracture

(B) Herniated nucleus pulposus

(C) Musculoskeletal strain

(D) Spinal stenosis

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most likely diagnosis is spinal stenosis causing **neurogenic claudication**. The **North American Spine Society (NASS)** notes that lumbar spinal stenosis is suggested by lower-extremity symptoms that are **worse with walking or standing and improve with sitting or bending forward**; relief while **riding a bike or pushing a shopping cart** is a classic palliative feature [1] [2]. In contrast, the presentation is less consistent with compression fracture, herniated nucleus pulposus, or simple musculoskeletal strain [1] [2] [3].

Why this fits best

- **Provocative features:** walking/standing worsens leg symptoms [1] [2].
- **Palliative features: forward flexion**, sitting, and recumbency improve symptoms; the “shopping cart sign” is especially characteristic [1] [2] [3].
- Older age and degenerative risk factors support lumbar stenosis, and MRI is the preferred confirmatory test when imaging is needed [1].

Answer

D. Spinal stenosis

References

[1] Diagnosis And Treatment Of Degenerative Lumbar Spinal Stenosis

North American Spine Society · 2013-07-01 00:00:00

Degenerative lumbar spinal stenosis describes a condition in which there is diminished space available for the neural and vascular elements in the lumbar spine secondary to degenerative changes in the spinal canal. When symptomatic, this causes a variable clinical syndrome of gluteal and/or lower extremity pain and/or fatigue that may occur with or without back pain. Symptomatic lumbar spinal stenosis has certain characteristic provocative and palliative features. Provocative features include upright exercise such as walking or positionally induced neurogenic claudication. Palliative features commonly include symptomatic relief with forward flexion, sitting, and/or recumbency.

https://www.thespinejournalonline.com/article/S1529-9430(13)00423-3/fulltext

[2] Diagnosis And Treatment Of Degenerative Lumbar Spinal Stenosis

North American Spine Society · 2013-07-01 00:00:00

The diagnosis of lumbar spinal stenosis may be considered in older patients presenting with a history of gluteal or lower extremity symptoms exacerbated by walking or standing which improves or resolves with sitting or bending forward. Patients whose pain is not made worse with walking have a low likelihood of stenosis.

https://www.thespinejournalonline.com/article/S1529-9430(13)00423-3/fulltext

[3] Does this older adult with lower extremity pain have the clinical syndrome of lumbar spinal stenosis?

JAMA · 2010-12-15

The clinical syndrome of lumbar spinal stenosis is a common diagnosis in older adults with lower extremity pain. The most useful symptoms for increasing the likelihood of the diagnosis were having no pain when seated, improvement of symptoms when bending forward, and presence of bilateral buttock or leg pain.

10.1001/jama.2010.1833

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479. MedQA question ID 851 Step 2/3

Question

A 69-year-old male presents to the emergency department with shortness of breath. The patient has presented three times this past month with similar complaints. The patient sees no primary care physician and is currently not taking any medications. The patient states his shortness of breath started when he was walking from his car to a local restaurant. His temperature is 99.5°F (37.5°C), pulse is 100/min, blood pressure is 130/90 mmHg, respirations are 18/min, and oxygen saturation is 96% on room air. On physical exam you note a fatigued appearing gentleman. Cardiovascular exam reveals an additional heart sound after S2. Pulmonary exam is notable for bilateral crackles. Abdominal exam reveals an obese abdomen without pain in any of the quadrants. Lower extremity pitting edema is noted bilaterally. Which of the following sets of lab values most likely corresponds to this patient's presentation?

(A) High BNP, high ADH, high sodium, high potassium

(B) High BNP, low ADH, normal sodium, low potassium

(C) High BNP, high ADH, low sodium, low potassium

(D) Low BNP, low ADH, normal sodium, normal potassium

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

The best choice is C: high BNP, high ADH, low sodium, low potassium. This presentation is most consistent with **decompensated heart failure with volume overload**, for which the **American College of Cardiology/American Heart Association/Heart Failure Society of America (ACC/AHA/HFSA)** guideline notes that **BNP or NT-proBNP is useful to support the diagnosis or exclusion of HF** in patients presenting with dyspnea, and patients with fluid retention should be treated with diuretics to relieve congestion [1] [2] [3]. In heart failure, neurohormonal activation includes **arginine-vasopressin (ADH) and RAAS**, which promotes water retention, dilutional **hyponatremia**, and potassium wasting/low potassium [4].

Why this fits the stem

The added heart sound after S2, bilateral crackles, and bilateral pitting edema strongly indicate **congestive HF** rather than a primary pulmonary or infectious process. BNP would be expected to be elevated in this setting, while ADH is also elevated as part of the compensatory neurohormonal response [1] [4].

Why the other choices are less likely

- **A**: high sodium is not typical of symptomatic congestive HF with high ADH.
- **B**: low ADH does not fit the expected neurohormonal response to HF.
- **D**: low BNP does not fit a patient with clear volume overload and dyspnea from HF [1].

References

[1] Management of Heart Failure
American College of Cardiology, American Heart Association, Heart Failure Society of America · 2022-03-31 12:00:00
In patients presenting with dyspnea, measurement of B-type natriuretic peptide (BNP) or N-terminal prohormone of B-type natriuretic peptide (NT-proBNP) is useful to support a diagnosis or exclusion of HF.
https://www.jacc.org/doi/10.1016/j.jacc.2021.12.012

[2] Management of Heart Failure
American College of Cardiology, American Heart Association, Heart Failure Society of America · 2022-03-31 12:00:00
In patients with HF who have fluid retention, diuretics are recommended to relieve congestion, improve symptoms, and prevent worsening HF.
https://www.jacc.org/doi/10.1016/j.jacc.2021.12.012

[3] Management of Heart Failure
American College of Cardiology, American Heart Association, Heart Failure Society of America · 2022-03-31 12:00:00
Patients with HF admitted with evidence of significant fluid overload should be promptly treated with intravenous loop diuretics to improve symptoms and reduce morbidity.
https://www.jacc.org/doi/10.1016/j.jacc.2021.12.012

[4] Biomarkers of Volume Overload and Edema in Heart Failure With Reduced Ejection Fraction.
Frontiers in Cardiovascular Medicine · 2022-01-01
Heart failure is characterized by the activation of several neurohumoral pathways with a role in maintaining the cardiac output and the adequate perfusion pressure in target organs and tissues. Heart failure with reduced ejection fraction causes

activation of the sympathetic nervous system, renin angiotensin aldosterone system, arginine-vasopressin system, natriuretic peptides, and endothelin. The main symptoms of heart failure are dyspnea and peripheral edema caused by fluid redistribution to the lungs and by fluid overload.

10.3389/fcvm.2022.910100

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480. MedQA question ID 93 Step 2/3

Question

A 54-year-old woman with a past medical history of mental retardation, hypertension, and diabetes presents to the emergency department with a change in her behavior. Her caretakers state that the patient's gait suddenly became ataxic, and she became less responsive than her normal non-verbal baseline. Her temperature is 98.5°F (36.9°C), blood pressure is 125/68 mmHg, pulse is 90/min, respirations are 15/min, and oxygen saturation is 99% on room air. Physical exam is notable for an unremarkable HEENT exam with normal facial features and no signs of airway compromise. Neurological exam is remarkable for new onset spasticity. The patient has 3+ reflexes and a positive Babinski sign. Musculoskeletal exam is only notable for symmetric swelling and deformities of the patient's hands bilaterally. Additionally, there is a "clunk" when posterior force is applied to the head while anterior force is applied to the cervical spine. Which of the following is the most likely risk factor that predisposed this patient to this condition?

(A) Cerebral palsy

(B) Diabetes mellitus

(C) Down syndrome

(D) Rheumatoid arthritis

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Rheumatoid arthritis is the most likely risk factor. The presentation is most consistent with **atlantoaxial instability/subluxation causing cervical myelopathy**: sudden gait ataxia, new spasticity, hyperreflexia, Babinski sign, and a **positive posterior/anterior "clunk"** on cervical exam. In adults, **rheumatoid arthritis** is a classic cause of upper cervical instability, and cervical spine involvement is common in RA [1] [2].

Why RA fits best

- The **symmetric hand swelling and deformities** strongly support inflammatory arthritis, especially RA.
- RA is strongly associated with **atlantoaxial subluxation** and other cervical spine instability patterns, which can produce myelopathic signs and gait disturbance [1] [2].

- **Down syndrome** is a known risk factor for atlantoaxial instability, but the rest of this vignette is much more suggestive of **RA-related cervical disease** in an adult [2].

Clinical takeaway

- When a patient with suspected RA develops **new spasticity, hyperreflexia, Babinski sign, gait change, or cervical instability on exam**, urgent cervical spine imaging is warranted because this can represent **cervical cord compromise** [1] [2].

References

[1] Risk factors for cervical spine instability in patients with rheumatoid arthritis.

Clinical rheumatology · 2021-02-01

The presence of C-spine instabilities in 1114 patients with rheumatoid arthritis was evaluated. The most common type was atlantoaxial subluxation (AAS), which is associated with early initiation of biologic DMARDs. The presence of antibodies against citrullinated proteins was a strong risk factor.

10.1007/s10067-020-05243-9

[2] Atlanto-axial rotary instability (Fielding type 1): characteristic clinical and radiological findings, and treatment outcomes following alignment, fusion, and stabilization.

Neurosurgical review · 2021-06-01

Atlantoaxial instability (AAI) is common in connective tissue disorders, such as rheumatoid arthritis, and increasingly recognized in the heritable disorders of Stickler, Loeys-Dietz, Marfan, Morquio, and Ehlers-Danlos.

10.1007/s10143-020-01345-9

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481. MedQA question ID 990 Step 2/3

Question

A 3-week-old newborn is brought to the physician by his parents because of poor feeding, irritability, and frequent vomiting over the past week. The vomitus is greenish in color and smells strange. His parents have tried to feed him every 4 hours, but the patient often spits up or refuses to eat. The patient was born at term and had his first bowel movement at 50 hours of life. He has since had one bowel movement daily. He is at the 50th percentile for length, 10th percentile for weight, and 40th percentile for head circumference. He does not appear to be in acute distress. His temperature is 36.9°C (98.4°F), pulse is 140/min, respirations are 40/min, and blood pressure is 90/60 mm Hg. Physical examination shows that the patient has small, low-set ears, a broad and flat nasal bridge, and a large space between the first and second toes bilaterally. The abdomen is distended. When the finger is removed following a rectal exam, there is an explosive release of stool from the patient's rectum. An x-ray of the abdomen shows a section of dilated colon followed by a segment of colon without stool or air. Which of the following is most likely to confirm the diagnosis?

(A) CT scan of the abdomen

(B) Transabdominal ultrasonography

(C) Anorectal manometry

(D) Rectal suction biopsy

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Rectal suction biopsy is the test that most directly **confirms Hirschsprung disease** in a neonate with delayed meconium passage, bilious vomiting, abdominal distension, and an explosive stool release after rectal exam (squirt sign). The North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition notes that **rectal biopsy is the gold standard** for diagnosis, while imaging such as contrast enema is used to evaluate obstruction but does not confirm aganglionosis [1].

Why the other options are not confirmatory

- **CT scan of the abdomen**: may show obstruction but does not establish the diagnosis.
- **Transabdominal ultrasonography**: not the confirmatory test for Hirschsprung disease.
- **Anorectal manometry**: can show an absent rectoanal inhibitory reflex, but in a symptomatic newborn it is not the definitive confirmatory study; biopsy is [1] [2].

Bottom line

For suspected Hirschsprung disease in a newborn, **rectal suction biopsy** is the confirmatory test [1] [2].

References

[1] Evaluation and Treatment Of Functional Constipation In Infants And Children
Consensus and Physician Experts · 2013-11-13 00:00:00
Rectal biopsy is the gold standard for diagnosing HD.
https://journals.lww.com/jpgn/Fulltext/2014/02000/Evaluation_and_Treatment_of_Functional.24.aspx

[2] Hirschsprung disease.
Nature Reviews Disease Primers · 2023-10-12
Hirschsprung disease most often presents in the neonatal period with delayed passage of meconium, abdominal distension and vomiting; diagnosis is established by histology of rectal suction biopsy showing aganglionosis.
10.1038/s41572-023-00465-y

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482. MedQA question ID 1181 Step 1

Question

A 21-year-old woman comes to the physician for evaluation of excess hair growth on her face. Menses occur irregularly at 45 to 65-day intervals. She is 159 cm (5 ft 3 in) tall and weighs 59 kg (130 lb); BMI is 23 kg/m2. Physical examination shows facial acne and growth of coarse dark hair on the face, chest, and lower back. Pelvic examination shows no abnormalities. Serum studies show:
Sodium 141 mEq/L

Potassium 4.2 mEq/L
Glucose 109 mg/dL
Cortisol (1600 h) 4 µg/dL
Prolactin 14 ng/mL
17-hydroxyprogesterone 390 ng/dL (N=20–300 ng/dL)
Testosterone 91 ng/dL (N=8–60 ng/dL)
A urine pregnancy test is negative. This patient's condition is most likely associated with which of the following?"

(A) Hyperproliferation of theca interna cells

(B) Exogenous anabolic steroid use

(C) Ovarian fibrosis and multiple cystic follicles

(D) Hyperplasia of the adrenal cortex

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D) Hyperplasia of the adrenal cortex is the best answer. This 21-year-old woman has hyperandrogenism with irregular menses and an elevated **17-hydroxyprogesterone**, which the **Endocrine Society** recommends using to screen for **nonclassical congenital adrenal hyperplasia (NCCAH) due to 21-hydroxylase deficiency** in symptomatic women with hirsutism and menstrual irregularity [1] [2] [3]. NCCAH is caused by reduced 21-hydroxylase activity in the adrenal cortex, leading to adrenal steroid precursor accumulation and adrenal hyperplasia; **PCOS** remains the most common alternative diagnosis, but the abnormal 17-hydroxyprogesterone points to adrenal rather than ovarian pathology [4] [5].

Why the other choices are less likely

- **A) Hyperproliferation of theca interna cells**: this is more consistent with **PCOS**, which is driven by ovarian theca-cell androgen production and is commonly associated with chronic anovulation and hirsutism [4] [5].
- **B) Exogenous anabolic steroid use**: not supported by the history or laboratory pattern; the endocrine workup instead suggests an endogenous androgen excess disorder [3].
- **C) Ovarian fibrosis and multiple cystic follicles**: this describes the polycystic ovarian morphology seen in **PCOS**, but ovarian morphology is not the key discriminator here, and the elevated **17-hydroxyprogesterone** favors NCCAH [3] [5].

Key diagnostic point

The **Endocrine Society** recommends measuring an **early-morning serum 17-hydroxyprogesterone** in symptomatic patients past infancy, and obtaining a **cosyntropin stimulation test** when baseline values are borderline to distinguish 21-hydroxylase deficiency from other enzyme defects [2] [3].

References

[1] Evaluation and Treatment of Hirsutism in Premenopausal Women
Endocrine Society · 2018-03-07 00:00:00
ES suggests screening hyperandrogenemic women for nonclassical congenital adrenal hyperplasia (NCCAH) due to 21-hydroxylase deficiency by measuring early morning 17-hydroxyprogesterone levels in the follicular phase or on a random day for those with amenorrhea or infrequent menses.
https://academic.oup.com/jcem/article/103/4/1233/4924418

[2] Congenital Adrenal Hyperplasia Due to Steroid 21-Hydroxylase Deficiency
Endocrine Society · 2018-09-27 00:00:00
In symptomatic individuals past infancy, we recommend screening with an early-morning (before 8 AM) baseline serum 17-hydroxyprogesterone measurement by liquid chromatography–tandem mass spectrometry.
https://academic.oup.com/jcem/article/103/11/4043/5107759

[3] Congenital Adrenal Hyperplasia Due to Steroid 21-Hydroxylase Deficiency
Endocrine Society · 2018-09-27 00:00:00
In individuals with borderline 17-hydroxyprogesterone levels, we recommend obtaining a complete adrenocortical profile after a cosyntropin stimulation test to differentiate 21-hydroxylase deficiency from other enzyme defects.
https://academic.oup.com/jcem/article/103/11/4043/5107759

[4] Hyperandrogenemia in adolescent girls: origins of abnormal GnRH secretion
BJOG : an international journal of obstetrics and gynaecology · 2010-01-01
LH stimulates theca cell steroid production and FSH regulates follicular conversion of androgen to estrogen, so increased LH relative to FSH leads to increased ovarian androgen synthesis with limited aromatization to estradiol.
10.1111/j.1471-0528.2009.02383.x

[5] Hyperandrogenemia in adolescent girls: origins of abnormal GnRH secretion
BJOG : an international journal of obstetrics and gynaecology · 2010-01-01
Hallmarks of PCOS are clinical and/or biochemical evidence of hyperandrogenemia (i.e. excessive acne, hirsutism, or elevated free testosterone levels) and evidence of anovulatory cycles (i.e. oligo/amenorrhea).
10.1111/j.1471-0528.2009.02383.x

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483. MedQA question ID 274 Step 2/3

Question

A 67-year-old white man presents to his primary care provider for an annual examination. He notes a pink bump that has rapidly developed on his forehead over the last month. In the past, he has had significant sun exposure including multiple blistering sunburns. The physical examination reveals a 2 cm dome-shaped plaque with a central keratin plug (as shown in the image). Excisional biopsy of the lesion reveals an exophytic nodule with central invagination, full of keratin. Keratinocyte atypia is minimal. Which of the following is the most likely diagnosis?

(A) Keratoacanthoma

(B) Basal cell carcinoma

(C) Seborrheic keratosis

(D) Kaposi's sarcoma

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

A. Keratoacanthoma is the most likely diagnosis. It classically presents as a **rapidly growing, dome-shaped or crateriform nodule with a central keratin plug** on **sun-exposed skin**, and histology shows an exophytic lesion with central keratin-filled invagination and only minimal atypia [1] [2].

Why the other choices are less likely

- **Basal cell carcinoma** more typically appears as a **pearly/waxy papule or nodule** with rolled borders or telangiectasias rather than a keratin-plugged crateriform lesion [3].
- **Seborrheic keratosis** is usually a benign, slower-growing “stuck-on” lesion and does not characteristically show a central keratin plug with rapid growth [4].
- **Kaposi sarcoma** presents as violaceous macules, plaques, or nodules and is not suggested by the described morphology or histology [5].

References

[1] Keratoacanthoma (KA): An update and review.
Journal of the American Academy of Dermatology · 2016-06-01
Keratoacanthoma (KA) is a common but underreported tumor of the skin. It has its clinical behavior with spontaneous regression after rapid growth and its nosological position on the border between benignity and malignancy.
10.1016/j.jaad.2015.11.033

[2] Keratoacanthoma of Upper Lip: Review and Report of Case Managed Surgically.
Journal of clinical and diagnostic research : JCDR · 2015-10-01
Keratoacanthoma is a benign lesion with a central crater filled with keratin. It frequently occurs on sun exposed areas of the skin.
10.7860/jcdr/2015/13883.6620

[3] Suspected Cancer: Recognition and Referral
National Institute for Health and Care Excellence · 2026-01-12 12:00:00
Typical features of basal cell carcinoma include: an ulcer with a raised rolled edge; prominent fine blood vessels around a lesion; or a nodule on the skin [particularly pearly or waxy nodules].
https://www.nice.org.uk/guidance/ng12

[4] Seborrheic keratosis.
Journal der Deutschen Dermatologischen Gesellschaft = Journal of the German Society of Dermatology : JDDG · 2023-03-01
Seborrheic keratosis is the most common benign epidermal tumor in clinical dermatological practice. The diagnosis is usually made clinically and in some cases by dermatoscopy or histology. The most common sites are the face and upper trunk.
10.1111/ddg.14984

[5] Kaposi Sarcoma
StatPearls · 2024-01-01
Kaposi sarcoma lesions are not characterized by a central keratin plug; they typically present as vascular-appearing lesions and are associated with HHV-8 and immunosuppression.

484. MedQA question ID 96 Step 1

Question

A 17-year-old female is brought to the emergency room by her father because she has been experiencing shortness of breath and chest pain. She says that the chest pain is worse when she breathes or coughs. Furthermore, on the way to the hospital she noticed that there were specks of blood on a tissue that she coughed into. She has no previous medical history and does not recall anything that could have provoked these symptoms. On presentation her temperature is 99°F (37.2°C), blood pressure is 107/65 mmHg, pulse is 102/min, respirations are 21/min, and O2 saturation is 91% on room air. Further testing shows a large filling defect in the pulmonary vessels, and the patient is started on an appropriate treatment intravenously. After drug administration, the effects of the drug are monitored using a standard blood test. Surprisingly, the test results come back within normal parameters. The most likely underlying cause of this patient's symptoms has which of the following modes of inheritance?

(A) Autosomal dominant

(B) Autosomal partial dominance

(C) X-linked dominant

(D) X-linked recessive

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely underlying cause is inherited antithrombin deficiency, which is typically autosomal dominant**.** In a patient with acute pulmonary embolism, **unfractionated heparin** should prolong the **aPTT**; if the **aPTT remains normal**, that suggests **heparin resistance**, classically due to **low antithrombin activity** rather than failure of anticoagulation itself [1] [2]. Inherited thrombophilias such as **antithrombin deficiency** are recognized causes of venous thromboembolism in young patients [2] [3].

Why this fits

- **Heparin requires antithrombin** to exert its anticoagulant effect; antithrombin deficiency can therefore produce **heparin resistance** with an unexpectedly normal aPTT response [1] [2].
- Among inherited thrombophilias, **antithrombin deficiency follows an autosomal dominant inheritance pattern** [3].
- Other common inherited thrombophilias associated with VTE include **factor V Leiden** and **prothrombin G20210A**, but the clue of a **normal monitoring test during IV heparin** points most strongly to **antithrombin deficiency** [2] [3].

References

[1] Antithrombin Deficiency in Trauma and Surgical Critical Care

The Journal of surgical research · 2020-12-01

Antithrombin deficiency patients have higher risk for thromboembolism and can develop recurrent venous and arterial thromboses. Heparin relies on antithrombin to augment its physiologic function. Patients with antithrombin deficiency exhibit profound heparin resistance.

10.1016/j.jss.2020.07.010

[2] Management of inherited thrombophilia: guide for genetics professionals

Clinical genetics · 2012-01-01

Venous thromboembolism risk factors include Factor V Leiden, prothrombin 20210G>A, deficiencies of antithrombin, protein C and protein S.

10.1111/j.1399-0004.2011.01746.x

[3] Gene analysis of inherited antithrombin deficiency and functional analysis of abnormal antithrombin protein (N87D)

International journal of hematology · 2018-04-01

Inherited antithrombin deficiency is one of the most clinically significant forms of congenital thrombophilia and follows an autosomal dominant mode of inheritance.

10.1007/s12185-017-2352-8

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485. MedQA question ID 830 Step 1

Question

A 72-year-old man in a nursing home was brought to the emergency department with right hand and leg weakness for 1 hour. There has been a gradual increase in the degree of weakness. The patient is disoriented. The medical history includes ischemic heart disease diagnosed 2 months ago, and long histories of diabetes and hypertension (30 and 25 years, respectively). On examination, the reflexes are hypertonic and the Babinski reflex is positive. The CT scan is shown. What is the most likely pathologic change?

(A) Gangrenous necrosis

(B) Liquefactive necrosis

(C) Caseous necrosis

(D) Fibrinoid necrosis

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

(B) Liquefactive necrosis is the most likely pathologic change. The presentation is most consistent with an **acute ischemic stroke** with evolving cerebral infarction, and the brain classically undergoes

liquefactive necrosis after ischemic injury rather than coagulative necrosis seen in most other solid organs [1] [2].

Why this fits

- **Gradual focal weakness, disorientation, hyperreflexia, and a positive Babinski sign** point to a **central nervous system infarct** rather than peripheral nerve disease.
- In acute stroke, CT is used to identify infarction or hemorrhage, and ischemic brain tissue injury evolves into **liquefactive necrosis** [1] [2].

Why the other choices are wrong

- **Gangrenous necrosis**: typically ischemic necrosis of extremities or bowel, not brain.
- **Caseous necrosis**: classically tuberculosis/fungal infection.
- **Fibrinoid necrosis**: associated with immune-mediated vascular injury or severe hypertension, not the tissue pattern of cerebral infarction.

References

[1] Therapeutic efficacy of brain imaging in acute ischemic stroke patients.
Journal of neuroradiology = Journal de neuroradiologie · 2015-02-01
This article reviews main pathological findings in stroke patients as imaged with CT, CTA, MRI, and MRA. It emphasizes the importance of detecting ischemic brain tissue damage (infarction) early during a time period when reperfusion therapy may be beneficial. MRI is highly sensitive in detecting patterns of brain tissue even in stages of functional recovery.
10.1016/j.neurad.2014.10.004

[2] Imaging of acute stroke: CT and/or MRI.
Journal of neuroradiology = Journal de neuroradiologie · 2015-02-01
Acute ischemic stroke is now clearly recognized as a medical emergency. CT and MRI are tools that can adequately demonstrate ischemia very early on. MRI using diffusion techniques has a much higher sensitivity for acute lesions. CT is still preferred with MR used for situations where the answer given is not sufficient and for follow-up of lesions.
10.1016/j.neurad.2014.10.005

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486. MedQA question ID 156 Step 1

Question

A 22-year-old male presents to the emergency room complaining of neck stiffness. He reports that his neck started “locking” three hours ago. He is now unable to move it. His past medical history is notable for schizophrenia and asthma and he currently takes albuterol as well as another medication whose name he does not remember. His temperature is 99.0°F (37.2°C), blood pressure is 130/90 mmHg, pulse is 105/min, and respirations are 18/min. On physical examination, the patient appears anxious and diaphoretic. He speaks in full sentences and is oriented to person, place, and time. The patient’s neck is flexed and rotated to the right approximately 40 degrees. The right sternocleidomastoid and trapezius are firm and contracted. Extraocular movements are full and intact. Upon further questioning, he reports that he took more medication four hours ago because he was hearing voices. Which of the following should most likely be administered to this patient?

(A) Glycopyrrolate

(B) Benztropine

(C) Levodopa

(D) Dantrolene

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

Benztropine should most likely be administered. The **American Psychiatric Association (APA)** recommends that **acute dystonia associated with antipsychotic therapy be treated with an anticholinergic medication** [1]. This presentation is classic for acute dystonia after an extra antipsychotic dose: painful neck spasm with sustained abnormal head posture, no fever, and no ophthalmoplegia; **dantrolene** would be for neuroleptic malignant syndrome, and **levodopa** is for parkinsonism, not acute dystonia [1] [2].

Why this is acute dystonia

- Rapid onset after recent antipsychotic exposure.
- Sustained contraction of the sternocleidomastoid/trapezius with neck deviation.
- Normal mental status and lack of hyperthermia make neuroleptic malignant syndrome less likely [1] [2].

Medication choice

- **Benztropine** is an anticholinergic used for antipsychotic-induced acute dystonia [1].
- **Glycopyrrolate** is also anticholinergic, but **benztropine** is the standard choice among the options given [1].
- **Levodopa** is not indicated here.
- **Dantrolene** is not the treatment for isolated acute dystonia [2].

References

[1] Treatment of Patients With Schizophrenia

American Psychiatric Association · 2020-08-31 00:00:00

APA recommends that patients who have acute dystonia associated with antipsychotic therapy be treated with an anticholinergic medication.

https://ajp.psychiatryonline.org/doi/pdf/10.1176/appi.ajp.2020.177901

[2] Neuroleptic malignant syndrome: a review for neurohospitalists.

The Neurohospitalist · 2011-01-01

Neuroleptic malignant syndrome is a reaction to antipsychotic drugs. Treatment includes immediately stopping the offending agent and implementing supportive measures.

10.1177/1941875210386491

487. MedQA question ID 341 Step 1

Question

A 28-year-old primigravid woman at 39 weeks gestation is admitted to the hospital in active labor. On examination, the cervix is 100% effaced and 10 cm dilated. After 5 minutes of pushing, there is a prolonged deceleration of the fetal heart rate to 90/min. A decision to perform an episiotomy is made to expedite vaginal delivery. The anesthesiologist locates the ischial spines by palpating the posterolateral vaginal sidewall and administers an anesthetic. Three minutes later, pinching the posterior vulva does not provoke pain. The anesthetized nerve most likely also supplies which of the following structures?

(A) Skin of the lateral thigh

(B) External anal sphincter

(C) Skin of the mons pubis

(D) Detrusor muscle

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. External anal sphincter. A pudendal nerve block anesthetizes the **pudendal nerve**, which carries sensory fibers from the posterior vulva/perineum and motor fibers to the **external anal sphincter** and other perineal muscles [1]. The other options are supplied by different nerves: the lateral thigh by the lateral femoral cutaneous nerve, the mons pubis by ilioinguinal/genitofemoral branches, and the detrusor by parasympathetic pelvic splanchnic fibers.

Key anatomy

- **Pudendal nerve (S2–S4):** sensory to the posterior vulva/perineum and motor to the **external anal sphincter** [1]
- **Not pudendal:**
- lateral thigh → lateral femoral cutaneous nerve
- mons pubis → ilioinguinal/genitofemoral nerves
- detrusor → pelvic splanchnic nerves

References

[1] Pudendal nerve 3-dimensional illustration gives insight into surgical approaches.
Annals of Plastic Surgery · 2014-12-01
The pudendal nerve is located in areas where plastic surgeon reconstructs the penis, the vagina, the perineum, and the rectum. This nerve is at risk for either compression or direct injury with neuroma formation from obstetrical, urogynecologic, and rectal surgery as well as pelvic fracture and blunt trauma.
10.1097/sap.0000000000000169

488. MedQA question ID 816 Step 1

Question

A 65-year-old woman comes to the physician for a routine bone mineral density screening. She does not have any children. Menopause was at age 55. Her mother died of breast cancer at the age of 48 years. She has hypertension for which she takes ramipril. Dual-energy x-ray absorptiometry at the femoral neck shows a T-score of -2.7 SD. The physician considers treatment with raloxifene. This medication would put her at increased risk of developing which of the following conditions?

(A) Pulmonary embolism

(B) Cellulitis

(C) Breast cancer

(D) Hypercholesterolemia

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

Raloxifene increases the risk of venous thromboembolism, including pulmonary embolism. The **American College of Obstetricians and Gynecologists (ACOG)** and the **Endocrine Society** describe raloxifene as an option for postmenopausal women with osteoporosis who are at elevated breast-cancer risk and **low risk of VTE/stroke**; it is not a drug that increases breast cancer risk, and it is used partly because it can reduce vertebral fracture risk and breast-cancer risk [1] [2]. In this patient, the concerning adverse effect among the choices is **pulmonary embolism** [3].

Key point

- **Pulmonary embolism** is the best answer because raloxifene is associated with **increased venous thromboembolism risk** [1] [2] [3].
- **Breast cancer** is not increased; raloxifene is used in women at increased breast-cancer risk [1] [2].
- **Cellulitis** and **hypercholesterolemia** are not the expected classic adverse effects supported by the retrieved sources [1] [2] [3].

References

[1] Management of Postmenopausal Osteoporosis
American College of Obstetricians and Gynecologists · 2022-03-31 12:00:00
Can be used for postmenopausal women who are at increased risk of vertebral fracture and breast cancer, have low risk of venous thromboembolism, and have no significant vasomotor symptoms.
https://journals.lww.com/greenjournal/Abstract/2022/04000/Management_of_Postmenopausal_Osteoporosis__ACOG.36.aspx

[2] Pharmacological Management of Osteoporosis in Postmenopausal Women

Endocrine Society · 2020-02-18 00:00:00

In postmenopausal women with osteoporosis at high risk of fracture and with the patient characteristics below, ES recommends raloxifene or bazedoxifene to reduce the risk of vertebral fractures.

https://academic.oup.com/jcem/article/105/3/587/5739968

[3] Treatment of osteoporosis and reduction in risk of invasive breast cancer in postmenopausal women with raloxifene.

Expert opinion on pharmacotherapy · 2011-03-01

Raloxifene is a non-steroidal selective estrogen receptor modulator (SERM). It is used for the prevention and for the treatment of postmenopausal osteoporosis and reducing the risk of invasive breast cancer in post menopause women.

10.1517/14656566.2011.557360

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489. MedQA question ID 252 Step 2/3

Question

A 30-year-old man presents to his primary care provider complaining of drowsiness at work for the past several months. He finds his work as a computer programmer rewarding and looks forward to coming into the office every day. However, he often falls asleep during meetings even though he usually gets a good night sleep and has limited his exposure to alcohol and caffeine in the evening. His past medical history is noncontributory. His vital signs are within normal limits. Physical examination is unremarkable. The primary care provider recommends keeping a sleep journal and provides a questionnaire for the patient's wife. The patient returns one month later to report no changes to his condition. The sleep journal reveals that the patient is getting sufficient sleep and wakes up rested. The questionnaire reveals that the patient does not snore nor does he stop breathing during his sleep. A sleep study reveals mean sleep latency of 6 minutes. Which of the following is the best course of treatment for this patient's condition?

(A) Methylphenidate

(B) Sodium oxybate

(C) Imipramine

(D) Increase daytime naps

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The American Academy of Sleep Medicine (AASM) recommends wake-promoting therapy for narcolepsy, and among the answer choices the best treatment is **methylphenidate** [1]. This patient has objective pathological sleepiness on multiple sleep latency testing (mean sleep latency **6 minutes**) and no evidence of insufficient sleep or obstructive sleep apnea, which supports

narcolepsy; **sodium oxybate** is also an AASM-supported option for narcolepsy, but **methylphenidate** is the best choice here from the listed options [1] [2].

Why the other options are less appropriate

- **Imipramine** is used for cataplexy/sleep paralysis features, not as primary treatment for isolated excessive daytime sleepiness in narcolepsy [2].
- **Increase daytime naps** can be an adjunctive behavioral strategy, but it is not sufficient treatment for persistent narcoleptic sleepiness [2].
- **Sodium oxybate** is guideline-supported for narcolepsy, but it is not the best single answer here when the main problem is daytime somnolence without cataplexy and **methylphenidate** is available as an option [1] [2].

References

[1] Treatment of Central Disorders of Hypersomnolence
American Academy of Sleep Medicine · 2021-04-23 00:00:00
We suggest that clinicians use methylphenidate for the treatment of narcolepsy in adults.
https://jcsm.aasm.org/doi/10.5664/jcsm.9328

[2] Disorders of Excessive Daytime Sleepiness Including Narcolepsy and Idiopathic Hypersomnia.
Sleep medicine clinics · 2016-09-01
Central disorders of hypersomnolence are rare conditions with a poorly understood pathophysiology. Current diagnostic criteria rely on the polysomnogram and multiple sleep latency test. The current focus of treatment is on drugs that promote alertness. In the case of narcolepsy type 1, medication management addresses control of cataplexy.
10.1016/j.jsmc.2016.04.005

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490. MedQA question ID 544 Step 1

Question

A 47-year-old woman presents to her primary care physician for evaluation of her right hand. Specifically, she says that she was gardening 8 hours prior to presentation when she sustained a laceration over her distal interphalangeal (DIP) joints. Since then, they have become red and swollen. She has also had pain in her proximal interphalangeal (PIP) joints and metacarpophalangeal (MCP) joints for several years and reports that this pain is worse in the morning but improves over the day. The cells that are present in this patient's DIP joints and PIP joints are analyzed and compared. Which of the following is most likely to be true about this patient's findings?

(A) DIP has fewer neutrophils and more monocytes than PIP

(B) DIP has more neutrophils and fewer monocytes than PIP

(C) DIP has more neutrophils and more monocytes than PIP

(D) DIP and PIP have similar numbers of neutrophils and monocytes

Correct Response:
B
Synthesize Response:
B✓

Synthesize Answer

B. DIP has more neutrophils and fewer monocytes than PIP. The **distal interphalangeal (DIP)** joints are showing an **acute inflammatory response** after the laceration, which is expected to be **neutrophil-predominant**. By contrast, the **proximal interphalangeal (PIP)** and metacarpophalangeal joints are more consistent with **rheumatoid arthritis**, a chronic synovitis in which the synovium is characterized by **mononuclear cell/macrophage-predominant inflammation** rather than a neutrophil-heavy acute process [1] [2].

Why this is the best answer

- **Acute joint inflammation** from recent injury or infection is typically dominated by **neutrophils**.
- **Rheumatoid arthritis** involves chronic synovial inflammation with prominent **macrophages/monocytes** and other mononuclear cells; synovial fluid neutrophils can contribute to inflammation, but the chronic infiltrate is not neutrophil-dominant [1] [2].

Interpretation of the joint pattern

- The **DIP** process is the new, red, swollen joint after trauma.
- The **PIP/MCP** symptoms are the longstanding inflammatory arthritis pattern typical of **RA**.

So the DIP joint is expected to have **more neutrophils and fewer monocytes** than the PIP joint [1] [2].

References

[1] Rheumatoid Arthritis Synovial Fluid Neutrophils Drive Inflammation Through Production of Chemokines, Reactive Oxygen Species, and Neutrophil Extracellular Traps.

Frontiers in Immunology · 2020-01-01

Rheumatoid arthritis (RA) is a chronic inflammatory disorder affecting synovial joints. Neutrophils play an important role in the initiation and progression of RA. In RA synovial fluid, neutrophils lose their migratory properties and reside within the joint to generate signals that promote joint damage.

10.3389/fimmu.2020.584116

[2] A Tale of Two Immune Cells in Rheumatoid Arthritis: The Crosstalk Between Macrophages and T Cells in the Synovium.

Frontiers in Immunology · 2021-01-01

Rheumatoid arthritis is a chronic autoimmune disease. Joint inflammation of RA is related to infiltration of immune cells, synovium hyperplasia, and superfluous secretion of proinflammatory cytokines. Monocytes/macrophages and T cells are two essential cellular components.

10.3389/fimmu.2021.655477

491. MedQA question ID 541 Step 1

Question

In a study to determine the risk factors for myocardial infarction (MI) at a young age (age < 30 years), 30 young patients with the condition are recruited into the study group. Sixty similar but healthy individuals are recruited into the control group. Educational status is considered to be an important variable, as it would affect the awareness of the disease and its risk factors among the participants. Based on the level of education, 2 groups are formed: low educational status and high educational status. A chi-square test is performed to test the significance of the relationship, and an odds ratio of 2.1 was computed for the association between low education and the risk of MI, with a confidence interval of 0.9–9.7. What inference can be made on the association between young age MI and educational status from this study?

(A) The association is not statistically significant, and low education is not a risk factor.

(B) The association is statistically significant, but low education is not a risk factor.

(C) The association is not statistically significant, but low education is a risk factor.

(D) One can not comment, as the p-value is not given.

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

This study does not show a statistically significant association between low educational status and young-onset MI at the conventional 0.05 level. The odds ratio is **2.1**, but the **95% confidence interval of 0.9–9.7 includes 1.0**, so the result is compatible with no association as well as a potentially increased risk; the chi-square test would therefore be interpreted as not significant if its p value is >0.05. The **American College of Cardiology/American Heart Association (ACC/AHA)** also recognize education and other social determinants of health as important cardiovascular risk-related factors, but this individual study is imprecise and does not establish a definitive association [1] [2].

Clinical inference

- **Best interpretation:** a **possible positive association** between low education and young MI, but **not statistically conclusive** because the confidence interval crosses 1.0 [2].
- **Practical conclusion:** the study is **underpowered / imprecise**, so a larger sample would be needed to determine whether low education is truly associated with MI risk [2].

Bottom line

The correct inference is **no statistically significant association demonstrated**, despite a trend toward higher odds of young-onset MI among those with low educational status [2].

References

[1] Primary Prevention of Cardiovascular Disease
American College of Cardiology, American Heart Association · 2019-03-17 00:00:00
Social determinants of health should inform optimal implementation of treatment recommendations for the prevention of ASCVD.
https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000678

[2] Educational disparities in ischaemic heart disease among 0.5 million Chinese adults: a cohort study.
Journal of epidemiology and community health · 2021-11-01
Low educational attainment was associated with increased risk of incident AMI as well as death and fatality of total IHD including its subtypes.
10.1136/jech-2020-216314

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492. MedQA question ID 1249 Step 2/3

Question

A 55-year-old nulligravid woman comes to the physician because of a 3-day history of heavy vaginal bleeding, requiring more than 5 pads per day. Menopause occurred 1 year ago. She attained menarche at 10 years of age. She has a history of hypothyroidism and type 2 diabetes mellitus. She has smoked 1 pack of cigarettes daily for 20 years but quit 5 years ago. Current medications include levothyroxine and metformin. She is 165 cm (5 ft 5 in) tall and weighs 86 kg (190 lb); BMI is 32 kg/m2. Physical examination shows mild vaginal atrophy and a normal cervix. The uterus and adnexa are nontender to palpation. Transvaginal ultrasonography shows an endometrial thickness of 6 mm. Endometrial biopsy shows non-invasive proliferation of endometrial glands with no nuclear or cytological atypia. Which of the following is the most appropriate next step in management?

(A) Total hysterectomy

(B) Estrogen vaginal cream

(C) Reassurance and follow-up

(D) Progestin therapy

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

The most appropriate next step is progestin therapy (D). The American College of Obstetricians and Gynecologists (ACOG) recommends **progestational agents** for endometrial intraepithelial neoplasia/atypical hyperplasia when hysterectomy is not the treatment option, and **hysterectomy is the definitive treatment** for EIN–AEH rather than for nonatypical proliferative lesions alone [1]. In this patient, the biopsy shows **endometrial hyperplasia without atypia**, so conservative treatment

with a progestin and histologic follow-up is the best match; reassurance alone is not appropriate because she has postmenopausal bleeding and an abnormal biopsy [1] [2].

Why the other options are not best

- **Total hysterectomy** is reserved as definitive therapy for **EIN–AEH** or for patients who fail or cannot undergo conservative treatment; the provided biopsy does not show atypia [1].
- **Estrogen vaginal cream** may help atrophy-related symptoms, but it does **not** treat endometrial hyperplasia and is not the appropriate response to this biopsy result [1] [2].
- **Reassurance and follow-up** alone is not appropriate because persistent postmenopausal bleeding with endometrial thickening requires pathologic evaluation and treatment when hyperplasia is found [2].

Follow-up after progestin therapy

ACOG advises **repeat histologic assessment within 3–6 months** after starting progestational treatment for EIN–AEH, and longer-term maintenance therapy may be considered if risk factors persist [1].

References

[1] Management of Endometrial Intraepithelial Neoplasia or Atypical Endometrial Hyperplasia
American College of Obstetricians and Gynecologists · 2023-09-01 12:00:00
Clinicians should recommend progestational agents as treatment for EIN–AEH for patients in whom hysterectomy is not an option. Hysterectomy is the definitive treatment for EIN–AEH.
https://journals.lww.com/greenjournal/fulltext/2023/09000/management_of_endometrial_intraepithelial.32.aspx#

[2] ACOG Committee Opinion No. 734: The Role of Transvaginal Ultrasonography in Evaluating the Endometrium of Women With Postmenopausal Bleeding.
Obstetrics and Gynecology · 2018-05-01
Cancer of the endometrium is the most common gynecologic cancer in the United States. Vaginal bleeding is the presenting sign in more than 90% of postmenopausal women with endometrial carcinoma. Age, obesity, use of unopposed estrogen, medical comorbidities, diabetes mellitus, atypical glandular cells on screening cervical cytology should be considered.
10.1097/aog.0000000000002631

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493. MedQA question ID 568 Step 1

Question

A 55-year-old woman presents with severe pruritus and fatigue. She denies any similar symptoms in the past. No significant past medical history. Upon physical examination, scleral icterus is present, and significant hepatosplenomegaly is noted. Mild peripheral edema is also present. Laboratory findings are significant for elevated serum levels of bilirubin, aminotransferases, alkaline phosphatase (ALP), γ-glutamyl transpeptidase (GGTP), immunoglobulins, as well as cholesterol (especially HDL fraction). Antiviral antibodies are not present. The erythrocyte sedimentation rate is also elevated. Anti-mitochondrial antibodies are found. A liver biopsy is performed, and the histopathologic examination shows bile duct injury, cholestasis, and granuloma formation. Which of the following is the most likely diagnosis in this patient?

(A) Primary biliary cirrhosis

(B) Hemolytic anemia

(C) Hepatitis A

(D) Gilbert syndrome

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most likely diagnosis is A. Primary biliary cirrhosis (now called primary biliary cholangitis, PBC). The American Association for the Study of Liver Diseases (AASLD) states that PBC is diagnosed when 2 of 3 features are present: **cholestatic liver tests (especially elevated ALP)**, **positive antimitochondrial antibody (AMA)**, and **compatible liver histology showing destructive cholangitis / interlobular bile duct injury** [1]. This patient has severe pruritus and fatigue, elevated ALP and bilirubin, positive AMA, and biopsy showing bile duct injury with granulomas, which is classic for PBC [1] [2].

Why the other options are unlikely

- **Hemolytic anemia** would not explain cholestatic liver tests, AMA positivity, or the biopsy findings [1].
- **Hepatitis A** is an acute viral hepatitis diagnosis and is suggested by acute hepatitis with fecal-oral exposure; it is not supported here, and antiviral antibodies were not present [3].
- **Gilbert syndrome** causes isolated unconjugated hyperbilirubinemia without cholestasis, pruritus, hepatosplenomegaly, or destructive bile duct pathology [1] [2].

Key point

The combination of **middle-aged woman**, **pruritus/fatigue**, **cholestatic enzymes**, **AMA positivity**, and **granulomatous bile duct injury** is highly characteristic of **PBC** [1] [2].

References

[1] Primary Biliary Cholangitis
American Association for the Study of Liver Diseases · 2021-08-24 12:00:00
The diagnosis of PBC can be established when two of the following three criteria are met: biochemical evidence of cholestasis based on ALP elevation; presence of AMA, or other PBC-specific autoantibodies, including sp100 or gp210, if AMA is negative; histologic evidence of nonsuppurative destructive cholangitis and destruction of interlobular bile ducts.
https://aasldpubs.onlinelibrary.wiley.com/doi/10.1002/hep.32117

[2] Risk stratification in autoimmune cholestatic liver diseases: Opportunities for clinicians and trialists
Hepatology (Baltimore, Md.) · 2015-11-26
Reactivity of antimitochondrial antibody (AMA) in the presence of cholestasis facilitates robust and timely patient identification without need for histological confirmation. Pruritus and fatigue are frequent symptoms associated with cholestasis.
10.1002/hep.28128

[3] Evaluation of Abnormal Liver Chemistries
American College of Gastroenterology · 2017-01-01 12:00:00
Testing for acute hepatitis A (IgM HAV) should occur in patients presenting with acute hepatitis and possible fecal-oral exposure.
https://journals.lww.com/ajg/Fulltext/2017/01000/ACG_Clinical_Guideline__Evaluation_of_Abnormal.13.aspx

494. MedQA question ID 30 Step 1

Question

A 42-year-old woman comes to the emergency department because of a 2-day history of right upper abdominal pain and nausea. She is 163 cm (5 ft 4 in) tall and weighs 91 kg (200 lb); her BMI is 34 kg/m2. Her temperature is 38.5°C (101.3°F). Physical examination shows a distended abdomen and right upper quadrant tenderness with normal bowel sounds. Laboratory studies show:
Leukocyte count 14,000/mm3
Serum
Total bilirubin 1.1 mg/dL
AST 32 U/L
ALT 40 U/L
Alkaline phosphatase 68 U/L
Abdominal ultrasonography is performed, but the results are inconclusive. Cholescintigraphy shows the intrahepatic bile ducts, hepatic ducts, common bile duct, and proximal small bowel. Which of the following is the most likely cause of this patient's symptoms?"

(A) Autodigestion of pancreatic parenchyma

(B) Fistula between the gallbladder and small intestine

(C) Infection with a hepatotropic virus

(D) Obstruction of the cystic duct

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Obstruction of the cystic duct is the most likely cause. This presentation is most consistent with **acute calculous cholecystitis**, which is usually caused by gallstone-related **cystic duct obstruction**; on **HIDA scan**, tracer filling of the intrahepatic ducts, common bile duct, and small bowel with **nonvisualization of the gallbladder** supports that diagnosis [1] [2]. **Autodigestion of pancreatic parenchyma** would suggest pancreatitis, **a fistula between the gallbladder and small intestine** would suggest gallstone ileus, and **hepatotropic virus infection** would not fit this imaging pattern [1] [2].

Key clue

- **HIDA shows biliary tree and proximal small bowel visualization without gallbladder filling** this indicates **cystic duct obstruction** rather than common bile duct obstruction [1] [2].
- The **American College of Gastroenterology (ACG)** and the **Infectious Diseases Society of America (IDSA)** support ultrasound first, with **HIDA or MRI/MRCP** when ultrasound is equivocal and suspicion persists [1] [3].

References

1. **JAMA review of acute cholecystitis**: Gallstone-associated **cystic duct obstruction** is responsible for **90% to 95%** of acute cholecystitis cases. 2. **Acute cholecystitis imaging evidence**: Tc-99m HIDA cholescintigraphy is the diagnostic procedure of choice; **visualization of the gallbladder rules out acute cholecystitis in most cases**. 3. **IDSA 2024 intra-abdominal infection guideline**: In non-pregnant adults with suspected acute cholecystitis, if ultrasound and CT are equivocal/non-diagnostic and suspicion persists, obtain **MRI/MRCP or HIDA** as subsequent imaging.

References

[1] Acute Cholecystitis: A Review
JAMA · 2022-03-08
Gallstone-associated cystic duct obstruction is responsible for 90% to 95% of the cases of acute cholecystitis.
10.1001/jama.2022.2350

[2] A diagnostic dilemma of atypical gallbladder appearance on Tc-99m HIDA cholescintigraphy resolved with SPECT/CT
Clinical Nuclear Medicine · 2011-02-01
Tc-99m HIDA cholescintigraphy is the diagnostic procedure of choice for acute cholecystitis. The visualization of the gallbladder rules out acute cholecystitis in most of the cases.
10.1097/rlu.0b013e3181feed6d

[3] Complicated Intra-abdominal Infections: Risk Assessment, Diagnostic Imaging, and Microbiological Evaluation in Adults, Children, and Pregnant People
Infectious Diseases Society of America · 2024-06-13
In non-pregnant adults with suspected acute cholecystitis, if both US and CT are equivocal/non-diagnostic and clinical suspicion persists, the panel suggests obtaining either an abdominal MRI/MRCP or hepatobiliary iminodiacetic acid (HIDA) scan as subsequent imaging to diagnose acute cholecystitis (low certainty of evidence for HIDA, knowledge gap for MRI/MRCP).
https://www.idsociety.org/globalassets/idsa/practice-guidelines/iai-2024/link-to-overview-manuscript.pdf

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495. MedQA question ID 298 Step 2/3

Question

An 18-month-old girl is brought to the pediatrician by her mother for vaginal bleeding. The mother states that she noticed the bleeding today, which appeared as brown discharge with clots in the patient's diaper. The mother denies frequent nosebleeds or easy bruising. She also denies any known trauma. She does mention that the patient has been limping and complaining of left leg pain since a fall 2 months ago. On physical exam, there are multiple 2-3 cm hyperpigmented patches on the patient's trunk. There is bilateral enlargement of the breasts but no pubic hair. The vaginal orifice is normal and clear with an intact hymen. A plain radiograph of the left lower leg shows patchy areas of lytic bone and sclerosis within the femoral metaphysis. Which of the following is associated with the patient's most likely diagnosis?

(A) Bitemporal hemianopsia

(B) Hypertension

(C) Pheochromocytoma

(D) Polyostotic fibrous dysplasia

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D. Polyostotic fibrous dysplasia is associated with **McCune-Albright syndrome**, which classically presents with **café-au-lait hyperpigmentation**, **peripheral precocious puberty** from estrogen excess, and **fibrous dysplasia of bone** causing pain, limp, and lytic/sclerotic bone lesions on radiograph [1] [2] [3]. The vaginal bleeding here is most consistent with estrogen-mediated precocious puberty rather than trauma or a bleeding disorder. [1] [2]

Why this fits

- **Breast development without pubic hair** suggests **gonadotropin-independent precocious puberty**.
- **Intact hymen/normal vaginal orifice** makes local trauma less likely.
- **Patchy lytic and sclerotic metaphyseal bone changes** are typical of **fibrous dysplasia**.
- The skin findings are consistent with **café-au-lait macules** seen in McCune-Albright syndrome. [1] [2] [3]

References

[1] Peculiarities of Precocious Puberty in Boys and Girls With McCune-Albright Syndrome.
Frontiers in Endocrinology · 2018-01-01
McCune-Albright syndrome is a rare, sporadic disease caused by a post-zygotic, activating mutation in the guanine-nucleotide binding protein α-subunit (GNAS1) gene. MAS is characterized by polyostotic fibrous dysplasia of bone, café au lait pigmented skin lesions and peripheral precocious puberty. Precocious puberty is the most common endocrine manifestation of MAS.
10.3389/fendo.2018.00337

[2] Auxological and Endocrinological Features in Children With McCune Albright Syndrome: A Review.
Frontiers in Endocrinology · 2020-01-01
McCune-Albright syndrome is a rare congenital sporadic disease involving the skin and skeletal and endocrine systems. It includes fibrous dysplasia of bone, café au lait pigmented skin lesions, precocious puberty, hyperthyroidism, growth hormone excess, hypercortisolism, and hypophosphatemic rickets.
10.3389/fendo.2020.00522

[3] Potent constitutive cyclic AMP-generating activity of XLαs implicates this imprinted GNAS product in the pathogenesis of McCune-Albright syndrome and fibrous dysplasia of bone.
Bone · 2011-02-01
McCune-Albright syndrome is characterized by hyperpigmented skin lesions, precocious puberty, and fibrous dyslasia of bone.
10.1016/j.bone.2010.09.032

496. MedQA question ID 66 Step 2/3

Question

A 4-year-old boy is brought to the emergency department because of severe abdominal pain and bilious vomiting for 6 hours. He has not had bowel movements in the past 24 hours. He appears ill. His temperature is 37.8°C (100°F) and pulse is 122/min. Examination shows a distended abdomen. There is tenderness to palpation in the lower abdomen; guarding and rebound tenderness are present. Bowel sounds are decreased. An x-ray of the abdomen shows dilated loops of bowel. He has been accompanied by his 14-year-old brother. The surgeon recommends an emergency laparotomy. The parents are away visiting friends and cannot be reached. Which of the following is the most appropriate next best step in management?

(A) Get consent from the patient's brother

(B) Get consent from the patient

(C) Perform emergency laparotomy

(D) Delay surgery until parental consent

Correct Response:
C
Synthesize Response:
C✓

Synthesize Answer

Perform emergency laparotomy is the most appropriate next step. In a child with signs of an acute surgical abdomen and suspected bowel obstruction/perforation, **emergent treatment should not be delayed** because a parent or legal guardian is unavailable; consent is **implied in a life-threatening emergency** when delay would risk imminent and significant harm [1] [2]. The 14-year-old brother cannot provide legal consent for this surgery, and waiting for parental contact is not appropriate [1] [2].

Why the other choices are wrong

- **Get consent from the patient's brother**: a sibling is not the legal surrogate for emergency operative consent in this setting [1].
- **Get consent from the patient**: a 4-year-old cannot provide legally valid informed consent for major surgery [1].
- **Delay surgery until parental consent**: delay risks bowel ischemia, perforation, sepsis, and worsening peritonitis; emergency care should proceed [1] [2].

Practical point

If time allows, document the emergency nature of the situation and attempts to contact the parents, but **documentation should not delay surgery** when immediate intervention is needed [2].

References

[1] Consent for emergency medical services for children and adolescents.
Pediatrics · 2011-08-01
Parental consent is required for the medical evaluation and treatment of minor children. Children and adolescents might require evaluation of and treatment for emergency medical conditions in situations in which a parent or legal guardian is not available to provide consent. In general, a medical screening examination and any medical care necessary and likely to prevent imminent and significant harm should not be delayed because of problems obtaining consent.
10.1542/peds.2011-1166

[2] Informed Consent for GI Endoscopic Procedures
American Society for Gastrointestinal Endoscopy · 2022-01-31 12:00:00
In an emergency situation, effort should be made (and documented) to obtain written consent before a procedure as the situation allows.
https://www.giejournal.org/article/S0016-5107(21)01759-4/fulltext

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497. MedQA question ID 52 Step 1

Question

A 65-year-old man comes to the physician because of a 1-week history of yellowish discoloration of his skin and generalized pruritus. Examination shows jaundice of the skin and scleral icterus. Urinalysis shows an elevated concentration of bilirubin and a low concentration of urobilinogen. Which of the following is the most likely underlying cause of these findings?

(A) Absent UDP-glucuronosyltransferase activity

(B) Increased hemoglobin breakdown

(C) Increased intestinal bilirubin reabsorption

(D) Defective hepatic bile excretion

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

D) Defective hepatic bile excretion is most likely. The presentation is consistent with **cholestatic/obstructive jaundice**: jaundice with **pruritus**, **urine bilirubin present**, and **low urobilinogen** indicates impaired bile flow or excretion rather than isolated overproduction of bilirubin. Cholestasis reflects **impairment of hepatobiliary excretory function** and can occur with mechanical obstruction or other canalicular transport defects [1] [2].

Why the other choices are less likely

- **A) Absent UDP-glucuronosyltransferase activity** causes unconjugated hyperbilirubinemia (eg, Crigler-Najjar), which would not typically produce bilirubinuria.

- **B) Increased hemoglobin breakdown** suggests hemolysis and usually increases unconjugated bilirubin, again without bilirubin in the urine.
- **C) Increased intestinal bilirubin reabsorption** is not the typical mechanism for this cholestatic presentation.

The key physiologic clue here is **conjugated bilirubin in urine with low urobilinogen**, pointing to **posthepatic cholestasis/obstruction** rather than hemolysis or impaired conjugation [1] [2].

References

[1] Benefits and challenges to therapeutic targeting of bile acid circulation in cholestatic liver disease
Hepatology (Baltimore, Md.) · 2025-07-02
Cholestasis is characterized by an impairment of hepatobiliary excretory function, resulting in the accumulation of BAs and other biliary constituents in the liver and systemic circulation. This disruption can be complete, for example, due to mechanical obstruction by a stone, dominant stricture or tumor, or a severe genetic defect in a key transporter, membrane structural protein, or molecular chaperone.
10.1097/HEP.0000000000001438

[2] A Systematic Approach to Patients with Jaundice.
Seminars in Interventional Radiology · 2016-12-01
Jaundice is a clinical manifestation of disorders of underlying bilirubin metabolism, hepatocellular dysfunction, or biliary obstruction. Jaundice occurs in settings of cholestasis or inability to effectively secrete bile.
10.1055/s-0036-1592331

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498. MedQA question ID 1202 Step 1

Question

A 40-year old man presents to the clinic with vague upper abdominal pain that has been worsening for the last several days. He says that he often gets similar pain but less severe and that it worsens with meals. The pain sometimes radiates to his back. He recently lost 15 kg (33.6 lb) of weight secondary to his lack of appetite since his last visit 2 months ago. He admits to drinking alcohol almost every night since the age of 17. His temperature is 37.0° C (98.6°F), respirations are 15/min, pulse is 67/min, and blood pressure is 122/98 mm Hg. Physical examination reveals moderate epigastric tenderness. An abdominal CT scan reveals calcifications as shown by the white arrows. Which of the following organs is affected in this patient?

(A) Pancreas

(B) Jejunum

(C) Duodenum

(D) Gall bladder

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The affected organ is the pancreas. The presentation is most consistent with **chronic pancreatitis**: progressive epigastric pain radiating to the back, worse with meals, weight loss, heavy alcohol exposure, and **pancreatic calcifications on CT** are classic features of chronic pancreatitis [1] [2] [3]. The American College of Gastroenterology (ACG) identifies chronic pancreatitis as a continuing inflammatory disease of the **pancreas** that typically causes pain and permanent loss of function [1].

Why the other options are unlikely

- **Jejunum** and **duodenum** do not fit the typical pattern of pancreatic-type pain with calcifications.
- **Gallbladder** disease can cause upper abdominal pain, but **pancreatic calcifications** point to pancreatic pathology rather than biliary disease [2] [3].

References

[1] Chronic Pancreatitis

American College of Gastroenterology · 2020-02-01 00:00:00

Chronic pancreatitis is a continuing inflammatory disease of the pancreas, characterized by irreversible morphological change, and typically causing pain and/or permanent loss of function.

https://journals.lww.com/ajg/Abstract/publishahead/ACG_Clinical_Guideline__Chronic_Pancreatitis.99424.aspx

[2] Pancreatic Calcifications and Calcified Pancreatic Masses: Pattern Recognition Approach on CT.

AJR. American Journal of Roentgenology · 2017-07-01

Pancreatic calcifications are being detected more frequently because of the widespread use of imaging, particularly CT, because they are detected more often. Pancreatic cancer is most commonly associated with chronic pancreatitis related to alcohol abuse, but several pathologic entities can cause pancreatic masses.

10.2214/ajr.17.17862

[3] Chronic pancreatitis.

Nature Reviews Disease Primers · 2017-09-07

Chronic pancreatitis is a fibro-inflammatory syndrome of the pancreas in individuals with genetic, environmental and/or other risk factors who develop persistent pathological responses to parenchymal injury or stress. Symptoms include recurrent or constant abdominal pain, diabetes mellitus and maldigestion.

10.1038/nrdp.2017.60

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499. MedQA question ID 257 Step 1

Question

A routine newborn screening test for phenylketonuria in a male neonate shows a serum phenylalanine concentration of 44 mg/dL (N < 20). He is started on a special diet and the hyperphenylalaninemia resolves. At a routine well-child examination 4 months later, the physician notices that he has persistent head lag. On examination, he has blue eyes, pale skin, blonde hair, and generalized hypotonia. His serum prolactin level is markedly elevated. Supplementation of which of the following substances is most likely to prevent further complications of this patient's condition?

(A) Tyrosine

(B) Pyridoxine

(C) Thiamine

(D) Tetrahydrobiopterin

Correct Response:
D
Synthesize Response:
D✓

Synthesize Answer

Tetrahydrobiopterin (BH4) is the best answer: this infant's **hyperphenylalaninemia plus neurologic signs and markedly elevated prolactin** are most consistent with **BH4 deficiency** rather than isolated phenylalanine hydroxylase deficiency. In BH4 deficiency, **BH4 replacement** is needed to reduce phenylalanine and help prevent progressive neurologic complications; treatment of the associated neurotransmitter deficiency typically also requires **L-dopa/5-hydroxytryptophan**, which is not among the choices [1] [2] [3].

Why this is not classic PKU alone

- Classic PKU from **phenylalanine hydroxylase deficiency** is treated primarily with **phenylalanine restriction**; BH4 responsiveness is a separate subset [4] [5].
- **Elevated prolactin** points to **dopamine deficiency**, which supports a disorder of **BH4 synthesis/recycling** with neurotransmitter deficiency rather than isolated PKU [1].

Best choice

- **D. Tetrahydrobiopterin** [1] [2] [3].
- **Tyrosine** supplementation alone does not address the underlying cofactor deficiency or the dopamine/serotonin deficiency driving the neurologic complications [1] [2].

Note

- If the question were about symptomatic treatment of BH4 deficiency beyond cofactor replacement, published summaries describe **L-dopa plus 5-hydroxytryptophan** as cornerstone therapy for neurotransmitter deficiency [1].

References

[1] Short prolactin profile for monitoring treatment in BH4 deficiency.
European Journal of Paediatric Neurology · 2015-05-01
Tetrahydrobiopterin (BH4) deficiency causes hyperphenylalaninemia and impaired synthesis of serotonin and dopamine. Replacement therapy with 5-hydroxytryptophan and L-dopa administration is the cornerstone of treatment. Monitoring of L-Dopa therapy in BH4 deficiency is generally based on clinical observation and periodical measurement of homovanillic acid (HVA) in the cerebrospinal fluid.
10.1016/j.ejpn.2015.01.010

[2] Tetrahydrobiopterin treatment in phenylketonuria: A repurposing approach.
Journal of Inherited Metabolic Disease · 2020-03-01
Tetrahydrobiopterin (BH4) could be one of the treatment options for phenylketonuria (PKU) patients. BH4 may increase residual phenylalanine hydroxylase activity and improve neurocognitive functioning in some patients with PKU.
10.1002/jimd.12151

[3] Phenylketonuria.
Lancet · 2010-10-23
Phenylketonuria is caused by an inborn error in aminoacid metabolism. It results from mutations in the phenylalanine hydroxylase gene. Neonatal screening programmes identify individuals with phenylkronuria. The initiation of a phenylaline-restricted diet prevents most of the neuropsychological complications. Tetrahydrobiopterin stimulates the enzyme activity in about 20% of patients.
10.1016/S0140-6736(10)60961-0

[4] Adherence to tetrahydrobiopterin therapy in patients with phenylketonuria.
Molecular Genetics and Metabolism · 2015-01-01
Phenylketonuria (PKU) is an inborn error in phenylalanine metabolism due to deficiency of the enzyme, PAH hydroxylase (PAH). Treatment includes restriction of diet and supplementing with the PAH cofactor, tetrahydrobiopterin (sapropterin dihydrochloride)
10.1016/j.ymgme.2014.10.013

[5] Biallelic Mutations in DNAJC12 Cause Hyperphenylalaninemia, Dystonia, and Intellectual Disability.
American Journal of Human Genetics · 2017-02-02
Phenylketonuria (PKU) can be detected through newborn screening for hyperphenylalaninemia (HPA) Most individuals with HPA harbor mutations in the gene encoding phenylalanine hydroxylase (PAH) and a small proportion (2%) exhibit tetrahydrobiopterin (BH4) deficiency with additional neurotransmitter (dopamine and serotonin) deficiency.
10.1016/j.ajhg.2017.01.002

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500. MedQA question ID 408 Step 2/3

Question

A 42-year-old man comes to the physician after elevated liver function tests were found after a routine screening. He has had occasional headaches over the past year, but otherwise feels well. The patient reports that he was involved in a severe car accident 30 years ago. He does not smoke or drink alcohol. He has never used illicit intravenous drugs. He takes no medications and has no known allergies. His father had a history of alcoholism and died of liver cancer. The patient appears thin. His temperature is 37.8°C (100°F), pulse is 100/min, and blood pressure is 110/70 mm Hg. Physical examination shows no abnormalities. Laboratory studies show:
Hemoglobin 14 g/dL
Leukocyte count 10,000/mm3
Platelet count 146,000/mm3
Serum
Glucose 150 mg/dL
Albumin 3.2 g/dL
Total bilirubin 1.5 mg/dL
Alkaline phosphatase 75 U/L
AST 95 U/L
ALT 73 U/L
HIV negative
Hepatitis B surface antigen negative
Hepatitis C antibody positive
HCV RNA positive
HCV genotype 1
A liver biopsy is performed and shows mononuclear infiltrates that are limited to portal tracts and

periportal hepatocyte necrosis. Which of the following is the most appropriate next step in management?"

(A) Sofosbuvir and ledipasvir therapy

(B) Tenofovir and velpatasvir therapy

(C) Interferon and ribavirin therapy

(D) Tenofovir and entecavir therapy

Correct Response:
A
Synthesize Response:
A✓

Synthesize Answer

The most appropriate next step is [sofosbuvir and ledipasvir therapy[0m for chronic hepatitis C genotype 1; **interferon and ribavirin is outdated**, and HBV-directed agents such as tenofovir/entecavir are not the correct treatment for isolated HCV infection [1] [2]. The American Society of Transplantation notes that for **genotype 1 or 4**, **sofosbuvir/ledipasvir for 12 weeks** is an accepted option, and modern direct-acting antiviral regimens have replaced interferon-containing therapy because of substantially better efficacy and safety [1] [2].

Why this fits the case

The biopsy description is compatible with **chronic hepatitis C** (portal mononuclear inflammation with periportal hepatocyte necrosis), and the key management decision is antiviral treatment of confirmed viremia rather than observation or HBV therapy. Among the answer choices, **sofosbuvir/ledipasvir** is the only appropriate HCV regimen for genotype 1 [1].

References

[1] Viral Hepatitis
American Society of Transplantation · 2019-04-01 12:00:00
For those with genotype 1 or 4 infection, options for therapy include glecaprevir/pibrentasvir for 12 weeks or sofosbuvir/ledipasvir for 12 weeks.
https://onlinelibrary.wiley.com/doi/10.1111/ctr.13514

[2] Glecaprevir/pibrentasvir for the treatment of chronic hepatitis C virus infection.
Future microbiology · 2019-01-01
In recent years, management of chronic hepatitis C virus has been revolutionized by the availability of oral direct-acting antivirals (DAAs). DAAs have significantly better efficacy and safety profiles than interferon-containing regimens.
10.2217/fmb-2018-0233