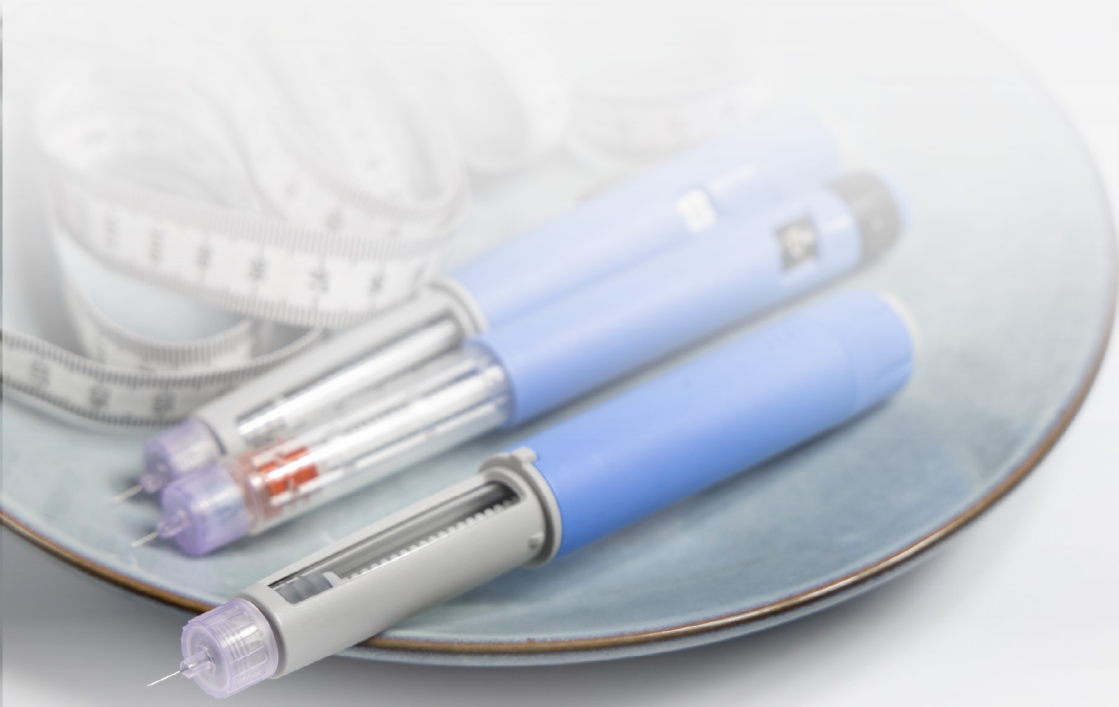


Insulin

Insulin

What is insulin?

Insulin is a hormone secreted by the pancreas. The pancreas is a gland located behind the stomach. Insulin lowers blood sugar levels by transporting glucose (a simple sugar produced when starches and complex carbohydrates in food are digested) from the bloodstream into the body's cells, where it is used as an energy source according to the body's needs.

Insulin is used in:

- Pregnancy.
- Type 1 diabetes.
- Severe illness and surgical procedures.
- Type 2 diabetes that does not respond to diet, exercise, and tablets.

Notes:

- The amount of insulin administered is determined by several factors, such as body weight, physical activity, food intake, overall health condition, and the stress a person is exposed. Some of these factors may change over time, which highlights the importance of regularly monitoring and adjusting the amount and the type of insulin with a physician.
- The body requires a certain amount of basal insulin to cover periods of sleep and the times between meals typically (intermediate- and long-acting insulin). It also requires prandial/ mealtime insulin to cover meals (rapid- or short-acting insulin).
- The duration of insulin action varies from person to person and can be influenced by factors such as the injection site and the dose of insulin units administered.

A person with diabetes who uses insulin should:

1. Visit diabetes education clinic.
2. Carry an identification card stating they have diabetes, including the type of insulin used, what others should do in case of a low blood sugar, and the phone number of doctor and the relatives.
3. Keep a small, fast-acting sugary snack with them at all times.
4. Keep a glucagon injection kit, especially when traveling, make sure it has not expired, learn how to use it, and train people around them to use it in case of severe low blood sugar .Visit diabetes education clinic to learn how to use the injection.
5. Check blood sugar levels before, during, and after exercise.
6. Monitor blood sugar regularly and increase the frequency during pregnancy, fasting, or illness.
7. Never stop taking insulin during illness.

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8. Inform school staff about a child with diabetes and educate them what to do in emergencies (severe low or high blood sugar and diabetic ketoacidosis).
9. Inject long acting insulin consistently, at the same times each day
10. Eat healthy foods and follow an appropriate meal plan.

Types of insulin and its effects:

There are two types of insulin used to treat diabetes:

- Human insulin.
- Insulin analogs.

Most insulin products on the market have a concentration of 100 units per milliliter (U-100), and insulin injections are designed to be administered according to this concentration.

Insulin is classified based on the onset, peak, and duration of action into the following types:

- Rapid-acting (Immediate):

Transparent, taken 5 to 15 minutes before the meal or during it, or 15 minutes at most after it, providing flexibility for meal scheduling.
Examples:
-insulin lispro (Humalog) .
-insulin aspart (Novolog, Novorapid).
-insulin glulisine(Apidra).
Begins working in about 15-30 minutes, peaks at 1-1.5 hours, and lasts 3 to 4 hours.

- Short-acting effect:

Transparent, taken 15 to 30 minutes before the meal.
Examples:
-Regular insulin (Humulin R, Actrapid).
Start working in 30-60 minutes, peaks 2 to 4 hours, and lasts 6 to 8 hours.

- Medium-acting effect:

Cloudy, take before sleeping or in the morning, it is necessary to fix meal times as much as possible to avoid blood sugar drops.
Example:
-NPH: N humulin insulatard
Begins working in about 1-2 hours, peaks 6-12 hours, and lasts about18 to 24 hours.

- Long-acting effect:

Transparent, taken once or twice daily at a fixed time, not related to meal time.
Example:
- Lantus (Glargine) it has no peak time, with a duration of effect lasting 24 hours,
-Levemir (Detemir) starts its effect after 3 to 4 hours and peaks after 6 to 8 hours, with a duration of effect lasting 6 to 23 hours.
-Tresiba (Degludec) is used once daily. The dosing time can be adjusted as long as it is not less than 8 hours between doses.
-Toujeo (Glargine) starts its effect after 3 to 4 hours and is used daily.

- Mixed:

Cloudy, contains a fixed ratio of short-acting or rapid-acting effect + medium-acting effect in a single vial. Therefore, it has the advantages and characteristics of rapid-acting insulin (or short-acting insulin) in addition to the medium-acting effect.

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It deals with the body's basic requirements and after meal insulin needs.

For example:

Rapid + Medium: Taken 5 to 15 minutes before the meal, during it, or 15 minutes at most after it, such as:
-Novomix 70/30" and "Humalog Mixtard 75/25

-Short + Medium: Taken 15 to 30 minutes before the meal, such as Humulin 70/30, Humalog Mixtard 70/30.

Storage:

1. Store unopened Insulin in the refrigerator.
2. Used insulin can be stored at room temperature but should not exceed 30°C.
3. Do not freeze insulin, and do not use insulin that has been frozen.
4. Do not place insulin in a hot area or in direct sunlight.
5. Avoid vigorous shaking to prevent insulin from precipitating or losing its effect.
6. When traveling, insulin should be kept in an insulin cooler bag or in thermos ice packs.
7. Do not use insulin if you notice crystals forming in the vial or on the wall, or if the color changes.
8. Do not use insulin after one month from opening (consult with diabetes educator as there are differences in the expiration date of insulin pens or vials after first use).
9. Do not use insulin if expired.

Injection problems:

Increased fat tissue: (Lipid swelling):
Appears as lumps or bumps on the skin surface with a soft texture.
Decreased fat tissue: (Lipoatrophy):
This condition appears as areas that are lower than the surface of the skin, with a firm texture.
Local effects: burning, itching, swelling, pain, bleeding, or bruising at the injection site.

Tips to avoid injection problems:

1. Always change the injection sites regularly.
2. It is better to change the injection sites within the same area of the body before moving to another area. Do not reuse the needle.
3. Gently press with your fingers on the injection site for 5 seconds if there is pain or if blood droplets or clear fluid appear. Repeat blood sugar test if this happen.
4. Inject insulin at room temperature (at least 10 minutes after taking it out of the refrigerator).
5. Regularly check the injection sites with your fingers to ensure the skin is in a good condition. If you notice any lumps or abnormal texture, or bruising, avoid using that site until it heals, as insulin may not be absorbed properly.
6. For thin people or children, inject at a 45-degree angle instead of 90 degrees to avoid injecting into the muscle.
7. Do not switch the injection site too often.
8. Quickly perform the injection technique with your doctor or certified diabetes educator.

Insulin

Insulin injection tools:

• Syringes

It come in various sizes:

30 units: Two types: (Each line = half unit of insulin or each line = one unit of insulin). Needle length: 8 mm suitable for small doses.

50 units: (Each line = one unit of insulin). Needle length: 8 mm or 12.7 mm suitable for doses between 30 and 50 units.

100 units: (Each line = two units of insulin). Needle length: 8 mm or 12.7 mm. Suitable for doses over 50 units.

It is important to choose the syringe size according to the prescribed insulin dose, and the needle length depending on the thickness of the subcutaneous layer.

• Insulin Pens:

These are pens with a small cartridge prefilled with insulin. After the cartridge is empty, it is either replaced with a new filled cartridge, or the entire pen is disposed of if it's a disposable type.

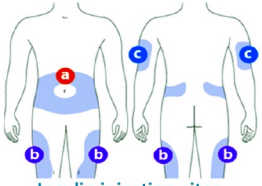
Needle lengths available: 5 mm, 6 mm, 8 mm, or 12.7 mm

• Insulin Pump:

A small, lightweight device that contains insulin which is delivered through a tube and a needle fixed in the patient's abdomen (or any other injection site).

The patient wears the device throughout the day and night, and removes it during exercise, showering or bathing. The pump is programmed to deliver small continuous doses of insulin throughout the day and night. The patient can program an additional dose (bolus) during meals based on the amount of food to be consumed.

(Only one type of insulin is used in the pump – rapid-acting insulin).



Insulin injection sites



Correct method for injecting insulin:

To lift a skin fold, use the thumb and index finger or the middle finger. This ensures that you avoid the muscles and inject the insulin into the subcutaneous layer (beneath the skin).

• Absorption rate:

Fastest absorption: from the abdomen (avoid the area within three fingers' width from the navel) followed by: arm, then thigh, and slowest from the buttocks.

Before meal insulin dose can be injected into the abdomen for rapid absorption, a bedtime insulin dose can be injected into the thigh for gradual absorption throughout the night, premixed insulin can be injected into any site.

• How to inject insulin using a syringe:

Prepare all required items, check the insulin expiration date, wash your hands with soap and water, and clean the rubber stopper of the insulin vial with an alcohol swab.

Insulin

1. Roll the vial of cloudy insulin gently between your palms for 15 seconds to mix it. Do not shake the vial. For clear insulin, this step is not necessary.



2. Pull the plunger back to draw in air equal to the number of insulin units prescribed to you.



3. Place the insulin vial upright. Remove the metal cap from the top of the vial to expose the rubber stopper. Remove the needle cap. Insert the needle straight into the rubber stopper, then push the plunger downward to inject the air into the vial. (This step helps equalize the pressure inside the vial, making it easier to withdraw the insulin).



4. Turn the vial upside down while keeping the needle inside. The needle tip must remain fully submerged in the insulin.



5. Pull back the plunger until you reach the prescribed dose, make sure no air bubbles are present, tap the syringe gently with your finger to move air bubbles to the top, then push the plunger slightly to return the bubbles into the vial, ensure you have drawn the correct dose afterward.



6. Remove the needle straight out of the vial, do not let the needle touch anything to avoid contamination, if you are not injecting immediately, cover the needle with its cap.

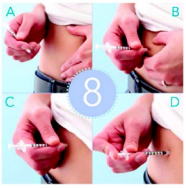


7. The abdomen (away from the navel), upper arm, thigh, or buttocks, wipe the injection site with an alcohol swab, then wait for it to dry, avoid areas with scars (e.g., from surgeries) or hardened skin, as these may not absorb insulin well. You can numb the area by applying an ice cube for 1–2 minutes before injecting. Dry the skin with a clean cloth before injection.



8. There are four steps to inject insulin:

A. Hold the syringe like a pencil.
B. With your other hand, pinch the skin gently to lift it, and insert the needle quickly at a 90-degree angle.
C. Release the pinch and stabilize the syringe using the same hand that was pinching.
D. Push the plunger down completely to inject all the insulin. Leave the needle in place for 5 –10 seconds to prevent insulin from leaking out. Then remove the needle straight out.
It is normal to see a small drop of blood or a bruise sometimes. Press gently with a tissue or cotton for about 5 seconds. Do not massage the injection site. Do not recap the needle after use — dispose of it in a puncture-resistant container, such as one made of hard plastic or metal.



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Mixing insulin doses:

Some people with diabetes use two types of insulin for better blood sugar control. One for mealtime coverage, and one for basal (background) needs.
You may mix different types of insulin in the same syringe, only if your doctor has instructed you to do so.
Once mixed, inject immediately.
Rapid-acting or short-acting insulin can be mixed with intermediate-acting insulin.
• Do not mix Glargine (Lantus) with any other type of insulin.

Follow the same previous steps, taking into account the following:
1. Push air first into the long-acting insulin vial, but do not draw any insulin yet.
2. Withdraw the syringe while it is still empty from the long-acting insulin vial.
3. Push air into the rapid-acting insulin vial, draw the prescribed dose of rapid-acting insulin, remove any air bubbles, then withdraw the syringe from the vial. Make sure you have drawn the correct dose.
4. Insert the syringe into the long-acting insulin vial. Tilt the vial and syringe upside down. Gently tap the vial to push air bubbles to the top. Do not shake the vial forcefully, as this can create small bubbles that are difficult to remove.
5. Make sure the needle tip is completely covered with insulin.
6. Pull back the plunger so that the total amount of insulin in the syringe equals the sum of the rapid-acting dose and long-acting dose.
7. Remove the needle from the vial. Make sure you have drawn the correct doses. Your total dose should be Rapid-acting dose and Long-acting dose = Total dose in the syringe.

Warnings:
•If you draw more of the cloudy (long-acting) insulin than needed, discard the content of the syringe and start over.
•If there are air bubbles that you could not remove, discard the contents of the syringe and start over.
•If the rapid-acting insulin vial is contaminated with long-acting insulin by mistake, the rapid insulin will not act as quickly as it should. Ask your doctor or diabetes educator if you need to discard the contaminated vial.

How to use an insulin pen:

1. Remove the pen cap.
If you are using cloudy insulin, gently roll the pen between your palms for 15 seconds to mix it. Do not shake the pen.





2. Remove the paper seal from the
Attach the needle to the pen, and
Remove the outer plastic cap from

Insulin

3. Turn the dose selector at the end of the pen to 1 or



4. Turn the dose selector to the number of units prescribed to you. The dose selector can also be turned backward. Make sure you set the correct dose.



5. Choose the injection site.
As previously explained for syringe use.



6. A. Wrap your fingers around the top of the pen. Place your thumb above the dose button.
B. Gently pinch the skin with your other hand to lift it slightly.
C. Insert the needle at a 90-degree angle, then release the pinched skin.
D. Use your thumb to press down on the dose button completely until it stops (the dose counter should return to zero).
Leave the needle in place for 5–10 seconds to prevent insulin from leaking out. Withdraw the needle straight out from the skin. It is normal to see a small drop of blood or a bruise sometimes. Press the injection site gently with a tissue or cotton for 5 seconds, do not rub.



7. Cover the needle with its outer plastic cap and remove the needle from the pen. Dispose of used needles in a puncture-resistant plastic or metal container. Cover the pen with its outer cap to keep it ready for the next use.



فقيه

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