Navigating the Pharmacopoeia Landscape: How to Stay Compliant by Utilizing Regulatory Intelligence

REDICA Systems

Agenda

1. Introduction - Our framework
2. Pharmacopoeia Landscape
3. Pharmacopoeia Compliance - Regulatory Basis and Risks
4. Redica’s current offering to stay ahead of pharmacopoeial change
5. Pharmacopoeia Retrospective 2025 - Hot Spots
6. More items on the Horizon
7. Q&A

Speakers:

Joe Albanese

Managing Director and Consultant - Albanese Consulting, LLC
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Redica Regulatory Intelligence

We've built a precision, AI-driven regulatory monitoring system, combining automation, human expertise, and an infrastructure designed to adapt to regulator evolutions.

We act as the first line of detection for critical regulatory changes & provide timely actionable intelligence.

Staying ahead of global regulatory changes is hard. That's why Redica does the heavy lifting:

Continuously Monitor Global Regulatory Change
Track full document lifecycles or regulatory queries across agencies, regions, and standards.

Detect Relevant Changes Early
Identify new or revised requirements as they happen, including subtle updates that are often missed.

Understand Trends and Impact
Connect regulatory changes to inspection trends, enforcement history, and (soon) SOPs.

Align Teams with Shared Intelligence
Manage early impact assessments across RA, QA, and compliance stakeholders.

Transition to Proactive Compliance
Reduce manual effort, accelerate response time, and stay ahead of regulatory expectations with traceable rationale.

Comprehensive Regulatory Intelligence Coverage

Countries & Sources

Worldwide Coverage
350+ unique sources from 100+ countries with more sources added regularly.

50+ Trade Associations

- EFPIA
- BioPhorum
- IFPMA
- MedTech Europe

40+ Harmonization Orgs

- ICH
- WHO
- PIC/S
- IMDRF

Primary Industries

- Human Drugs
- Biologics
- Animal Health
- Medical Devices
- In Vitro Diagnostics

Scope

- GMP
- GMP for IMP
- GDP
- GVP
- GCP
- GPeP
- GLP
- GTP
- GPP
- Labels
- Design & Dev
- PMS
- RA - Filing
- RA - CMC
- RA - Clinical
- RA - Preclinical
- RA - General
- Pharmacopoeia
- Health, Safety, Environment (HSE)

Pharmacopoeia Landscape

Origin and roles of Pharmacopoeias

The Development of Pharmacopoeias, **George Urdang**

🏛️ **Etymology -** The term **“pharmacopoeia”** originates from the Ancient Greek **φαρμακοποιΐα (*pharmakopoiia*)**, which literally means **“drug-making.”**

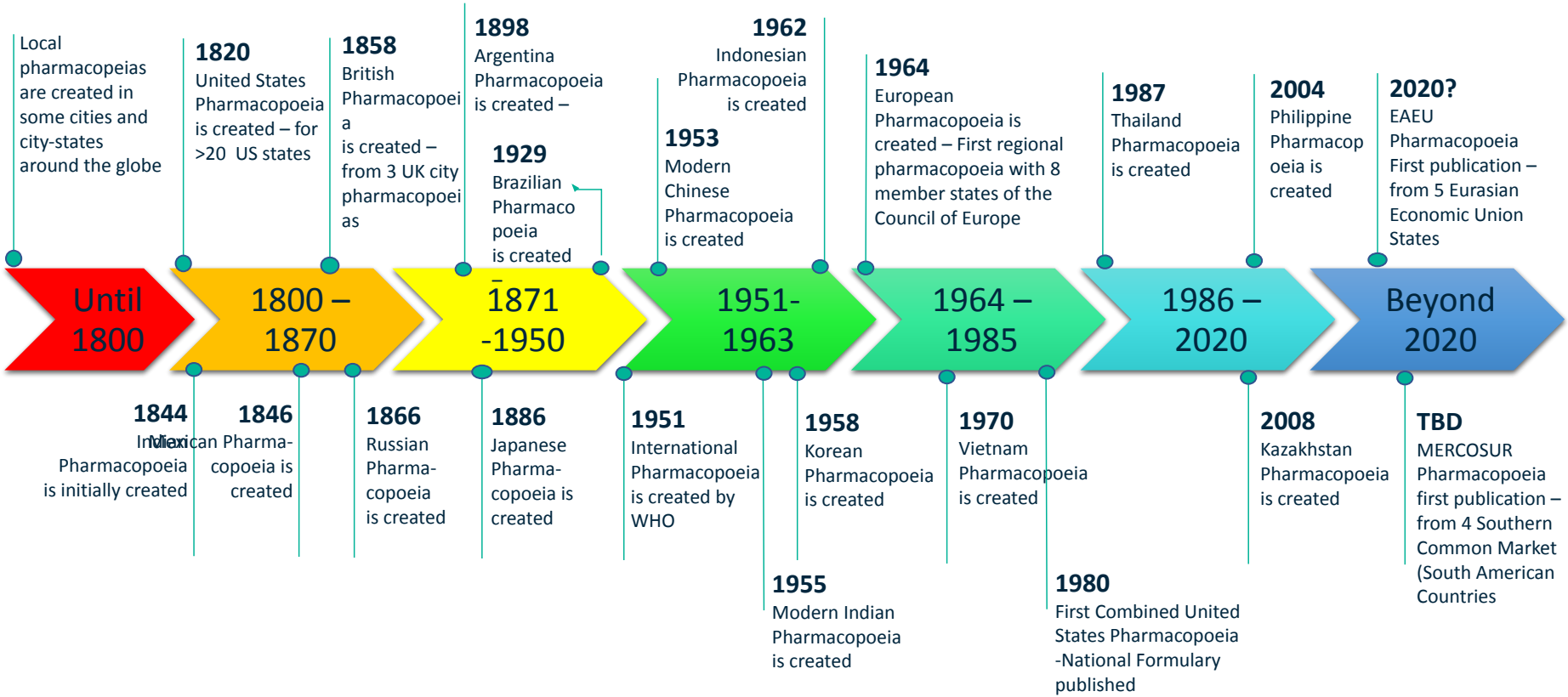
📖 **Historical Definition -** *“A pharmacopoeia in the modern sense of the word is a pharmaceutical standard intended to secure uniformity in the kind, quality, composition and strength of remedies approved by the representatives of medicine within a particular political unit and made obligatory for its pharmacists by the authorities concerned.”*

🔬 **Evolution and Scientific Progress -** *“The very usefulness of the pharmacopoeia is determined by the periodical changes it has to undergo to keep pace with the latest progress in the sciences on which it is based.”*

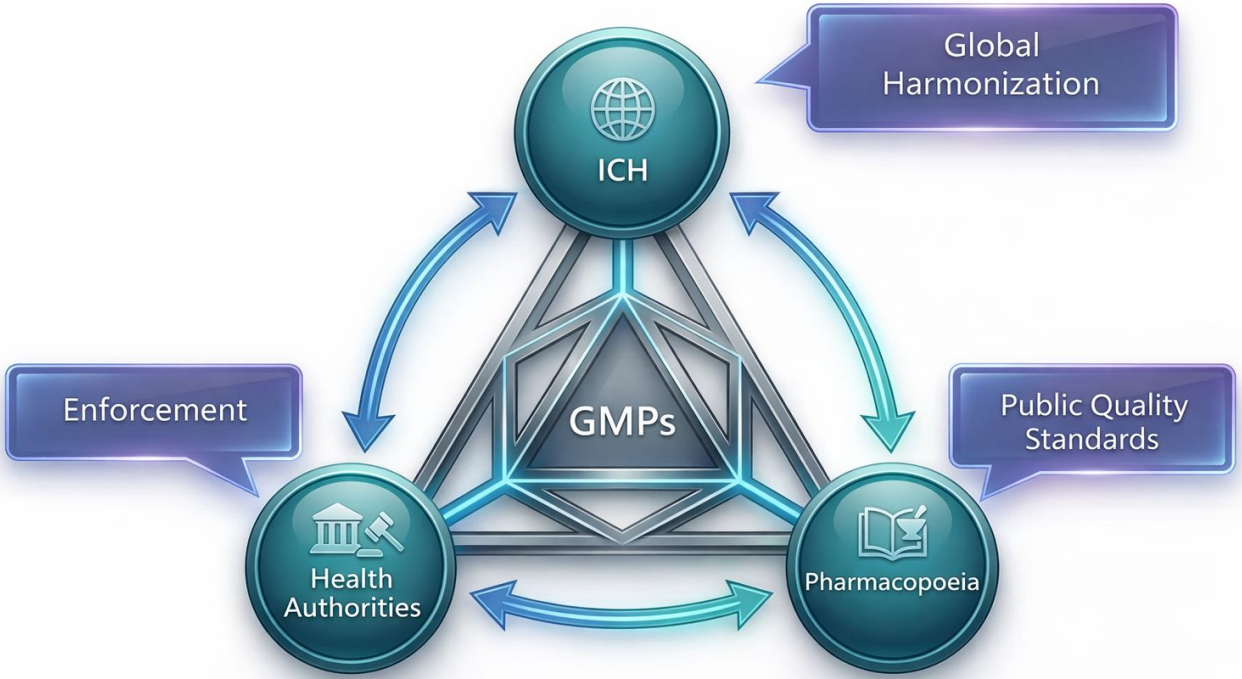
⚖️ **Modern Role -** Over time, pharmacopoeias have evolved into:

📘 **Official books of pharmaceutical standards**
⚖️ **Legally enforceable references** governing the **quality, composition, strength, and identity** of medicines.

Pharmacopoeias Development over time



Pharmacopoeia relationship to GMP



A Comprehensive Scope of Public Standards

Pharmacopoeia Compliance
Regulatory Basis and Risks

Pharmacopoeia Compliance: Fundamental Principles

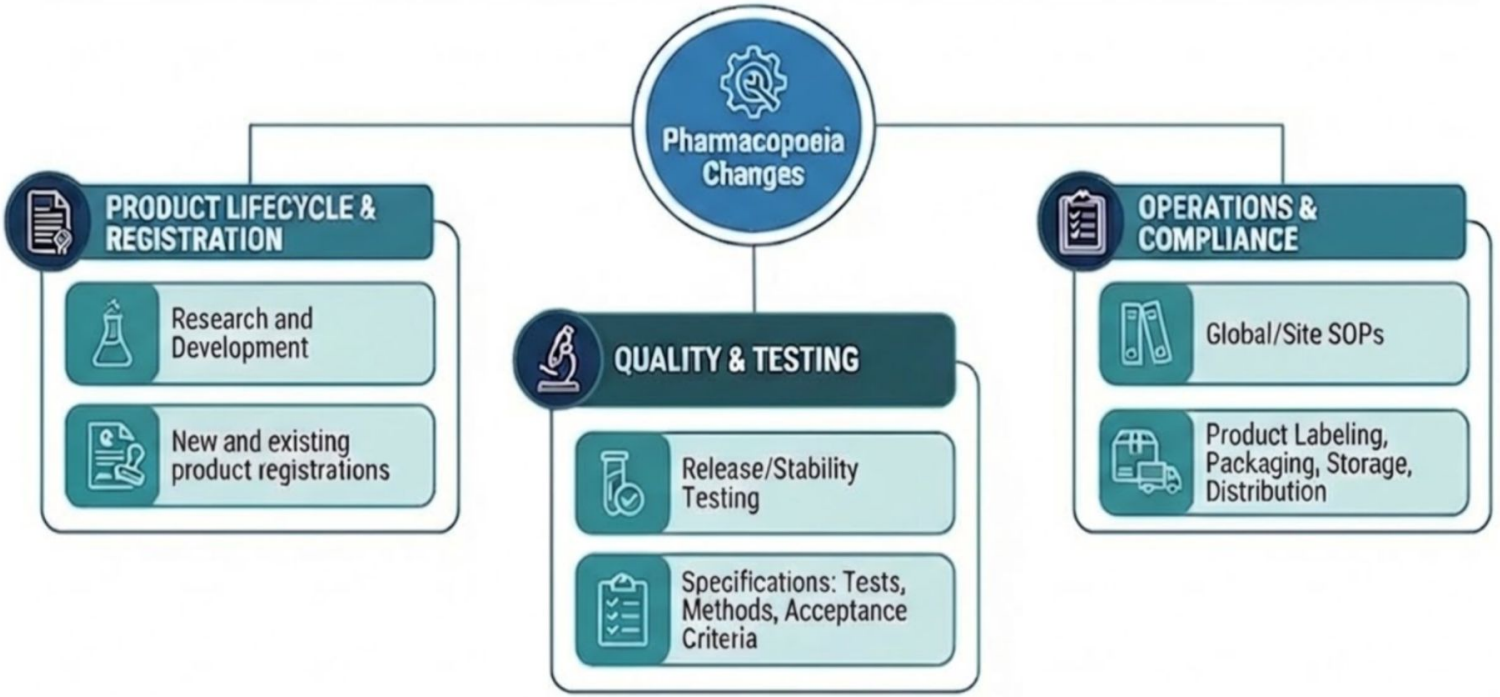
- Compliance with requirements published by pharmacopoeias is a legal and regulatory requirement in applicable countries and regions.

- A company must comply with **current** compendial requirements.

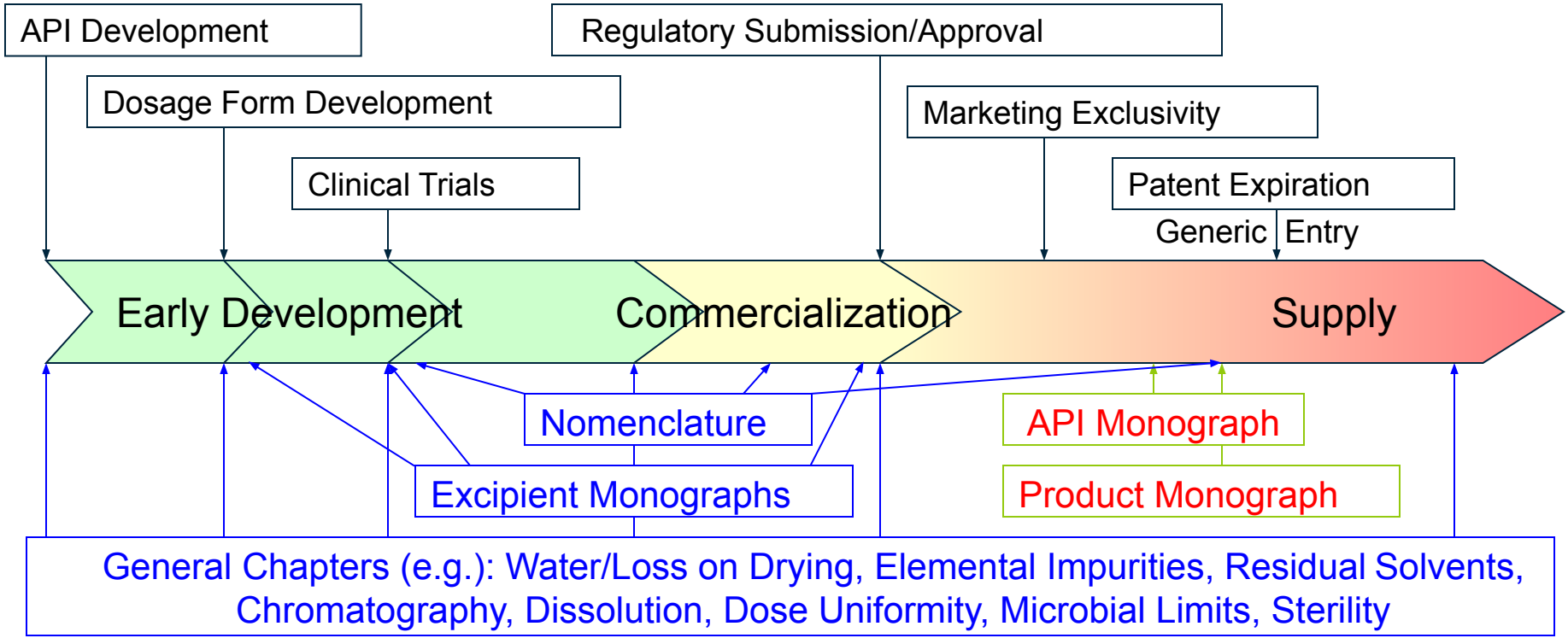
- A company must comply with the compendial requirements applicable in a particular country, **and also** with their product registrations as approved worldwide.

Why Pharmacopoeia matters?

"Pharmacopoeia is something where nobody pays attention to them until something goes wrong. I've seen it in many places." - Christine Moore, Organon



Impact of Pharmacopoeia Throughout Drug Product Life-Cycle



Three main challenges to Pharmacopoeia Compliance

1. Complexity & Lifecycle Management

- Compliance required throughout product lifecycle (development to post-market)
- Compliance is required to both product registrations and pharmacopoeia requirements for both release and stability testing

2. Global Regulatory Divergence

- Multiple, often conflicting, global regulatory expectations
- Lack of broad harmonization across the pharmacopoeia
- Significant number of compendial revisions published by the pharmacopoeia

3. Internal Alignment & Execution

- Lack of cross-functional understanding & partnership
- Inadequate compendial line-of-sight during development
- Complex change control processes hindering timely implementation

A sample of crispy enforcement actions across the board

Reference - Redica App 2.0	Observation
True Botanica, LLC - **Form 483, 2025-08-22**	Laboratory controls do not include the establishment of scientifically sound and appropriate specifications designed to assure that components and in-process materials conform to appropriate standards of identity, strength, quality and purity. Specifically, A. **Your firm has no documented justification/rationale for not following the testing and acceptance criteria outlined in the USP monograph for (b)(4) USP** (which includes (b)(4) when produced by (b)(4)), which requires testing for Conductivity, Total Organic Carbon (TOC), and pH.
embecta Medical I LLC - **Form 483, 2025-10-17**	Laboratory controls do not include the establishment of scientifically sound and appropriate specifications designed to assure that components conform to appropriate standards of identity, strength, quality and purity. **Specifically, You do not test your raw material (b)(4) for volatile impurities of (b)(4) (b)(4) or unspecified impurities as specified in the (b)(4) USP monograph**, nor do you receive and review a qualified supplier's Certificate of Analysis or Certificate of Conformance ……
Medtronic, Inc. - **Form 483, 2025-12-10**	Each batch of drug product purporting to be sterile and pyrogen-free is not laboratory tested to determine conformance to such requirements. Specifically, A. Not all batches of combination product (b)(4) (“ (b)(4) ”) manufactured are **tested for bacterial endotoxin;** rather, each (b)(4) for testing….. Additionally, method CSS-0911-XXXX-0004 requires solely soybean casein digest media (SCDM; TSB) for (b)(4) testing and not fluid thioglycollate medium (FTM); **compendial chapters for sterility testing of drug products (namely, USP <71>) specify both media types are to be used**
US Specialty Formulations LLC - **Form 483, 2026-01-14**	The accuracy, sensitivity, specificity and reproducibility of test methods have not been established and documented. Specifically, (A) You have **not established stability-indicating test methods to determine the stability** of (b)(4), and the current analytical methods lack the capability to identify potential degradants and impurities in the finished drug product. (B) **You have not demonstrated that your in-house benzyl alcohol test method QC-0060, Assay of Benzyl Alcohol, for testing incoming material is equal to or better than the USP compendial method.** (D) Prior to December 29, 2025, **your firm used the (b)(4) sample from the benzyl alcohol ingredient supplier as the in-house reference standard and did not qualify this secondary standard against the USP reference standard.**

A sample of crispy enforcement actions across the board

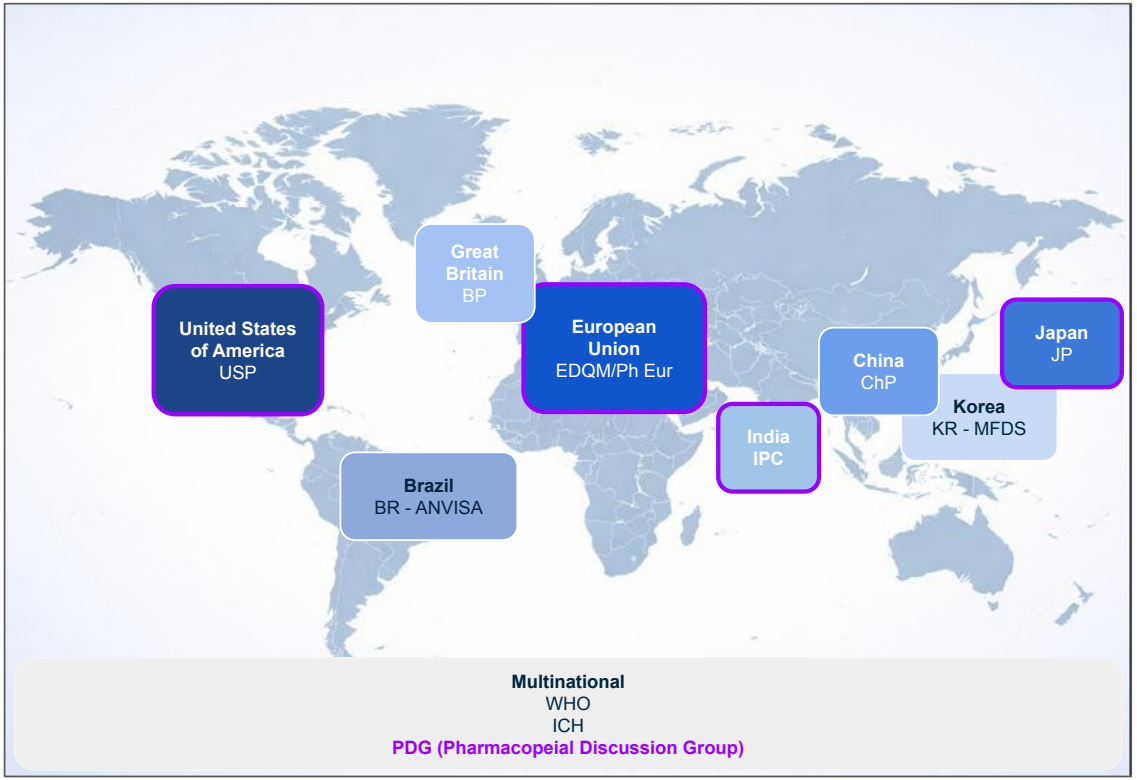
Reference - Redica App 2.0	Observation
Delcath Systems, Incorporated - **Complete Response Letter, 2013-09-12**	Labeling In your resubmission, submit revised draft labeling that addresses the following comments (...) Full Prescribing Information 27. As discussed in CDER's Manual of Policies and Procedures (MAPP) 5020.1, which describes how CDER will **apply the United States Pharmacopeia (USP) Monograph Naming Policy for Salt Drug Substances in Drug Products** and Compounded Preparations (the USP Salt Policy) to prescription drug products to ensure consistent drug product naming **when the USP Salt Policy becomes official on May 1, 2013**, t**he strength of melphalan (hydrochloride), for Injection should be expressed in terms of the active moiety (melphalan base) and the names and strengths of both the active moiety and specific salt forms are to be provided in the labeling."**
MedImmune UK Limited - **MHRA Inspection Report, 2024-10-16**	Microbiology Sterility testing was performed in an isolator using equipment and consumables. **It was noted that the validated sterility test method included which was not considered to be in strict compliance with the BP monograph.** A discussion was held regarding this, and the inspectors to support periodic review of the monograph.
SPC Co., Ltd. - **MFDS - GMP Inspection Results, 2023-07-21**	Summary of findings (corrective/supplementary Items) - Laboratory: **Establish detailed test procedures and test criteria for endotoxin testing**
Stabicon Life Sciences Pvt. Ltd. - **WHO - Public Inspection Report (WHOPIR), 2024-03-15**	**Detailed guidance on pharmacopeial** requirements was typically provided in the general notices and **specific monographs of the pharmacopoeia** or the specifications issued by DAV. Test procedures were adequately described, providing sufficient information for trained analysts to perform analyses reliably and reproducibly.

Redica’s current offering to stay ahead of pharmacopoeial change

Your responses when registering

- As a CDMO, the materials and products mix rapidly changes across sites so it is difficult to ensure all sites are aware of changes and are evaluating for impact to their particular site.
- Staying up to date
- Keeping informed
- Time with keeping up and knowing what to pay attention to.
- Time consuming
- The number of different documents to review for changes

Redica Pharmacopoeia Regulatory Intelligence Focus



- USP as independent body, not affiliated to FDA
- European Pharmacopoeia (Ph. Eur.) published through European Directorate for the Quality of Medicines & HealthCare (EDQM), part of EMA
- ChP published by Chinese Pharmacopoeia Commission under NMPA
- JP published by Japanese Ministry of Health, Labour and Welfare MHLW
- BP published by British Pharmacopoeia Commission under MHRA
- IPC (Indian Pharmacopoeia Commission) under the Ministry of Health & CDSCO
- Brazilian and Korean Pharmacopoeia echoed by ANVISA and MFDS respectively
- PDG signals published by Members: EDQM, IPC, JP or USP
- ICH shaping the analytical method landscape:
  - ICH Q4 dedicated to Pharmacopoeia topics but has not been revised for a while
  - Changes to other ICH Q Guidelines drive changes to analytical methods in the pharmacopoeia (e.g., Q2, Q3C, Q3D, Q3E)
  - Through PDG, those chapters gets harmonized

Redica framework to support Pharmacopoeia compliance

📘 **Official Content**

Publish **Tables of Content** for new issues or supplements containing new or revised texts to become official.

🧪 **Proposed Content**

Publish **Tables of Content** for proposed monographs and general chapters (e.g., USP *PF* and *Pharmeuropa*).

Publish **Draft Content** (Monographs, General Chapters, General Tests, etc.) for comments (ChP) .

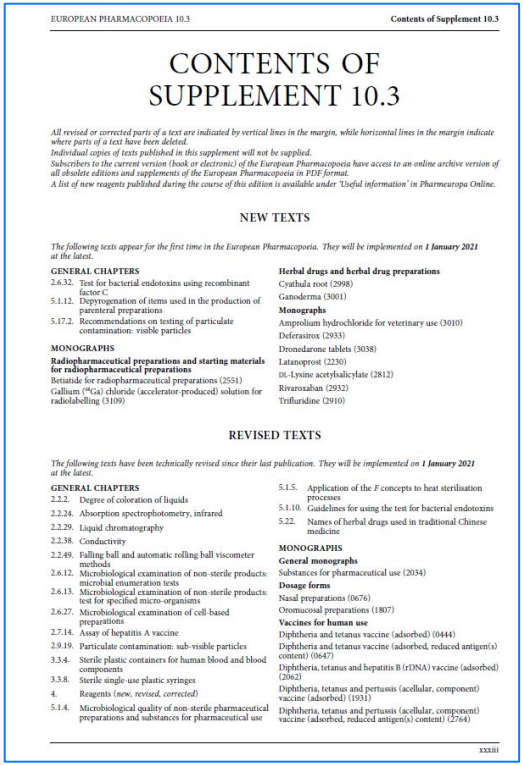
⚠️ **Most of the content is behind the pharmacopoeial online platform paywalls**

- 🔎 **Identification** of new and updated texts based on customer's products and excipients portfolio
- 🌐**Machine Translations provided** of the new and updated texts identified

🔭 **Track Developments -** Track emerging regulatory and pharmacopeial changes.

📢 **News & Announcements -** Share updates/context on changes ("*Hot Spots*" and *"Items on the Horizon"*) and the implementation of new standards.

Surveillance Process Example



EUROPEAN PHARMACOPOEIA 10.3 — Contents of Supplement 10.3

CONTENTS OF SUPPLEMENT 10.3

All revised or corrected parts of a text are indicated by vertical lines in the margin, while horizontal lines in the margin indicate where parts of a text have been deleted.
Individual copies of texts published in this supplement will not be supplied.
Subscribers to the current version (book or electronic) of the European Pharmacopoeia have access to an online archive version of all obsolete editions and supplements of the European Pharmacopoeia in PDF format.
A list of new reagents published during the course of this edition is available under 'Useful information' in Pharmeuropa Online.

NEW TEXTS

The following texts appear for the first time in the European Pharmacopoeia. They will be implemented on ***1 January 2021*** *at the latest.*

GENERAL CHAPTERS

2.6.32. Test for bacterial endotoxins using recombinant factor C
5.1.12. Depyrogenation of items used in the production of parenteral preparations
5.17.2. Recommendations on testing of particulate contamination: visible particles

MONOGRAPHS

Radiopharmaceutical preparations and starting materials for radiopharmaceutical preparations

Betiatide for radiopharmaceutical preparations (2551)
Gallium (^{68}Ga) chloride (accelerator-produced) solution for radiolabelling (3109)

Herbal drugs and herbal drug preparations

Cyathula root (2998)
Ganoderma (3001)

Monographs

Amprolium hydrochloride for veterinary use (3010)
Deferasirox (2933)
Dronedarone tablets (3038)
Latanoprost (2230)
DL-Lysine acetylsalicylate (2812)
Rivaroxaban (2932)
Trifluridine (2910)

REVISED TEXTS

The following texts have been technically revised since their last publication. They will be implemented on ***1 January 2021*** *at the latest.*

GENERAL CHAPTERS

2.2.2. Degree of coloration of liquids
2.2.24. Absorption spectrophotometry, infrared
2.2.29. Liquid chromatography
2.2.38. Conductivity
2.2.49. Falling ball and automatic rolling ball viscometer methods
2.6.12. Microbiological examination of non-sterile products: microbial enumeration tests
2.6.13. Microbiological examination of non-sterile products: test for specified micro-organisms
2.6.27. Microbiological examination of cell-based preparations
2.7.14. Assay of hepatitis A vaccine
2.9.19. Particulate contamination: sub-visible particles
3.3.4. Sterile plastic containers for human blood and blood components
3.3.8. Sterile single-use plastic syringes
4. Reagents (*new, revised, corrected*)
5.1.4. Microbiological quality of non-sterile pharmaceutical preparations and substances for pharmaceutical use
5.1.5. Application of the *F* concepts to heat sterilisation processes
5.1.10. Guidelines for using the test for bacterial endotoxins
5.22. Names of herbal drugs used in traditional Chinese medicine

MONOGRAPHS

General monographs

Substances for pharmaceutical use (2034)

Dosage forms

Nasal preparations (0676)
Oromucosal preparations (1807)

Vaccines for human use

Diphtheria and tetanus vaccine (adsorbed) (0444)
Diphtheria and tetanus vaccine (adsorbed, reduced antigen(s) content) (0647)
Diphtheria, tetanus and hepatitis B (rDNA) vaccine (adsorbed) (2062)
Diphtheria, tetanus and pertussis (acellular, component) vaccine (adsorbed) (1931)
Diphtheria, tetanus and pertussis (acellular, component) vaccine (adsorbed, reduced antigen(s) content) (2764)

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Contents of Supplement 10.3 — EUROPEAN PHARMACOPOEIA 10.3

Diphtheria, tetanus and pertussis (whole cell) vaccine (adsorbed) (0445)
Diphtheria, tetanus and poliomyelitis (inactivated) vaccine (adsorbed, reduced antigen(s) content) (2328)
Diphtheria, tetanus, pertussis (acellular, component) and haemophilus type b conjugate vaccine (adsorbed) (1932)
Diphtheria, tetanus, pertussis (acellular, component) and hepatitis B (rDNA) vaccine (adsorbed) (1933)
Diphtheria, tetanus, pertussis (acellular, component) and poliomyelitis (inactivated) vaccine (adsorbed) (1934)
Diphtheria, tetanus, pertussis (acellular, component) and poliomyelitis (inactivated) vaccine (adsorbed, reduced antigen(s) content) (2329)
Diphtheria, tetanus, pertussis (acellular, component), hepatitis B (rDNA), poliomyelitis (inactivated) and haemophilus type b conjugate vaccine (adsorbed) (2067)
Diphtheria, tetanus, pertussis (acellular, component), poliomyelitis (inactivated) and haemophilus type b conjugate vaccine (adsorbed) (2065)
Diphtheria, tetanus, pertussis (whole cell) and poliomyelitis (inactivated) vaccine (adsorbed) (2061)
Diphtheria, tetanus, pertussis (whole cell), poliomyelitis (inactivated) and haemophilus type b conjugate vaccine (adsorbed) (2066)
Tetanus vaccine (adsorbed) (0452)

Vaccines for veterinary use

Tetanus vaccine for veterinary use (0697)

Herbal drugs and herbal drug preparations

Belamcanda chinensis rhizome (2561)
Caraway fruit (1080)
Clove (0376)
Hawthorn leaf and flower (1432)
Hawthorn leaf and flower dry extract (1865)
Hawthorn leaf and flower liquid extract (1864)
Lime flower (0957)
Lovage root (1233)
Opium dry extract, standardised (1839)
Passionflower herb (1459)
Passionflower herb dry extract (1882)

Homoeopathic preparations

Homoeopathic preparations (1038)
Pillules for homoeopathic preparations (2153)

Monographs

Acamprosate calcium (1585)
Acetylcysteine (0967)
Adrenaline (2303)
Ascorbyl palmitate (0807)
Bambuterol hydrochloride (1293)
Betamethasone (0312)
Betamethasone acetate (0975)
Betamethasone dipropionate (0809)
Bleomycin sulfate (0976)
Borax (0013)
Calcium carbonate (0014)
Calcium chloride dihydrate (0015)
Calcium sulfate dihydrate (0982)
Celiprolol hydrochloride (1632)
Cetostearyl alcohol (0702)
Codeine monohydrate (0076)
Codeine phosphate hemihydrate (0074)
Cod-liver oil, farmed (2398)
Cyanocobalamin (0547)
Danaparoid sodium (2090)
Deferiprone oral solution (2987)
Deferiprone tablets (2986)
Dexamethasone (0388)
Dexamethasone acetate (0548)
Dipotassium phosphate (1003)
Disodium phosphate (1509)
Disodium phosphate dihydrate (0602)
Disodium phosphate dodecahydrate (0118)
Epinastine hydrochloride (2411)
Epirubicin hydrochloride (1590)
Ergotamine tartrate (0224)
Etanercept (2895)
Everolimus (2918)
Fluoxetine hydrochloride (1104)
Human coagulation factor IX (rDNA) concentrated solution (2522)
Human coagulation factor IX (rDNA) powder for solution for injection (2994)
Infliximab concentrated solution (2928)
Isoconazole (1018)
Isoconazole nitrate (1017)
Ketoconazole (0921)
Labetalol hydrochloride (0923)
Lacosamide infusion (2991)
Lacosamide oral solution (2990)
Lacosamide tablets (2989)
Lactose (1061)
Lactose monohydrate (0187)
Letrozole (2334)
Magnesium chloride hexahydrate (0402)
Magnesium hydroxide (0039)
Magnesium oxide, heavy (0041)
Magnesium oxide, light (0040)
Magnesium sulfate heptahydrate (0044)
Mexiletine hydrochloride (1029)
Minocycline hydrochloride dihydrate (1030)
Moxifloxacin hydrochloride (2254)
Mupirocin (1450)
Mupirocin calcium (1451)
Mycophenolate sodium (2813)
Ofloxacin (1455)
Omega-3-acid triglycerides (1352)
Pentobarbital (0200)
Pentobarbital sodium (0419)
Potassium chloride (0185)
Potassium clavulanate (1140)
Potassium clavulanate, diluted (1653)
Prednisolone acetate (0734)
Prednisone (0354)
Primidone (0584)
Raltegravir chewable tablets (2939)
Raltegravir tablets (2938)
Rosuvastatin tablets (3008)
Salmon oil, farmed (1910)
Silver, colloidal (2281)
Sitagliptin tablets (2927)
Sodium acetate trihydrate (0411)
Sodium carbonate (0773)
Sodium carbonate decahydrate (0191)
Sodium carbonate monohydrate (0192)
Sodium dihydrogen phosphate dihydrate (0194)

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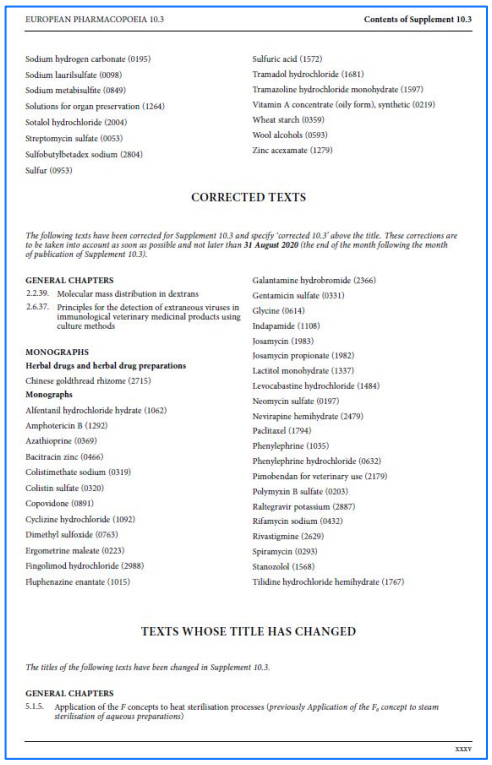

EUROPEAN PHARMACOPOEIA 10.3 — Contents of Supplement 10.3

Sodium hydrogen carbonate (0195)
Sodium laurilsulfate (0098)
Sodium metabisulfite (0849)
Solutions for organ preservation (1264)
Sotalol hydrochloride (2004)
Streptomycin sulfate (0053)
Sulfobutylbetadex sodium (2804)
Sulfur (0953)
Sulfuric acid (1572)
Tramadol hydrochloride (1681)
Tramazoline hydrochloride monohydrate (1597)
Vitamin A concentrate (oily form), synthetic (0219)
Wheat starch (0359)
Wool alcohols (0593)
Zinc acexamate (1279)

CORRECTED TEXTS

The following texts have been corrected for Supplement 10.3 and specify 'corrected 10.3' above the title. These corrections are to be taken into account as soon as possible and not later than ***31 August 2020*** *(the end of the month following the month of publication of Supplement 10.3).*

GENERAL CHAPTERS

2.2.39. Molecular mass distribution in dextrans
2.6.37. Principles for the detection of extraneous viruses in immunological veterinary medicinal products using culture methods

MONOGRAPHS

Herbal drugs and herbal drug preparations

Chinese goldthread rhizome (2715)

Monographs

Alfentanil hydrochloride hydrate (1062)
Amphotericin B (1292)
Azathioprine (0369)
Bacitracin zinc (0466)
Colistimethate sodium (0319)
Colistin sulfate (0320)
Copovidone (0891)
Cyclizine hydrochloride (1092)
Dimethyl sulfoxide (0763)
Ergometrine maleate (0223)
Fingolimod hydrochloride (2988)
Fluphenazine enantate (1015)
Galantamine hydrobromide (2366)
Gentamicin sulfate (0331)
Glycine (0614)
Indapamide (1108)
Josamycin (1983)
Josamycin propionate (1982)
Lactitol monohydrate (1337)
Levocabastine hydrochloride (1484)
Neomycin sulfate (0197)
Nevirapine hemihydrate (2479)
Paclitaxel (1794)
Phenylephrine (1035)
Phenylephrine hydrochloride (0632)
Pimobendan for veterinary use (2179)
Polymyxin B sulfate (0203)
Raltegravir potassium (2887)
Rifamycin sodium (0432)
Rivastigmine (2629)
Spiramycin (0293)
Stanozolol (1568)
Tilidine hydrochloride hemihydrate (1767)

TEXTS WHOSE TITLE HAS CHANGED

The titles of the following texts have been changed in Supplement 10.3.

GENERAL CHAPTERS

5.1.5. Application of the *F* concepts to heat sterilisation processes (*previously Application of the F_0 concept to steam sterilisation of aqueous preparations*)

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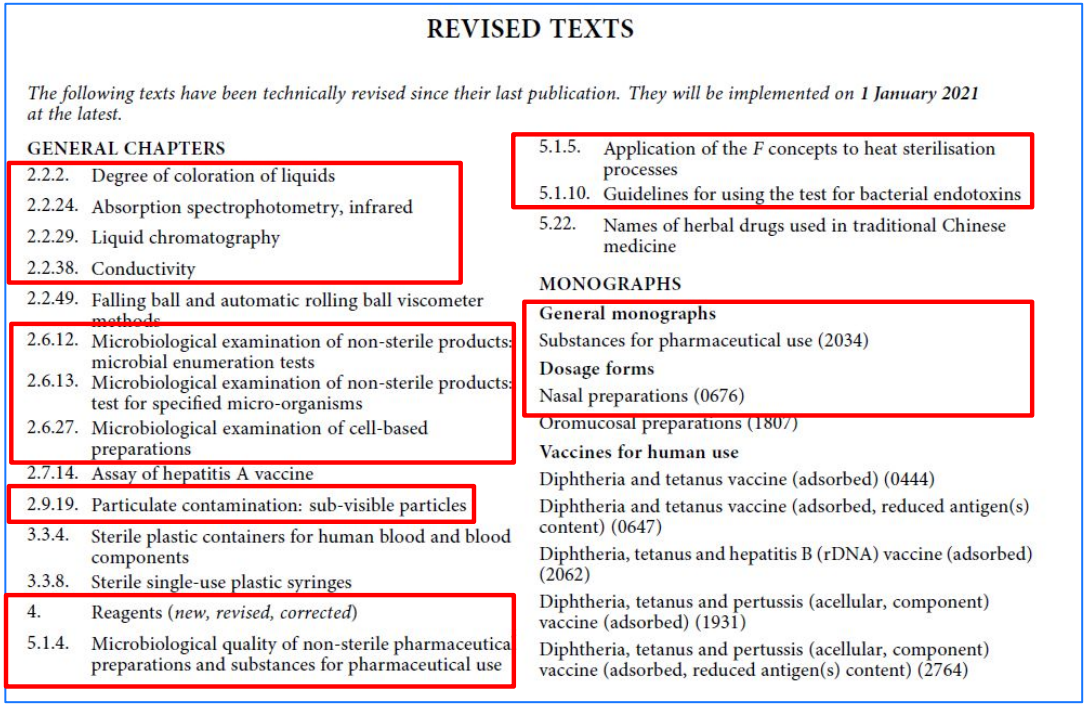
Ph. Eur. Supplement 10.3 – total 190 items listed

Surveillance Process Example

59 of the 190 items have potential impact to company X.

SMEs will review text and assess change impact.



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5.22. Names of herbal drugs used in traditional Chinese medicine

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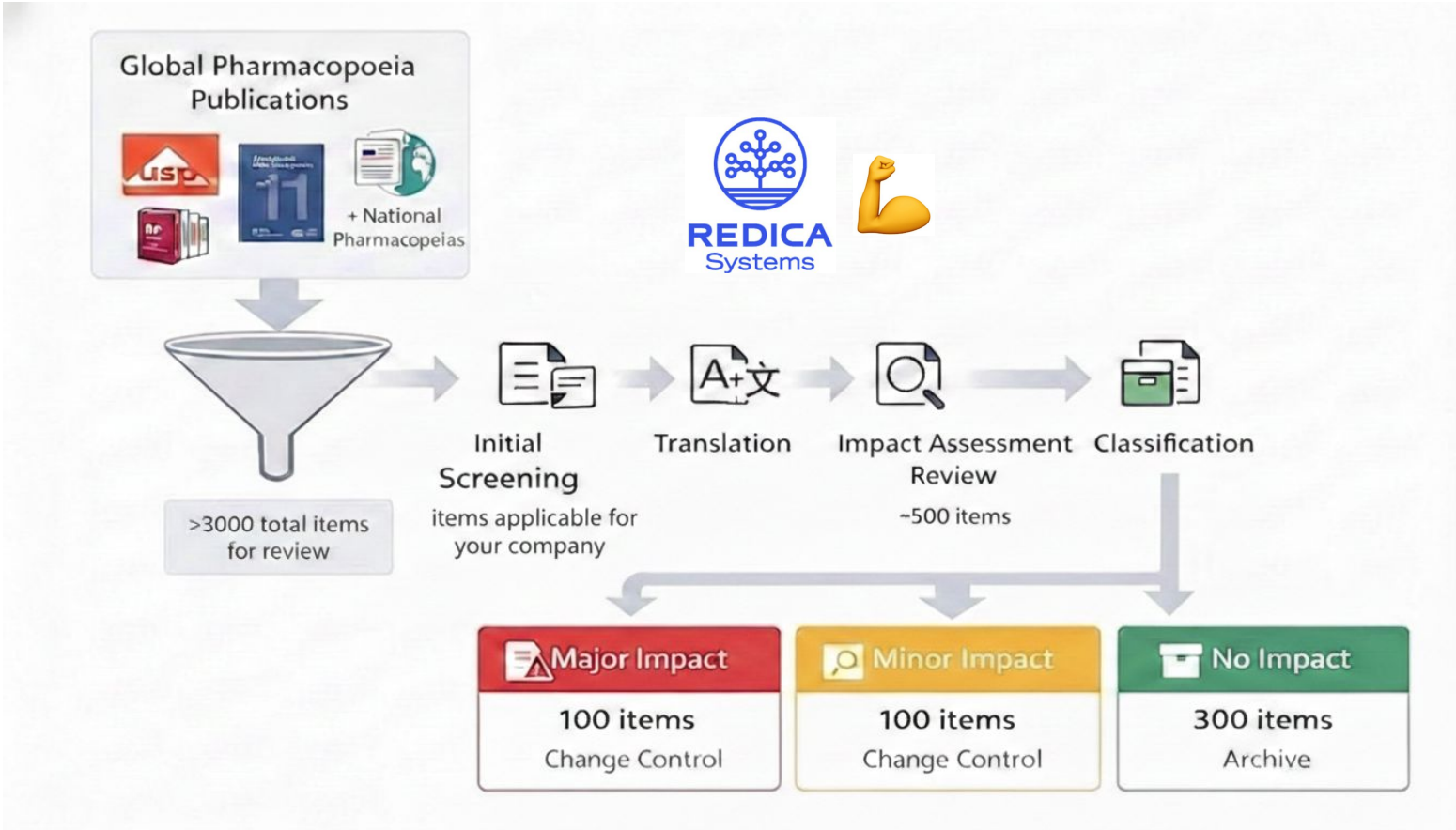
Diphtheria, tetanus and pertussis (acellular, component) vaccine (adsorbed, reduced antigen(s) content) (2764)

Filtering global pharmacopoeia publications for impact

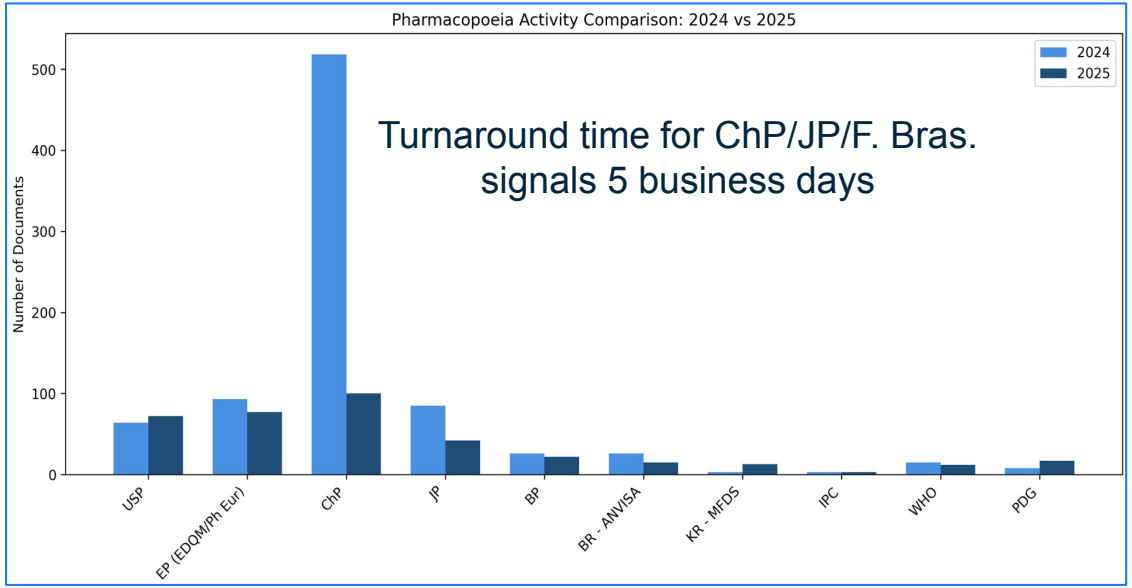


Redica - Call for Experts

- Redica Systems seeks feedback on requirements to design an assessment tool tailored to pharmacopoeia users and internal SMEs.
- Specialists experienced in pharmacopoeia monitoring, triaging and assessment are needed to provide input on these requirements
- **To participate, email events@redica.com**

Pharmacopoeia Retrospective 2025
Hot Spots

Noticeable evolution in publications



Chinese Pharmacopoeia - 2024
front-loaded ahead of ChP 2025 edition

Japanese Pharmacopoeia
JP19 finalization, next edition preparation

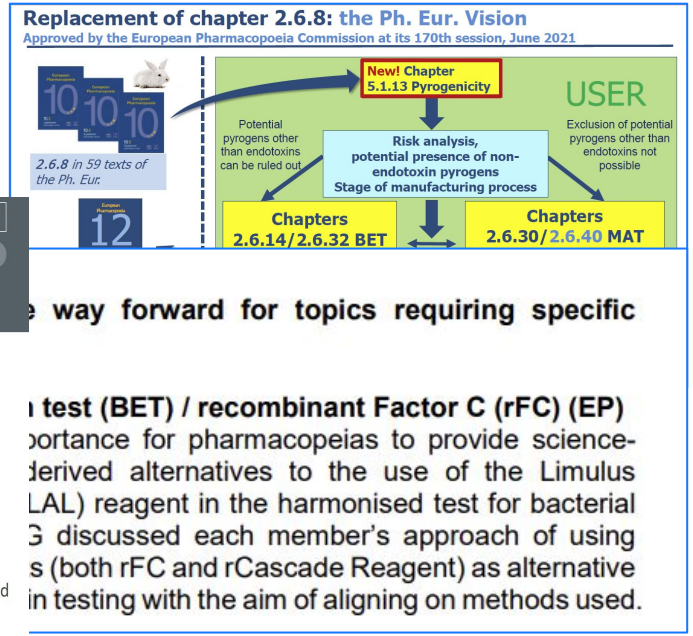
PDG

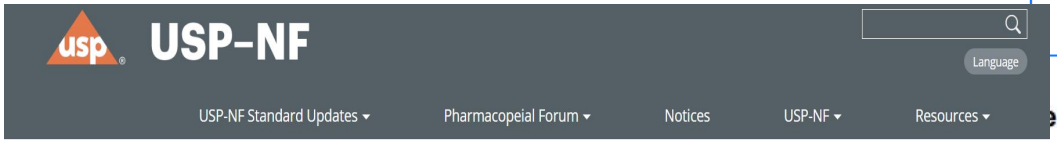
- India's inclusion and Korea's trial membership
- Expanded harmonization driven by bilateral and trilateral monograph development
- Countries outside the PDG are aligning (e.g., Brazil, China, Mexico)

Hot Spots: Animal Welfare

Stronger regulatory emphasis on Reduce, Refine, Replace **(3Rs)** supported by pharmacopoeial shifts:

- New reagent for Endotoxin testing
- Elimination of the Rabbit Pyrogen Test
  - Pace of change globally
  - Being discussed at “PDG to globally harmonize





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Call for Submissions: Data to Support Alternative Pyrogen Tests

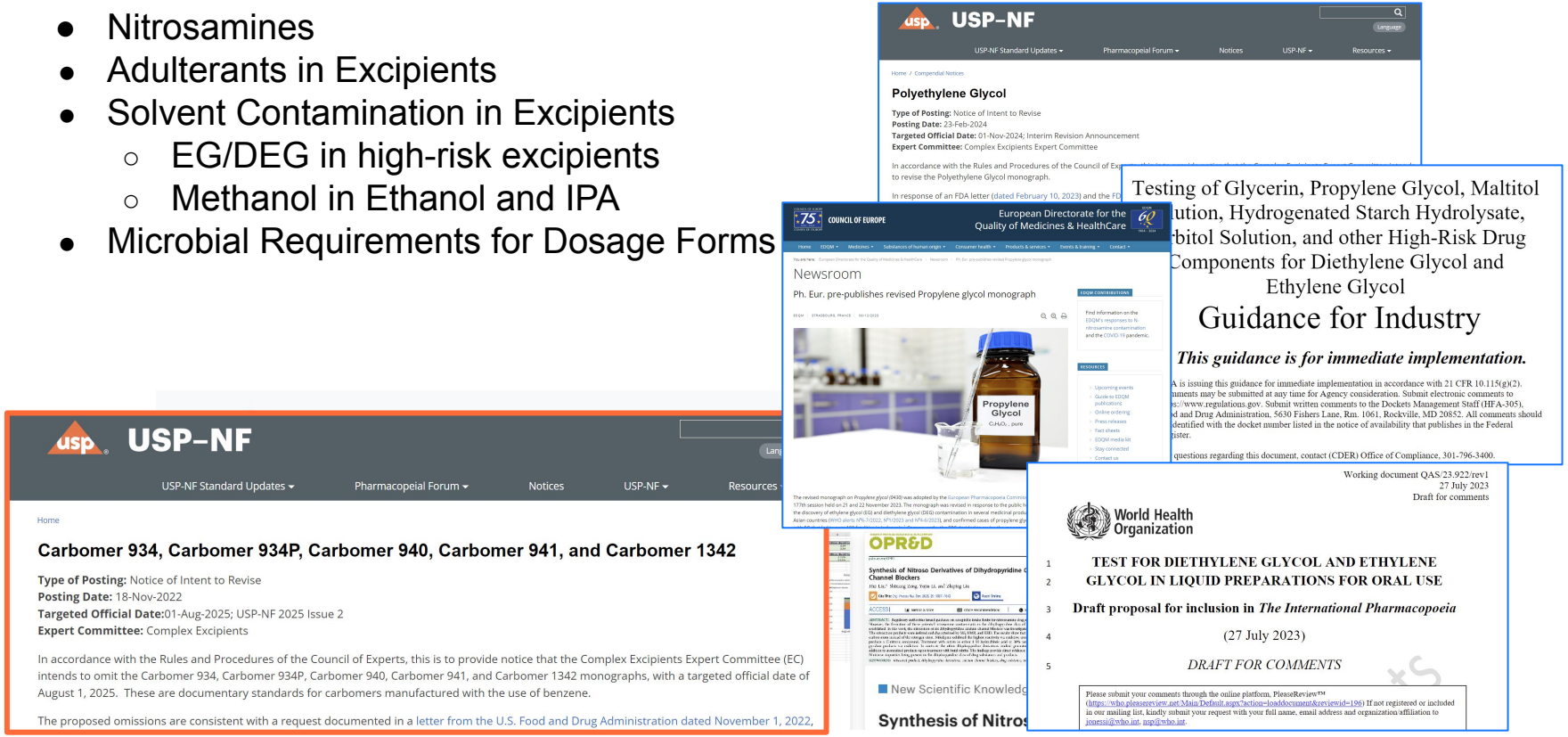
Type of Notice: General Announcement
Posting Date: 27-Feb-2026
Input Deadline: 01-May-2026

The United States Pharmacopeia (USP) is planning to convene an **Expert Panel on Modern Alternatives to Pyrogen Testing** to evaluate the suitability of non-animal pyrogen detection methods as alternatives to the **Rabbit Pyrogen Test (RPT)** described in <151> *Pyrogen Test.* This would include evaluation of potential non-endotoxin pyrogen analytical reference standards.

To support the work of this Expert Panel, USP is requesting that stakeholders submit **scientific, technical, and validation data** related to the use of alternative pyrogen tests, including, but not limited to, the **Monocyte Activation Test (MAT)** and other in vitro or non-animal methods.

Hot Spots: Impurities Management

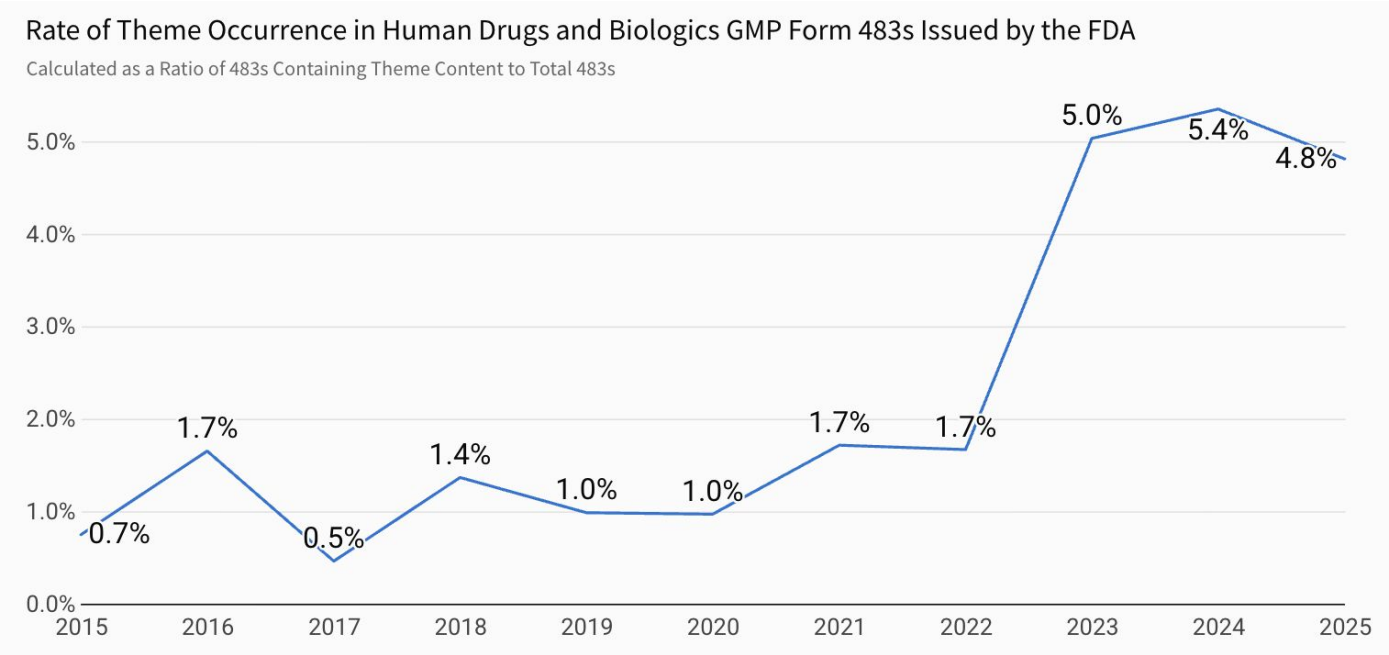
- Nitrosamines
- Adulterants in Excipients
- Solvent Contamination in Excipients
  - EG/DEG in high-risk excipients
  - Methanol in Ethanol and IPA
- Microbial Requirements for Dosage Forms



Top FDA Guidances Mentioned in Warning Letters

# of Warning Letters	Year of Date Issued (DOCUMENT_ES_COMPOSITE)										
Guidance Document	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Grand total
Quality Systems Approach to Pharmaceutical Current Good Manufacturing Practice Regulations		3	9	41	15	5	23	28	52	64	240
Process Validation: General Principles and Practices	1	14	22	28	20	4	14	21	27	28	179
Data Integrity and Compliance With Drug CGMP				24	17	5	14	12	19	18	109
Contract Manufacturing Arrangements for Drugs: Quality Agreements		9	11	23	8	5	9	15	11	15	106
Testing of Glycerin, Propylene Glycol, Maltitol Solution, Hydrogenated Starch Hydrolysate, Sorbitol Solution, and Other High-Risk Drug Components for Diethylene Glycol and Ethylene Glycol								13	29	25	67
Investigating Out-of-Specification (OOS) Test Results for Pharmaceutical Production	1	5	9	10	5	2	10	5	5	9	61
Sterile Drug Products Produced by Aseptic Processing	3	5	6	7	6	1	4	5	5	7	49
Policy for Testing of Alcohol (Ethanol) and Isopropyl Alcohol for Methanol							7	7	12	10	36
Q7 Good Manufacturing Practice Guidance for Active Pharmaceutical Ingredients		7	5	3	2	2	3	1	3	7	33
Testing of Glycerin for Diethylene Glycol		2	7	7	6		3	6	1		32
Circumstances that Constitute Delaying, Denying, Limiting, or Refusing a Drug or Device Inspection		4	1	1			1		3	2	12
Analytical Procedures and Methods Validation for Drugs and Biologics				1	1	1	3		2		8
PET Drug Products - Current Good Manufacturing Practice (CGMP)			1	2			1			1	5

FDA Form 483 Occurrence for High Risk Excipients



REDICA Systems

FDA is continuing to issue 483s in 2025 that mention issues with “glycerin” “diethylene glycol” and/or “ethylene glycol”. Warning Letters potentially to follow…

More items on the Horizon

More Items on the Horizon

Impact of Innovation Driving Introduction of Flexible Monographs

"By listening attentively to the needs of both regulators and industry and **rapidly incorporating new technological advances,** pharmacopoeias can ensure that their content remains relevant and state-of-the-art and that their quality standards and methods are not only able to ensure the safety and efficacy of medicines but **reflect advances in technology and science.** This proactive course is matched by an ability to **react swiftly to emerging challenges and with a large degree of flexibility** (through alternative methods)".

S. Keitel, "The Pharmacopeia in the 21st Century," PDA.org, PDA Letter, April 2019.

More items on the Horizon

Standards for Complex Biologics

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Horizontal Standard Development Beyond Product Class

- *2.5.44 Capillary isoelectric focusing for recombinant therapeutic monoclonal antibodies:*
  - cIEF procedure and imaged cIEF for analysis of charge heterogeneity of mAbs, to monitor identity, quality, production consistency
  - based on data generated in multi-laboratory verification study
  - guidance on the aspects to consider for product-specific application (validation)

- *2.5.43 Size exclusion chromatography for recombinant therapeutic monoclonal antibodies:*
  - widely used methodology for determination of size variants (monomer, HMWS); quantitation of LMWS can be highly variable depending on the mAb analysed
  - SE-HPLC and SE-UPLC procedures, widely applicable to mAbs, given as examples
  - suitability demonstrated by collaborative study

➡ well-defined analytical procedures and **tools to control performance** (including reference materials) and facilitate analytical assessment of key quality attributes of mAbs

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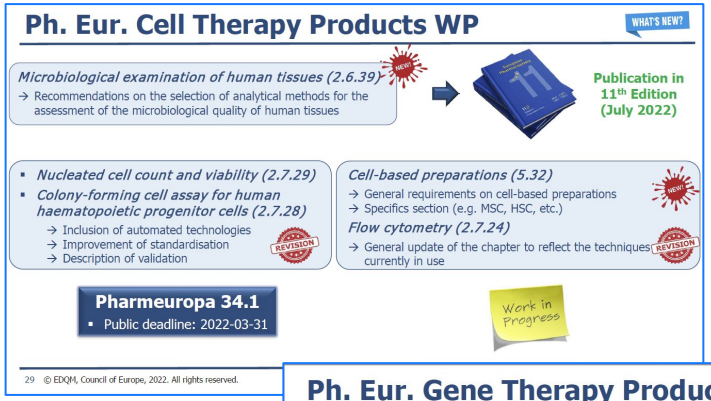
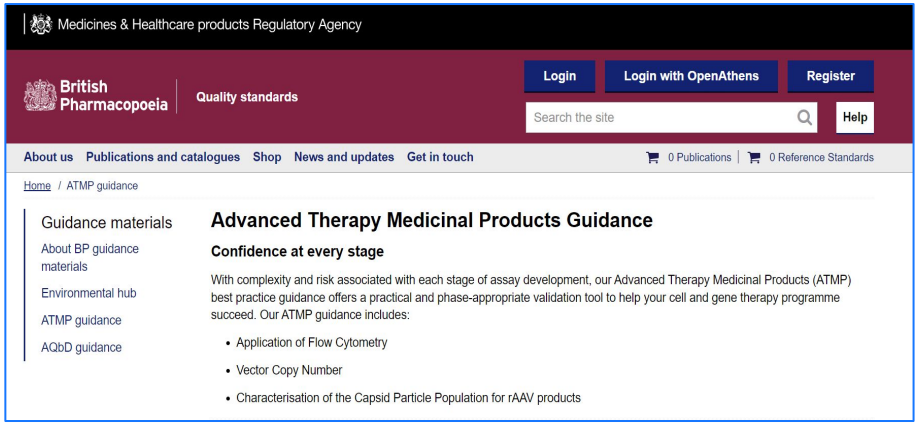
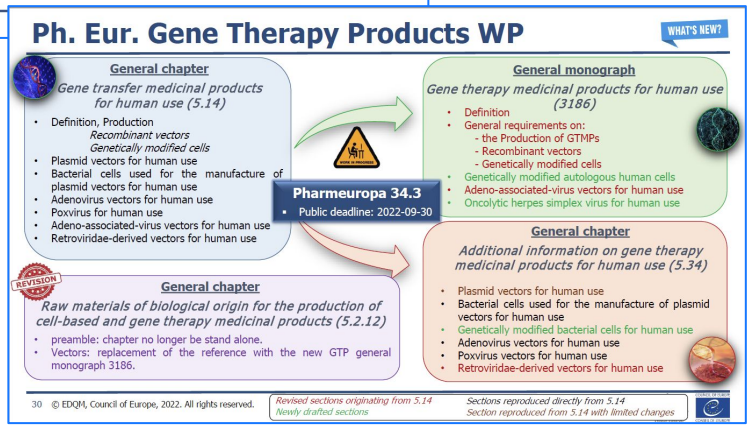
More items on the Horizon

Cell & Gene Therapy







More items on the Horizon

Environmental Sustainability

Medicines & Healthcare products Regulatory Agency

British Pharmacopoeia | Quality standards

Environmental Sustainability Information Pack

An overview of key resources and case studies on how to improve the environmental impact of your laboratory and quality control testing.

Published March 2024

USP's commitment to fostering a healthier, more sustainable world

At the U.S. Pharmacopeia (USP) we recognize that fulfilling our mission to improve public health through quality standards and related programs can also help to address pressing social and environmental challenges. To build on progress made in helping to meet these challenges, USP has expanded its approach to embedding key environmental, social, and operational considerations across the organization.

Sustainability commitment

As a private, nonprofit standards-setting organization driven by its public health mission, USP is committed to fostering a healthier, more sustainable world. This includes helping to address environmental and social challenges in areas most relevant to USP's operations, standards-setting activities, and stakeholder priorities, and where USP's work can have a disproportionately positive impact.

With this imperative in mind, USP is working to adopt select sustainability reporting metrics – encompassing social, environmental, and operational considerations – that can provide added transparency into USP's impact.

More items on the Horizon

Risk Management approaches

- **Analytical Quality by Design** (AQbD)
  - First monograph – Atorvastatin Tablets published BP 2023 with “additional method understanding” to provide assurance of the analytical procedure and highlight sensitivities (boundary conditions) of the analytical procedures design space.
  - Further supplemented by ICH Q2(R2) and ICH Q14 which an updated analytical validation guidance and AQbD guidance.
  - **Companies should expect new general chapters in the pharmacopoeias will follow**.

- **Continuous manufacturing** (CM)
  - **Still evolving topic for the pharmacopoeias**
  - Ph. Eur. and USP make it clear that PAT and RTRT are acceptable alternatives to ensure compliance with the pharmacopoeia.
  - Ph. Eur. General Chapter 5.28 – Multivariate Statistical Process Controls – first by a pharmacopoeia to publish such a chapter.

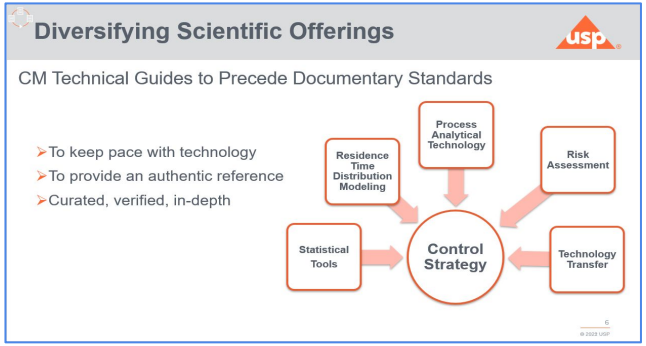
Analytical Quality by Design Guidance (AQbD)

Why are we exploring AQbD?

Quality by Design (QbD) is a systematic approach to development that begins with predefined objectives and emphasises product and process understanding and process control, based on sound science and quality risk management. As a concept, it aims to assure the quality of medicines by using enhanced approaches to design, development and manufacture of medicinal products. The application of QbD principles to analytical methods, Analytical Quality by Design (AQbD), is being explored by industry, regulators, and academia.

Pharmacopoeial standards are a key component of a regulatory framework. For medicinal products in the UK, they are published in the British Pharmacopoeia (BP), a publication of the MHRA. Pharmacopoeial standards evolve with advances in the manufacture of medicinal products.

The MHRA is exploring how AQbD may apply to pharmacopoeial standards through the BP's AQbD working party, which brings together BP scientists with MHRA assessors and inspectors as well as the Therapeutic Goods Administration of Australia (TGA), multinational biopharmaceutical manufacturers, the generics manufacturing industry and experts in the field of metrology.



Bringing it all together

- "**Pharmaceutical manufacturers must establish** acceptance criteria, analytical procedures, storage conditions, labeling, and other product requirements **consistent with the applicable pharmacopoeias.**"

- "However, **pharmacopoeial requirements are not static**, and monitoring of pharmacopoeias is necessary to ensure continued compliance."

- "…**continued compliance demands** that companies…**be alert to changes.**"

Neil A. Schwarzwalder and Rafik H. Bishara,
Establishing a Process for Pharmacopoeial Review and Interaction American Pharmaceutical Review,
Vol. 7(4), pp. 53-57 (Jul-Aug 2004)

To request a demo of Redica's Regulatory Intelligence Platform, use this QR code:

To participate in our Call for Experts, email events@redica.com

Questions & Answers

Thank you!