Biosimilars

OVERVIEW

Biosimilars explain the science, manufacturing technology, and regulatory requirements for receiving approval to market biosimilar products. Beginning with an overview of protein structure, function and production, the class hones in on different types of biologics and how each mitigates disease. The Manufacturing section highlights how conditions can alter a biosimilar, causing it to function differently than its reference product. The Safety and Regulation section examines immunogenicity and approaches to demonstrating biosimilar safety and efficacy that have been acceptable to the FDA and EMA. The class ends with four case studies demonstrating real-world complexity of biosimilar science, manufacturing and regulatory challenges.

Five Takeaways:

1. Demonstrate how a biosimilar's structure dictates its function.
2. Discuss how post-translational modifications can change a protein's intended function.
3. Learn how biosimilars may differ from their reference product due to the manufacturing process.
4. Explain FDA and EMA requirements for biosimilar approval and the underlying scientific, quality, and regulatory principles involved.
5. List general preclinical and clinical considerations, and state the FDA's Totality-of-the-Evidence approach.

AGENDA

Proteins

- Protein types and their functions
  - Enzymes, antibodies, receptors
- Protein synthesis: transcription and translation
- Protein structure and how it determines function
- Post-translational modifications
  - Purpose of glycosylation and phosphorylation

Biologics

- Biologics in healthcare
- Characteristics of biologics
- Small molecule drugs vs biologics

Biosmilars

- The product is the process
- Generic vs biosimilar
- FDA and EMA biosimilar regulatory process

Manufacturing

- Establishing production cell lines
- Cell bank types and purposes
- Same gene can produce a different protein
- Upstream process: cell culture seeding and scale-up
- Downstream processing: harvesting and purification
- Biosimilar formulation
- Stability studies

Safety and Regulation

- Protein complexity
- Immunogenicity
- Clinical impact of neutralizing and non-neutralizing antibodies
- Data exclusivity
- Gaining approval for biosimilars
  - Preclinical and clinical trials

Biosimilar Case Studies

- **Case Study 1:** Changes In Amino Acid Sequence Affect Properties Of Biologics
- **Case Study 2:** Impurity Profile May Results In Differences In Immunogenicity
- **Case Study 3:** Careful Analysis Of Proposed Biosimilar Product May Detect Significant Differences Before Clinical Trials
- **Case Study 4:** Packaging Changes May Have Serious Safety Consequences