PHARMSOL NEWS

Complex Generics & Its Opportunities

JANUARY 2025 EDITION *PSNL/003/01/2025*

The pharmaceutical industry has undergone a significant shift in recent years, transitioning from a focus on simple generics to the development of more complex generics. This shift is driven by a combination of evolving market dynamics, technological advancements, and regulatory changes. As patents for many high-cost biologics and specialty drugs expire, the opportunity to offer affordable alternatives that retain the same therapeutic benefits has expanded.

Injectables present a major opportunity, especially in oncology and hospital settings. These products often require advanced manufacturing processes, and even minor variations in formulation or production can have a profound impact on efficacy and safety. Generic manufacturers who can navigate these complexities are well-positioned to access high-revenue markets, with oncology continuing to experience substantial growth.

What Are Complex Generic Products?

Complex generic products typically possess one or more of the following characteristics:

- **Complex Active Ingredients**: These can include complex mixtures of active pharmaceutical ingredients (APIs), polymeric compounds, or peptides.
- **Complex Formulations**: Examples include liposomes, suspensions, emulsions, and gels.
- **Complex Routes of Delivery**: This includes locally acting drugs such as dermatological formulations and inhalational drugs.
- **Complex Dosage Forms**: Examples are long-acting injectables, implants , transdermal patches, and metered-dose inhalers (MDIs).
- **Complex Drug-Device Combinations**: This category encompasses inhalers, injectables, and other combination products.

Other factors that contribute to the complexity of these products include challenges in scale-up, unclear regulatory pathways, and difficulties in manufacturing or administering these products.

Complex Injectable Products

Complex injectable products represent a significant advancement in the pharmaceutical industry, providing enhanced therapeutic options for patients with chronic, severe, or difficult-to-treat conditions. These products, which include biologics, long acting injectables, and those utilizing advanced technologies such as nanoparticles or liposomes, offer numerous opportunities to improve treatment outcomes, increase patient compliance, and address unmet medical needs.

These products are generally categorized based on the complexities associated with the drug substances (e.g., Copaxone® – Glatiramer acetate injection), excipients, dosage forms (e.g., Sandostatin LAR® Depot – Octreotide acetate injectable suspension), and drug-device combinations (e.g., EpiPen® – Epinephrine pre-filled auto-injector).

The following image provides a detailed breakdown of each category of complex injectable products.

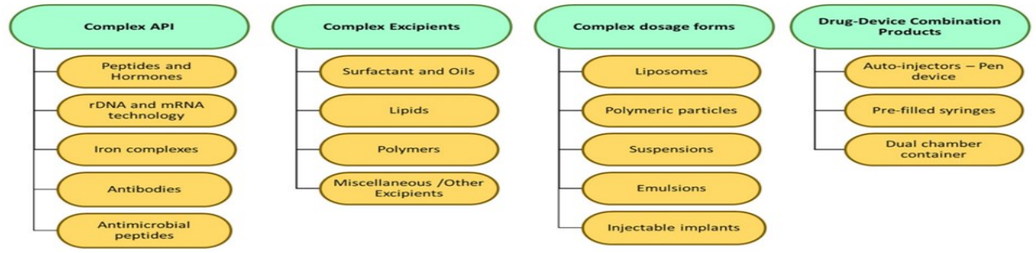
Some of the primary advantages include:

1. Improved Bioavailability
2. Targeted Drug Delivery
3. Sustained or Controlled Release
4. Enhanced Stability
5. Ability to Deliver Large or Complex Molecules
6. Minimized First-Pass Metabolism
7. Potential for Personalized Medicine
8. Better Management of Acute and Chronic Diseases

Overall, complex injectable products provide more efficient, effective, and targeted treatment options.

Challenges Associated with Complex Injectable Products:

- Adoption of advanced technologies for formulation development addressing the challenges related to stability, bioavailability, and controlled release of complex injectable products Comprehensive characterization of APIs, excipients, and finished products.



- Complex manufacturing processes and challenges related to scale-up
- Rigorous product-specific in vitro and in vivo bioequivalence requirements
- Ambiguity in regulatory requirements

Uncertainty surrounding the regulatory filing pathway for approval.

Types of Bioequivalence studies required for Complex Injectable products.

For complex injectable products, bioequivalence studies are crucial to demonstrate that a generic or biosimilar product performs similarly to the reference product in terms of safety, efficacy, and quality. These studies are typically more complex than those for oral medications due to the intricacies of injectables, especially when dealing with biologics or other complex formulations.

Below are the main types of bioequivalence studies recommended for complex injectable products:

- Pharmacokinetic (PK) Bioequivalence Studies
- Clinical Bioequivalence Studies
- In Vitro Bioequivalence Studies
- In Vivo Bioequivalence Studies
- Immunogenicity Studies (For Biologics)
- Therapeutic Equivalence Studies
- Comparative Pharmacodynamic (PD) Studies
- Bio similarity Studies (For Biologics)

Bioequivalence studies for complex injectables are multi-faceted and typically involve a combination of pharmacokinetic, clinical, in vitro, and immunogenicity assessments, depending on the type of injectable product, its composition, similarity to the reference product, patient safety and efficacy and regulatory requirements. All major regulatory bodies provide product-specific guidance for BE studies. However, in the absence of such guidance, the generic manufacturer should consult with the relevant regulatory authority before initiating BE studies.

Conclusion

The future of complex injectables is bright, with ample opportunities for generic players willing to invest in the necessary technology, expertise, and regulatory compliance. As the pharmaceutical industry continues to evolve, the demand for complex generics, particularly injectables, will only grow.

How PharmSol Helps

- **Providing Scientific advice right thru Conceptualization to product launch**
- **Development and Technology Transfer of Complex Injectable Products**
- **Execution of Bioequivalence Studies as per regulatory requirements**

End to End services for Compilation of Dossier and Regulatory Filing, market access

Get in touch with our experts inquiries@pharm-sol.com or info@pharm-sol.com
DO NOT REPLY TO THIS E-MAIL! If you have any questions, please write to info@pharm-sol.com
If you do not wish to receive any further Newsletter from us, please write to info@pharm-sol.com
Past issues of "PharmSol Newsletters" can be found in www.pharm-sol.com