Master Thesis

Physiologically based pharmacokinetic modelling (PBPK) of protein therapeutics

The Project

Protein therapeutics play a critical role in modern medicine by offering targeted treatment for various diseases, including cancer, age related macular degeneration, and other modalities. However, the efficacy of these biologics, particularly when administered via intra-ocular routes, is influenced by numerous physiological factors, necessitating detailed analysis through Physiologically Based Pharmacokinetic (PBPK) modelling. PBPK models simulate the absorption, distribution, metabolism, and excretion (ADME) of drugs within the body, utilizing physiological parameters that provide crucial insights for optimizing drug efficacy and safety.
Recent advancements in PBPK modelling have deepened our understanding of how protein therapeutics interact within the complex biological landscape of the body, including specific challenges related to intra-ocular drug delivery. These models incorporate detailed representations of biological processes and are increasingly used to predict how variations in biological and environmental factors impact drug behaviour. However, integrating protein-specific interactions in various tissues, especially within the unique environment of the eye, remains a challenge.
The goal of this project is to develop and refine PBPK models to accurately predict the pharmacokinetics of protein therapeutics with a specific focus on intravitreal disposition. By achieving this, we aim to improve therapeutic profiles and individualize treatment plans, ultimately enhancing clinical outcomes for patients requiring ocular treatments.

In this project, you will:
- Begin by reviewing current literature on PBPK models related to protein therapeutics, understanding key physiological and molecular factors that influence drug behaviour.
- Identify critical parameters and interactions that need refinement in existing models.
- Use computational tools (PK-sim, R) and techniques, such as sensitivity analysis and simulation, to improve the accuracy and predictability of PBPK models.

What do we expect from you?
- Fluency in English (oral and written)
- Background in pharmacology, bioengineering, computational biology, or a related field.
- Strong interest in pharmacokinetics and pharmacodynamics.
- Experience with mathematical modelling using R and computational modelling is a plus.

How can we support you?
We offer you an introduction in the field of PBPK modelling techniques, inclusion in a dynamic research team at our institute, and support for your project milestones and thesis completion.

Contact

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