



w : Pharmacokinetics; Drug metabolism; Molecular pathways; Metabolic rates; Personalized medicine

Navigating the landscape of drug metabolism is akin to embarking on a journey through a complex and dynamic terrain, where molecular pathways, enzymatic reactions, and physiological interactions intertwine to shape the fate of pharmaceutical compounds within the body. Understanding the mechanisms underlying drug metabolism is paramount for optimizing drug efficacy, minimizing adverse effects, and guiding therapeutic interventions. In this introduction, we embark on a voyage through the intricate world of drug metabolism, exploring the diverse models and mechanisms employed to unravel its complexities [1].

: w - patients. As our knowledge of drug metabolism continues to expand, these models will play an increasingly vital role in shaping the future of

Systems biology models offer a holistic perspective on drug metabolism by integrating metabolic pathways with broader systems-level interactions within the body. These models encompass complex networks of molecular interactions, signaling pathways, and regulatory mechanisms that govern drug metabolism and its physiological consequences [9]. Systems biology models leverage techniques such as mathematical modeling, bioinformatics, and network analysis to elucidate the interconnectedness of metabolic pathways, cellular responses, and organismal physiology. By capturing the dynamic interplay between drug metabolism, pharmacodynamics, and systemic effects, systems biology models enhance our understanding of drug action, toxicity, and therapeutic responses. These models have applications in drug discovery, personalized medicine, and systems pharmacology, facilitating the development of novel therapeutics and predictive tools for precision medicine [10].

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The diverse models of drug metabolism discussed in this article offer complementary approaches to understanding the mechanisms, kinetics, and systems-level interactions underlying drug metabolism. From mechanistic insights into molecular pathways to quantitative predictions of metabolic rates and systemic effects, these models provide essential tools for drug discovery, development, and clinical practice. By leveraging the power of modeling and simulation, researchers can unravel the complexities of drug metabolism, identify novel targets for therapeutic intervention, and optimize drug therapies for individual