



Artificial Intelligence to Improve Drug Safety and Toxicology

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Abstract

The field of drug safety and toxicology is vital for ensuring the safety and effectiveness of pharmaceutical products. However, traditional approaches to drug safety assessment and toxicological studies are often resource-intensive, time-consuming, and reliant on animal testing, presenting ethical concerns. In recent years, artificial intelligence (AI) has emerged as a promising solution to revolutionize drug safety and toxicology research. This dissertation aims to explore the applications of AI in enhancing drug safety and toxicology, examine the associated challenges and limitations, and propose potential solutions for future advancements. The study will provide an overview of AI techniques, including machine learning, deep learning, and natural language processing, and their relevance to drug safety and toxicology. It will assess the benefits and challenges of implementing AI in this field, such as improved predictive modeling of drug toxicity, computational models for pharmacokinetics and pharmacodynamics, drug repurposing, and detection of adverse drug reactions. Additionally, ethical considerations, data availability and quality, and regulatory and legal implications will be discussed. The dissertation will conclude with future perspectives, recommendations, and the potential impact of AI on drug safety and toxicology research, ultimately contributing to the advancement of this critical field.

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