

The Role of Artificial Intelligence in Drug Discovery and Development

Vinayak Bhaskar Chaudhar¹, Shivshankar D Mhaske², Zameer Shah³, Adil Shah Bad Shah⁴,
Utsav Vasant Kumbhamwar⁵

Student B Pharm, Final Year, Satyajeet College of Pharmacy, Mehkar, India^{1,4}

Student B Pharm Final Year, New Montfort Institute of Pharmacy, Ashti, Wardha, Maharashtra, India⁵

Principal, Satyajeet College of Pharmacy, Mehkar, India²

Professor, Satyajeet College of Pharmacy, Mehkar, India³

vinaykchaudhar5599@gmail.com

Abstract: *The rapid advancement of Artificial Intelligence (AI) technologies is transforming the landscape of drug discovery and development, offering innovative solutions to long-standing challenges in the pharmaceutical industry. AI, through machine learning (ML) and deep learning (DL), has shown tremendous potential in accelerating the drug development process, improving the efficiency of identifying novel drug targets, and optimizing lead compound identification. AI applications are also pivotal in drug repurposing, biomarker discovery, and personalizing treatments based on genetic and clinical data. Moreover, AI-driven algorithms are being increasingly integrated into preclinical and clinical trial designs to enhance patient recruitment, predict treatment responses, and streamline trial monitoring, reducing costs and time-to-market. Despite its promise, challenges remain in the adoption of AI technologies due to the need for high-quality, large datasets, regulatory uncertainties, and the complexities of model interpretability. Nevertheless, AI's growing role in the pharmaceutical industry offers the potential to significantly improve the success rates of drug discovery, lead to more personalized therapies, and reshape the future of healthcare. This research aims to provide an overview of the various applications of AI in drug discovery and development, along with its current limitations and future prospects.*

Keywords: Artificial Intelligence