

“AI -Powered Precision Medicine: Shaping the Future of Personalized Healthcare”

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ABSTRACT: JKKM-ORAL 018

Artificial intelligence (AI) has emerged as a powerful tool that harnesses anthropomorphic knowledge and provides expedited solution to complex challenges. Outstanding progress in machine learning and AI technology offers a revolutionary chance in the development, formulation, and testing of medicinal dosage forms. Artificial Intelligence (AI) is revolutionizing precision medicine by enabling highly individualized patient care through data-driven insights. By integrating genomic information, electronic health records, imaging data, and real-time physiological monitoring, AI algorithms can identify disease patterns, predict treatment responses, and guide clinical decision-making with unprecedented accuracy. Machine learning and deep learning models enhance diagnostic precision, accelerate drug discovery, and optimize therapeutic strategies tailored to each patient's unique biological profile. AI-powered technologies aid in the early diagnosis of cancer and the development of customized treatment regimens in oncology, whereas predictive analytics allows for proactive interventions in the management of chronic illnesses. Moreover, AI lowers the development time for targeted treatments by assisting in the discovery of new biomarkers and facilitating adaptive clinical trials. AI facilitates early tumour identification via image pattern recognition and genomic profiling in oncology, while predictive algorithms in cardiology foresee negative occurrences before they manifest themselves clinically. By identifying novel molecular targets and simulating therapeutic responses, AI greatly shortens development timelines by speeding up drug discovery pipelines. Moreover, AI-powered decision support systems empower clinicians with real-time recommendations, enhancing accuracy while preserving clinical judgment. AI-powered precision medicine represents a paradigm shift toward preventive, predictive, and participatory healthcare offering improved patient outcomes, cost-effective care, and a truly personalized medical future.

Key words: Artificial Intelligence, Precision Medicine, Personalized Healthcare, Machine Learning, Biomarkers, Drug Discovery, Clinical Decision Support, Preventive Medicine

“Intelligent Formulations: AI in Advanced Pharmaceutics”

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The integration of Artificial Intelligence (AI) in advanced pharmaceutics represents a revolutionary change in the way drugs are found, created, and distributed. By optimizing complex pharmaceutical processes and improving drug efficacy, safety, and personalization, intelligent formulations use the power of AI algorithms, such as machine learning (ML), deep learning, and natural language processing. Researchers can now analyze enormous datasets from genomics, proteomics, and clinical trials using AI-driven platforms, which speeds up the identification of new drug candidates and allows for molecular-level optimization of their formulations. The use of AI in formulation science helps to forecast the physicochemical properties, solubility, stability, and bioavailability of chemicals. Moreover, AI is revolutionizing drug delivery systems through the design of targeted and controlled-release formulations, improving therapeutic outcomes and patient adherence. It also supports Quality by Design (QbD) approaches by identifying critical quality attributes (CQAs) and critical process parameters (CPPs), ensuring consistent product performance. Personalized medicine stands to benefit immensely, with AI enabling tailored formulations based on patient-specific data such as genetic profiles, disease state, and pharmacokinetics. Despite its promise, the implementation of AI in pharmaceutics faces challenges, including data quality, regulatory compliance, and the need for interdisciplinary collaboration. Nonetheless, the future of pharmaceutical formulation is undeniably intelligent. As AI technologies continue to evolve, they will play an increasingly pivotal role in creating safer, more effective, and personalized therapeutic solutions, fundamentally redefining the landscape of modern medicine. This convergence of AI and pharmaceutics represents a paradigm shift towards more predictive, efficient, and patient-centric healthcare.

Key words: Artificial Intelligence (AI), Machine Learning (ML), Advanced Pharmaceutics

Leveraging Artificial Intelligence for Advancing Pharmacy Education and Research: Opportunities and Challenges

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Artificial Intelligence (AI) is rapidly transforming the landscape of pharmacy education and research, offering innovative solutions to enhance learning, streamline research processes, and improve healthcare outcomes. In education, AI-driven tools such as intelligent tutoring systems, adaptive learning platforms, and virtual simulations provide personalized learning experiences, enabling pharmacy students to acquire clinical, analytical, and decision-making skills more effectively. AI-powered language models and chatbots support continuous learning, facilitate instant feedback, and bridge knowledge gaps. In research, AI applications in drug discovery, pharmacogenomics, and clinical trial optimization accelerate the identification of drug candidates, predict therapeutic responses, and enhance data interpretation. Additionally, AI-driven big data analytics aids in evidence-based decision-making, promoting precision medicine approaches. Despite its vast potential, integrating AI into pharmacy education and research presents challenges, including ethical concerns, data privacy issues, bias in algorithms, and the need for proper faculty training. Furthermore, reliance on AI without critical human oversight may risk misinterpretation of results or overdependence on automated systems. Overcoming these barriers requires interdisciplinary collaboration, robust regulatory frameworks, and curriculum reform to incorporate AI literacy into pharmacy training. By addressing these challenges, AI can be strategically leveraged to cultivate a future-ready pharmacy workforce, advance scientific discovery, and optimize patient care. The integration of AI promises to revolutionize pharmacy education and research, provided that it is implemented ethically, inclusively, and sustainably.

Keywords: Artificial Intelligence, Pharmacy Education, Drug Discovery