

Nanotechnology for Nucleic Acid Delivery



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Editors

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The convergence of nanotechnology and nucleic acid delivery systems represents a paradigm shift in modern medicine. Traditional drug delivery mechanisms face significant challenges, such as poor bioavailability, limited targeting capabilities, and adverse side effects. Nanotechnology offers innovative solutions to these obstacles, enabling the development of effective delivery vehicles. This book explores the intricate interplay between nanotechnology and genetic medicine, offering insights into the latest advancements, methodologies, and applications.

The book covers a broad spectrum of topics, from the fundamental principles of nanotechnology and nucleic acid chemistry to the design, synthesis, and characterization of various nanocarriers. Special attention is given to the practical aspects of developing nanotechnology-based delivery systems, including scalability, regulatory considerations, and clinical translation. The volume discusses the challenges in nucleic acid delivery, the role of polymers in nucleic acid delivery, the regulatory aspects related to nanomedicine and gene therapy applications, the role of artificial intelligence in optimizing nanocarriers for nucleic acid delivery, the application of AI and nanotechnology for personalized cancer care by nucleic acid delivery, as well as case studies and success stories of AI-driven approaches for nucleic acid delivery.

ABOUT THE EDITORS

Pankaj Sharma, PhD, is a Professor of Pharmaceutics at the Shri Ram College of Pharmacy, Banmore, Madhya Pradesh, India. He is actively involved in formulating nanocarriers for effective delivery of drugs for the treatment of malaria, arthritis, etc. Dr. Sharma has received many awards and prizes for his contributions. He has been an invited speaker at conferences, seminars, symposiums, and workshops and participates on a number of university, department, and institute committees. He has produced peer-reviewed papers in the field of pharmaceutical sciences, along with book chapters. He is also a reviewer for several international scientific publications.

Saloni Jain, PhD, is an Associate Professor of Pharmacology at the Shri Ram College of Pharmacy, Banmore, Madhya Pradesh, India. Her research interests focus on the development of herbal preparations and antidiabetic activities for effective drug delivery, specifically for skin diseases, diabetes, and diuretics. Dr. Jain has presented research papers at international conferences and has been granted a UK patent design. She is an active participant in various universities, departments, and institute committees and has published several book chapters and research and review papers in national and international journals.

Vinay Jain, PhD, is the Principal of Shri Ram College of Pharmacy, Banmore, Madhya Pradesh, India. He has made significant contributions to the field through his research and publications, including peer-reviewed articles, edited and indexed books, and guidance for over 30 research scholars. Dr. Jain is an active member of the pharmacy community, serving as co-convenor of the Indo-Caribbean conference and organizing secretary of the Future Prospect in Pharma-Marketing national conference. He has been recognized for his leadership and mentorship in the field. He has filed two patents and published many papers in international and national journals.



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CHAPTER 6

Fundamentals of Artificial Intelligence

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ABSTRACT

Artificial intelligence (AI) is all about creating machines or computer systems that can do work that people can do, like learning, reasoning, problem-solving, Natural Language Processing (NLP), robotics, and computer vision. Basically, it's all about simulating human intelligence in machines. Machine learning and deep learning are both subsets of AI, which are the basic components of it. The ability to analyze and process large amounts of data quickly and accurately is the main advantage of AI. Because of its technology's practical uses in a wide range of technological and research sectors, it has become an extremely important component of industry. The future of AI holds tremendous potential for transformative advancements across various domains like healthcare, finance, manufacturing, autonomous vehicles, education, and human resources. Looking ahead, the future of AI is anticipated to witness advancements in autonomous systems, human-AI collaboration, explainable AI (XAI), and AI ethics. Addressing challenges related to interpretability, transparency, and trust in AI systems will be pivotal for their widespread acceptance and ethical utilization across various domains. This article aims to offer an