
Nanomedicine for Bioactives

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Editors

Nanomedicine for Bioactives

Healthcare Applications

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Preface

This book, “Nanomedicine for Bioactives: Healthcare Applications”, is the product of our sincere effort, to provide scientific evidence for the extraordinary power of nature’s wonder molecules—bioactives. Chapters by experts in different specific aspects of bioactive and its effective delivery by nanomedicines for better healthcare applications have been presented to our widespread readers and health professionals. Nanotechnology is an opening up for new perspectives in all scientific and technological fields. Among these applications, bioactive and nutraceuticals are the fast-growing fields in nano-research. A variety of nanoformulations such as **polymeric nanoparticles**, **nanocapsules**, nano emulsions, transferosomes and ethosomes, liposomes, lipospheres and lipid polymer hybrid nanoparticles have been reported for bioactive delivery and food materials. New herbal drugs and nutraceuticals-loaded nanomedicine are reported to have remarkable advantages over conventional formulations of plant actives and extracts which include enhancement of solubility, **bioavailability**, multiple drug delivery, expansion of stability, sustained delivery, improved tissue macrophages distribution, protection from toxicity, enhancement of pharmacological activity and protection from physical and chemical degradation.

A succinct account on key highlights of each of the chapter included in the book has been discussed in the below-mentioned text.

Chapter 1 on the topic entitled “*Ganoderic acid for anticancer applications: Scope of nanomedicine in its effective delivery*” extensively covers the history of *G. lucidum*, its traditional use and therapeutic application against cancer with molecular mechanism based on in vitro and in vivo experiments.

Chapter 2 of Dr Akhbari on “*Vitamin E-based nanomedicines for anticancer drug delivery*” covers the role of vitamin which is a promising candidate for achieving patients’ dream: “Chemotherapy at Home”. Furthermore, vitamin E-based nanomedicines are suitable candidates for the preparation of novel anticancer treatments in the future.

Chapter 3 of Dr Akhbari on the topic entitled as “*Rutin-based phytomedicines for cancer benefit*” emerging as therapeutic agent for fighting cancer because of its antioxidant and anti-inflammatory effects. It also has been shown to induce apoptosis, or cancer cell death, and display anti-tumour effects and Chap. 7 of Dr Ahmad on “*Nanomedicine Approaches for the delivery of herbal anticancer drugs*” explores the use of nanomedicine to revolutionize the way to discover and administer the phytoconstituents in the patients.

In Chap. 4, Dr B. Mukherjee describes the role of betulinic acid and its delivery by nanoformulation approach towards cancer therapy.

Dr S. Kumar in Chaps. 5 and 9 summarizes the role of quercetin-loaded nanomedicine in cancer management and as nutritional applications.

Dr Farhan J. Ahmad in Chap. 6 on “Polyunsaturated fatty acids-loaded nanomedicine for solid tumour” summarizes that the PUFA-loaded nanoformulations showing both anti-inflammatory and anti-neoplastic activities could make them more bioavailable. Whereas PUFAs helps in decreasing the adverse effects, lowering the toxicity, and targeting and affecting only the cancerous cell, without affecting the normal cells which are present in the human body.

Entesar Hanan in Chap. 8 discusses the prospects of “*Nutraceuticals-loaded chitosan nanoparticles for healthcare applications*” and also highlights the superior characteristics of the said nanoparticles and its gained versatility in the effective delivery of nutraceuticals.

In Chap. 10, Dr Deepika Singh discusses on “*Polyphenols-loaded nanomedicines against skin aging*” and broadly covers plant-derived polyphenols, its bioavailability, different types of nanocarriers for pharmaceutical and cosmetological purposes and product-oriented solutions used in skin aging.

Dr Kamalinder K. Singh in Chap. 11 describes the various skin infections and then comprehensively describes various lipid nanocarriers and their application in the treatment of utaneous infections. Dr Shammy Jindal in Chap. 12 discusses on the emergence of lipid nanocarriers in the effective dermal delivery of lutein.

Dr Biswajit Mukherjee in Chap. 13 describes the array of biological activities of apigenin and addresses the issues of delivering apigenin through nanocarriers to improve the efficacy of apigenin, more particularly in diabetes and various types of cancer.

In Chap. 14, Dr Dinesh K. Patel discusses the importance of *Aegle marmelos* and their phytochemical “aeglin” in various therapeutic healthcare applications.

Dr Nupur Garg in Chap. 15 summarizes the clinical applications and epigallocatechin-3-gallate which combined with the nanosystems hold a promising future for advancements in the therapeutic applications of natural products.

In Chap. 16, Mohamad Taleuzzaman describes the chemical and biological applications of eugenol and eugenol nanoformulations. It has abundant potential applications and are sure to be incorporated in future into commercially available products and new uses/processes are lying in wait to be explored.

Dr Madhu Khatri in Chap. 17 focuses on regulations for proper usage of nanomaterials and also highlights the currently existing regulations for safe delivery of drug molecules.

In Chap. 18, Dr Madhu Gupta discusses the intake of fruits and vegetables has enhanced the level of components having antioxidative effects such as vitamin C, vitamin E, selenium, lycopene and several phytochemicals in the treatment of cancer as nutritional value.

Dr Harshita, in Chap. 19, describes the role of thymoquinone, its molecular mechanism of action, clinical-pharmaceutical aspect and its potential targets for cancer prevention including breast cancer in preclinical models.

This book focuses on the advanced nanomaterials utilized for the encapsulation of nutrients/vitamins/phytoconstituents for nutrition and, beyond of it, for other healthcare benefits. This book, therefore, carries a lot of potential as a repertoire of knowledge and package of information for the herbal scientist, pharmaceutical scientists, nano-scientists and nanobiotechnologists to provide holistic information on the subject of interest.

Finally, volume editors would like to extend their appreciation to Springer and their staff for providing professional platform for communication with the experts in the field.

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About the Editors

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Sarwar Beg is an Assistant Professor at the Department of Pharmaceutics, School of Pharmaceutical Education and Research, Jamia Hamdard, New Delhi. He has over 10 years of teaching and research experience in the field of pharmaceutics and biopharmaceutics, especially in the systematic development and characterization of novel and nanostructured drug delivery systems employing Quality by Design paradigms. Dr Beg has authored 140 publications, 45 book chapters, 10 books and 3 Indian patent applications.

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Farhan Jalees Ahmad is currently a Professor at the School of Pharmaceutical Education & Research, Jamia Hamdard, New Delhi, India, and is an internationally known researcher in the area of Pharmaceutical Sciences. He has 26 years of rich experience in Research and Teaching. His domain of research therein included development, scale-up, technology transfer and launching of pharmaceutical products, both for domestic and international markets. He has published more than 300 research and review papers, 12 Book chapters and 9 books.