

Preface

Innovative and fusion technologies have shown incredible influence to improve various aspects of society for the betterment of mankind and healthcare systems. Nanobiotechnology as well as nanomedicine refers to the application of nanotechnology in various aspects of life. Nanobiotechnology aspires to endow with economically sound yet excellent performing health and medical pieces of equipment, amenities as well as treatment approaches through continuous research investigations and studies. Many pharmaceutical and medical companies all over the world now count on medical nanotechnology due to its abundant applications and practical uses.

This book is a pivotal reference source that provides insights into a comprehensive collection of different new and novel techniques used for the development of safe drugs that use available resources for diverse deadly diseases. It also discusses the various platforms of nanobiotechnology to be utilized in various fields. Nevertheless, the safety of nanotechnology is not yet entirely clear. However, it is expected that in the near future, the bionanosystems will play a crucial role in the treatment of human diseases and also in the improvement of existing healthcare systems.

This book, *Innovative Approaches for Nanobiotechnology in Healthcare Systems*, is a collection of 12 chapters contributed by leading experts in nanotechnology field. This book is ideally designed for Scientists, Medical professionals, Entrepreneurs, Researchers, Academicians and Students. Nevertheless, this book is premeditated to act as a reference source on conceptual, methodological and technical aspects, as well as to provide insight into emerging trends and future opportunities within the healthcare systems. In this book, each chapter covers a special subject that falls within these areas: General introduction, properties, specific applications as well as escort to future directions.

Chapter 1 gives an outlook on recent techniques of developing nanoscale medicines. In this chapter, emphasis has been made on understanding the concept of nanomaterials based therapeutic system with recent advances and exploration of characteristics of nanomaterials as well as their interactions with the biological environment. Chapter 2 deals with the research being carried out to further enhance the drug loading/and release kinetics of nanofibers. This chapter briefly summarizes the history, effects of

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various parameters, and drug delivery applications of electrospun nanofibers. Also, the drug incorporation techniques are highlighted. In addition the challenges and future perspectives have been covered. Accordingly, Chapter 3 describes therapeutic potentials of different formulations of nanoparticles or nanovectors in combating cancer, with a special focus on their suppressive effects on angiogenesis process using the *in vitro* and *in vivo* models.

Furthermore, Chapter 4 particularly focuses on phytomedicine for cancer therapy based on nanocarrier systems to address them to tumor site, because nanosystems allow modifying physicochemical properties of the drugs and offers targeting ability in addition to their specificity. Similarly, Chapter 5 provides an overview on recent studies about potential cancer biomarkers. Also, specific characteristics of potential biomarkers in three common types of cancer are discussed herein.

On the other hand, Chapter 6 pays attention on the synthesis and applications of CNTs in therapeutics, mainly about the research in all areas of pharmacy and medicine. Chapter 7 addressed the significance of some medicinal plants and novel herb-based formulations from Himalayan region of India that offers numerous possible advantages for synergistic activity in the medication of diabetes with or without structural modifications.

Moreover, Chapter 8 draws attention on to the development of preventive strategies and methods for biofilm control using new nanotechnology. Interestingly, Chapter 9 is targeted on potential of phytochemicals, in particular flavonoids in the management of Rheumatic diseases. Likewise, Chapter 10 attempts to obtain understanding on the biological effects of flavonoids with special references to their targeted and efficient delivery via novel nanosystems to treat various diseases and disorders.

Subsequently, Chapter 11 spotlights the application of electrospinning method and electrospun nanofibers for water purification, in order to control the spread of waterborne diseases. The last chapter (Chapter 12) endows awareness about the role of nanoscience to control pollution and its contribution in environment mitigation.

Conclusively, it has now been accepted that the innovative technologies have clout to supplement numerous sections of civilization. Unquestionably, the current times have observed an unmatched development in research in the field of nanotechnology. There is always an escalating confidence that nanotechnology subjected to medicine will fetch noteworthy progress in the area of cure, diagnosis, as well as deterrence of infectious diseases. Ever rising awareness about the prospective therapeutic potential of nanoscience is escorting to the appearance of a novel area eminently known as nanomedicine.

Nevertheless, the field of nanomedicine requires conquering the challenges for its uses, to advance the thoughtfulness of basis of illness, fetch advance and classy analytical methods and to deliver outstanding remedies and shielding applications. Nanomaterials are probing almost into each and every facet of our life, such as

nanoscale materials are progressively being applied in pharmaceutical and medical purposes, makeup and private stuffs, to store energy, for purification of water, air filtration as well as cleaning of environment, chemical and biological sensors, military defense etc. Furthermore, nanotechnology is also swiftly developing in industrial uses, medical imaging, targeted drug delivery applications, cancer cure, gene management therapeutics, and assist in visual imaging.

In summary, nanotechnology irrefutably, is at the climax of revolutionary stage of swift development of healthcare stuff/or nanomedicine, as it possesses numerous imminent human health significances. Admittedly, on the other hand nanotechnology still needs more in-depth research to investigate its possible potential health hazards. We hope that this book, *Innovative Approaches for Nanobiotechnology in Healthcare Systems*, will build a positive influence on students and scientists and aid in the development of novel healthcare materials/or nanomedicine for amelioration of society, simultaneously keeping in consideration the safety and environment. The Editors are highly grateful to all who facilitated in compiling the book project successfully in the given time frame.

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