

## Preface



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*Guest Editor*

I would like to share my excitement and optimism as the Guest Editor of this issue of *Medical Clinics of North America* specifically created for scientists, engineers, physicians, and clinicians interested in the field of nanomedicine. We have seen unprecedented advances in the area of nanotechnology during the last two decades, and the impact of this new technology is seen in all scientific fields.

In 1959, Nobel Laureate Richard Feynman predicted the emergence of a new science called nanotechnology. Nanotechnology deals with structures of one to one hundred nanometers in scale. Sometimes, nanoscale is extended into micron level. We have just begun to witness the application of this cutting-edge technology to medicine. It will have a profound impact on the future of medical practice. Nanomedicine is the medical diagnosis, monitoring, and treatment at the level of single molecules or molecular assemblies that provide structure, control, signaling, homeostasis, and motility in cells, that is, at the “nano” scale of about 100 nm or less.

There have been many scientific and technological advances in both the physical and biological sciences over the past several years. Nanomedicine is an important new concept in combining nanotechnology and medicine, and it provides a new direction for development in those research areas. For example, new tools are being developed that permit imaging of structures at a molecular

level, and high-speed measurement of the dynamic behavior of these molecular assemblies is developing. The forces produced by molecular machines, as well as the forces needed to disrupt them, are undergoing investigation.

The long-term goal of nanomedicine research is to quantitatively characterize the molecular scale components or nanomachinery of living cells and to precisely control and manipulate these molecular and supramolecular assemblies in living cells to improve human health. Nanomedicine will exploit and build upon other research findings in nanotechnology and apply it to the study of molecular systems in living cells that contain a multitude of nanoscale structures, such as membrane transporters; processes, such as self-assembly of protein-nucleic acid complexes; and nanomachines, such as molecular motors.

The benefits of nanomedicine include dramatically expanded knowledge of the human genome; a greater understanding of the pathophysiology of specific diseases at the molecular scale; more specific treatments of diseases; and the ability to understand the dynamic behavior of dysfunctional cellular machinery in the context of the total cell machinery.

This issue has been specifically created to provide researchers and clinicians with a peer-reviewed, indexed, international forum for their work. Through the pages of these articles we can expand the growing dialogue between researchers in many disciplines that are part of Nanomedicine. This issue provides a new forum for researchers around the world to share their discoveries and applications in this exciting new field of medicine.

The material herein covers basic, clinical, and engineering research areas of nanotechnology in biology and medicine: clinical applications; drug delivery; diagnosis and preventive medicine; ethical dimensions; genetic nanomedicine and tissue engineering; oncology; cardiovascular and neurological nanomedicine; and future approaches of nanomedicine in clinical science.

As the Guest Editor, I am delighted to launch this issue, and I know it will provide valuable insights to enhance understanding of nanomedicine research projects. I appreciate the authors' efforts and contributions, and I believe this issue serves as an appropriate source for scientists and clinicians in nanomedicine research and development alike to share their discoveries and applications of this exciting, new field of medicine.

*This issue is dedicated to my teachers, my fellows, my family members, my wife, and my children.*

Sincerely,



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