
Preface



As diseases evolve and become more resistant to existing medications over time, the development of stronger and more effective pharmaceuticals has become a necessity. In response to the escalating threat of these resilient diseases, newer generations of medications have been introduced. While these advancements have proven effective in combating diseases, they have also led to an increase in the prescribed dosages and sparked significant discussions regarding their potential systemic toxicities and long-term side effects.

In the realm of innovative treatments, nanomedicines have emerged as a promising alternative. These medicines utilize nanoscale materials, which require lower doses, making them particularly appealing. This book delves into the comprehensive

history and application of nanomedicines, beginning with the synthesis of nanomaterials and extending to their utilization as therapeutic agents. Despite the steady increase in research publications that highlight the advantages and applications of nanomaterials in medicine, we provide an in-depth analysis of how these materials can effectively induce the death of pathogenic cells. Nanomaterials typically exert their effects either through oxidative stress or by damaging the DNA/RNA of pathogens, which raises important questions about their safety when it comes to normal blood cells.

Chapter 3 focuses on the various types of nanomaterials that have been explored for biomedical applications. By Chapter 5, the discussion shifts to methods of making nanomaterials target-specific, ensuring they concentrate their effects on diseased cells alone. Surface functionalization is the most prevalent technique used for this purpose. Each type of disease emits specific biomarkers, which can be targeted by functionalizing nanomaterials with antibodies that are specific to those biomarkers. This chapter provides a thorough literature review on how surface functionalization has been successfully used to target specific cancer cells while sparing healthy blood cells.

Despite the precision with which nanomaterials can be designed to target specific cells, their behavior within the human body can still be unpredictable. Chapter 6 outlines the limitations in using nanomaterials as nanomedicines, which may include their accumulation in certain body organs. This accumulation could potentially lead to various toxic effects, extensively discussed in Chapter 7.

Finally, Chapter 8 explores the past, present, and future of nanomaterials in the medical industry. It discusses the rising use of nanomaterials and anticipates future trends and developments in this field. By analyzing both historical context and current advancements, this chapter provides insights into the potential long-term impact and evolution of nanomaterials in healthcare.

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*Dedicated to
Mum and Dad
Friends and Co-Authors
Thank You*

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