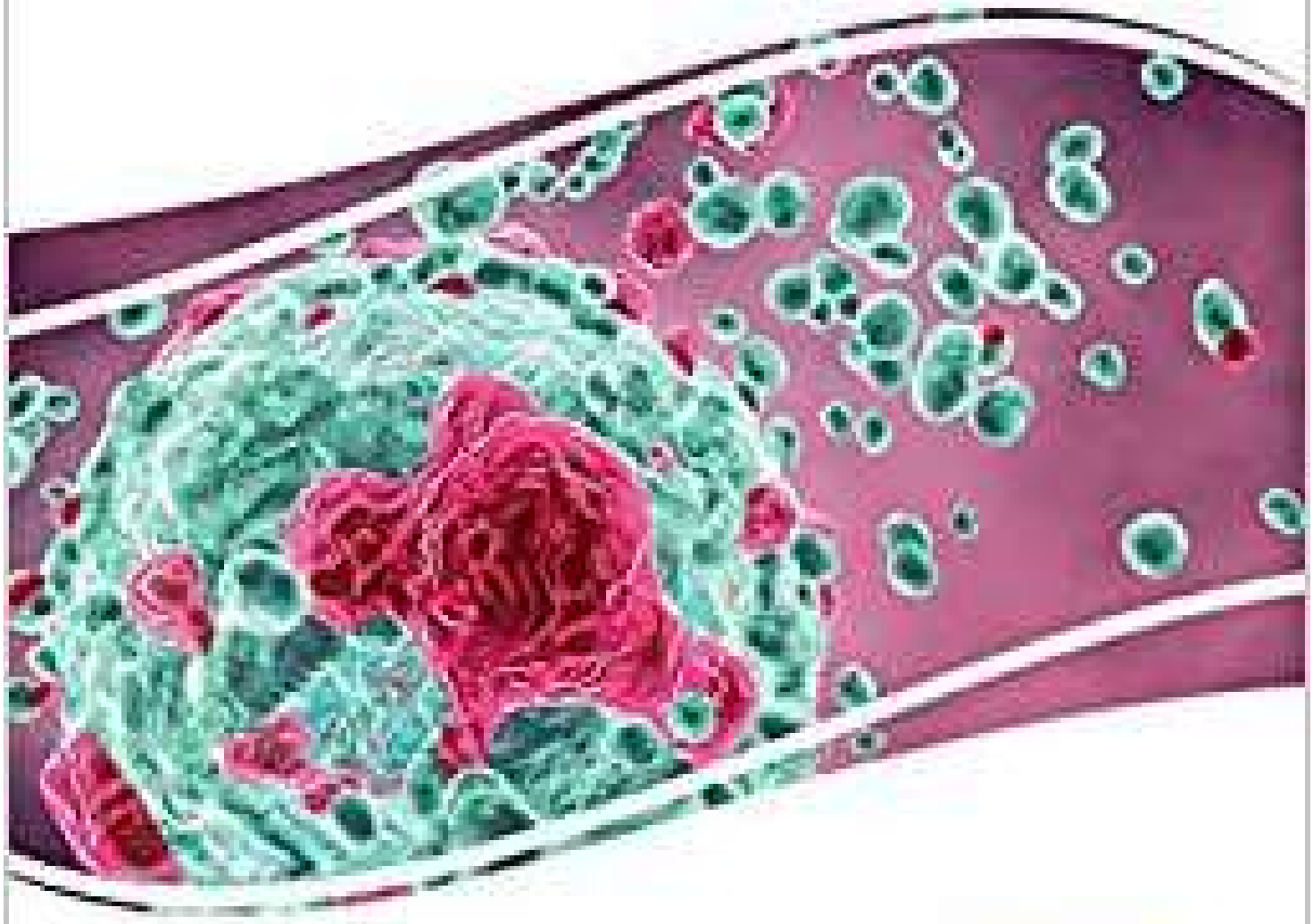
Handbook of Research on

Nano-Strategies for Combatting Antimicrobial Resistance and Cancer



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Chapter 6
Medicine at Nanoscale: A New Paradigm for the Emerging Trend of Multidrug Resistance in Bacteria

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ABSTRACT

Antibiotic therapy for life-threatening bacterial infections has greatly enhanced the lifespan and health of human beings. But continued increase in the improper usage of antibiotics and emergence of multidrug resistant bacteria (MDR) remains a major reason for the morbidity and mortality worldwide. Delay in the detection of pathogens, poor penetration power of the antimicrobial agent, and susceptibility for mutational resistance also resulted in clinical failure of conventional antibiotics. Innovation of nanoparticles (NPs) serves as a promising strategy to overcome MDR bacteria. The site-specific action of NPs, high penetration power, minimal dosage, and multidimensional mechanism makes NPs highly efficient to tackle MDR bacteria than conventional drugs. This chapter presents a brief overview on various types of NPs, strategies to combat drug resistance, mode of action of NPs as antibacterial agents, applicability in various medical fields, clinical manifestation, challenges in clinical translation, and future prospects.

INTRODUCTION

Infectious diseases remain an important cause of mortality worldwide. In recent days, researchers have focused their attention towards the development of novel antibiotics for chemotherapeutic applications. Despite the intense research in discovery of antibiotics, bacterial resistance to antibiotics is also becoming increasingly important in clinical practice (Mann, 1999). Bacteria present along with infectious micro-

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