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FROM SYNTHESIS TO APPLICATIONS

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From Synthesis to Applications

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Chapter 5 - Nanogels: A New Dawn in Antimicrobial Chemotherapy

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Abstract

Nanogels are swollen nanosized networks composed of hydrophilic or amphiphilic polymer chains developed as carriers for drug transport. They are designed to spontaneously incorporate biologically active molecules through the formation of salt bonds, hydrogen bonds, or hydrophobic interactions. Nanogels are the nanoversion of their parent hydro gels, encompassing high water uptake capability, swelling ability, degradability, and pH-sensitivity. These qualities make them appropriate as responsive nanocarriers in innovative drug delivery systems. They play a vital role by addressing the problems associated with chronic and modern therapeutics, such as nonspecific effects and poor stability. The nanostructured hydrogel molecules combined with bacterial enzymes are shown to trigger antibiotic release by degrading the polymeric core. The targeted nanogel preferentially delivers drugs to either macrophages or onto the invading microbes, leading to drug accumulation at bacterial infection sites, consequently providing lesion site-responsive drug release properties, which inhibit bacterial growth. The antigen-specific immune responses induced by novel Nanogel vaccine have shown to effectively protect animals against pathogens such as *Streptococcus pneumoniae*, making it ideal for tunable degradability, screening excellent blood compatibility, cytocompatibility, and cellular localization when tested on various cell lines. Thus the pursuit of this chapter is to concisely describe the recent development of nanogel drug delivery system in terms of its efficacy in antimicrobial chemotherapy.

Keywords

nanogel; polymer; biodegradable; pH sensitive; antibacterial; antimicrobial; chemotherapy; cytocompatibility; drug delivery

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