

The Function of Chitosan as The Effective Nano Carrier for Antibacterial and Anticancer Agents

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Aim and Background: Cancer is taken into account as one of the most prominent lifethreatening diseases worldwide, with increasing mortality rates in the last decades. Beside unhealthy life style, specific bacterial infections including *Helicobacter pylori*, *Salmonella Enteritidis*, and *Salmonella Typhi* could induce neoplastic changes in gastric, colon, gallbladder, and cervical, respectively. Use of anticancer agents is a routine modality. However, severe side effects, poor solubility and nonspecific dissemination of chemical drugs are major challenges in cancer treatment that need to be overcome.

Methods: Published articles including key words chitosan, nanodelivery, nanoparticle, anticancer and antibacterial agents were extracted in databases PubMed, Web of Science, and Google scholar.

Results and discussion: Chitosan is one of the most versatile cationic, linear and natural polysaccharide polymers composed of β -(1–4)-linked D-glucosamine and N-acetyl-Dglucosamine units. In contrast to other nanoparticles, chitosan nanocomplexes (CSNCs) could be used in cancer diagnosis, imaging, photodynamic therapy and drug/nano-vaccine delivery. In this regard, water solubility, stability, pH sensitivity, and controlled drug release of CSNCs, which have been modified in thiolated, amphiphilic and quaternized derivatives, made these nanocarriers great options to cope with abnormal physiochemical cancer microenvironment, such as acidic pH, redox environment and high temperature. Also, our previous experiences indicated that CSNCs could be successfully used for delivery of antibacterial agents like Sodium Ceftriaxone.

Conclusion: CSNCs with their considerable biocompatibility, biodegradability, and negligible toxicity, have the potential to dispatch anticancer agents to cancer cells via targeted approach and evade issues challenged by drug delivery.

Keywords: Chitosan nanocomplexes, Anticancer drugs, Antibacterial agents, Nanodelivery.