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Unlocking the potential of chitosan-based polymeric nanoparticles for the treatment of neurological disorders
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Abstract

Neurological disorders are the diseases associated with the central and peripheral nervous system. They are among the most serious and prevalent diseases nowadays. However, most of the pharmacological agents used to treat neurological disorders demonstrate severe toxicities and side effects, along with failure to achieve the desired outcomes due to their inability to cross the blood-brain barrier (BBB). Therefore, efforts have been made to develop potential drug carriers that can enhance the penetration of various therapeutic agents across the BBB. Due to the remarkable selectivity of nanoparticles and their ability to penetrate the BBB, they have attracted enormous interest as a viable solution to overcome these challenges. Polymeric nanoparticles used as drug delivery systems, in particular, demonstrated multiple advantages over traditional drug delivery systems in the treatment of neurological and psychological disorders due to several beneficial properties. This minireview article discusses the current literature on the use of chitosan nanoparticles in particular as promising carriers for delivering therapeutic agents to the brain for the treatment of different neurological diseases. The article emphasizes the advantages of using chitosan over other natural and synthetic polymers, and illustrates the methods of preparation of chitosan nanoparticles, in addition to the characterization of chitosan-based nanoparticles. The article also discusses the specific application of chitosan-based nanoparticles for brain targeting with the aim of the treatment of neurological disorders. Furthermore, challenges and future prospects were also discussed. © 2024 Mashhad University of Medical Sciences. All rights reserved.

Author Keywords

Chitosan; Drug delivery systems; Nanocapsules; Neurological disorders; Polymer

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