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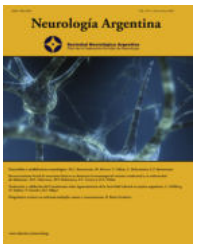

Original article

Recent advancements in nanoparticle drug delivery systems to cure neurological disorders via the nasal route

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ABSTRACT

Neurological disorders present a significant global health challenge, with limited effective treatment options due to the complex and selective nature of the blood–brain barrier (BBB). Recent years have witnessed remarkable advancements in nanoparticle-based drug delivery systems designed to overcome these barriers and enhance the therapeutic outcomes of neurological disorder treatments. Among these innovations, nasal drug delivery has emerged as a promising non-invasive approach to bypass the BBB and directly target the central nervous system (CNS). This article provides an overview of the origin of nanotechnology and its intersection with biotechnology, leading to the emergence of nanobiotechnology. It highlights the role of nanotechnology in drug delivery and its potential to enhance the effectiveness of nanoscale structures in biomedical science. The article emphasizes the significance of the chemical composition of nanoparticles (NPs) in determining their physiochemical properties and drug-release behavior. The challenges posed by the BBB in delivering drugs to the CNS and the limited permeability of macromolecules to the barrier. The article emphasizes the role of the BBB as a diffusion barrier and explains the mechanisms by which molecules can cross the barrier. It mentions the presence of interendothelial junctions and receptors/transporters in endothelial cells that regulate the permeability of the BBB. Overall, the article provides an overview of the role of nanoparticles in drug delivery through the nasal route for the treatment of neurological disorders.

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