



Nanomaterials for Drug Delivery and Therapy

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Chapter 6 - Nanoparticles for drug delivery targeting neurodegenerative diseases

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Abstract

The treatment of certain neurodegenerative diseases is limited by inadequate delivery efficiency and no therapeutics. For therapeutics targeting the brain, they need to first cross the biological barriers separating parenchyma, in particular the blood–brain barrier, to enter the targeted brain regions; for therapeutics targeting the eye, the cornea, sclera, and retina including the blood–retinal barrier act as obstacles for delivery. The dynamic clearance, etc.) also hinder the effective delivery and accumulation of the therapeutics. One of the approaches to transport therapeutics across these barriers to the targeted regions, especially to specific brain regions, is using nanoparticles. Nanoparticles need to accumulate in certain brain or retinal regions, so that cargoes inside or attached to the nanoparticles can more easily reach the effective concentration. This article aims to highlight the importance of drug delivery to the targeted regions for the treatment of different neurodegenerative diseases. To achieve this purpose, the criteria for drug administration, the challenges associated with respective biological barriers, the physiochemical properties of nanoparticles, and also some specific properties required for delivering different cargoes are detailed. Gene therapy for treating neurodegeneration, along with opportunities and challenges will also be discussed.



Previous

Keywords

Nanoparticles; drug delivery; central nervous system; brain; ocular; gene therapy

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