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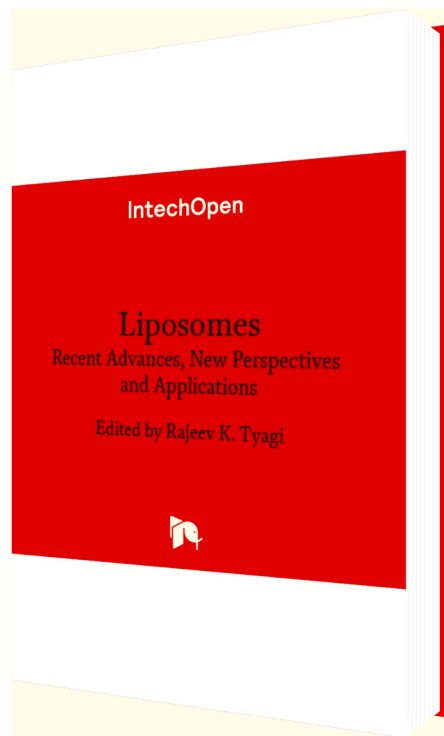
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The role of nanoscale drug carriers for the effective and controlled delivery of drugs and candidate antigens is instrumental in developing therapeutic and vaccine interventions for cancers, infectious diseases and beyond. As teachers of immunobiology, we think this information will contribute to the development of interventional approaches. This book, therefore, will be a valuable addition to exi...

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Chapter

Perspective Chapter: Nose-to-Brain Drug Delivery through Liposomes - Recent Applications

Abdul Hafeez and Shazia Afzal Usmani

Abstract

Diseases related to the brain are causing a huge problem worldwide. Different drug formulations are available for the management of brain-related disorders, but due to less drug availability for the brain and non-specificity, it becomes difficult to completely cure life-threatening brain disorders. The blood-brain barrier (BBB) restricts the entry of drug molecules/drug-loaded carriers because of the presence of various efflux transporters and drug inactivating enzymes. Researchers have identified an intranasal route for direct delivery to the brain, bypassing BBB. Nanotechnology-enabled lipid-based drug carrier systems have shown potential for the management of brain diseases through nose-to-brain delivery. Liposomes are the most extensively investigated carrier systems because of biocompatibility, controlled release characteristics, easy surface modification, and biodegradability. This chapter highlights the important aspects of nose-to-brain delivery and strategies for enhancing the availability of drugs through liposomes in the management of different brain-related diseases.

Keywords: liposomes, nanotechnology, brain tumor, brain delivery, Parkinson's disease, targeted delivery

1. Introduction

The diseases associated with the central nervous system (CNS) are continuously increasing in the populations worldwide in the last couple of decades. CNS disorders substantially contribute to the loss of health and social challenges across the lifespan of human beings. The CNS diseases causing numerous problems globally include Alzheimer's disease (AD), brain tumor, bipolar disorders, epilepsy, depression, Down's syndrome, Huntington's disease, Parkinson's disease (PD), multiple sclerosis, and schizophrenia [1, 2]. The major problem in the management of the mentioned disorders is the non-accessibility of most of the therapeutic compounds in the desired concentrations. The major hurdle for the entry of active pharmaceutical ingredients into the brain is the presence of blood-brain barrier (BBB), which separates the brain from the blood. The non-permeable nature of BBB is due to the presence of tight endothelial junctions supported by astrocytes and pericytes. Small lipid-soluble drug molecules can enter the brain through BBB and all large molecular weight drugs cannot

the concerned brain disease. Results suggested the potential of intranasal liposomal formulations for the management of brain diseases. A more mechanistic approach is needed for the identification of drug transport to brain areas.

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Conflict of interest

The authors declare no conflict of interest.

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