Lipid-based nanoformulations in the treatment of neurological disorders

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The neurological disorders affect millions of people worldwide, and are bracketed as the foremost basis of disability-adjusted life years (DALYs). The treatment options are symptomatic and often the movement of drugs is restricted by a specialized network of endothelial cell layers (adjoined by tight cell-to-cell junction proteins; occludin, claudins, and junctional adhesion molecules), pericytes and astroglial foot processes. In recent years, advances in nanomedicine have led to therapies that target central nervous system (CNS) pathobiology via altering signaling mechanisms such as activation of PI3K/Akt pathway in ischemic stroke arrests apoptosis, interruption of ?-synuclein aggregation prevents neuronal degeneration in Parkinson?s. Often such interactions are limited by insufficient concentrations of drugs reaching neuronal tissues and/or insufficient residence time of drug/s with the receptor. Hence, lipid nanoformulations, SLNs (solid lipid nanoparticles) and NLCs (nanostructured lipid carriers) emerged to overcome these challenges by utilizing physiological transport mechanisms across blood?brain barrier, such as drug-loaded SLN/NLCs adsorb apolipoproteins from the systemic circulation and are taken up by endothelial cells via low-density lipoprotein (LDL)-receptor mediated endocytosis and subsequently unload drugs at target site

(neuronal tissue), which imparts selectivity, target ability, and reduction in toxicity. This paper reviews the utilization of SLN/NLCs as carriers for targeted delivery of novel CNS drugs to improve the clinical course of neurological disorders, placing some additional discussion on the metabolism of lipid-based formulations. © 2020, © 2020 Informa UK Limited, trading as Taylor & Francis Group.

Blood?brain barrier

brain-targeted drug delivery systems

CNS

drug metabolism

drug targeting

lipid nanoparticles

neurological disorders

lipid

nanocarrier

solid lipid nanoparticle

lipid

nanoparticle

Alzheimer disease

blood brain barrier

brain ischemia

drug delivery system

epilepsy

human

lipid metabolism

lipid transport

microemulsion

microfluidics

nanomedicine

nanotechnology

neurologic disease

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