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Volume 16, Issue 8, 2019, Pages 698-711

Crossing the blood-brain barrier: A review on drug delivery strategies for treatment of the central nervous system diseases (Article)

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Abstract

Many drugs have been designed to treat diseases of the central nervous system (CNS), especially neurodegenerative diseases. However, the presence of tight junctions at the blood-brain barrier has often compromised the efficiency of drug delivery to target sites in the brain. The principles of drug delivery systems across the blood-brain barrier are dependent on substrate-specific (i.e. protein transport and transcytosis) and non-specific (i.e. transcellular and paracellular) transport pathways, which are crucial factors in attempts to design efficient drug delivery strategies. This review describes how the blood-brain barrier presents the main challenge in delivering drugs to treat brain diseases and discusses the advantages and disadvantages of ongoing neurotherapeutic delivery strategies in overcoming this limitation. In addition, we discuss the application of colloidal carrier systems, particularly nanoparticles, as potential tools for therapy for the CNS diseases. © 2019 Bentham Science Publishers.

SciVal Topic Prominence

Topic: Blood-Brain Barrier | Brain | Brain microvascular

Prominence percentile: 98.095

Author keywords

[Blood-brain barrier](#) [Central nervous system](#) [Colloidal carrier system](#) [Drug delivery system](#) [Nanoparticles](#)
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EMTREE drug terms:

albumin apolipoprotein E bleomycin chitosan nanoparticle chrysin curcumin
dopamine liposome lobradimil looperamide macrogol magnetic nanoparticle
magnetite nanoparticle nanoparticle nanosphere octoxinol paclitaxel polyacrylamide
polyethylenimine polyglactin polylactic acid povidone
ultra-small superparamagnetic iron oxide unclassified drug

EMTREE medical terms:

Article blood brain barrier central nervous system central nervous system disease
drug delivery system drug efficacy drug use endothelium cell enzyme specificity
human membrane permeability nanoencapsulation nonhuman priority journal
protein transport tight junction transcytosis

Chemicals and CAS Registry Numbers:

bleomycin, 11056-06-7, 9041-93-4; chrysin, 12624-02-1, 480-40-0; curcumin, 458-37-7; dopamine, 51-61-6, 62-31-7; lobradimil, 159768-75-9; looperamide, 34552-83-5, 53179-11-6; macrogol, 25322-68-3; octoxinol, 9002-93-1; paclitaxel, 33069-62-4; polyacrylamide, 9003-05-8; polyglactin, 26780-50-7, 34346-01-5; polylactic acid, 26100-51-6; povidone, 9003-39-8

Funding details

Funding sponsor	Funding number	Acronym
	GRF,NH1014D045	
Universiti Putra Malaysia		

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The authors express their gratitude to the Ministry of Agriculture of Malaysia (MOA) for NKEA Research Grant Scheme (NRGS) [Project number: NH1014D045] and Graduate Research Fellowship (GRF), Universiti Putra Malaysia (UPM).

ISSN: 15672018

Source Type: Journal

Original language: English

DOI: 10.2174/1567201816666190828153017

PubMed ID: 31456519

Document Type: Article

Publisher: Bentham Science Publishers

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