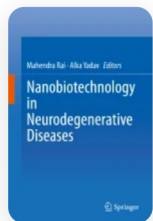


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Nanomedicines for Improved Antiretroviral Therapy in Neuro-AIDS

| Chapter | First Online: 03 December 2019

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Nanobiotechnology in Neurodegenerative Diseases

Aarti Belgamwar, Shagufta Khan & Pramod Yeole

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Abstract

Human immunodeficiency virus is neurotropic which invades the central nervous system (CNS) in early course of systemic infection and makes the CNS an important dominant reservoir with the capacity to supply virus in low/undetectable viremia. Neuro-AIDS is the major upcoming issue among long-term seropositive survivors as a consequence of incompetence of antiretroviral in complete eradication of HIV from the CNS. Justification behind the low CNS concentration of antiretroviral is anatomical barrier and physicochemical properties of antiretrovirals. Some unmet needs in neuro-AIDS treatment are simplified CNS-

targeted treatment regimen and disease-modifying therapies. Target-specific, safe, and controllable nanomedicines have been extensively studied, with particular success, to overcome the natural barriers to the antiretroviral drug delivery posed by the CNS anatomy, histology, and physiology. This chapter insight on current understanding of neuro-AIDS and the pathological mechanisms involved several limitations to the eradication of latent reservoirs and approaches to circumvent these limitations by state-of-the-art nanomedicines.

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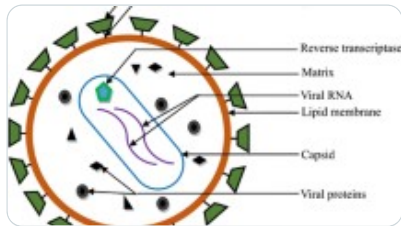
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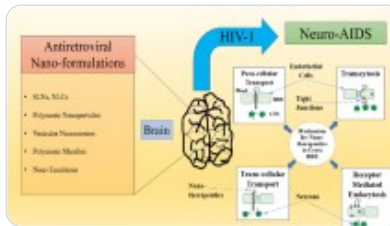
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Abbreviations

ABC: ATP-binding cassette

ADC: AIDS dementia complex

AIDS: Acquired immunodeficiency syndrome

ARV: Antiretroviral

BBB: Blood-brain barrier

BCRP: Breast cancer resistance protein

BCSFB: Blood–cerebrospinal fluid barrier

BMECs: Brain microvessel endothelial cells

BMVECs: Brain microvascular endothelial cells

cART: Combination antiretroviral therapy

CCR5: C–C chemokine receptor type 5

CD4: Cluster of differentiation 4

CNS: Central nervous system

CSF: Cerebrospinal fluid

CSFB: Cerebrospinal fluid–brain barrier

CXCR4: C–X–C chemokine receptor type 4

gp120: Glycoprotein 120

HAART: Highly active antiretroviral therapy

HAND: HIV-associated neurocognitive disorders

hCMEC/D3: Human cerebral microvascular endothelial cell line

HIV: Human immunodeficiency virus

NLCs: Nanostructured lipid carriers

PLA: Polylactic acid

PLGA: Poly(D,L-lactic-co-glycolic acid)

siRNA: Small interfering ribonucleic acid

SIV: Simian immunodeficiency virus

SLN: Solid lipid nanoparticle

Vpr: Viral protein R

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Author information

Authors and Affiliations

SVKM's Institute of Pharmacy, Dhule, Maharashtra, India

Aarti Belgamwar

Institute of Pharmaceutical Education and Research, Borgaon (Meghe), Wardha, Maharashtra, India

Shagufta Khan

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India

Pramod Yeole

Editor information

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Mahendra Rai

Nanobiotechnology Laboratory, Department of Biotechnology, SGB Amravati University, Amravati, Maharashtra, India

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Belgamwar, A., Khan, S., Yeole, P. (2019). Nanomedicines for Improved Antiretroviral Therapy in Neuro-AIDS. In: Rai, M., Yadav, A. (eds) Nanobiotechnology in Neurodegenerative Diseases. Springer, Cham. https://doi.org/10.1007/978-3-030-30930-5_10

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DOI

https://doi.org/10.1007/978-3-030-30930-5_10

Published

03 December 2019

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