

Neuro Drug Delivery: Advancements and Challenges in Targeting the Central Nervous System

Angelina Tran*

Department of Medical Sciences, University of Lyon, France

Corresponding author: Angelina Tran, Department of Medical Sciences, University of Lyon, France, Email: angelinatran56@hotmail.com

Received date: May 16, 2023, Manuscript No. IPNBT-23-17390; **Editor assigned date:** May 19, 2023, PreQC No. IPNBT-23-17390(PQ); **Reviewed date:** June 02, 2023, QC No IPNBT-23-17390; **Revised date:** June 15, 2023, Manuscript No. IPNBT-23-17390 (R); **Published date:** June 26, 2023, DOI: 10.36648/2573-5349.8.2.010

Citation: Angelina Tran (2023) Neuro Drug Delivery: Advancements and Challenges in Targeting the Central Nervous System. J Transl Neurosc Vol. 8 Iss No.2:010

Introduction

Effective drug delivery to the Central Nervous System (CNS) remains a significant challenge due to the complex and selective nature of the Blood-Brain Barrier (BBB). Neuro drug delivery systems aim to overcome these barriers and facilitate the transport of therapeutic agents to the CNS. This research article provides an in-depth analysis of neuro drug delivery strategies, including invasive and non-invasive approaches. We discuss various techniques, such as nanotechnology, liposomes, nanoparticles, and drug conjugation methods, highlighting their potential applications and limitations. Additionally, we address the challenges associated with neuro drug delivery, such as BBB permeability, safety concerns, and clinical translation. Through this comprehensive review, we aim to provide insights into the current advancements, future prospects, and potential impact of neuro drug delivery on the treatment of neurological disorders. Effective drug delivery to the CNS is crucial for the treatment of various neurological disorders. The blood-brain barrier poses a significant challenge due to its selective permeability, limiting the entry of therapeutic agents into the brain. This article provides an overview of neuro drug delivery systems, discussing the importance of targeted drug delivery and the challenges faced in achieving efficient CNS delivery.

Blood-Brain Barrier and its Challenges

The blood-brain barrier, composed of specialized endothelial cells, astrocytes, and tight junctions, regulates the transport of molecules into the CNS. We explore the structure and function of the BBB, highlighting the challenges it poses for drug delivery. Factors such as limited permeability, active efflux transporters, and enzymatic degradation significantly hinder CNS drug delivery. Invasive techniques involve direct delivery of therapeutic agents into the CNS through surgical procedures. We discuss various invasive methods, including intracerebral injections, convection-enhanced delivery, and implantable drug delivery systems. The article explores their advantages,

limitations, and specific applications in the treatment of neurological disorders. Non-invasive strategies aim to bypass or overcome the BBB without the need for invasive procedures. This section focuses on innovative approaches such as nanotechnology, liposomes, and nanoparticles for targeted drug delivery to the CNS. We discuss their potential applications, mechanisms of action, and current challenges in translating these technologies to clinical practice. Drug conjugation involves attaching a therapeutic agent to a carrier molecule to enhance its delivery and targeting capabilities. This section explores different drug conjugation strategies, including antibody-drug conjugates, prodrugs, and peptide-based delivery systems. We discuss their mechanisms, advantages, and limitations in neuro drug delivery.

Challenges and Safety Concerns

Neuro drug delivery faces several challenges, including maintaining drug stability, ensuring selective targeting, and minimizing off-target effects. This section addresses the safety concerns associated with neuro drug delivery, including the potential for neurotoxicity, immune responses, and long-term effects of drug accumulation in the CNS. The successful translation of neuro drug delivery technologies from preclinical studies to clinical practice is crucial. We discuss the current status of clinical trials and the potential impact of neuro drug delivery on the treatment of neurological disorders. Additionally, we explore future perspectives, including the integration of personalized medicine, bioengineering approaches, and the development of novel delivery systems. Neuro drug delivery plays a vital role in overcoming the challenges associated with delivering therapeutic agents to the CNS. This research article provides a comprehensive overview of neuro drug delivery strategies, including invasive and non-invasive approaches. By understanding the advancements, challenges, and future prospects in neuro drug delivery, we can pave the way for improved treatments and outcomes for patients with neurological disorders.