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Commentary

A short note on the Blood-Brain Barrier

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DESCRIPTION

The Blood-Brain Barrier (BBB) is a formidable barrier that prevents medications from entering the brain, making brain cancer therapy difficult. Previously showed that employing aptamers to target transferrin receptors boosted medication delivery to the brain. To further explain these phenomena, the authors created a mathematical model based on the finite element approach that accounts for the fluid flow and mass transfer of the aptamer molecule inside an 8-meter capillary tube across a 14-meter blood-brain barrier domain. The blood velocity and aptamer concentration profiles across the BBB were calculated using a combination of fluid flow and mass transport equations. The brain is one of the most difficult organs to administer drugs to. The blood-brain barrier, which regulates the passage of components into and out of the brain, protects it. Despite the fact that many ways have been used to cross the BBB, medication delivery into the brain remains less successful than in other sections of the human body. To overcome this complicated barrier, a thorough understanding of the mechanisms and capabilities of brain delivery for various components is essential. The BBB structure, its properties, and the BBB's processes for transferring components between the brain and blood have all been explored in this article. Furthermore, the challenges that drug delivery systems face, the tactics that should be used to overcome these challenges and distinct brain targeting paths are highlighted. The drug delivery mechanisms used to penetrate the BBB are considered, particularly Nano carriers and new approaches. Finally, bio conjugated vesicles are discussed as adaptable Nano carriers that mix bio conjugation and vesicles. The biomolecules utilised in Nano vesicular systems to overcome the BBB are the subject of this review. Bio conjugation can be done with a variety of biomolecules, including amino acids, peptides, proteins, antibodies, and polysaccharides. The blood-brain barrier is a protective barrier between the Central Nervous System (CNS) and circulating blood that is essential for maintaining CNS homeostasis by restricting the movement of ions, chemicals, and cells. The breakdown of the BBB is a critical event in the pathogenesis of a number of neurological illnesses, and it has recently been linked to infections with the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2). BBB damage, in turn, is thought to have a major clinical impact in BD patients. Recent studies have shown that BBB failure may play a crucial role in BD's pathogenesis, based on the high frequency of medical and mental comorbidities in BD and a growing body of data linking inflammatory and neuroinflammatory pathways to the condition. We hope to cover studies looking at biological markers of BBB integrity in patients with BD, processes that modulate BBB integrity, their clinical consequences on patients, and critical targets for future development of novel therapies in this thorough narrative review. Understanding the composition and function of the blood-brain barrier allows for the creation of new, innovative approaches for administering central nervous system drugs as well as technology to improve existing models. The construction of several in vitro BBB models has emerged from scientific and methodological interest in the pathology of the BBB. It would be a valuable tool for explaining the mechanism of action of CNS illnesses prior to their manifestation and pathogenic variables if it could be successfully explored and modelled.

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