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Targeting the Blood–Brain Barrier: A New Frontier in Alzheimer's Therapeutics

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Muhammad Irfan Bashir[1]

[1]Faculty of Pharmacy, Universiti Sultan Zainal Abidin, Besut Campus, Terengganu, Malaysia
mirfanbashir786@gmail.com

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Currently, there is a need for novel therapeutic strategies for Alzheimer's disease (AD) due to the rising global burden. Although some drugs can target amyloid-β and tau pathologies, but still cognitive decline has not been resolved. Advanced research focusing on the Blood-Brain Barrier (BBB) as a therapeutic target for AD, because BBB dysfunction significantly contributes to AD pathogenesis.

Emerging evidence shows that BBB dysfunction leads to AD through alterations of endothelial tight junctions, pericyte loss, basement membrane degradation, and impaired clearance mechanisms of amyloid-β waste from the brain and increases the permeability of neurotoxins inside the brain. This dysfunction leads to severe neurodegenerative events [1].

Possibly, the integrity of the BBB can be restored by protecting or repairing the structural and functional components of the BBB for homeostasis purposes, reducing the infiltration of peripheral inflammatory mediators, and supporting the normal clearance of soluble amyloid. Another key issue in AD treatment is the very low penetration of the drug inside the central nervous system (CNS). If the drug delivery system becomes better and a maximum amount of the drug can be penetrated inside the brain, it will also be a big milestone against AD progression. A recent study shows that nanomedicine engineered to engage the BBB transport mechanisms led to robust amyloid clearance and memory recovery in AD model mice [2].

Meanwhile, some studies also focus on finding new biomarkers and therapeutic targets to treat AD. There is a need to search for new targets that are associated with neurodegeneration [3]. There is a need to resist BBB dysfunction; once BBB damage becomes irreversible, then many challenges will become hurdles in AD treatment. Researchers should work to protect the BBB from irreversible damage.

In conclusion, we may get proper therapy for Alzheimer's Disease if we focus on seeking new therapeutic targets, restoring the BBB integrity and developing novel therapeutic strategies that can increase the availability of drugs inside the brain.

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