Targeting the transferrin receptor for brain drug delivery

Obtaining efficient drug delivery to the brain remains the biggest challenge for the development of therapeutics to treat diseases of the central nervous system. The main obstacle is the blood-brain barrier (BBB), which impedes the entrance of most molecules present in the systemic circulation, especially large molecule drugs and nanomedicines. To overcome this obstacle, targeting strategies binding to nutrient receptors present at the luminal membrane of the BBB are frequently employed. Amongst the numerous potential targets at the BBB, the transferrin receptor (TfR) remains the most common target used to ensure sufficient drug delivery to the brain. In this review, we provide a full account on the use of the TfR as a target for brain drug delivery by describing the function of the TfR in the BBB, the historical background of its use in drug delivery, and the most recent evidence suggesting TfR-targeted medicines to be efficient for brain drug delivery with a clear clinical potential.

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