NANOCARRIERS THAT MAY BYPASS THE BLOOD-BRAIN BARRIER

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Introduction: The blood-brain barrier (BBB), blood-cerebrospinal fluid barrier (BCSFB) and blood-brain tumour barrier (BBTB) are regarded as potential barriers for drug delivery. Nanocarriers are designed in order to bypass these natural obstacles. Low immunogenicity, low toxicity, biocompatibility, and stability are the desired properties in each drug along with its nanocarrier. Hiperosmolarity, ultrasound, and microbubbles may disrupt the integrity of the blood-brain barrier while nanoparticles are postulated to be the cause of an incresed incidence of Alzheimer's disease due to its amyloidogenicity.
Materials and methods: There were revised the PubMed, HINARI, Web of Science, Embase, ResearchGate, Google Scholar, and medRxiv databases. A number of 27 sources were identified to be eligible using the keywords 'nanocarrier', and 'blood-brain barrier'. The study was conducted in march, 2025.
Results: Nanocarriers mainly are inorganic, lipidic, polycyanoacrylic, polymeric, dendrimeric, nanogels, and carbon nanotubes. Additional routes of delivery are through viral particles, or cells. A coating process where aminoacids, either polyglycosides cover the nanocarrier may enhance their permeability. Carbon dots nanocarriers require a rigurous attention. The degree of suitability of a drug depends on the Lipinski's rule, thus nanocarriers can make the therapeutic drugs closer to this postulate. Nanoparticles that have paramagnetic properties can be guided to the blood-brain barrier using an external static magnetic field. Niemann-Pick disease (NPD), and lysosomal storage disorders (LSD) may have a negative impact on the nanocarriers' passage capability of the blood-brain barrier. Stroke, human immunodeficiency virus (HIV), epilepsy, and mental illness (neurosis, depression, and schizophrenia) are considered to be targeted by nanocarrier-delivered drug therapy. Intranasal, intrathecal/intracerebral, intratumoral, and intravenous injections are the elective routes for chemotherapeutic drugs delivery in brain tumours.
Conclusions: There is a high variety of nanocarriers which may be suitable for blood-brain barrier permeability enhancing. Their adverse reactions, long-term complications, and limitations must be regarded.
Keywords: nanocarrier, blood-brain barrier, Alzheimer's disease, glioma.