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Functionalized liposomes: an enticing nanocarrier for management of glioma

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Abstract

Glioma is one of the most severe central nervous systems (CNS)-specific tumors, with rapidly growing malignant glial cells accounting for roughly half of all brain tumors and having a poor survival rate ranging from 12 to 15 months. Despite being the most often used technique for glioma therapy, conventional chemotherapy suffers from low permeability of the blood-brain barrier (BBB) and blood-brain tumor barrier (BBTB) to anticancer drugs. When it comes to nanocarriers, liposomes are thought of as one of the most promising nanocarrier systems for glioma treatment. However, owing to BBB tight junctions, non-targeted liposomes, which passively accumulate in most cancer cells primarily via the increased permeability and retention effect (EPR), would not be suitable for glioma treatment. The surface modification of liposomes with various active targeting ligands has shown encouraging outcomes in the recent times by allowing various chemotherapy drugs to pass across the BBB and BBTB and enter glioma cells. This review article introduces by briefly outlining the landscape of glioma, its classification, and some of the pathogenic causes. Further, it discusses major barriers for delivering drugs to glioma such as the BBB, BBTB, and tumor microenvironment. It further discusses modified liposomes such as long-acting circulating liposomes, actively targeted liposomes, stimuli responsive liposomes. Finally, it highlighted the limitations of liposomes in the treatment of glioma and the various actively targeted liposomes undergoing clinical trials for the treatment of glioma.

Keywords: Liposomes; bBB; challenges; functionalized liposomes; glioma.