Advancing Glioma Therapy through Microfluidic Fabrication of Hybrid Liposomes with Homotypic Targeting

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Glioma treatment is challenged by the blood-brain barrier (BBB) and rapid immune clearance, demanding advanced delivery systems. Nanomaterials show promise, but their efficacy is often compromised by immune recognition. Liposomes are widely used, yet their BBB penetration can be limited. Recent approaches modify nanoparticles with cancer cell membranes (CM) to provide stealth and enable homotypic targeting [1,2].

Here, we used microfluidics to fabricate biomimetic hybrid liposomes by fusing synthetic lipids with CMs from U87 glioblastoma cells. 3D printing streamlined microfluidic device production, improving efficiency and cost-effectiveness. Successful fusion was confirmed by dynamic light scattering, FRET, flow cytometry, and Western blot. Hybrid liposomes were loaded with Paclitaxel and Carboplatin as a model glioblastoma therapy [2].

In an in vitro BBB model (Figure 1), these systems crossed the barrier, enabled combination therapy studies, and selectively recognized glioblastoma cells, promoting internalization and drug release. This work highlights biomimetic nanoparticles produced via microfluidics as promising carriers for targeted glioma therapy, potentially overcoming BBB and immune clearance challenges to improve patient outcomes.

References

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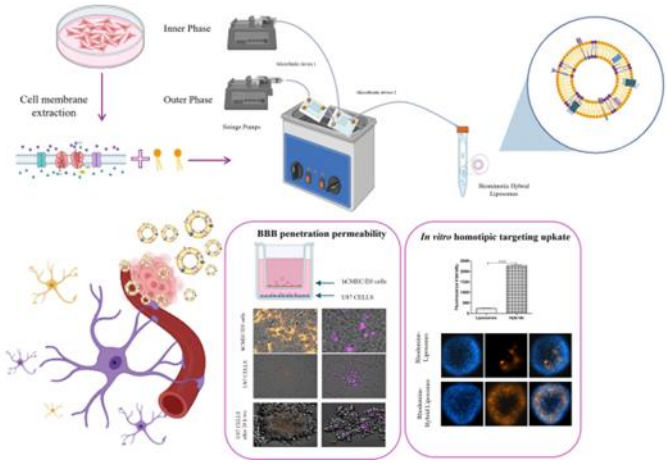

Figure 1: Schematic representation of biomimetic nanoparticles production and some biological experiments.