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Focused ultrasound therapy as a strategy for improving glioma treatment

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Abstract

The infiltrative and diffuse nature of gliomas makes complete resection unfeasible. Unfortunately, regions of brain parenchyma with residual, infiltrative tumor are protected by the blood-brain barrier (BBB), making systemic chemotherapies, small-molecule inhibitors, and immunotherapies of limited efficacy. Low-frequency focused ultrasound (FUS) in combination with intravascular microbubbles can be used to disrupt the BBB transiently and selectively within the tumor and peritumoral region. This technology can be leveraged either to improve access for a wide variety of therapeutic agents to the tumor-infiltrated parenchyma or to allow for the release of tumor biomarkers into the systemic circulation for disease monitoring. Furthermore, high-frequency FUS has the potential to serve as an ablative treatment option. This review aimed to summarize the benefits of FUS in the treatment of gliomas.

Keywords: blood-brain barrier disruption; drug delivery; focused ultrasound; glioma; sonodynamic therapy; tumor.

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