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Targeting diffuse midline gliomas: The promise of focused ultrasound-mediated blood-brain barrier opening

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Abstract

Diffuse midline gliomas (DMGs), including diffuse intrinsic pontine glioma, have among the highest mortality rates of all childhood cancers, despite recent advancements in cancer therapeutics. This is partly because, unlike some CNS tumors, the blood-brain barrier (BBB) of DMG tumor vessels remains intact. The BBB prevents the permeation of many molecular therapies into the brain parenchyma, where the cancer cells reside. Focused ultrasound (FUS) with microbubbles has recently emerged as an innovative and exciting technology that non-invasively permeabilizes the BBB in a small focal region with millimeter precision. In this review, current treatment methods and biological barriers to treating DMGs are discussed. State-of-the-art FUS-mediated BBB opening is then examined, with a focus on the effects of various ultrasound parameters and the treatment of DMGs.

Keywords: Diffuse midline gliomas; Drug delivery; Focused ultrasound; Microbubbles; State of the art.

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