Low-intensity pulsed ultrasound

Opening of the BBB with low-intensity pulsed ultrasound (LIPU) has emerged during the last 2 decades as a promising technique for enhancing drug delivery to the brain. In preclinical models, enhanced delivery of a wide range of therapeutic agents, from low-molecular-weight drugs to antibodies and immune cells, has been observed as well as tumor control and increased survival. This technique has recently entered clinical trials with extracranial and intracranial devices. The safety and feasibility of this technique has furthermore been shown in patients treated monthly for recurrent glioblastoma receiving carboplatin chemotherapy. In this review, the characteristics of the BBB in the most common pediatric brain tumors are reviewed. Then, principles and mechanisms of BBB disruption with ultrasound (US) are summarized and described at the histological and biological levels. Lastly, preclinical studies that have used US-induced BBB opening in tumor models, recent clinical trials, and the potential use of this technology in pediatrics are provided [1)].

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