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The effect of oncolytic virotherapy on pediatric brain tumor- a systematic review

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Abstract

Background: Childhood mortality remains high among pediatric brain tumor (PBT) patients, and current treatments like surgery, chemotherapy, and radiotherapy have limitations. Oncolytic viral therapy (OVT) has emerged as a promising strategy in cancer treatment, including pediatric brain tumors. This study evaluates the clinical evidence on the use of OVT in PBT.

Methods: A systematic review was conducted following PRISMA guidelines, collecting clinical trial data up to December 2023 from English-language publications. Key search terms included "clinical trial," "oncolytic viruses," "glioma," "glioblastoma," "pediatric brain tumors," and "oncolytic virotherapy." Data on patient characteristics, interventions, survival outcomes, and adverse events were extracted by two independent researchers.

Results: Four clinical trials involving 40 pediatric patients (median age 14.5 years) with malignant gliomas were identified. Oncolytic agents studied included HSV G-207, DNX-2401, AdV-tk, and Lerapolturev. Reported tumor types included glioblastoma, diffuse intrinsic pontine glioma, anaplastic astrocytoma, recurrent ependymoma, and diffuse hemispheric glioma. Overall survival ranged from 4.1 to 47.7 months, and progression-free survival ranged from 1.7 to 47.7 months. Treatment was generally well tolerated; the most common adverse events were fever, headache, and nausea, while serious adverse events were infrequent and primarily related to disease progression. Many patients also received standard therapies such as surgery, radiotherapy, or chemotherapy.

Conclusion: OVT appears safe and feasible in pediatric brain tumors, with signals of clinical benefit in selected patients. Larger, controlled trials are needed to clarify its survival impact and define optimal therapeutic strategies.

Keywords: Clinical trials; Glioma; Oncolytic virus; Pediatric brain tumors.