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The Emerging Field of Viroimmunotherapy for Pediatric Brain Tumors

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Abstract

Pediatric brain tumors are the most common solid tumors in children. Even to date, with the advances in multimodality therapeutic management, survival outcomes remain dismal in some types of tumors, such as pediatric-type diffuse high-grade gliomas or central nervous system (CNS) embryonal tumors. Failure to understand the complex molecular heterogeneity and the elusive tumor and microenvironment interplay continues to undermine therapeutic efficacy. Developing a strategy that would improve survival for these fatal tumors remains unmet in pediatric neuro-oncology. Oncolytic viruses (OVs) are emerging as a feasible, safe, and promising therapy for brain tumors. The new paradigm in virotherapy implies that the direct cytopathic effect is followed, under certain circumstances, by an antitumor immune response responsible for the partial or complete debulking of the tumor mass. OVs alone or combined with other therapeutic modalities have been primarily used in adult neuro-oncology. A surge in encouraging preclinical studies in pediatric brain tumor models recently led to the clinical translation of OVs with encouraging results in these tumors. In this review, we summarize the different virotherapy tested in preclinical and clinical studies in pediatric brain tumors, and we discuss the limitations and future avenues necessary to improve the response of these tumors to this type of therapy.

Keywords: clinical trials; oncolytic viruses; pediatric Brain Tumors; preclinical Studies; viroimmunotherapy.

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