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# Re-irradiation for recurrent/progressive pediatric brain tumors: from radiobiology to clinical outcomes

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## Abstract

**Introduction:** Brain tumors are the most common solid tumors in children. Neurosurgical excision, radiotherapy, and/or chemotherapy represent the standard of care in most histopathological types of pediatric central nervous system (CNS) tumors. Even though the successful cure rate is reasonable, some patients may develop recurrence locally or within the neuroaxis.

**Area covered:** The management of these recurrences is not easy; however, significant advances in neurosurgery, radiation techniques, radiobiology, and the introduction of newer biological therapies, have improved the results of their salvage treatment. In many cases, salvage re-irradiation is feasible and has achieved encouraging results. The results of re-irradiation depend upon several factors. These factors include tumor type, extent of the second surgery, tumor volume, location of the recurrence, time that elapses between the initial treatment, the combination with other treatment agents, relapse, and the initial response to radiotherapy.

**Expert opinion:** Reviewing the radiobiological basis and clinical outcome of pediatric brain re-irradiation revealed that re-irradiation is safe, feasible, and indicated for recurrent/progressive different tumor types such as; ependymoma, medulloblastoma, diffuse intrinsic pontine glioma (DIPG) and glioblastoma. It is now considered part of the treatment armamentarium for these patients. The challenges and clinical results in treating recurrent pediatric brain tumors were highly documented.

**Keywords:** BED; Brain tumors; biologically effective dose; radiation tolerance; radiation toxicity; radiobiology; re-irradiation.