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### Radiation-induced tumors in children irradiated for brain tumor: a longitudinal study.

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#### Abstract

**BACKGROUND:** Radiation-induced tumors (RIT) are increasingly recognized as delayed complications of brain irradiation during childhood. However, the true incidence is not established, their biology is poorly understood, and few guidelines exist regarding the long-term follow-up of irradiated children.

**METHODS:** We studied retrospectively patients irradiated for brain tumor under 18 years and followed in our institution since 1970. RIT were defined as new masses, different from the original tumor, occurring after delay in irradiated areas, and not related to phacomatosis.

**RESULTS:** Among 552 irradiated patients, 42 (7.6%) developed one or more RIT, 26 months to 29 years after irradiation (mean 12.8 years). The cumulated incidence was 2.0% at 5 years and 8.9% at 10 years. Of the patients, 73.8% were adult at the time of diagnosis of RIT, and 75% were diagnosed within 18.1 years after irradiation. We identified 60 cavernomas, 26 meningiomas, 2 malignant gliomas, 1 meningosarcoma, and 6 thyroid tumors. Compared with meningiomas, cavernomas appeared earlier, in children irradiated at an older age, and with a male predominance. Although RIT were correlated with higher irradiation doses, 80.9% of these occurred at some distance from the maximum irradiation field. Twenty-five lesions were operated in 20 patients; three patients died because of progression of the RIT.

**CONCLUSION:** A significant number of patients undergoing irradiation for brain tumor during childhood develop a RIT, often during adulthood. Our data suggest that radiation-induced cavernomas result from angiogenetic processes rather than true tumorigenesis. Protracted follow-up with MRI is warranted in children irradiated for brain tumor.

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