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## Late cognitive and radiographic changes related to radiotherapy

### Initial prospective findings

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**Background:** Assumptions about the damaging effects of radiotherapy (XRT) are based on studies in which total dose, dose fraction, treatment volume, degree of malignancy, chemotherapy, tumor recurrence, and neurologic comorbidity interact with XRT effects. This is a prospective, long-term study of XRT effects in adults, in which total dose and dose fraction were constrained and data related to tumor recurrence and neurologic comorbidity (e.g., hypertension) were excluded.

**Methods:** The effects of XRT on the cognitive and radiographic outcomes of 26 patients with low-grade, supratentorial, brain tumors yearly from baseline (6 weeks after surgery and immediately before XRT) and yearly to 6 years were examined. Radiographic findings were examined regionally.

**Results:** Selective cognitive declines (in visual memory) emerged only at 5 years, whereas ratings of clinical MRI (T2 images) showed mild accumulation of hyperintensities with post-treatment onset from 6 months to 3 years, with no further progression. White matter atrophy and total hyperintensities demonstrated this effect, with subcortical and deep white matter, corpus callosum, cerebellar structures, and pons accounting for these changes over time. About half of the patients demonstrated cognitive decline and treatment-related hyperintensities.

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**Conclusions:** There was no evidence of a general cognitive decline or progression of white matter changes after 3 years. Results argue for limited damage from XRT at this frequently used dose and volume in the absence of other clinical risk factors.

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