Delayed cognitive, behavioral and radiological changes related to cranial irradiation for pediatric brain tumors

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The aim of this study was to evaluate the delayed adverse changes in neuro-cognitive functions as well as white matter damage in radiated survivors of pediatric brain tumors. Forty-two children (22 males) with primary brain tumors who were only treated with cranial radiation, were recruited. Mean age's was 10.3 + or- 3.98 years. They were subjected, initially just before radiotherapy and at follow-up 1-2 year after completion of cranial radiation, to serial clinical and neuropsychological assessments including Wechseler intelligence scale for children, Vineland adaptive behavior scale, Benton visual retention test and revised behavior problem checklist.

Magnetic resonance scans were also performed to detect the presence of white matter damage before radiotherapy and at follow up. The results showed that initially after surgery and before radiation, intelligence test scores were below normal scores for age and this was of high statistical significance. Visual memory test showed evidence of organicity in all cases. Social maturity showed a statistically significant decline as well.

Follow-up after radiotherapy showed further decline with high statistical significance, visual memory. Both radiation dose and volume of radiation showed negative and statistically significant correlation with IQ. Age at diagnosis correlated positively and significantly with IQ. Impaired neuron-cognitive function was correlated with the degree of white matter damage and young age at diagnosis.