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“Quantitative neuroimaging and neurocognitive assessment to measure radiation-induced brain injury in non-targeted tissue: implications for cognitive preservation”

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Fractionated radiation therapy is a mainstay in the treatment of primary and metastatic brain tumors. However, radiation to the brain results in an inevitable decline in neurocognitive functioning. These radiation effects are mediated by tissue injury to white matter and neuronal injury to the hippocampus. With quantitative magnetic resonance imaging (MRI) techniques, we can directly and non-invasively measure such changes.

The purpose of this study is to examine radiation-induced imaging changes in normal, nontumor brain tissue and correlate with neurocognitive outcome after treatment. The overarching goal is to better understand these “bystander effects” responsible for neurocognitive decline, identifying particularly sensitive brain regions so that future radiation techniques can be optimally designed to mitigate collateral damage.