

Purpose:

Magnetic resonance diffusion tensor imaging (DTI) changes may predict for cognitive impairment following cranial irradiation. We sought to assess temporal changes in white matter integrity in children with brain tumors treated with proton therapy (PT) using DTI.

Methods:

Six patients with low grade gliomas who had been treated with proton therapy were included. Pre-therapy as well as the follow-up scans (including DTI) were registered. DTI parameters were calculated and studied for changes immediately after therapy and over time.

Results:

In the peri-tumoral regions which had received irradiation, FA value decreased after treatment while ADC increased over time. Within the tumor region, FA demonstrated a trend of steady increase while ADC decreased over time.

Conclusions:

Changes in DTI parameters were found in brain regions corresponding to higher radiation doses. In contrast, normal areas spared from excess radiation displayed no change over time. This supports the use of proton therapy for young patients. Future studies will assess patients treated with photon therapy and seek to correlate changes in imaging with cognitive outcomes.