

AbstractID: 11605 Title: Neural Stem Cell Sparing Radiation Therapy—A Feasibility Study

Purpose:

Neural stem cells (NSC) are found in two regions of the adult brain: the subventricular zone (SVZ) of the lateral ventricles and the dentate gyrus (DG) of the hippocampus. These cells are thought to be involved in injury repair and tumor inhibition. This study assesses the feasibility of sparing NSC niches during radiotherapy.

Method and Materials:

33 patients treated with IMRT for brain tumors were evaluated (10 glioblastoma multiforme (GBM), 10 low grade gliomas, 10 meningiomas, 3 pituitary macroadenomas). IMRT treatment plans were reconstructed using the Pinnacle treatment planning system (v.8.0m). SVZ and DG were contoured on fused MRI scans. A second IMRT plan using the NSC regions as an avoidance structure was created for each patient. The change in D70 to the contralateral NSC niches and PTV-1 was recorded.

Results:

The mean (range) reduction in D70 for the contralateral DG was: 8.3 Gy (0.7-14.3 Gy), 1.8 Gy (-0.15-5.42 Gy), 1.2 Gy (-1.46-7.28 Gy), and 0.5 Gy (-0.4-1.27 Gy) for GBM, low grade gliomas, meningiomas and pituitary adenomas respectively. The mean (range) reduction in D70 for the contralateral SVZ was: 7.3 Gy (2.5-13.4 Gy), 4.2 Gy (-0.5-10.4 Gy), 3.7 Gy (0.43-7.02 Gy), and 5.61 Gy (2-8.34 Gy) for GBM, low grade gliomas, meningiomas and pituitary adenomas respectively. There was no clinically relevant change in the coverage of the PTV-1.

Conclusion:

This study demonstrates that it is possible to spare some of the NSC containing regions of the brain using IMRT in patients with brain tumors. This is the first study to date to demonstrate feasibility of this technique in numerous patients with multiple tumor histologies.

Conflict of Interest:

None