AbstractID: 11230 Title: Precision Localized Radiation to Ablate Progenitor Cells in the Mouse Brain

Purpose: Neural stem cells in the adult brain participate in both the repair of normal tissue and inhibition of tumor growth. Here we investigate the effects of localized irradiation on neural stem cells in the rodent subventricular zone (SVZ) emplying a novel device to precisely localize this stem cell niche.

Method and Materials: We selectively targeted the SVZ of the mouse using a precision CT-guided radiation device developed in our laboratory. We delivered 10 Gy to the right SVZ through a 3 mm field (n=4). The left SVZ serves as its own control, but sham mice were also employed (n=4). Mice were sacrificed 7 days after irradiation and brain tissue was harvested, fixed, frozen and sectioned. Immunohistochemical staining was performed for H2Ax, a marker of DNA double strand breaks, and Ki67, a marker of cell proliferation in this neurogenic region.

Results: H2Ax stains indicated that the right lateral ventricle was specifically irradiated. A strong asymmetry was observed in the right (irradiated) vs. left (unirradiated) SVZ with 14,106±626 vs. 2,323±1094 cells ($p<0.001$). The data also showed that the unirradiated (left) SVZ has the same number of Ki67+ cells as a sham mouse ($p=0.27$) indicating that local irradiation produces no systemic effect under these conditions.

Conclusion: Localized irradiation is capable of selectively ablating proliferating cells in neurogenic regions of the mouse brain. This local dose response as well as the irradiating device can be used to study locoregional effects and migration of neural stem cells.