Subventricular Zone Localized Irradiation Affects the Generation of Proliferating Neural Precursor Cells and the Migration of Neuroblasts.

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Abstract

Radiation therapy is a part of the standard treatment for brain tumor patients, often resulting in irreversible neuropsychological deficits. These deficits may be due to permanent damage to the neural stem cell (NSC) niche, damage to local neural progenitors, or neurotoxicity. Using a CT-guided localized radiation technique, we studied the effects of radiation on NSC proliferation and neuroblast migration in the mouse brain. Localized irradiation of the subventricular zone (SVZ) eliminated the proliferating neural precursor cells (NPCs) and migrating neuroblasts. After irradiation, type B cells in the SVZ lacked the ability to generate migrating neuroblasts. Neuroblasts from the unirradiated posterior SVZ did not follow their normal migratory path through the irradiated anterior SVZ. Our results indicate that the migrating neuroblasts were not replenished, despite the presence of type B cells in the SVZ post-irradiation. This study provides novel insights into the effects of localized SVZ radiation on neurogenesis and cell migration that may potentially lead to the development of new radiotherapy strategies to minimize damage to NSCs and neuroblast migration.

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