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High-Grade Glioma Relationship to the Neural Stem Cell Compartment: A Retrospective Review of 104 Cases.

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Abstract

PURPOSE: To assess the incidence of involvement of the neural stem cell (NSC) compartment by high-grade astrocytomas in a series of adult patients.

METHODS AND MATERIALS: One hundred four initial diagnostic cranial magnetic resonance imaging series were reviewed. For each series, the gross tumor volume (GTV; enhancing tumor on T(1)), edema (hyperintensity on T(2) FLAIR), and the NSC compartment (hippocampal formation and lateral ventricle plus a 5-mm expansion) were identified. Involvement of NSC by GTV and edema was assessed. For tumors not involving NSC, we measured distances from NSC to GTV and edema. Maximum diameters of GTV were measured for each case. Subset analysis was performed for GTV of ≤2 cm and ≤3 cm in maximum diameter to assess the incidence of involvement of NSC by this group of smaller tumors. For 10 representative tumors, minimum distances from GTV center to NSC were calculated.

RESULTS: A total of 103/104 (99.0%) tumors, regardless of GTV maximum diameter, demonstrated involvement of NSC. A total of 101/104 (97.1%) tumors had NSC involvement by GTV, and 2/104 (1.9%) patients showed edema only. For GTV not involving NSC, the mean distance from NSC to GTV was 0.8 cm (range, 0.5--1.4 cm). The mean shortest distance from the center of GTV to NSC was 1.5 cm (range, 0.9--2.6 cm). Involvement of NSC by GTV was 90.9% (10/11 tumors) for GTV of ≤2 cm and 95.7% (22/23 tumors) for GTV of ≤3 cm.

CONCLUSIONS: Our results support the hypothesis that the NSC compartment represents the putative site of origin for these tumors. NSC involvement does not appear to represent a volumetric phenomenon.

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