

ABSTRACT

Radiother Oncol. 2022 Dec 15:S0167-8140(22)04581-9. doi: 10.1016/j.radonc.2022.11.024. Online ahead of print.

Evaluation of different tumor delineation strategies in patients with glioblastoma receiving standard chemoradiation: impact of reduced treatment volumes on patterns of recurrence and radiation dose to healthy brain tissue.

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PURPOSE: to analyze the recurrence pattern in patients with glioblastoma (GBM) after standard chemoradiation according to different target volume delineation strategy.

METHODS AND MATERIALS: two hundred seven patients with GBM who recurred after standard chemoradiation were evaluated. According to the European Society for Radiotherapy and Oncology (ESTRO) target volume delineation guideline, the clinical target volume (CTV) was generated by adding a 2-cm margin to the gross tumor volume (GTV), defined as the resection cavity plus residual tumor. Patterns of failure were analyzed using dose-volume histograms. The recurrent lesions were defined as in-field, marginal, or distant if >80%, 20-80%, or <20% of the intersecting volume was included in the 95% isodose line. For each patient, a theoretical plan consisting of reduced 1-cm GTV-to-CTV margin was created to compare patterns of failure and radiation doses to normal brain.

RESULTS: The median overall survival and progression-free survival were 15.3 months and 7.8 months, respectively, from the date of surgery. Recurrences were in-field in 180, marginal in 5, and distant in 22 patients. According to the O6-methylguanine-DNA-methyltransferase (MGMT) promoter methylation, distant recurrences occurred in 18.6% of methylated and 6% of unmethylated tumors ($p=0.0046$). Patterns of failure were similar between groups, although lower radiation doses to the healthy brain and hippocampi were observed using reduced margins ($p=0.0001$).

CONCLUSION: Target delineation with a 1-cm GTV-to-CTV margin offers similar patterns of tumor recurrence compared with standard target delineation, while significantly lowering radiation doses to normal brain and hippocampi.

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DOI: 10.1016/j.radonc.2022.11.024

PMID: 36529439

Conflict of interest statement: Conflict of Interest The authors declare that they have no competing interests.