

Cancer. 2025 Aug 1;131(15):e70016. doi: 10.1002/cncr.70016.

Impact of peri-tumoral resection on survival in primary glioblastoma

Linda Y Tang¹, David Botros¹, Anya A Kim¹, Adham M Khalafallah¹, Hayden Dux¹, Keiko Fox¹, Nauman Hussain¹, Yuncong Mao¹, Richard Pellegrino¹, Paarth Sharma¹, Calixto-Hope G Lucas², A Karim Ahmed¹, Christopher M Jackson¹, Gary Gallia¹, Chetan Bettgowda¹, Jon Weingart¹, Henry Brem¹, Debraj Mukherjee^{1 3}

Affiliations

PMID: 40704606 DOI: [10.1002/cncr.70016](https://doi.org/10.1002/cncr.70016)

Abstract

Objective: Glioblastoma (GBM) is the most common primary brain malignancy, and standard treatment includes maximal resection of contrast-enhancing tumor. Given recent interest in resection beyond areas of contrast-enhancement, the authors analyzed the role of peri-tumoral resection (PTR) in primary GBM.

Methods: This study included 126 adult patients with primary GBM amenable to peri-tumoral resection (PTR) at a tertiary care academic medical center. Patient characteristics and pre/postoperative tumor volumes were collected. Outcome-oriented cut-points for extent of resection of contrast-enhancing tumor (EOR) were determined using maximally selected rank statistics. Multivariable Cox proportional hazards (CPH) model for death was performed.

Results: This cohort had mean age 60.7 ± 11.3 years and median overall survival (OS)/progression-free survival (PFS) 15.2/7.5 months. EOR $>92.1\%$ was associated with increased OS compared to $<92.1\%$ EOR (23.1 vs. 14.0 months, $p < .01$). Fifty-four (42%) patients received PTR, of which 28 (22%) achieved PTR of $>1.74 \text{ cm}^3$ beyond the contrast-enhancing region. This latter group demonstrated greater OS than the PTR $<1.74 \text{ cm}^3$ group (21.6 vs. 16.8 months, $p < 0.01$). There was no significant difference in postoperative complications between groups. Multivariable CPH model found EOR 92.1%-99% (hazard ratio [HR], 0.30; confidence interval [CI], 0.15-0.60, $p < .01$) and PTR $>1.74 \text{ cm}^3$ (HR, 0.27; CI, 0.13-0.56, $p < .01$) were associated with increased OS. Preoperative T2-FLAIR volume $>192 \text{ cm}^3$ was associated with worse OS (HR, 3.18; CI, 1.17-8.61, $p < .01$).

Conclusion: Our results demonstrate increased OS in GBM with resection beyond contrast-enhancing tumor margins. With no associated increase in postoperative deficits, PTR $>1.74 \text{ cm}^3$ was both effective and safe in select cases.

Keywords: extent of resection; glioblastoma; neuro-oncology; peri-tumoral resection; volumetrics.

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