Meta-Analysis J Neurooncol. 2025 Dec 29;176(2):138. doi: 10.1007/s11060-025-05390-6.

Extent of resection and adjuvant treatment in adult cerebellar glioblastoma: systematic review and meta-analysis of survival outcomes

Khalil St Brice [1], Tariq Parker [2], Kim Wouters [3], Edgar Daniel Guzmán-Ríos [4], Ariel E Marciscano [5 6], Nancy Wang [5], Jorg Dietrich [5], Bryan D Choi [2], Brian V Nahed [2]

PMID: 41460384 DOI: 10.1007/s11060-025-05390-6

Abstract

Introduction: Cerebellar glioblastoma (cGBM) is a rare subtype, comprising of < 1% of patients with GBMs. This study sought to identify predictors of survival for patients with cGBM through an individual patient data (IPD) meta-analysis, focusing on the impact of chemoradiotherapy (CRT) and extent of resection (EOR).

Methods: Following PRISMA-IPD guidelines, we conducted a systematic review and Individual Patient Data (IPD) meta-analysis of 13 retrospective studies (113 adults) with IDH-wildtype cerebellar glioblastoma. Variables included demographics, tumor location, KPS, MGMT, TP53, extent of resection (GTR, STR, PR, biopsy), and CRT. Kaplan-Meier estimated OS and PFS; unadjusted and adjusted Cox models assessed predictors. Hazard ratios for CRT vs. monotherapy and GTR vs. incomplete resection were pooled in a two-stage random-effects model (Hartung-Knapp). Analyses used R (v4.4.2) and JMP Pro 17.

Results: Mean age was 54.9 years; 64% were male. GTR was performed in 37%, PR in 43%, STR in 11%, and biopsy in 10%. CRT was associated with improved OS (18 vs. 7 months; p = 0.02) and PFS (12 vs. 2.5 months; p = 0.0205) compared to monotherapy on Kaplan-Meier analysis. Two-stage IPD meta-analysis showed a 72% reduced risk of death with CRT (HR 0.28; 95% CI: 0.15-0.51; p = 0.0119), with similar significance in one-stage unadjusted Cox models (HR 0.49; 95% CI: 0.26-0.91; p = 0.0233). EOR comparisons were non-significant in meta-analyses, though GTR vs. biopsy showed early separation on Wilcoxon testing (p = 0.0422).

Conclusion: In this pooled IPD meta-analysis of cGBM, the use of CRT remained the only consistent and independent predictor of improved survival. GTR conferred a survival advantage over biopsy, likely reflecting the clinical benefit of debulking, however its advantage over subtotal resection was not statistically significant. These findings reinforce CRT as the maintstay of treatment highlighting the need for individualized strategies in cGBM. In selected cGBM patients, gross total surgical resection and adjuvant chemo-RT result in overall survival outcomes comparable with supratentorial GBM.

Clinical trial number: Not applicable.

Keywords: Cerebellar glioblastoma; Chemoradiotherapy; Extent of resection; Glioblastoma; Meta-analysis; Survival.