Supramaximal resection

- Commentary: Fluorescence-Guided Cord Transection for Supramaximal Resection of Spinal High-Grade Glioma: 2-Dimensional Operative Video
- Fluorescence-Guided Cord Transection for Supramaximal Resection of Spinal High-Grade Glioma: 2-Dimensional Operative Video
- Proliferation-Diffusion Modeling in Glioblastoma: Impact of Supramaximal Resection on Survival
- Spatial invasion patterns of temporal lobe glioblastoma after complete resection of contrast-enhancing tumor
- Molecular-based decision-making in glioblastoma surgery: when to aim for supramaximal resection
- Prognostic revalidation of RANO categories for extent of resection in glioblastoma: a reconstruction of individual patient data
- Aggressive resection of non-contrast-enhanced tumor provides varying benefits to glioblastoma, IDH-wildtype patients based on different clinical characteristics
- Standardisation of the radiological definition of supramaximal resection in glioblastoma

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Supramarginal vs. Supramaximal Resection

While often used interchangeably, these two terms can reflect different levels of surgical ambition:

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^ Term                    ^ Definition
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| **Supramarginal**         | Resection of tumor plus a margin of surrounding
brain tissue just beyond imaging abnormalities. |
| **Supramaximal**          | More extensive resection, potentially involving
entire brain regions or functional networks.    |
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In practice, the choice depends on tumor location, patient function, and surgeon philosophy.

A greater extent of resection of the contrast-enhancing (CE) tumour part has been associated with improved outcomes in glioblastoma. Recent results suggest that resection of the non-contrast-enhancing (NCE) part might yield even better survival outcomes (supramaximal resection, SMR). Therefore, this study evaluates the efficacy and safety of SMR with and without mapping techniques in high-grade glioma (HGG) patients in terms of survival, functional, neurological, cognitive and quality of life outcomes. Furthermore, it evaluates which patients benefit the most from SMR, and how they could be identified preoperatively.

This study is an international, multicentre, prospective, two-arm cohort study of observational nature. Consecutive glioblastoma patients will be operated with SMR or maximal resection at a 1:1 ratio. Primary endpoints are (1) overall survival and (2) proportion of patients with National Institute of Health Stroke Scale deterioration at 6 weeks, 3 months and 6 months postoperatively. Secondary endpoints are (1) residual CE and NCE tumour volume on postoperative T1-contrast and FLAIR (Fluid-attenuated inversion recovery) MRI scans; (2) progression-free survival; (3) receipt of adjuvant

therapy with chemotherapy and radiotherapy; and (4) quality of life at 6 weeks, 3 months and 6 months postoperatively. The total duration of the study is 5 years. Patient inclusion is 4 years, follow-up is 1 year.

Ethics and dissemination: The study has been approved by the Medical Ethics Committee (METC Zuid-West Holland/Erasmus Medical Center; MEC-2020-0812). The results will be published in peer-reviewed academic journals and disseminated to patient organisations and media [1)]

Resection of the T1 contrast-enhancing portion of glioblastoma has been shown to increase patient survival, although whether GBM resection beyond these boundaries has an additional survival benefit is not clear. In this study, we examined the effect of resecting the enhancement and a margin of brain tissue surrounding the enhancement in patients with GBM of the temporal lobe.

We identified 32 consecutive patients with temporal lobe GBM who underwent initial resection between 2012 and 2015. Progression-free survival (PFS) and overall survival (OS) were analyzed based on the following categories: subtotal resection (STR; <99% of contrast enhancement removed), gross total resection (GTR; 100% of T1 contrast enhancement removed), and supramaximal resection (SMR; removal of T1 contrast enhancement plus removal of at least 1 cm of brain tissue surrounding the enhancement).

Patients undergoing SMR demonstrated a substantially improved median PFS (15 months) compared with those undergoing GTR (7 months) or those undergoing STR (6 months) ($P < 0.003$). A median OS advantage was also present in the SMR group (24 months) compared with the GTR (11 months) and STR (9 months) groups ($P < 0.004$). SMR significantly improved PFS (hazard ratio [HR], 0.093; 95% confidence interval [CI], 0.01-0.89; $P = 0.039$) and OS (HR, 0.169; 95% CI, 0.05-0.57; $P < 0.004$) when controlling for other variables. The complication rates did not differ among the resection groups ($P = 0.66$).

Achieving SMR substantially improved survival in patients with temporal lobe GBM compared with GTR of the enhancement alone [2)].

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Gerritsen JKW, Young JS, Chang SM, Krieg SM, Jungk C, van den Bent MJ, Satoer DD, Ille S, Schucht P, Nahed BV, Broekman MLD, Berger M, De Vleeschouwer S, Vincent AJPE. SUPRAMAX-study: supramaximal resection versus maximal resection for glioblastoma patients: study protocol for an international multicentre prospective cohort study (ENCRAM 2201). BMJ Open. 2024 Apr 29;14(4):e082274. doi: 10.1136/bmjopen-2023-082274. PMID: 38684246; PMCID: PMC11086386.
2)
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