Anticancer Res. 2024 Nov;44(11):5043-5049. doi: 10.21873/anticanres.17328.

Preoperative Tumor Growth Rate Does Not Predict Overall or Progression-free Survival in Patients With Glioblastoma

Jan Leppert [1], Claudia Ditz [2], Jakob Matschke [3], Maria Vittoria Matone [2], Patrick Kuppler [2], Christina Hillbricht [4], Harald Krenzlin [2], Naureen Keric [2], Hannes Schacht [5], Christian Ziemann [6], Elisa Maria Groh [6], Larysa Liubich [7] [8], Oksana Zemskova [7], Dirk Rades [6], Anastassia Löser [6]

Affiliations

PMID: 39477314 DOI: 10.21873/anticanres.17328

Abstract

Background/aim: Presurgical tumor volume progression in glioblastoma (GBM) may be a predictor of survival. This study aims to evaluate the potential impact of preoperative tumor growth and other clinical as well as laboratory parameters on overall survival (OS) of GBM patients.

Patients and methods: We retrospectively analyzed 98 adult patients with GBM who received two magnetic resonance imaging (MRI) scans between 2013 and 2023, before primary surgery and concurrent Stupp chemoradiotherapy. Tumor growth rates were calculated to classify GBM into slower and faster growing categories. Statistical analyses, including Kaplan-Meier and multivariable Cox regression survival analyses, were performed to evaluate the impact of various clinical and treatment-related factors on OS and progression-free survival (PFS).

Results: Slower growing tumors had a significantly longer doubling time than faster growing lesions. Univariable analysis showed no significant differences in OS (p=0.12) or PFS (p=0.4) when analyzed according to tumor growth. When stratified by O6-methylguanin-DNA-methyltransferase (MGMT) status, there were still no differences in OS (p=0.14), but in PFS (p=0.009). In the multivariable Cox regression analysis, radiation dose (p=0.02) and the number of adjuvant cycles of temozolomide (TMZ) (p=0.002) were significantly associated with OS. MGMT status (p=0.02) and the number of adjuvant TMZ cycles (p<0.001) were significantly associated with prolonged PFS. Specific volume growth rate (SVGR), patient age, baseline tumor volume, Karnofsky performance status, extent of resection, and total radiation dose were not significantly associated with PFS.

Conclusion: SVGR was not significantly associated with OS or PFS. In contrast, MGMT status, radiation dose, and number of adjuvant TMZ cycles were identified as predictors of treatment outcomes. These factors can guide physicians when designing personalized treatment concepts for patients with GBM.

Keywords: Glioblastoma; overall survival; progression-free survival; tumor growth; tumor volume.