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# Defining subventricular zone involvement to predict the survival of patients in isocitrate dehydrogenase-wild type glioblastoma: validation in a prospective registry

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## Abstract

**Objectives:** The prognostic value of subventricular zone distance (SVD) is unclear because of different definitions and lack of evaluation of clinical survival models. The aim of this study was to define SVD and evaluate its prognostic value in a survival nomogram for glioblastoma.

**Methods:** This retrospective study included 158 (SVD biomarker) from historical glioblastoma patients and 187 (survival modeling) with IDH-wild type glioblastoma from a prospective registry ([NCT02619890](https://clinicaltrials.gov/ct2/show/study/NCT02619890)). SVD was assessed by two radiologists: definition 1, the distance between the tumor edge to subventricular zone (SVZ); definition 2, the distance between the tumor centroid to SVZ; definition 3, enhancement at the ventricular wall. The associations between SVD and overall survival (OS) were evaluated using multivariable Cox proportional hazards regression analysis. Performance of an updated SVD survival model was compared with that of the Radiation Therapy Oncology Group (RTOG) 0525 nomogram.

**Results:** SVD according to both definition 1 (hazard ratio [HR]: 0.97, 95% CI: 0.94-0.99;  $p = .011$ ) and definition 2 (HR: 0.96, 0.94-0.98,  $p < .001$ ) was adversely associated with OS. Definition 1 was adversely associated with PFS (HR: 0.96, 0.94-0.99,  $p = .008$ ) and showed the highest reproducibility (intraclass correlation coefficient, 0.90). The SVD-updated model showed similar to better performance than the RTOG model for predicting OS of up to 3 years (AUC: 0.735-0.738 vs. 0.687-0.708), with higher time-dependent specificity for 1-year (89.9% vs. 70.6%) and 3-year OS (93.3% vs. 80.0%).

**Conclusion:** SVZ distance is an independent adverse prognostic factor in patients with IDH-wild type glioblastoma. Updating the survival model with SVZ provides better time-dependent specificity and reproducibility.

**Key points:** • Subventricular zone distance (SVD) measurement from tumor edge showed high reproducibility. • Longer SVD was independently associated with longer overall survival. • Adding SVD improved time-dependent specificity for survival model in a prospective registry.

**Keywords:** Glioblastoma; MRI; Radiation Oncology; Subventricular zone; Survival.

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