Tumor Surface Regularity

Pérez-Beteta et al., evaluated the prognostic and predictive value of surface-derived imaging biomarkers obtained from contrast material-enhanced volumetric pretreatment T1 weighted image magnetic resonance sequences in patients with glioblastoma multiforme.

A discovery cohort from five local institutions (165 patients; mean age, 62 years ± 12 [standard deviation]; 43% women and 57% men) and an independent validation cohort (51 patients; mean age, 60 years ± 12; 39% women and 61% men) from The Cancer Imaging Archive with volumetric T1-weighted pretreatment contrast-enhanced MR imaging sequences were included in the study. Clinical variables such as age, treatment, and survival were collected. After tumor segmentation and image processing, tumor surface regularity, measuring how much the tumor surface deviates from a sphere of the same volume, was obtained. Kaplan-Meier, Cox proportional hazards, correlations, and concordance indexes were used to compare variables and patient subgroups.

Surface regularity was a powerful predictor of survival in the discovery (P = .005, hazard ratio [HR] = 1.61) and validation groups (P = .05, HR = 1.84). Multivariate analysis selected age and surface regularity as significant variables in a combined prognostic model (P < .001, HR = 3.05). The model achieved concordance indexes of 0.76 and 0.74 for the discovery and validation cohorts, respectively. Tumor surface regularity was a predictor of survival for patients who underwent complete resection (P = .01, HR = 1.90). Tumors with irregular surfaces did not benefit from total over subtotal resections (P = .57, HR = 1.17), but those with regular surfaces did (P = .004, HR = 2.07).

The surface regularity obtained from high-resolution contrast-enhanced pretreatment volumetric T1-weighted MR images is a predictor of survival in patients with glioblastoma. It may help in classifying patients for surgery [1].

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Pérez-Beteta J, Molina-García D, Ortiz-Alhambra JA, Fernández-Romero A, Luque B, Arregui E, Calvo M, Borrás JM, Meléndez B, Rodríguez de Lope Á, Moreno de la Presa R, Iglesias Bayo L, Barcia JA, Martino J, Velásquez C, Asenjo B, Benavides M, Herruzo I, Revert A, Arana E, Pérez-García VM. Tumor Surface Regularity at MR Imaging Predicts Survival and Response to Surgery in Patients with Glioblastoma. Radiology. 2018 Jul;288(1):218-225. doi: 10.1148/radiol.2018171051. PubMed PMID: 29924716.