

ABSTRACT

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Development and external validation of a clinical prediction model for survival in patients with IDH wild-type glioblastoma.

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OBJECTIVE: Prognostication of glioblastoma survival has become more refined due to the molecular reclassification of these tumors into isocitrate dehydrogenase (IDH) wild-type and IDH mutant. Since this molecular stratification, however, robust clinical prediction models relevant to the entire IDH wild-type glioblastoma patient population are lacking. This study aimed to provide an updated model that predicts individual survival prognosis in patients with IDH wild-type glioblastoma.

METHODS: Databases from Germany and the Netherlands provided data on 1036 newly diagnosed glioblastoma patients treated between 2012 and 2018. A clinical prediction model for all-cause mortality was developed with Cox proportional hazards regression. This model included recent glioblastoma-associated molecular markers in addition to well-known classic prognostic variables, which were updated and refined with additional categories. Model performance was evaluated according to calibration (using calibration plots and calibration slope) and discrimination (using a C-statistic) in a cross-validation procedure by country to assess external validity.

RESULTS: The German and Dutch patient cohorts consisted of 710 and 326 patients, respectively, of whom 511 (72%) and 308 (95%) had died. Three models were developed, each with increasing complexity. The final model considering age, sex, preoperative Karnofsky Performance Status, extent of resection, O6-methylguanine DNA methyltransferase (MGMT) promoter methylation status, and adjuvant therapeutic regimen showed an optimism-corrected C-statistic of 0.73 (95% confidence interval 0.71-0.75). Cross-validation between the national cohorts yielded comparable results.

CONCLUSIONS: This prediction model reliably predicts individual survival prognosis in patients with newly diagnosed IDH wild-type glioblastoma, although additional validation, especially for long-term survival, may be desired. The nomogram and web application of this model may support shared decision-making if used properly.

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