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# Prognostic significance of MRI contrast enhancement in newly diagnosed glioblastoma, IDH-wildtype according to WHO 2021 classification

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## Abstract

**Background and objectives:** Contrast enhancement in glioblastoma, IDH-wildtype is common but not systematic. In the era of the WHO 2021 Classification of CNS Tumors, the prognostic impact of a contrast enhancement and the pattern of contrast enhancement is not clearly elucidated.

**Methods:** We performed an observational, retrospective, single-centre cohort study at a tertiary neurosurgical oncology centre (January 2006 - December 2022). We screened adult patients with a newly-diagnosed glioblastoma, IDH-wildtype in order to assess the prognosis role of the contrast enhancement and the pattern of contrast enhancement.

**Results:** We included 1149 glioblastomas, IDH-wildtype: 26 (2.3%) had a no contrast enhancement, 45 (4.0%) had a faint and patchy contrast enhancement, 118 (10.5%) had a nodular contrast enhancement, and 960 (85.5%) had a ring-like contrast enhancement. Overall survival was longer in non-contrast enhanced glioblastomas (26.7 months) than in contrast enhanced glioblastomas (10.9 months) ( $p < 0.001$ ). In contrast enhanced glioblastomas, a ring-like pattern was associated with shorter overall survival than in faint and patchy and nodular patterns (10.0 months versus 13.0 months, respectively) ( $p = 0.033$ ). Whatever the presence of a contrast enhancement and the pattern of contrast enhancement, surgical resection was an independent predictor of longer overall survival, while age  $\geq 70$  years, preoperative KPS score  $< 70$ , tumour volume  $\geq 30\text{cm}^3$ , and postoperative residual contrast enhancement were independent predictors of shorter overall survival.

**Conclusion:** A contrast enhancement is present in the majority (97.7%) of glioblastomas, IDH-wildtype and, regardless of the pattern, is associated with a shorter overall survival. The ring-like pattern of contrast enhancement is typical in glioblastomas, IDH-wildtype (85.5%) and remains an independent predictor of shorter overall survival compared to other patterns (faint and patchy and nodular).

**Keywords:** Contrast enhancement; Glioblastoma; Magnetic Resonance Imaging; Neurosurgery; Survival analysis.

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