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Magnetic resonance imaging-derived parameters to predict response to regorafenib in recurrent glioblastoma

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Abstract

Purpose: Regorafenib is a multikinase inhibitor, approved as a preferred regimen for recurrent glioblastoma (rGB). Although its effects on prolonging survival could seem modest, it is still unclear whether a subset of patients, potentially identifiable by imaging biomarkers, might experience a more substantial positive effect. Our aim was to evaluate the potential value of magnetic resonance imaging-derived parameters as non-invasive biomarkers to predict response to regorafenib in patients with rGB.

Methods: 20 patients with rGB underwent conventional and advanced MRI at diagnosis (before surgery), at recurrence and at first follow-up (3 months) during regorafenib. Maximum relative cerebral blood volume (rCBVmax) value, intra-tumoral susceptibility signals (ITSS), apparent diffusion coefficient (ADC) values, and contrast-enhancing tumor volumes were tested for correlation with response to treatment, progression-free survival (PFS), and overall survival (OS). Response at first follow-up was assessed according to Response Assessment in Neuro-Oncology (RANO) criteria.

Results: 8/20 patients showed stable disease at first follow-up. rCBVmax values of the primary glioblastoma (before surgery) significantly correlated to treatment response; specifically, patients with stable disease displayed higher rCBVmax compared to progressive disease ($p = 0.04$, 2-group t test). Moreover, patients with stable disease showed longer PFS ($p = 0.02$, 2-group t test) and OS ($p = 0.04$, 2-group t test). ITSS, ADC values, and contrast-enhancing tumor volumes showed no correlation with treatment response, PFS nor OS.

Conclusion: Our results suggest that rCBVmax of the glioblastoma at diagnosis could serve as a non-invasive biomarker of treatment response to regorafenib in patients with rGB.

Keywords: CBV; DSC-PWI; Imaging biomarkers; Recurrent glioblastoma; Regorafenib.