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Eur Radiol. 2016 Dec 14. [Epub ahead of print]

Dynamic contrast-enhanced MR imaging in predicting progression of enhancing lesions persisting after standard treatment in glioblastoma patients: a prospective study.

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Abstract

OBJECTIVES: To prospectively explore the value of dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) in predicting the progression of enhancing lesions persisting after standard treatment in patients with surgically resected glioblastoma (GBM).

METHODS: Forty-seven GBM patients, who underwent near-total tumorectomy followed by concurrent chemoradiation therapy (CCRT) with temozolomide (TMZ) between May 2014 and February 2016, were enrolled. Twenty-four patients were finally analyzed for measurable enhancing lesions persisting after standard treatment. DCE-MRI parameters were calculated at enhancing lesions. Mann-Whitney U tests and multivariable stepwise logistic regression were used to compare parameters between progression (n = 16) and non-progression (n = 8) groups.

RESULTS: Mean K^{trans} and v_e were significantly lower in progression than in non-progression (P = 0.037 and P = 0.037, respectively). The 5th percentile of the cumulative K^{trans} histogram was also significantly lower in the progression than in non-progression group (P = 0.017). Mean v_e was the only independent predictor of progression (P = 0.007), with a sensitivity of 100%, specificity of 63%, and an overall accuracy of 88% at a cut-off value of 0.873.

CONCLUSIONS: DCE-MRI may help predict the progression of enhancing lesions persisting after the completion of standard treatment in patients with surgically resected GBM, with mean v_e serving as an independent predictor of progression.

KEY POINTS: • Enhancing lesions may persist after standard treatment in GBM patients. • DCE-MRI may help predict the progression of the enhancing lesions. • Mean K^{trans} and v_e were lower in progression than in non-progression group. • DCE-MRI may help identify patients requiring close follow-up after standard treatment. • DCE-MRI may help plan treatment strategies for GBM patients.

KEYWORDS: Chemoradiotherapy; Glioblastoma; Magnetic resonance imaging; Perfusion; Progression

PMID: 27975145 DOI: [10.1007/s00330-016-4692-9](https://doi.org/10.1007/s00330-016-4692-9)

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