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## Evaluation of early imaging response criteria in glioblastoma multiforme.

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### Abstract

ABSTRACT:

**BACKGROUND:** Early and accurate prediction of response to cancer treatment through imaging criteria is particularly important in rapidly progressive malignancies such as Glioblastoma Multiforme (GBM). We sought to assess the predictive value of structural imaging response criteria one month after concurrent chemotherapy and radiotherapy (RT) in patients with GBM.

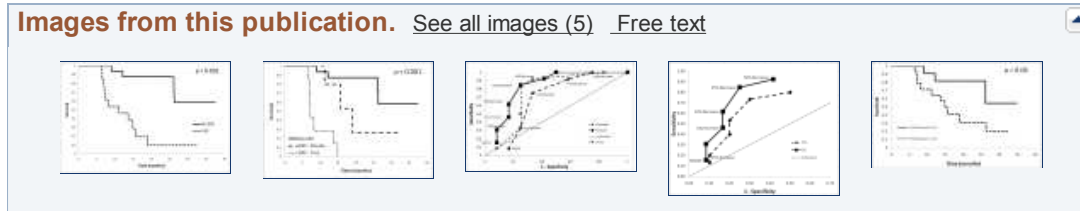
**METHODS:** Thirty patients were enrolled from 2005 to 2007 (median follow-up 22 months). Tumor volumes were delineated at the boundary of abnormal contrast enhancement on T1-weighted images prior to and 1 month after RT. Clinical Progression [CP] occurred when clinical and/or radiological events led to a change in chemotherapy management. Early Radiologic Progression [ERP] was defined as the qualitative interpretation of radiological progression one month post-RT. Patients with ERP were determined pseudoprogressors if clinically stable for  $\geq 6$  months. Receiver-operator characteristics were calculated for RECIST and MacDonald criteria, along with alternative thresholds against 1 year CP-free survival and 2 year overall survival (OS).

**RESULTS:** 13 patients (52%) were found to have ERP, of whom 5 (38.5%) were pseudoprogressors. Patients with ERP had a lower median OS (11.2 mo) than those without (not reached) ( $p < 0.001$ ). True progressors fared worse than pseudoprogressors (median survival 7.2 mo vs. 19.0 mo,  $p < 0.001$ ). Volume thresholds performed slightly better compared to area and diameter thresholds in ROC analysis. Responses of  $> 25\%$  in volume or  $> 15\%$  in area were most predictive of OS.

**CONCLUSIONS:** We show that while a subjective interpretation of early radiological progression from baseline is generally associated with poor outcome, true progressors cannot be distinguished from pseudoprogressors. In contrast, the magnitude of early imaging volumetric response may be a predictive and quantitative metric of favorable outcome.

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