

ABSTRACT

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Myo-Inositol Levels Measured with MR Spectroscopy Can Help Predict Failure of Antiangiogenic Treatment in Recurrent Glioblastoma.

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Background Patients with recurrent glioblastoma (GBM) are often treated with antiangiogenic agents, such as bevacizumab (BEV). Despite therapeutic promise, conventional MRI methods fail to help determine which patients may not benefit from this treatment. **Purpose** To use MR spectroscopic imaging (MRSI) with intermediate and short echo time to measure corrected myo-inositol (mI) normalized by contralateral creatine (hereafter, mI/c-Cr) in participants with recurrent GBM treated with BEV and to investigate whether such measurements can help predict survivorship before BEV initiation (baseline) and at 1 day, 4 weeks, and 8 weeks thereafter. **Materials and Methods** In this prospective longitudinal study (2016-2020), spectroscopic data on mI-a glial marker and osmoregulator within the brain-normalized by contralateral creatine in the intratumoral, contralateral, and peritumoral volumes of patients with recurrent GBM were evaluated. Area under the receiver operating characteristic curve (AUC) was calculated for all volumes at baseline and 1 day, 4 weeks, and 8 weeks after treatment to determine the ability of mI/c-Cr to help predict survivorship. **Results** Twenty-one participants (median age \pm standard deviation, 62 years \pm 12; 15 men) were evaluated. Lower mI/c-Cr in the tumor before and during BEV treatment was predictive of poor survivorship, with receiver operating characteristic analyses showing an AUC of 0.75 at baseline, 0.87 at 1 day after treatment, and 1 at 8 weeks after. A similar result was observed in contralateral normal-appearing tissue and the peritumoral volume, with shorter-term survivors having lower levels of mI/c-Cr. In the contralateral volume, a lower ratio of mI to creatine (hereafter, mI/Cr) predicted shorter-term survival at baseline and all other time points. Within the peritumoral volume, lower mI/c-Cr levels were predictive of shorter-term survival at baseline (AUC, 0.80), at 1 day after treatment (AUC, 0.93), and at 4 weeks after treatment (AUC, 0.68). **Conclusion** Lower levels of myo-inositol normalized by contralateral creatine within intratumoral, contralateral, and peritumoral volumes were predictive of poor survivorship and antiangiogenic treatment failure as early as before bevacizumab treatment. Adapting MR spectroscopic imaging alongside conventional MRI modalities conveys critical information regarding the biologic characteristics of tumors to help better treat individuals with recurrent glioblastoma. Clinical trial registration no. NCT02843230 © RSNA, 2021 Online supplemental material is available for this article.

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