Recurrent Glioblastoma: Combination of High Cerebral Blood Flow with MGMT Promoter Methylation Is Associated with Benefit from Low-Dose Temozolomide Rechallenge at First Recurrence.

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Abstract

Purpose To determine if the combination of high cerebral blood flow (CBF) and O\(^6\) -methylguanine DNA methyltransferase (MGMT) promoter methylation is associated with benefit from a second round of low-dose temozolomide (TMZ) (ie, rechallenge) in patients with glioblastoma at first recurrence. Materials and Methods The institutional review board approved this retrospective cohort study and waived the requirement for informed consent. Seventy-two patients with recurrent glioblastoma after concurrent TMZ radiation therapy were treated with a low-dose TMZ rechallenge and underwent arterial spin labeling magnetic resonance imaging. The cohort was dichotomized to high-CBF and low-CBF subgroups. MGMT promoter methylation was determined before concurrent TMZ radiation therapy. The coprimary end points were median time to progression (TTP) and 6-month outcome after the initiation of low-dose TMZ. The Cox proportional hazards model was used to assess the association between clinical outcome and CBF status. Results There was a significant difference between the high- and low-CBF cohorts in median TTP (6 months vs 3 months, respectively; P = .001). Favorable 6-month outcomes occurred in 16 of 31 (52%) patients with high CBF and six of 41 (15%) patients with low CBF (P = .001). At multivariate analysis, high CBF was independently associated with longer TTP (P = .023). The association between high CBF and favorable outcome was significant only in the MGMT promoter methylation group (P = .006 for TTP; P = .005 for 6-month outcome). Conclusion The combination of high CBF with MGMT methylation may be associated with benefits from a low-dose TMZ rechallenge in patients with recurrent glioblastoma. However, alternative strategies might be needed for patients with both low CBF and a lack of MGMT methylation. © RSNA, 2016 Online supplemental material is available for this article.