
Clinical Studies


Abstract:

OBJECTIVE: To determine whether relative cerebral blood volume (rCBV) can predict patient outcome, specifically tumor progression, in low-grade gliomas (LGGs) and thus provide a second reference standard in the surgical and postsurgical management of LGGs.

METHODS: Thirty-five patients with histologically diagnosed LGGs (21 low-grade astrocytomas and 14 low-grade oligodendrogliomas and low-grade mixed oligoastrocytomas) were studied with dynamic susceptibility contrast-enhanced perfusion magnetic resonance imaging. Wilcoxon tests were used to compare patients in different response categories (complete response, stable, progressive, death) with respect to baseline rCBV. Log-rank tests were used to evaluate the association of rCBV with survival and time to progression. Kaplan-Meier time-to-progression curves were generated. Tumor volumes and CBV measurements were obtained at the initial examination and again at follow-up to determine the association of rCBV with tumor volume progression.

RESULTS: Wilcoxon tests showed patients manifesting an adverse event (either death or progression) had significantly higher rCBV (P = 0.003) than did patients without adverse events (complete response or stable disease). Log-rank tests showed that rCBV exhibited a significant negative association with disease-free survival (P = 0.0015), such that low rCBV values were associated with longer time to progression. Kaplan-Meier curves demonstrated that lesions with rCBV less than 1.75 (n = 16) had a median time to progression of 4620 +/- 433 days, and lesions with rCBV more than 1.75 (n = 19) had a median time to progression of 245 +/- 62 days (P < 0.005). Lesions with low baseline rCBV (<1.75) demonstrated stable tumor volumes when followed up over time, and lesions with high baseline rCBV (>1.75) demonstrated progressively increasing tumor volumes over time.

CONCLUSION: Dynamic susceptibility contrast-enhanced perfusion magnetic resonance imaging may be used to identify LGGs that are either high-grade gliomas, misdiagnosed because of sampling error at pathological examination or that have undergone angiogenesis in the progression toward malignant transformation. This suggests that rCBV measurements may be used as a second reference standard to determine the surgical management/risk-benefit equation and postsurgical adjuvant therapy for LGGs.