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Neuroradiology

Gliomas: Predicting Time to Progression or Survival with Cerebral Blood Volume Measurements at Dynamic Susceptibility-weighted Contrast-enhanced Perfusion MR Imaging[1]

Meng Law, MD, Robert J. Young, MD, James S. Babb, PhD, Nicole Peccerelli, BSRT, Sophie Chheang, MD, Michael L. Gruber, MD, Douglas C. Miller, MD, PhD, John G. Golfinos, MD, David Zagzag, MD, PhD, and Glyn Johnson, PhD

[1] From the Departments of Radiology and Neurosurgery, Mount Sinai Medical Center, One Gustave L. Levy Place, New York, NY 10029 (M.L.); Department of Radiology, Memorial Sloan-Kettering Cancer Center, New York, NY (R.J.Y.); Departments of Radiology (J.S.B., N.P., S.C., G.J.), Neuro-oncology (M.L.G.), Pathology (D.C.M., D.Z.), and Neurosurgery (M.L.G., D.C.M., J.G.G., D.Z.), New York University Medical Center, New York, NY; and NYU Comprehensive Cancer Center, New York, NY (M.L.G., D.C.M., J.G.G., D.Z.). Received May 23, 2007; revision requested July 30; revision received August 13; accepted September 12; final version accepted December 6. Supported by grants RO1 CA093992, RO1 CA1111996, and R01 CA100426 from the National Institutes of Health. **Address correspondence to** M.L. (e-mail: *Meng.law@mountsinai.org*).

Purpose: To retrospectively determine whether relative cerebral blood volume (CBV) measurements can be used to predict clinical outcome in patients with high-grade gliomas (HGGs) and low-grade gliomas (LGGs) and specifically whether patients who have gliomas with a high initial relative CBV have more rapid progression than those who have gliomas with a low relative CBV.

Materials and Methods: Approval for this retrospective HIPAA-compliant study was obtained from the Institutional Board of Research Associates, with waiver of informed consent. One hundred eighty-nine patients (122 male and 67 female patients; median age, 43 years; range, 4–80 years) were examined with dynamic susceptibility-weighted contrast material–enhanced perfusion magnetic resonance (MR) imaging and were followed up clinically with MR imaging (median follow-up, 334 days). Log-rank tests were used to evaluate the association between relative CBV and time to progression by using Kaplan-Meier curves. Binary logistic regression was used to determine whether age, sex, and relative CBV were associated with an adverse event (progressive disease or death).

Results: Values for the mean relative CBV for patients according to each clinical response were as follows: 1.41 ± 0.13 (standard deviation) for complete response (n = 4), 2.36 ± 1.78 for stable disease (n = 41), 4.84 ± 3.32 for progressive disease (n = 130), and 3.82 ± 1.93 for death (n = 14). Kaplan-Meier estimates of median time to progression in days indicated that patients with a relative CBV of less than 1.75 had a median time to progression of 3585 days, whereas patients with a relative CBV of more than

1.75 had a time to progression of 265 days. Age and relative CBV were also independent predictors for clinical outcome.

Conclusion: Dynamic susceptibility-weighted contrast-enhanced perfusion MR imaging can be used to predict median time to progression in patients with gliomas, independent of pathologic findings. Patients who have HGGs and LGGs with a high relative CBV (>1.75) have a significantly more rapid time to progression than do patients who have gliomas with a low relative CBV.

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