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## Comparison of 3 Tesla proton MR spectroscopy, MR perfusion and MR diffusion for distinguishing glioma recurrence from posttreatment effects.

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### Abstract

**PURPOSE:** To compare 3 Tesla (3T) multi-voxel and single-voxel proton MR spectroscopy (MRS), dynamic susceptibility contrast perfusion MRI (DSC), and diffusion-weighted MRI (DWI) for distinguishing recurrent glioma from postradiation injury.

**MATERIALS AND METHODS:** We reviewed all 3T MRS, DSC and DWI studies performed for suspicion of malignant glioma recurrence between October 2006 and December 2008. Maximum Cho/NAA and Cho/Cr peak-area and peak-height ratios were recorded for both multi-voxel and single-voxel MRS. Maximum cerebral blood volume (CBV) and minimum apparent diffusion coefficient (ADC) were normalized to white matter. Histopathology and clinical-radiologic follow-up served as reference standards. Receiver operating characteristic curves for each parameter were compared.

**RESULTS:** Forty lesions were classified as glioma recurrence (n = 30) or posttreatment effect (n = 10). Diagnostic performance was similar for CBV ratio (AUC = 0.917, P < 0.001), multi-voxel Cho/Cr peak-area (AUC = 0.913, P = 0.002), and multi-voxel Cho/NAA peak-height (AUC = 0.913, P = 0.002), while ADC ratio (AUC = 0.726, P = 0.035) did not appear to perform as well. Single-voxel MRS parameters did not reliably distinguish tumor recurrence from posttreatment effects.

**CONCLUSION:** A 3T DSC and multi-voxel MRS Cho/Cr peak-area and Cho/NAA peak-height appear to outperform DWI for distinguishing glioma recurrence from posttreatment effects. Single-voxel MRS parameters do not appear to distinguish glioma recurrence from posttreatment effects reliably, and therefore should not be used in place of multi-voxel MRS. J. Magn. Reson. Imaging 2011;. © 2011 Wiley Periodicals, Inc.

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