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Advanced Imaging in the Diagnosis and Response Assessment of High-Grade Glioma: *AJR* Expert Panel Narrative Review

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Abstract

This *AJR* Expert Panel Narrative explores the current status of advanced MRI and PET techniques for the post-therapeutic response assessment of high-grade adult-type gliomas, focusing on ongoing clinical controversies in current practice. Discussed techniques that complement conventional MRI and aid the differentiation of recurrent tumor from post-treatment effects include DWI and diffusion tensor imaging; perfusion MRI techniques including dynamic susceptibility contrast (DSC), dynamic contrast-enhanced MRI, and arterial spin labeling; MR spectroscopy including assessment of 2-hydroxyglutarate (2HG) concentration; glucose- and amino acid (AA)-based PET; and amide proton transfer imaging. Updated criteria for Response Assessment in Neuro-Oncology are presented. Given the abundant supporting clinical evidence, the panel supports a recommendation that routine response assessment after HGG treatment should include perfusion MRI, particularly given the development of a consensus recommended DSC-MRI protocol. Although published studies support 2HG MRS and AA PET, these techniques' widespread adoption will likely require increased availability (for 2HG MRS) or increased insurance funding in the United States (for AA PET). The article concludes with a series of consensus opinions from the author panel, centered on the clinical integration of the advanced imaging techniques into posttreatment surveillance protocols.