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Multimodality Assessment of Brain Tumors and Tumor Recurrence.

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Abstract

Neuroimaging plays a significant role in the diagnosis of intracranial tumors, especially brain gliomas, and must consist of an assessment of location and extent of the tumor and of its biologic activity. Therefore, morphologic imaging modalities and functional, metabolic, or molecular imaging modalities should be combined for primary diagnosis and for following the course and evaluating therapeutic effects. MRI is the gold standard for providing detailed morphologic information and can supply some additional insights into metabolism (MR spectroscopy) and perfusion (perfusion-weighted imaging) but still has limitations in identifying tumor grade, invasive growth into neighboring tissue, and treatment-induced changes, as well as recurrences. These insights can be obtained by various PET modalities, including imaging of glucose metabolism, amino acid uptake, nucleoside uptake, and hypoxia. Diagnostic accuracy can benefit from coregistration of PET results and MRI, combining the high-resolution morphologic images with the biologic information. These procedures are optimized by the newly developed combination of PET and MRI modalities, permitting the simultaneous assessment of morphologic, functional, metabolic, and molecular information on the human brain.

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