Neuroimaging of High-Grade Gliomas: Correlation Between 3T MRI Findings and Histopathological Markers

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Abstract

Introduction: High-grade gliomas (HGG) require precise preoperative evaluation to guide treatment strategy. Multimodal 3T MRI offers detailed morphological and metabolic information. Correlation with histopathological markers, such as IDH mutation and Ki-67 index, enhances diagnostic accuracy.

Objective: To evaluate the diagnostic potential of 3T MRI for preoperative characterization of HGG and to determine its correlation with histopathological markers (IDH, Ki-67).

Materials and Methods: We analyzed 103 patients with immunohistochemically confirmed gliomas (56 males, 47 females; mean 47.6). All underwent 3T MRI (GE Signa Architect). Protocol included conventional sequences (T1, T2, T2-FLAIR, DWI/ADC) and advanced modalities: SWAN, ASL/DSC perfusion, MRS (TE 35/144), and contrast-enhanced T1+Gad. Glioma grading was based on morphological features, IDH mutation status, and Ki-67 immunoexpression (MIB-1).

Results: SWAN: neoangiogenesis, microhemorrhages, calcifications in 84.4%. **Perfusion (ASL/DSC):** increased CBF, rCBF, rCBV in 79.6%, reflecting vascular proliferation. **MRS:** elevated Cho/Cr in 67.9%; Lip/Lac peaks in 17.4%. **DWI/ADC:** restricted diffusion in 87.3%. **T1+Gad:** ring-shaped/heterogeneous enhancement, typical of HGG. Correlation with histopathology confirmed agreement with vascular proliferation in 85.4% of cases.

Conclusion: Multimodal 3T MRI provides robust preoperative characterization of high-grade gliomas and demonstrates strong correlation with histopathological markers. This approach is particularly valuable when biopsy is not feasible or histological results are inconclusive.

Keywords

Radiology, Perfusion, Glioma, Diagnosis, Immunohistochemistry, MRI.