ABSTRACT

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Treatment Response and Prognosis Evaluation in High-Grade Glioma: An Imaging Review Based on MRI.

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In recent years, the development of advanced magnetic resonance imaging (MRI) technology and machine learning (ML) have created new tools for evaluating treatment response and prognosis of patients with high-grade gliomas (HGG); however, patient prognosis has not improved significantly. This is mainly due to the heterogeneity between and within HGG tumors, resulting in standard treatment methods not benefitting all patients. Moreover, the survival of patients with HGG is not only related to tumor cells, but also to noncancer cells in the tumor microenvironment (TME). Therefore, during preoperative diagnosis and follow-up treatment of patients with HGG, noninvasive imaging markers are needed to characterize intratumoral heterogeneity, and then to evaluate treatment response and predict prognosis, timeously adjust treatment strategies, and achieve individualized diagnosis and treatment. In this review, we summarize the research progress of conventional MRI, advanced MRI technology, and ML in evaluation of treatment response and prognosis of patients with HGG. We further discuss the significance of the TME in the prognosis of HGG patients, associate imaging features with the TME, indirectly reflecting the heterogeneity within the tumor, and shifting treatment strategies from tumor cells alone to systemic therapy of the TME, which may be a major development direction in the future.
LEVEL OF EVIDENCE: 5 TECHNICAL EFFICACY STAGE: 4.

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