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68Ga-Pentixafor PET in Combination With MRI Improves the Differential Diagnosis of Glioblastoma and Primary Central Nervous System Lymphoma

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Abstract

Purposes: This study aims to investigate the diagnostic performance of combining 68Ga-pentixafor PET with MRI to differentiate primary central nervous system lymphoma (PCNSL) from glioblastoma (GBM), particularly focusing on atypical lymphoma identification.

Patients and methods: Seventy-one PCNSL and 53 GBM patients who underwent both 68Ga-pentixafor PET/CT and MRI were retrospectively included. We evaluated the quantitative imaging parameters and MRI features of positive lesions, identifying atypical PCNSL by hemorrhage, necrosis, or heterogeneous enhancement. Logistic regression identified key variables, and the ROC-AUC evaluated their diagnostic value. Immunohistochemistry for CXCR4 was performed.

Results: PCNSLs, including 23 atypical cases, showed higher SUVmax and TBR, and lower MTV, ADCmin, and relative ADCmin (rADCmin) than GBMs (all P's < 0.05). The CXCR4 staining in PCNSL was also more pronounced in GBM (P = 0.048). Multivariate logistic regression indicated that a combination of TBR, MTV, and ADCmin (quantitative model 1) had a superior AUC of 0.913 in distinguishing PCNSL from GBM, outperforming single parameters (all P's < 0.05). For differentiating atypical PCNSL from GBM, single quantitatively parameters showed moderate performance (AUC, 0.655-0.767). Further combining TBR with ADCmin (quantitative model 2) significantly improve the AUC to 0.883. Multiparameter models, incorporating significant quantitative and qualitative MRI features, achieved AUCs of 0.953 (PCNSL vs GBM) and 0.902 (atypical PCNSL vs GBM), significantly outperforming single parameters (all P's < 0.05).

Conclusions: 68Ga-pentixafor PET in combination with MRI provides valuable diagnostic information in differentiating PCNSL from GBM, especially for atypical PCNSL.

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