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Methionine-PET to differentiate between brain lesions appearing similar on conventional CT/MRI scans

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Abstract

Background and purpose: ¹¹ C-Methionine (MET)-PET is a useful tool in neuro-oncology. This study aimed to examine whether a combination of diagnostic variables associated with MET uptake could help distinguish between brain lesions that are often difficult to discriminate in conventional CT and MRI.

Methods: MET-PET was assessed in 129 patients with glioblastoma multiforme, primary central nervous lymphoma, metastatic brain tumor, tumefactive multiple sclerosis, or radiation necrosis. The accuracy of the differential diagnosis was analyzed using five diagnostic characteristics in combination: higher maximum standardized uptake value (SUV) of MET in the lesion/the mean normal cortical SUV of MET ratio, overextension beyond gadolinium, peripheral pattern indicating abundant MET accumulation in the peripheral region, central pattern denoting abundant MET accumulation in the central region, and dynamic-up suggesting increased MET accumulation during dynamic study. The analysis was conducted on sets of two of the five brain lesions.

Results: Significant differences in the five diagnostic traits were observed among the five brain lesions, and differential diagnosis could be achieved by combining these diagnostic features. The area under the curve between each set of two of the five brain lesions using MET-PET features ranged from .85 to 1.0.

Conclusions: According to the findings, combining the five diagnostic criteria could help with the differential diagnosis of the five brain lesions. MET-PET is an auxiliary diagnostic technique that could help in distinguishing these five brain lesions.

Keywords: 11C-methionine-PET; glioblastoma; metastatic brain tumor; primary central nervous lymphoma; radiation necrosis; tumefactive multiple sclerosis.

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