ABSTRACT

18F-FET-PET imaging in high-grade gliomas and brain metastases: a systematic review and meta-analysis.

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PURPOSE: To provide a summary of the diagnostic performance of 18F-FET-PET in the management of patients with high-grade brain gliomas or metastases from extracranial primary malignancies.

METHODS: MEDLINE, EMBASE, and Cochrane Database of Systematic Reviews databases were searched for studies that reported on diagnostic test parameters in radiotherapy planning, response assessment, and tumour recurrence/treatment-related changes differentiation. Radiomic studies were excluded. Quality assessment was performed using the Quality Assessment of Diagnostic Accuracy Studies (QUADAS-2) tool and the GRADE approach. A bivariate, random-effects model was used to produce summary estimates of sensitivity and specificity.

RESULTS: Twenty-six studies with a total of 1206 patients/lesions were included in the analysis. For radiotherapy planning of glioma, the pooled proportion of patients from 3 studies with 18F-FET uptake extending beyond the 20 mm margin from the gadolinium enhancement on standard MRI was 39% (95% CI, 10-73%). In 3 studies, 18F-FET-PET was also shown to be predictive of early responders to treatment, whereas MRI failed to show any prognostic value. For the differentiation of glioma recurrence from treatment-related changes, the pooled sensitivity and specificity of TBRmax 1.9-2.3 from 6 studies were 91% (95% CI, 74-97%) and 84% (95% CI, 69-93%), respectively. The respective values for brain metastases from 4 studies were 82% (95% CI, 74-88%) and 82% (95% CI, 74-88%) using TBRmax 2.15-3.11.

CONCLUSION: While 18F-FET shows promise as a complementary modality to standard-of-care MRI for the management of primary and metastatic brain malignancies, further validation with standardized image interpretation methods in well-designed prospective studies are warranted.