ABSTRACT

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Diagnostic utility of amino acid PET in the differential diagnosis of recurrent brain metastases and treatment-related changes: a meta-analysis.

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Amino acid PET is an established method to assist differential diagnosis of therapy-related changes vs. recurrence in gliomas. However, its diagnostic value in brain metastases is yet to be determined. The goal of this study was to summarize evidence on diagnostic utility of amino acid PET in reccurent brain metastases. Methods: Medical databases MEDLINE, EMBASE, and the Cochrane Library were screened for studies in English with at least 10 patients, who had undergone first-line treatment including radiotherapy and in whom a final diagnosis had been determined by histological examination and/or imaging and clinical follow-up. Pooled estimates with 95% confidence intervals (95% CI) were calculated. Heterogeneity was assessed using I2-statistics. Results: Following the above criteria, 12 studies with tracers methyl-[11C]-methionine (n = 6), O-(2-[18F]fluoroethyl)-L-tyrosine (n = 3), methyl-[11C]-methionine and O-(2-[18F]fluoroethyl)-L-tyrosine (n = 1) and O-3-(2-[18F]fluoroethyl)-LDopamine (n = 2), with a total of 547 lesions in 397 patients were included. Pooled sensitivity and specificity were 82% (95% CI 76-86) and 84% (95% CI 79-88), respectively. Pooled positive and negative predictive values were 84% (95% CI 77-90) and 83% (95% CI 77-88), respectively. Positive, negative likelihood ratios, and diagnostic odds ratio were 3.9 (95% CI 3.0-4.9), 0.3 (95% CI 0.2-0.3), and 17.1 (95% CI 11.3-26.5), respectively. Heterogeneity was overall low. Conclusion: The present meta-analysis indicates a good accuracy of amino acid PET in the differential diagnosis of recurrent brain metastases. In particular, a specificity of 84% suggests that amino acid PET may reduce the number of invasive procedures and overtreatment in patients with treatment-related changes. This study provides IIa class evidence on the diagnostic utility of amino acid PET in the differential diagnosis of recurrent brain metastases.

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