ABSTRACT

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[[18F]Fluorothymidine Positron Emission Tomography Imaging in Primary Brain Tumours: A Systematic Review.

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PURPOSE: This review aimed to summarize the available literature on the clinical application of [18F]FLT PET imaging in primary brain tumours.

METHODS: A comprehensive search strategy based on Pubmed/Medline, Scopus, Web of Science, Cochrane Library, Google Scholar, and the Embase databases was carried on using the following search string: ('3` Fluorothymidine'/exp OR 'FLT' OR '[18F]-FLT' OR '[18F]Fluorothymidine') AND ('pet'/exp OR 'pet' OR 'positron emission tomography') AND ('glioma'/exp OR 'glioma' OR 'brain tumour'/exp OR 'brain tumour'). The search was updated till March 2021 and only articles in English and studies investigating the clinical applications of [18F]FLT PET and PET/CT in primary brain tumours were considered eligible for inclusion.

RESULTS: The literature search ultimately yielded 52 studies to be included in the systematic review, with main results as follows: a) the uptake of [18F]FLT may guide stereotactic biopsy but does not discriminate between grade II and III glioma. b) [18F]FLT uptake and texture parameters correlate with overall survival (OS) in newly diagnosed gliomas. c) In patients with recurrent glioma, proliferative volume (PV) and tumour-to-normal brain (T/N) uptake ratio are independent predictors of survival. d) Patients demonstrating response to therapy at [18F]FLT PET scan show longer OS compared to non-responders. e) [18F]FLT PET demonstrated good performance in discriminating tumour recurrence from radionecrosis. However, controversial results exist in comparative literature examining the performance of [18F]FLT vs. other radiotracers in the assessment of recurrence.

CONCLUSION: [18F]FLT PET imaging has demonstrated potential benefits for grading, diagnostic and prognostic purposes, despite the small sample size studies due to the relatively low availability of the radiotracer.

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