



PET Recommendation Report 10

PET Imaging in Brain Cancer

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Report Date: January 19, 2009

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Section 1: Recommendations
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Recommendation Report - PET #10: Section 1

PET Imaging in Brain Cancer: Recommendations

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QUESTIONS

- What benefit to clinical management does positron emission tomography (PET) or positron emission tomography/computed tomography (PET/CT) contribute to the diagnosis or staging of gliomas?
- What benefit to clinical management does PET or PET/CT contribute to the assessment of treatment response for gliomas?
- What benefit to clinical management does PET or PET/CT contribute when recurrence of gliomas is suspected but not proven?
- What benefit to clinical management does PET or PET/CT contribute to restaging at the time of documented recurrence for gliomas?
- What is the role of PET when a solitary metastasis is identified at the time of recurrence and a metastectomy is being contemplated?

TARGET POPULATION

Patients with gliomas.

INTENDED PURPOSE

- This recommendation report is primarily intended to guide the Ontario PET Steering Committee in their decision making concerning indications for the use of PET imaging.
- This recommendation report may also be useful in informing clinical decision making regarding the appropriate role of PET imaging and in guiding priorities for future PET imaging research.

RECOMMENDATIONS AND KEY EVIDENCE

These recommendations are based on an evidentiary foundation consisting of one recent high-quality systematic review from the U.S. Agency for Health Research and Quality (AHRQ) (1) that included primary study literature for the period from 2003 to March 2008.

Diagnosis/Staging

PET is not recommended for the determination of diagnosis or grading in gliomas.

Five studies (Chen et al [2], Cher et al [3], Liu et al [4], Potzi et al [5], Stockhammer et al [6]) assessed diagnostic accuracy and prognostic influence of PET scanning on survival, but none have demonstrated any additional diagnostic accuracy or prognostic influence over and above that provided by magnetic resonance imaging (MRI) and histology in a multivariate model.

Qualifying Statement

None.

Assessment of Treatment Response

A recommendation cannot be made for or against the use of PET for the assessment of treatment response in gliomas due to insufficient evidence.

None of the studies discuss this question.

Qualifying Statement

- Anecdotal evidence exists that PET/CT may differentiate radiation necrosis from tumour recurrence, but there is no gold standard for the diagnosis of radiation necrosis in glioblastoma multiforme.

Recurrence/Restaging

A recommendation cannot be made for or against the use of PET or PET/CT in the assessment of patients with recurrent gliomas due to insufficient evidence.

Two studies evaluating the use of PET included patients with recurrent gliomas (Chen et al [2], Potzi et al [5]). In both studies, fluorodeoxyglucose (FDG) PET was not the focus of the study but a comparison test for the tracer of interest, F-DOPA-PET in Chen et al (2) and Methionine-PET in Potzi et al (5). The evidence was insufficient to generate a recommendation on the use of FDG PET.

Qualifying Statements

- PET or PET/CT has not been examined in a prospective cohort of gliomas to assess the treatment effect on PET imaging before and after treatment and correlate this with survival.
- Radiation necrosis is a major factor in assessing recurrent gliomas.

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PET REPORT 10 IN REVIEW

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REFERENCES

1. McEwan AJ, Gulenchyn K, Ospina M, Horton J, Seida J, Vandermeer B, et al. Positron emission tomography for nine cancers (bladder, brain, cervical, kidney, ovarian, pancreatic, prostate, small cell lung, testicular). Rockville, Maryland: Agency for Healthcare Research and Quality; 2008 Aug. [Draft].
2. Chen W, Silverman DH, Delaloye S, Czernin J, Kamdar N, Pope W, et al. 18F-FDOPA PET imaging of brain tumors: comparison study with 18F-FDG PET and evaluation of diagnostic accuracy. *J Nucl Med* 2006;47(6):904-11.
3. Cher LM, Murone C, Lawrentschuk N, Ramdave S, Papenfuss A, Hannah A, et al. Correlation of hypoxic cell fraction and angiogenesis with glucose metabolic rate in gliomas using 18F-fluoromisonidazole, 18F-FDG PET, and immunohistochemical studies. *J Nucl Med* 2006;47(3):410-8.
4. Liu RS, Chang CP, Chu LS, Chu YK, Hsieh HJ, Chang CW, et al. PET imaging of brain astrocytoma with 1-11C-acetate. *Eur J Nucl Med Mol Imaging* 2006;33(4):420-7.
5. Potzi C, Becherer A, Marosi C, Karanikas G, Szabo M, Dudczak R, et al. [11C] methionine and [18F] fluorodeoxyglucose PET in the follow-up of glioblastoma multiforme. *J Neuro-Oncol* 2007;84(3):305-14.
6. Stockhammer F, Thomale UW, Plotkin M, Hartmann C, Von Deimling A. Association between fluorine-18-labeled fluorodeoxyglucose uptake and 1p and 19q loss of heterozygosity in World Health Organization Grade II gliomas. *J Neurosurg* 2007;106(4):633-7.