

<b>Title:</b>	<b>Positron emission tomography (PET) for glioma</b>
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### **Aim**

To assess the safety, effectiveness and cost-effectiveness of PET for glioma: for diagnosing malignancy in patients with suspected primary brain tumour for whom prior MRI is equivocal; for tumour grading in patients for whom prior MRI is positive for malignancy but grade is indeterminate; and for distinguishing between active disease and treatment-related changes in patients with residual or recurrent brain tumour suspected on anatomical imaging.

### **Results and conclusions**

**Safety:** PET and PET/CT are considered safe procedures.

**Effectiveness:** No direct evidence was found reporting the health outcomes of patients with glioma, assessed with and without PET. Therefore, evidence for accuracy, change in management and the expected benefit of changes in treatment on health outcomes was considered to evaluate the effectiveness of PET using a linked evidence approach.

In one low quality study of patients with suspected brain tumours on MRI, PET was true-positive for malignancy in 29% of patients, with no false-positives. The applicability of these results to patients with MRI equivocal for malignancy is unclear.

Two studies reporting the accuracy of PET in grading primary brain tumours using retrospectively defined optimum thresholds yielded low negative likelihood ratios (LRs) for ruling out high-grade disease (0.0–0.12). Negative LRs in the remaining four studies were modest (0.21–0.82). No studies specifically considered patients with unknown grade based on prior tests.

The largest study of PET in detecting residual or recurrent brain tumours yielded a high positive LR for the detection of recurrence (20.5). Positive LRs in the remaining four studies were modest ( $\leq 4.3$ ). Negative LRs ranged between 0.10 and 0.45 (or 1.75) (depending on test threshold used). PET changed management in 45% of cases.

**Economic considerations:** For the detection of residual or recurrent glioma, a decision-analytic model indicated that PET was associated with more appropriate initial surgery (4%) and chemotherapy (6%); less delay in starting appropriate chemotherapy (14%); more appropriate continuation (2%) and less inappropriate continuation (2%) of first line chemotherapy; and more frequent clinical observation of patients with untreatable disease (6%). However, the frequency of unnecessary initial surgery was not reduced (5%); appropriate surgery was delayed in an additional 2% of patients; and inappropriate chemotherapy was initiated in an additional 4% of patients. These health outcomes were associated with incremental costs of \$63,000 per 100 patients.

### **Methods**

This report updates a previous MSAC review from 2001. A systematic review of the biomedical literature (Medline; EMBASE; Pre-Medline; Current Contents; All-EBM databases) from 1999 to August 2009 was undertaken. In the absence of an overall measure of health outcome (eg life-years saved), a cost-consequence analysis was conducted to explore economic implications.