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Title **Overview of the Clinical Effectiveness of Positron Emission Tomography Imaging in Selected Cancers**

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Aim

To evaluate the clinical effectiveness of positron emission tomography using 2-[^{18}F]-fluoro-2-deoxy-D-glucose (FDG-PET) in 8 cancers (breast, colorectal, head and neck, lung, lymphoma, melanoma, esophageal, and thyroid).

Conclusions and results

For each cancer, the study evaluated the use of FDG-PET and FDG-PET + computed tomography (CT) to aid management decisions relating to diagnosis, staging/restaging, recurrence, treatment response, and radiotherapy (RT) planning. For non-small cell lung cancer (NSCLC), FDG-PET was cost effective in CT node-negative patients, but not in CT node-positive patients. A model indicated that FDG-PET was also cost effective in RT planning, but this model was based on sparse evidence. In late-stage Hodgkin lymphoma (HL), FDG-PET was cost effective for restaging after induction therapy. Robust evidence shows that FDG-PET changed patient management in staging/restaging colorectal cancer and when characterizing a solitary pulmonary nodule (SPN). FDG-PET had an impact on patient management across pediatric lymphoma decisions, but this indication requires further study of individual management decisions. For other cancer management decisions, the evidence on patient management is weak. In terms of diagnostic accuracy, FDG-PET was accurate in detecting distant metastases across several sites, but sensitivity was varied in detection of lymph node metastases and was poor for small lesions, or when biopsy or sentinel lymph node biopsy were the alternatives. FDG-PET also showed improved diagnostic accuracy over alternatives in the following cancers: a) colorectal recurrence; b) detection of occult and synchronous head and neck tumors where other tests have failed; c) staging regional lymph nodes in clinically N+ necks; d) restaging/recurrence in head and neck; e) staging SCLC; f) staging lymphoma; g) restaging non-Hodgkin lymphoma; h) staging esophageal; and i) recurrent epithelial thyroid cancer, where elevated biomarkers are not confirmed by ^{131}I scintigraphy.

Recommendations

The strongest evidence for the clinical effectiveness of FDG-PET is in staging NSCLC, restaging HL, staging/restaging colorectal cancer, and characterization of SPN. Some of these may still require clinical audit to augment the evidence base.

Methods

See Executive Summary link at www.hta.ac.uk/project/1487.asp.

Further research/reviews required

This report details the type of studies required to augment the evidence for each cancer management decision, but these must be considered alongside UK clinical priorities, taking account of the recent work of the National Cancer Research Institute. For treatment response and RT planning, the need for larger studies using consistent methods across the UK is highlighted as a priority for all cancers.

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