A quantitative review of the use of FDG-PET in the axillary staging of breast cancer

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CRD summary
The review concluded that $^{18}$F2-fluoro-2-deoxy-D-glucose positron emission tomography shows promise for the staging of axillary lymph nodes in breast cancer. Axillary involvement (e.g. number of nodes) was not defined and the reporting of review methodology was generally poor; the pooled estimates of diagnostic accuracy are unlikely to be reliable.

Authors' objectives
To assess the diagnostic performance of $^{18}$F2-fluoro-2-deoxy-D-glucose positron emission tomography (FDG-PET) for the staging of axillary lymph nodes in breast cancer.

Searching
MEDLINE, EMBASE and Current Contents were searched to December 2005. Searches were restricted to articles published in English, French or Spanish. The bibliographies of retrieved articles were examined for additional studies.

Study selection
Studies that compared the diagnostic performance of FDG-PET with a reference standard test (biopsy or histology of surgically resected lymph nodes), in patients with confirmed or suspected breast cancer, were eligible for inclusion. The instruments and protocols for FDG-PET varied across the included studies; details of instrument type, resolution, and image acquisition and analysis were reported. Both prospective and retrospective studies that reported 2x2 contingency data (numbers of true positives, false negatives, false positives and true negatives) were eligible for inclusion.

The authors did not state how the studies were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The included studies were assigned a methodological quality rating (A to D). Methodological quality was assessed on the basis of prospective or retrospective study design, sample size and spectrum of patients, use of an appropriate reference standard, quality of FDG-PET examinations, and determination of diagnosis independent of FDG-PET result. The authors did not state how the quality assessment was performed.

Data extraction
Data were extracted on population characteristics, details of the FDG-PET instrument and procedure, and 2x2 contingency data. The sensitivity, specificity, and positive and negative predictive values were calculated and reported for each study. The authors did not state how the data were extracted for the review, or how many reviewers performed the extraction.

Methods of synthesis
Pooled estimates of sensitivity, specificity, and positive and negative predictive values were presented, stratified by methodological quality grade. No details of the methods used to generate these estimates, or an assessment of between-study heterogeneity, were reported.

Results of the review
Twenty studies with a total of 1,332 participants (506 with disease) were included in the review; diagnostic accuracy results were reported for 18 studies.

For studies graded 'A' for methodological quality (3 studies, 675 participants), the pooled sensitivity and specificity estimates were 78% and 85%, respectively, and the positive and negative predictive values were 80% and 84%.

For studies graded 'B' for methodological quality (4 studies, 222 participants), the pooled sensitivity and specificity
estimates were 67% and 89%, respectively, and the positive and negative predictive values were 82% and 78%.

For studies graded 'C' for methodological quality (5 studies, 207 participants), the pooled sensitivity and specificity estimates were 96% and 84%, respectively, and the positive and negative predictive values were 78% and 97%.

For studies graded 'D' for methodological quality (6 studies, 167 participants), the pooled sensitivity and specificity estimates were 78% and 99%, respectively, and the positive and negative predictive values were 99% and 76%.

Authors' conclusions
FDG-PET has the potential to be of use in the axillary staging of breast cancer, if the observed variation in diagnostic performance between studies can be addressed.

CRD commentary
The research question to be addressed by the review was clearly stated and inclusion criteria appropriate to this question were defined. It was stated that the study aimed to address axillary staging of breast cancer, but no definition of axillary involvement (e.g. number of nodes) was given. Relevant sources were searched for published studies, but publication and language restrictions might have resulted in the omission of relevant data; details of the search strategy were not reported. Whilst the criteria used to assess the methodological quality of the included studies were broadly appropriate, the generation of aggregate quality scores and their use to stratify outcomes data are generally not recommended and have been shown to generate misleading results. Details of the review process were not reported and its susceptibility to error and/or bias cannot, therefore, be assessed. The results of two of the included studies were apparently missing from the report, and the diagnostic accuracy data presented did not include any estimate of variance for either individual studies or pooled estimates. The methods used to generate pooled estimates were not reported and, in the absence of any assessment of between-study heterogeneity, or the effect of variation in diagnostic threshold, these estimates cannot be considered reliable.

Implications of the review for practice and research
Practice: The authors made no recommendations for practice.

Research: The authors recommended that further studies be conducted, with a view to investigating possible sources in of the variations in accuracy observed (e.g. patient position during imaging, tumour size).

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