Positron emission tomography: systematic review. PET as a diagnostic test in lung cancer

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Authors' objectives
To assess the efficacy of positron emission tomography (PET) in the diagnosis of lung cancer.

Searching
MEDLINE, HEALTH, Current Contents and PDQ were searched for peer-reviewed studies in the English language; abstracts were excluded. The searches were restricted to the years 1991 to 1995. Significant articles appearing before that period were identified by selected searches of the years 1986 to 1991, and from the reference lists of retrieved articles. It was noted in the text that peer-reviewed literature published and indexed up to September 10th 1996 was also included.

Study selection
Study designs of evaluations included in the review
The inclusion criteria were not clearly reported with respect to study design.

Specific interventions included in the review
PET imaging compared with alternatives such as computed tomography (CT) and PET plus CT.

Reference standard test against which the new test was compared
The reference standard was not clearly reported, but it appears to have been biopsy and histology.

Participants included in the review
Patients undergoing PET for defining unknown primary disease, detecting overall lymph adenopathy, detecting hilar or lobar lymph adenopathy, detecting mediastinal lymph adenopathy, or distinguishing local cancer recurrence from fibrosis. All patients had suspected or biopsy-proven lung cancer.

Outcomes assessed in the review
The sensitivity, specificity and accuracy of PET were assessed.

How were decisions on the relevance of primary studies made?
The author did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The validity of the retrieved studies was assessed using a series of grading schemes that assessed the methodological quality of the primary studies. The studies were graded from A to D based on sample size, spectrum composition, reference standard, and the technical quality of PET. An external reviewer judged the studies for quality, although the initial process was unclear.

Data extraction
The author did not state how the data were extracted for the review, or how many reviewers performed the data extraction. Data were extracted on: study role, study details, the number of participants (cases and controls, when included), and the sensitivity and specificity.

Methods of synthesis
How were the studies combined?
The studies were combined by a narrative review.
How were differences between studies investigated?
Differences between the studies were investigated narratively.

Results of the review
Eleven studies (n=518) of diagnostic accuracy efficacy were included.

For defining an unknown primary disease: the sensitivity of PET was 100% (2 studies) and the specificity was 52% (1 study); the sensitivity of PET plus CT was 83 to 100% (4 studies) and the specificity was 58 to 90% (3 studies); the positive and negative predictive values (PPV and NPV) were 75 and 100%, respectively (1 study); the sensitivity of CT was 33 to 100% (2 studies) and the specificity was 52% (1 study); the PPV and NPV were 83 and 52%, respectively (1 study).

For detecting overall lymph adenopathy, the sensitivity of PET was 83% (1 study) and the specificity was 82% (1 study); the sensitivity and specificity of CT were 43% (1 study) and 85% (1 study), respectively.

For detecting hilar or lobar lymph adenopathy, the sensitivity of PET was 73% (1 study) and the specificity was 76% (1 study); the sensitivity and specificity of CT were 27% (1 study) and 86% (1 study), respectively.

For detecting mediastinal lymph adenopathy: the sensitivity of PET was 82 to 100% (3 studies), the specificity was 81 to 100% (3 studies), and the accuracy was 81% (1 study); the sensitivity of PET plus CT was 70 to 100% (3 studies) and the specificity was 81 to 100% (3 studies); the sensitivity and specificity of CT were 56 to 81% (6 studies) and 44 to 94% (6 studies), respectively, and the accuracy was 52 to 70% (3 studies).

Distinguishing local cancer recurrence from fibrosis: the sensitivity of PET plus CT was 97 to 100% (2 studies), the specificity was 56 to 100% (2 studies), and the accuracy was 86%; the sensitivity and specificity of CT were not available.

Cost information
A discussion of the costs of PET provision was included in the report.

Authors' conclusions
Preliminary studies of the potential role of PET in diagnosing lung cancer have not demonstrated the incremental values of PET in the sequence of tests used to diagnose and stage lung cancer or to distinguish lung cancer from fibrosis. There were also methodological weakness with the relevant studies.

CRD commentary
This review was of average quality. The search was limited to four databases and only English language studies were eligible for inclusion. It is therefore possible that important studies may have been missed. Details of the review process (e.g. inclusion criteria, how the studies were assessed for relevance and how the data were extracted) were lacking. The author performed a quality assessment of the included studies and good details of the included and excluded studies were presented. The synthesis of the results was poor. The results presented in this abstract were taken from the table of included study details. The author's conclusions are supported by the results presented.

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

Research: The author stated that studies with larger patient populations comparing PET with existing modalities will be needed to refine the characteristics of PET as a diagnostic tool in lung cancer, and to establish a base for further research. Future research should focus on: establishing a PET registry, which would provide a range of data on demographic and clinical characteristics of patients on whom PET studies are performed, and on their clinical outcomes in a variety of settings; defining the role of PET as part of a diagnostic test battery; and defining the impact of PET on
treatment decision-making and on outcomes such as survival, compared with existing technologies such as CT, magnetic resonance imaging and endoscopic procedures.

Bibliographic details

Other publications of related interest

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.