Position emission tomography: systematic review. PET as a diagnostic test in Alzheimer's disease
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Authors' objectives
To assess the efficacy of positron emission tomography (PET) in the diagnosis of Alzheimer's disease.

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 for study design were not clearly reported.

Specific interventions included in the review
The interventions were PET imaging, computed tomography (CT), single-photon emission computed tomography (SPECT), CT plus SPECT, and magnetic resonance imaging (MRI).

Reference standard test against which the new test was compared
The reference standard test was histopathology or clinical criteria.

Participants included in the review
Patients with suspected or probable Alzheimer's disease.

Outcomes assessed in the review
The sensitivity and specificity of the diagnostic test 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 authors 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 in a narrative review.
How were differences between studies investigated?
Differences between the studies were investigated narratively.

Results of the review
Data from 9 studies (according to Table 3) were reported, with a total of 439 suspected or probable cases of Alzheimer’s disease.

The sensitivity of CT was 94% and the specificity was 93.5% (1 study).

The sensitivity of SPECT was 43 to 96% (2 studies) and the specificity was 89% (2 studies).

For CT plus SPECT, the sensitivity and specificity were 90 and 97%, respectively (1 study).

The sensitivity of PET was 94 to 95% (4 studies) and the specificity was 53 to 99% (4 studies). In patients with a 50% pre-test probability of disease (1 study), the post-test probability of disease was 90% for a positive test and 10% for a negative test.

PET versus CT (1 study): the sensitivity and specificity were, respectively, 97 and 84% for PET and 86 and 28% (cortical atrophy) for CT. PET versus MRI (1 study): the sensitivity and specificity were, respectively, 97 and 84% for PET and 92 and 60% for MRI.

PET versus SPECT (1 study): the sensitivity and specificity were, respectively, 80 and 100% for PET and 80 and 65% for SPECT.

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

Authors’ conclusions
The face validity of the diagnostic accuracy of PET in Alzheimer's disease appears to be very good, and fairly equivalent across a variety of data analysis methods and scanning protocols. However, PET has been evaluated against clinical criteria only (an imperfect diagnostics standard).

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 stated that the routine clinical application of PET as a diagnostic tool for Alzheimer's disease should await the results of an ongoing European multicentre study evaluating its accuracy against the diagnostic standard of histopathology, as well as the development of more effective treatments and risk modification interventions for Alzheimer's disease.

Research: The author made no recommendations for future research.

Bibliographic details
Flynn K. Position emission tomography: systematic review. PET as a diagnostic test in Alzheimer’s disease. Boston,
MA, USA: Veterans Affairs Medical Center, Health Services Research and Development Service, Management Decision and Research Center. Technology Assessment Program PET Report; A8. 1996

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.