Diagnostic performance of positron emission tomography in the detection of coronary artery disease: a meta-analysis

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CRD summary
This review concluded that PET demonstrated excellent diagnostic properties in the diagnosis of coronary artery disease, especially at the patient level. However, the substantial variation observed between the studies (which were of variable quality) means that the authors’ conclusions should be interpreted with caution.

Authors’ objectives
To evaluate the use of positron emission tomography (PET) in the diagnosis of coronary artery disease.

Searching
MEDLINE and EMBASE were searched for studies published in any language from 1977 to 2007; search terms were reported. References in retrieved articles, reviews, and books were searched. Meeting abstracts were excluded.

Study selection
Studies that used PET as a diagnostic test for (suspected or known) significant obstructive coronary artery disease (≥50% diameter stenosis) and catheter-based X-ray angiography as the reference standard were eligible for inclusion. Studies had to report absolute numbers of true positive, false positive, true negative and false negative results (or data from which to derive them). Studies of fewer than 10 participants were excluded.

The included studies mostly used either rubidium-82 or nitrogen-13 as radiotracers. The percentage of male patients ranged from 0 to 95% (where stated). Around half of the studies were of patients with suspected coronary artery disease. Dipyridamole and exercise were the two most commonly used stressors.

The authors stated neither how the papers were selected for the review nor how many reviewers performed the selection.

Assessment of study quality
Two reviewers independently assessed study quality using a modified checklist based on the Quality Assessment of Diagnostic Accuracy Studies tool (QUADAS). Disagreements were resolved by consensus. Each study received a score between 0 and 10.

Data extraction
Two reviewers independently extracted (or calculated) sensitivity, specificity and positive and negative likelihood ratios (LR), along with 95% confidence intervals (CI) at both the patient and coronary territory level (left anterior descending, left circumflex and right coronary artery). Disagreements were resolved by consensus.

Methods of synthesis
Pooled estimates of sensitivity, specificity, and LRs were calculated using a bivariate mixed-effects model. Heterogeneity was assessed both graphically and by calculating the I² statistic.

Results of the review
Nineteen studies (n=1,442) were included in the review. Sample sizes ranged from 16 to 287 participants. Study quality scores were generally varied, and ranged from 2 to 9 out of 10 (mean score 5.8).

At the patient level (14 studies) PET had a sensitivity of 0.92 (95% CI 0.90 to 0.94, I²=0%) and a specificity of 0.85 (95% CI 0.79 to 0.90, I²=65%); with a positive LR of 6.2 (95% CI 3.3 to 11.8) and a negative LR of 0.11 (95% CI 0.08 to 0.14).
At the coronary territory level (nine studies) PET had a sensitivity of 0.81 (95% CI 0.77 to 0.84, I²=87%) and a specificity of 0.87 (95% CI 0.84 to 0.90, I²=53%), with a positive LR of 5.9 (95% CI 4.5 to 7.9) and a negative LR of 0.19 (95% CI 0.09 to 0.38).

**Authors' conclusions**
PET demonstrated excellent diagnostic properties in the diagnosis of coronary artery disease, especially at the patient level.

**CRD commentary**
The review addressed a clear question and was supported by appropriate inclusion criteria. Attempts to identify relevant studies in any language were undertaken by searching only two electronic databases and by checking references. There was no search for unpublished studies, so some relevant studies may have been missed. Suitable methods were employed to reduce the risks of reviewer error and bias during data extraction and assessment of study quality, although the authors did not report on whether such methods were used to select studies for inclusion. Study quality was adequately assessed and used in interpreting the results of the review. Sufficient study details were provided and appropriate methods were used to pool the data and assess heterogeneity. However, many analyses were statistically heterogeneous and the quality of the included studies was very varied. The authors acknowledged these limitations and that their conclusions should be interpreted with caution.

**Implications of the review for practice and research**
**Practice:** The authors stated that PET should be more widely considered as an initial test in the diagnosis of coronary artery disease.

**Research:** The authors did not state any implications for research.

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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.