Authors' objectives
To evaluate the evidence substantiating the use of electron-beam computed tomography (CT) as a screening or diagnostic test for coronary artery disease.

Searching
MEDLINE and Current Contents were searched, and the search terms were provided. The MEDLINE searches were limited to English-language literature published between 1966 and 1997. The reference lists of selected articles were reviewed for additional relevant articles.

Study selection
Study designs of evaluations included in the review
All prospective studies of electron-beam CT were eligible for inclusion in the review. Abstracts which were not peer reviewed were excluded.

Specific interventions included in the review
Articles relating to coronary artery calcium and its detection by fluoroscopy or electron-beam CT were eligible for inclusion in the review.

Reference standard test against which the new test was compared
No inclusion or exclusion criteria were specified that related to any reference standard.

Included studies evaluated the diagnostic performance of coronary artery calcium detected by electron-beam CT in determining the presence of angiographically evident atherosclerosis. Angiographic definitions of significant coronary artery disease used in included studies were equal to or greater than 50%, 79% or 75% stenosis.

Participants included in the review
Primary studies could include symptomatic and asymptomatic patients with and without known coronary artery disease.

The mean age (where stated) of participants in included studies ranged from 44 to 56 years. The proportion of male participants (where stated) ranged from 40-91%.

Outcomes assessed in the review
Articles were excluded from the review if they failed to present sufficient data for the calculation of sensitivity, specificity, and positive and negative predictive values.

How were decisions on the relevance of primary studies made?
Only the author made decisions about whether a study should be included.

Assessment of study quality
The author does not state that they assessed validity.

Data extraction
The author does not state how the data were extracted for the review, or how many of the reviewers performed the data extraction.
Data were extracted on: bibliographic details of studies; participant numbers; male/female ratio of participants; participant age; angiographic definitions of significant coronary artery disease used by primary studies; the number of adjacent pixels with a density > 130 Hounsfield units required for detection and quantitation of coronary artery calcium; coronary artery calcium diagnostic threshold. The sensitivities, specificities and positive and negative predictive values were calculated for each study, at the specified threshold.

Methods of synthesis
How were the studies combined?
Studies were combined narratively.

How were differences between studies investigated?
No method was reported for assessing between-study heterogeneity and differences between studies were not discussed in the text.

Results of the review
Fourteen studies, comprising 3301 participants, examined the detection of angiographically determined coronary artery disease using electron-beam CT.

Seven studies found that sensitivity for hemodynamically significant lesions was very high and specificity was poor to moderate, whereas sensitivity was worse and specificity was better for detecting any angiographically evident disease. Four studies indicated that coronary artery calcification occurs later and to a lesser extent in women than in men, although the sensitivity and specificity of coronary artery calcium scores for disease was similar for men and women. Three studies demonstrated that increasing the threshold for coronary artery calcium score decreased sensitivity and improved specificity (the author suggests that this can be done to compensate for the increase in coronary artery calcium with age).

Authors’ conclusions
Electron-beam CT is a promising new tool for the evaluation of coronary artery disease because patients who have coronary artery calcium are likely to have angiographically evident atherosclerosis. However, too few data currently exist to support the broad use of this tool in clinical decision making during the evaluation of patients with known or suspected coronary artery disease.

CRD commentary
The review addressed a clear research question, although inclusion/exclusion criteria were somewhat poorly defined, particularly in relation to the reference standard.

The literature search could have been extended to include other databases, And this lack, together with the restriction to English language articles makes it unlikely that all available published data was retrieved. No attempt to identify unpublished data was reported and the possibility of publication bias cannot, therefore, be ruled out.

The validity of the included studies was not assessed, making it difficult to assess the extent to which methodological flaws in the included studies may have impacted upon the findings of the review.

Details of included primary studies were clearly presented and a narrative summary appears appropriate given their apparent heterogeneity. The narrative summary as presented, however, lacked structure and clarity.

The author’s conclusions were appropriately cautious given the evidence presented.

Implications of the review for practice and research
Practice: The author states that the current role for electron-beam CT in clinical practice is unclear. Given conflicting reports, the use of electron-beam CT for screening asymptomatic patients currently has little support and its use in
symptomatic patients, prior to more invasive techniques, cannot rule out coronary artery disease (significant, uncalcified lesions may be present). For a patient who requires an exercise tolerance test or angiography but cannot exercise or has renal failure, electron-beam CT might be useful.

Research: The author suggests that future research should examine the use of electron-beam CT in acute risk stratification, as part of the emergency department evaluation of patients with chest pain. In addition, more prospective data on outcomes in asymptomatic high-risk patients and symptomatic patients are needed, addressing both patients with very low calcium scores and patients with high calcium scores.

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