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

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

Searching
MEDLINE, HEALTH and Current Contents were searched; PDQ was also searched for background information. Only peer-reviewed studies in the English language were included; 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), magnetic resonance imaging (MRI), colonoscopy, hydrocolonic ultrasound, immunoscintigraphy and endoscopic ultrasound.

Reference standard test against which the new test was compared
The reference standard was not clearly reported.

Participants included in the review
Patients undergoing PET for the detection or staging of primary or recurrent colorectal cancer or metastases.

Outcomes assessed in the review
The outcomes computed from the primary studies included the sensitivity and specificity of PET.

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.

Methods of synthesis
How were the studies combined?
A narrative review was undertaken.
How were differences between studies investigated?
Differences between the studies were discussed in the narrative.

Results of the review
Fifteen studies (n=863) were identified for inclusion. Twelve studies met the inclusion criteria, while 13 studies were tabulated; the patient numbers were difficult to provide for these as some were reviews.

The sensitivity and specificity of PET (1 study) for detecting or staging primary or recurrent disease were 87 and 67%, respectively, compared with 47 and 100% for CT (1 study), 94 and 100% for colonoscopy (2 studies) and 97 and 97% for hydrocolonic ultrasound (1 study).

The sensitivity and specificity of PET (4 studies) for diagnosing recurrent tumour versus scar were 92 to 95% and 100%, respectively, compared with 91 and 100% for MRI (1 study), 40 and 50% for immunoscintigraphy (1 study), and 99 and 88% for endoscopic ultrasound (1 study).

The sensitivity and specificity of PET (3 studies) for diagnosing liver metastases were 90 to 95% and 57 to 100%, respectively, compared with the following: 80 to 100% and 14 to 94% for CT (4 studies); 82 to 100% and 99 to 100% for MRI (2 studies); 85 and 98% for CT and/or ultrasound (1 study); 97 to 100% and 9 to 33% for CT portography (1 study); 80 and 90% for ultrasound (1 study); 9 to 47% and 92 to 98% for liver enzymes; 70 and 94% for pre-operative ultrasound; 84 and 97% for surgical exploration; and 97 and 98% for intra-operative ultrasound.

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

Authors’ conclusions
PET appears to have very good accuracy in distinguishing recurrent colorectal cancer from treatment artefacts such as scars, and in documenting hepatic or more distant metastases that might preclude surgery with curative intent. However, the methodological limitations of the studies should be taken into account. Systematic reviews of the literature indicate that the knowledge-base supporting clinical diagnostic applications of PET has significant deficiencies. Methodologic weaknesses in published studies seriously limit the validity and generalisability of the available evidence on the accuracy of PET as a diagnostic test, and PET’s contribution to improving outcomes has not been systematically addressed. Accordingly, the assessment team believes that the literature as of September 1996 does not support the widespread incorporation of PET studies into routine diagnostic strategies for the applications addressed in this assessment.

CRD commentary
This review was of average quality. The search was limited to three 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 larger studies with stronger study designs are needed to refine the characteristics of PET as a diagnostic test in colorectal cancer. A PET registry could provide a range of data on the demographic and clinical characteristics of patients on whom PET studies are performed, and on their clinical outcomes in a variety of settings. The use of PET to avoid unnecessary surgery by detecting unresectable recurrent disease in patients who are
scheduled for surgery based on other imaging and blood chemistry studies should be systematically addressed in larger patient samples. If it is demonstrated that post-operative follow-up in colorectal cancer patients reduces mortality, the marginal gains attributable to PET when incorporated into a multi-test follow-up strategy should be quantified.

**Bibliographic details**
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**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.