Diagnostic value of FDG-PET in recurrent colorectal carcinoma: a meta-analysis


CRD summary
This review found that positron emission tomography was a valuable tool for the assessment of recurrent colorectal cancer. The review suffered from a number of limitations, including limited searches, poor reporting of study and validity details and heterogeneity between studies, and the findings should be interpreted with caution.

Authors' objectives
To determine the accuracy of positron emission tomography (PET) using fluor-18-deoxyglucose (FDG) in recurrent colorectal carcinoma.

Searching
MEDLINE and EMBASE were searched from inception to January 2008. Search terms were reported and included a diagnostic filter. References of retrieved articles were screened. The review was limited to published English-language studies.

Study selection
Studies that assessed the accuracy of FDG-PET for the identification or characterisation of recurrent colorectal carcinoma were eligible for inclusion. Studies had to include at least 10 participants and report sufficient data to allow construction of a 2x2 table of test performance.

Mean age in the included studies ranged from 55 to 68.4 years. The proportion of men ranged from 44% to 77%. Reference standards used in the included studies were histopathological examination, percutaneous biopsy specimens and serial CT scans (computerised tomography scan) and follow ups.

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

Assessment of study quality
Studies were assessed for methodological quality using the following criteria: description of study design and patient selection; characteristics of the patient population studied; patient indications that led to use of FDG-PET; details of technology used during the study and image-interpretation issues; final diagnostic confirmation; sensitivity and specificity data; and change-in-management information. Two reviewers independently assessed study quality; it was unclear how disagreements were resolved.

Data extraction
Data were extracted as 2x2 tables of test performance. Sensitivity, specificity and log diagnostic odds ratio together with 95% confidence intervals (CI) were calculated for each set of 2x2 data; 0.5 was added to all cells in any 2x2 table that contained 0 cells.

Data were extracted independently by two reviewers who were blinded to authors, journals, institutions and funding information. Disagreements were resolved through discussion and referral to a third reviewer.

Methods of synthesis
If studies were homogeneous, the diagnostic odds ratio was pooled using a fixed-effects model. If heterogeneity was present, a random-effects model was used. The Moses Littenberg model was used to calculate symmetric and asymmetric summary receiver operating characteristic (SROC) curves. The area under the curve and Q* (the point of equal sensitivity and specificity) were calculated. Data were analysed separately according to three groupings of location of recurrence of metastasis: distant metastasis or whole body involvement; hepatic metastasis; and pelvic.
metastasis or local regional recurrence. Heterogeneity was assessed statistically using the Q statistic and graphically using Galbraith plots.

**Results of the review**

Twenty seven studies were included (n=1,639). No studies fulfilled all quality agreement: three fulfilled 90% or more; five fulfilled 80% to 89%; four fulfilled 70% to 79%; seven fulfilled 60% to 69%; four fulfilled 50% to 59%; and four satisfied less than 50%.

**Distant metastasis or whole body involvement (19 studies):** Sensitivity ranged from 63% to 100%. Specificity ranged from 43% to 100%. Pooled sensitivity was 91% (95% CI: 88% to 92%). Pooled specificity was 83% (95% CI: 79% to 87%). There was strong evidence of heterogeneity for both measures (p<0.0001).

**Hepatic metastasis (16 studies):** Sensitivity ranged from 89% to 100%. Specificity from 44% to 100%. Pooled sensitivity was 97% (95% CI: 95% to 98%). Pooled specificity was 98% (95% CI: 97% to 99%). There was no evidence of heterogeneity for sensitivity (p=0.45), but strong evidence for specificity (p=0.0004).

**Pelvic metastasis or local regional recurrence (14 studies):** Sensitivity ranged from 70% to 100%. Specificity from 85% to 100%. Pooled sensitivity was 94% (95% CI: 91% to 97%). Pooled specificity was 94% (95% CI: 92% to 96%). There was no evidence of heterogeneity for sensitivity (p=0.27) and weak evidence of heterogeneity for specificity (p=0.09).

**Authors’ conclusions**

FDG-PET was valuable for the assessment of recurrent colorectal carcinoma.

**CRD commentary**

The objective and inclusion criteria were stated, but lacked clarity. It was unclear from the objective exactly what role of FDG-PET was being investigated. The literature search was limited by the use of a diagnostic filter and restriction of the review to published English-language studies which, as the authors acknowledged, made it likely that relevant studies were missed. Appropriate steps were taken to minimise bias and errors in the review process. Study quality was assessed using some appropriate criteria, but the results were not considered in the synthesis of results. Very few details on the primary studies included were reported, so the generalisability of the findings was unclear. The analysis suffered from a number of limitations. Pooled sensitivity and specificity were reported, but details were not presented on how these estimates were calculated. There was significant heterogeneity in many of the pooled estimates, but this was not investigated further. However, inclusion of forest plots and SROC plots was very helpful in summarising the results of the primary studies. The authors’ conclusions were supported by the data, but should be interpreted with caution due to the likelihood of missing studies, limited reporting of study and validity details and heterogeneity between studies.

**Implications of the review for practice and research**

The authors did not state any implications for research or practice.

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