Screening and Surveillance for Colorectal Cancer

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Background information

- Patient factors
  - age
  - functional status
  - co-morbidity

- Tumour factors
  - site
  - histological type and differentiation
  - stage: T, N, M, peritoneal lavage cytology
Background information

- **Treatment factors**
  - surgery
    - curative
    - limited / radical
    - residual disease (R0, R1, R2)
    - palliative
      - resection / bypass - stoma
  - adjuvant chemotherapy / radiotherapy

- **Post-treatment duration / progress**
Aims of Follow up

- detect recurrence
- detect metachronous tumours and pre-malignant lesions
- detect complications of treatment
How to follow up?

- How often and what investigations?

- Questions:
  - does intensive follow up lead to early detection?
  - does treatment of this lead to improved survival?
  - any lead time bias?
  - any side effects?
  - is it cost effective?
Colorectal Ca: benefits of FU

- 2/3 receive curative resection, 30-50% of these relapse and die of disease

- Practice
  - Wales and Trent audit (1997)
    - 57% colonoscopy 3-5 times in 5 years
    - 13% no routine testing at all

- Guidelines
  - SIGN (1997)
    - no evidence of survival benefit

- Evidence
  - RCTs: none with sufficient power
  - meta-analyses
Results of meta-analysis of seven non-randomised trials that compared intensive with minimal or no follow up (Bruinvels et al, 1994).

Combined results of three randomised trials of intensive follow up.
### Results of intensive follow up*

<table>
<thead>
<tr>
<th>Follow up</th>
<th>Colonoscopy</th>
<th>Chest x ray</th>
<th>Liver CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard (n = 158)</td>
<td>72</td>
<td>17</td>
<td>66</td>
</tr>
<tr>
<td>Intensive (n = 167)</td>
<td>577</td>
<td>650</td>
<td>674</td>
</tr>
<tr>
<td>No of extra investigations</td>
<td>505</td>
<td>633</td>
<td>608</td>
</tr>
<tr>
<td>No of asymptomatic recurrences resulting from extra investigations</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>No of cures resulting from extra investigations</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

CT = computed tomography.
*Data from Schoemaker et al, 1998 (see Further reading box).

### Costs of follow up, suggested by recent study from Italy
- £2530 per patient over five years
- £9050 per recurrence detected
- £39 890 for each case undergoing further surgery
- £91 190 for each “cured” patient

### Results of “second look” surgery according to measurement of carcinoembryonic antigen (CEA)*

<table>
<thead>
<tr>
<th>CEA concentration</th>
<th>No of patients</th>
<th>No (%) of “curative” resections</th>
<th>% of patients free of recurrence at 1 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raised</td>
<td>345</td>
<td>47 (14)</td>
<td>2.9</td>
</tr>
<tr>
<td>Normal</td>
<td>672</td>
<td>38 (6)</td>
<td>1.9</td>
</tr>
<tr>
<td>Not measured</td>
<td>200</td>
<td>23 (12)</td>
<td>2.0</td>
</tr>
</tbody>
</table>

*Data from Moertel et al, 1995.

### Comparison of results of trial of early versus delayed chemotherapy in patients with advanced colorectal cancer

<table>
<thead>
<tr>
<th>Treatment group</th>
<th>No of patients</th>
<th>Median symptom-free survival (months)</th>
<th>Median survival (months)</th>
<th>Survival at 1 year (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early</td>
<td>92</td>
<td>10</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td>Delayed</td>
<td>91</td>
<td>2</td>
<td>9</td>
<td>38</td>
</tr>
</tbody>
</table>

Early chemotherapy was given when patients were asymptomatic; delayed chemotherapy was given when patients were symptomatic.
Data from the Nordic Gastrointestinal Tumor Group, 1992.
### Colorectal Ca FU: Metanalysis

<table>
<thead>
<tr>
<th>Study</th>
<th>Intensive follow up</th>
<th>Control follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maakala et al, 1996&lt;sup&gt;17&lt;/sup&gt;</td>
<td>Seen in clinic 3 monthly for first 2 years, then 6 monthly: physical examination, full blood count, faecal occult blood test, carcinoembryonic antigen levels, and chest x-ray. Yearly colonoscopy. Sigmoidoscopy 3 monthly for rectal and sigmoid cancers. Ultrasonography of liver 6 monthly. Computed tomography yearly. All followed up to 5 years</td>
<td>Seen in clinic 3 monthly for first 2 years, then 6 monthly: physical examination, full blood count, faecal occult blood test, carcinoembryonic antigen levels, and chest x-ray. Yearly barium enema. Rigid sigmoidoscopy 3 monthly for rectal cancers. All followed up to 5 years</td>
</tr>
<tr>
<td>Ohlsson et al, 1995&lt;sup&gt;18&lt;/sup&gt;</td>
<td>Seen in clinic 3 monthly for the first 2 years, then 6 monthly: physical examination, rigid proctosigmoidoscopy, liver function tests, carcinoembryonic antigen levels, faecal occult blood test, chest x-ray. Colonoscopy at 3, 15, 30, and 60 months, computed tomography after abdominopelvic resection at 3, 6, 12, 18, and 24 months. All followed up to 5 years</td>
<td>No systematic follow up. Patients were instructed to leave samples for faecal occult blood test testing every third month during the first 2 years and then every year. All accounted for to 5 years</td>
</tr>
<tr>
<td>Schoemaker et al, 1998&lt;sup&gt;19&lt;/sup&gt;</td>
<td>Seen in clinic 3 monthly for first 2 years, then 6 monthly for 5 years; physical examination, full blood count, liver function tests, and Haemoccult II. Yearly chest x-ray and computed tomography of liver. Yearly colonoscopy. Carcinoembryonic antigen measurements were performed but not used to trigger further examinations. 94% followed up to 5 years</td>
<td>Seen in clinic 3 monthly for first 2 years, then 6 monthly for 5 years; physical examination, full blood count, liver function tests, carcinoembryonic antigen levels, and Haemoccult II. Carcinoembryonic antigen measurements were performed but not used to trigger further examinations. 96% followed up to 5 years</td>
</tr>
<tr>
<td>Pietra et al, 1996&lt;sup&gt;20&lt;/sup&gt;</td>
<td>Seen in clinic 3 monthly for first 2 years, then 6 monthly for next 3 years, thereafter yearly; physical examination, ultrasonography of liver, carcinoembryonic antigen levels. Yearly colonoscopy, chest x-ray, and computed tomography. All followed up to 5 years</td>
<td>Seen in clinic 6 monthly for first year, then yearly; physical examination, ultrasonography of liver, carcinoembryonic antigen levels. Yearly colonoscopy and chest x-ray. All followed up to 5 years</td>
</tr>
<tr>
<td>Kjeldsen et al, 1997&lt;sup&gt;21&lt;/sup&gt;</td>
<td>Physical examination, digital rectal examination, gynaecological examination, Haemoccult-II, colonoscopy, chest x-ray, full blood count, erythrocyte sedimentation rate, liver function tests, at 6 monthly in first 3 years, then 12 monthly for next 2 years, then 5 yearly. 79% followed up to 5 years</td>
<td>Physical examination, digital rectal examination, gynaecological examination, Haemoccult-II, colonoscopy, chest x-ray, full blood count, erythrocyte sedimentation rate, liver function tests, at 5 and 10 years. 73% followed up to 5 years</td>
</tr>
<tr>
<td>Studies</td>
<td>Deaths at 5 years/No of patients</td>
<td>Risk ratio</td>
</tr>
<tr>
<td>-------------------------------</td>
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<tr>
<td>Extramural detection trials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Makela et al, 1996&lt;sup&gt;17&lt;/sup&gt;</td>
<td>23/52 27/54</td>
<td>0.88</td>
</tr>
<tr>
<td>Ohlsson et al, 1995&lt;sup&gt;18&lt;/sup&gt;</td>
<td>15/53 22/54</td>
<td>0.69</td>
</tr>
<tr>
<td>Schoemaker et al, 1998&lt;sup&gt;19&lt;/sup&gt;</td>
<td>43/167 55/158</td>
<td>0.74</td>
</tr>
<tr>
<td>Pietra et al, 1998&lt;sup&gt;20&lt;/sup&gt;</td>
<td>28/104 43/103</td>
<td>0.64</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>109/376 148/369</td>
<td>0.73</td>
</tr>
<tr>
<td>Intramural detection trial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kjeldsen et al, 1997&lt;sup&gt;21&lt;/sup&gt;</td>
<td>88/290 100/307</td>
<td>0.93</td>
</tr>
<tr>
<td>All trials (95% CI)</td>
<td>197/666 247/676</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Tests for heterogeneity $\chi^2=3.42$, df=4, $P=0.49$

Fig 3 Pooled analysis with summary estimates (fixed effects method) for five year survival: data categorised into detection groups in accordance with a priori hypothesis (see methods)
Fig 4  Pooled data and summary risk ratios (fixed effects method) for recurrences, metastases, and metachronous (second colorectal primary) cancers.
Colorectal Ca FU : conclusions

- Intensive FU after curative resection improves survival at 5 years - absolute reduction in mortality of 9-13%
- Effect superior to the 5-10% benefit for adjuvant chemotherapy for Duke’s C disease
- The cause of survival benefit is unclear. The components of follow up which are of most benefit are not defined
- Does not include benefits of
  - liver resection for hepatic mets
  - pelvic exenteration for recurrent pelvic disease
  - combined therapy for advanced disease
  - psychological well being
Colorectal Ca FU : conclusions

• Recurrence in all sites detected 8.5 months earlier in intensive group. No difference in overall recurrence rates between the two groups
• Intraluminal recurrence and detection of metachronous cancers were low in both groups
• It is not appropriate to follow up ALL patients intensively
• More research is required to define a suitable policy which utilises already limited resources
Suggested study outline to test three follow up strategies: intensive vs minimalist; role of carcinoembryonic antigen; and general practitioner (community) coordinated vs hospital coordinated.
Colorectal Ca FU: recommendations

- Every 3 months for 2 years, then 6 monthly till 5 years
- Physical, rectal and pelvic examination
- FBC, LFT, CEA, FOB
- Yearly CXR, colonoscopy and CT liver
Reverse transcriptase polymerase chain reaction.

Guanylyl cyclase C messenger RNA (GCC mRNA) was found in the lymph nodes of all of the 10 patients who had recurring cancer within three years of surgery. Moreover, the protein did not show up in any of the samples taken from the 11 patients who were free of disease for six years or more after surgery.
Counting alleles to predict recurrence of early-stage colorectal cancers

Allelic imbalance is a better predictor of prognosis than histopathological stage
In patients who have undergone colonoscopic polypectomy, colonoscopic examination is a more effective method of surveillance than double-contrast barium enema. (N Engl J Med 2000;342:1766-72.)
Screening

Beginning age 50

- Digital rectal examination, faecal occult blood yearly plus sigmoidoscopy every 5 years
- Barium enema every 5-10 years
- Colonoscopy every 10 years
- Stool genetic tests

Some form of screening is better than none