

# Incidence and site distribution of colorectal cancer in Northern Ireland

F Kee, B J Collins, C C Patterson

Accepted 10 April 1990.

---

## SUMMARY

*Death rates from colorectal cancer in Northern Ireland are higher than in most of the rest of the United Kingdom. Although local surgeons have recognised this problem for some time it has remained unclear whether this reflects a greater underlying incidence or a worse mortality. We have reviewed all histological diagnoses of colorectal cancer in the province over a three year period and we report the incidence and site distribution for this disease in this population of one and a half million.*

*With the exception of rectal cancer in females the incidence of colorectal cancer, whether histologically diagnosed or registered, is higher than in England, Wales or Scotland. The site distribution accords with that in other high risk countries. These results indicate that Northern Ireland has the highest underlying incidence of colorectal cancer in the United Kingdom.*

## INTRODUCTION

It is known that Northern Ireland has one of the highest death rates from colorectal cancer in the United Kingdom;<sup>1</sup> reliable province-wide incidence data has not previously been reported. There has been a local cancer registry since 1959, but its data-base has not been routinely collated by the International Association of Cancer Registries for inclusion in the World Health Organisation's "Cancer Incidence in Five Continents".<sup>2</sup>

Mortality trends for these two cancers in Northern Ireland have not followed the pattern of post-war decline in the rest of the United Kingdom.<sup>3</sup> Internationally, mortality and incidence for this disease show a high correlation<sup>4</sup> but there are known to be significant variations in incidence between relatively small areas within the UK.<sup>5</sup> As part of a larger study into the epidemiology of hereditary bowel cancer, we report the age and sex specific incidence, and site distribution, of all histologically confirmed bowel tumours diagnosed over a three year period in the 1.5 million population of Northern Ireland.

---

Department of Epidemiology and Public Health, The Queen's University of Belfast, Mulhouse Building, Royal Victoria Hospital.

F Kee, BSc, MSc, MD, MRCP, MFCM, Senior Registrar.

C C Patterson, PhD, Lecturer.

Department of Medicine, The Queen's University of Belfast, Institute of Clinical Science, Royal Victoria Hospital.

B J Collins, BSc, MD, MRCP, Senior Lecturer and Consultant Physician.

Correspondence to Dr Kee, Department of Epidemiology and Public Health, Mulhouse Building, Royal Victoria Hospital, Belfast.

## METHODS

All new histological diagnoses of cancer of the colon and rectum were reviewed from the topographically indexed records of the three histopathology laboratories in the province between 1976 and 1978. From the operative request and the pathology report, details of the age and sex of the patient and the site of the primary tumour were obtained. Metachronous or recurrent cancers during the period were not included and only the site of the first growth (or the largest if synchronous tumours were present) was recorded. The cancers were assigned to five anatomical sites: caecum and ascending colon; transverse colon (including hepatic and splenic flexures); descending colon; sigmoid colon; rectum and anal canal. In accordance with the International Classification of Diseases, "recto-sigmoid" junction growths were routinely assigned to the rectal group. Mid-year population estimates (in five year age groups) for 1976–78 were obtained from the Northern Ireland Registrar General's Office, and age-standardised incidence rates were computed using a truncated world standard population.<sup>2</sup>

For comparison purposes, an age and sex breakdown of colorectal cancer registrations of new cases notified between 1976 and 1978 was requested from the local cancer register. Incidence was therefore calculated both for histologically confirmed cases and for registered cases. Comparisons were made with registration data from England, Wales and Scotland.

Analysis of variance was used to compare the mean age at diagnosis of cases at different bowel sites. A *z* statistic and a chi-square statistic were calculated to compare incidence rates and site distribution respectively between men and women.

## RESULTS

There were 1241 histologically diagnosed cases and 1847 new cases registered over the period 1976–78. For two of the laboratory cases no age was given and they have been excluded from further analysis. The average age of patients with histologically confirmed colon and rectal cancer was 65.3 yrs (range 23–99) and 66.2 yrs (range 20–99) respectively. Although at relatively young ages the incidence of colon cancer in women appeared to exceed that in men, the difference in the 25–44 yrs age group was not significant. With the exception of the youngest age groups (for whom rates are based on small numbers of cases) the incidence of rectal cancer in men appeared higher than that in women. The difference between the sexes was not significant. (Fig 1).

Women have a greater proportion of proximal disease (ascending and transverse) than men (28.4% versus 19.1%). The differences in the proportions of proximal and distal disease were significant (chi-square = 13.56, *df* = 1, *p* < 0.001). The average age of females with proximal colon cancers (ascending and transverse) was some five years greater than those with distal disease and so the site distribution has been represented for each sex separately in two broad age categories (Fig 2). The proportion of proximal disease seems to increase with age for females but not for males. For males the distribution is dominated by the proportion of rectal cancer.

The age-standardised incidence (in age groups 35–64 yrs) of histologically confirmed cancer and of registered cancer is shown in the Table, with data from cancer registrations for England, Wales and Scotland shown for comparison.

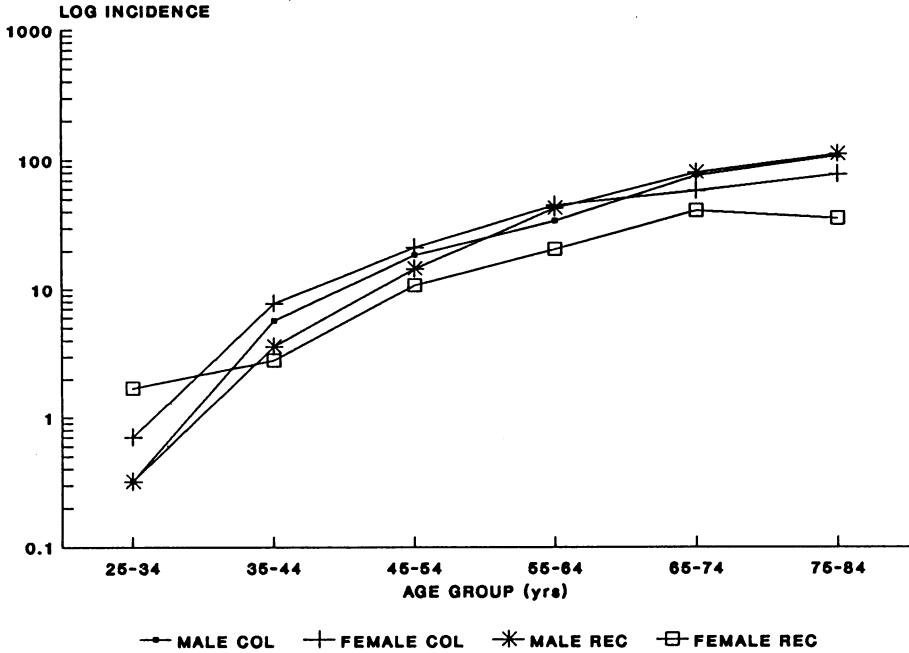


Fig 1. Age specific incidence of histologically confirmed colorectal cancer (per 100,000)

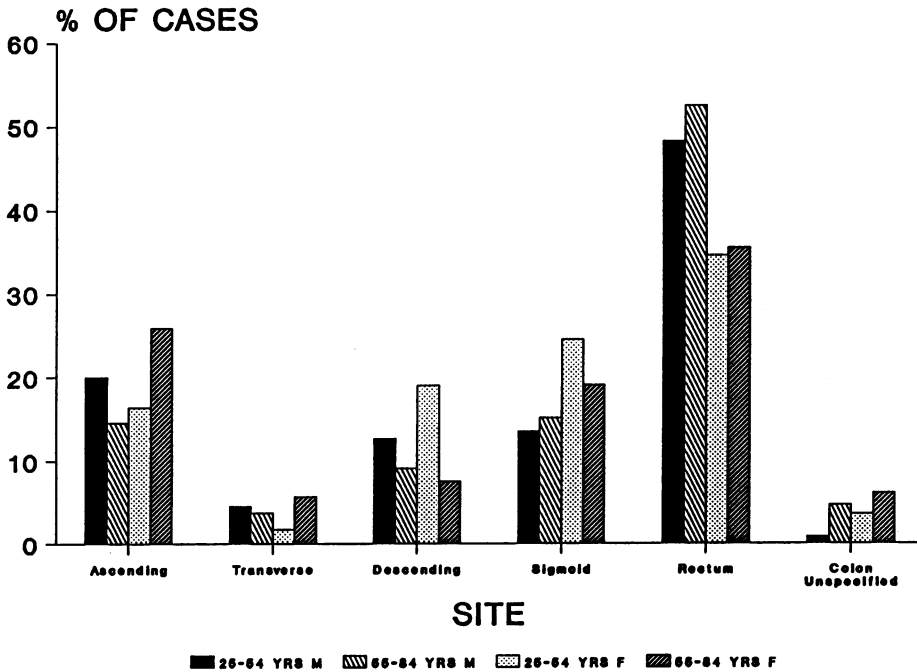


Fig 2. Site distribution of histologically confirmed bowel tumours in males and females (proportions calculated separately for each sex)

The incidence in Northern Ireland of laboratory confirmed colon cancer in females and of rectal cancer in males is higher than equivalent registered rates in the rest of the UK. With the exception of rectal cancer in females, the incidence of registered colorectal cancer in Northern Ireland is the highest in the UK.

TABLE  
*Age standardised incidence (per 100,000) of colorectal cancer  
in the United Kingdom (35–64 yrs)*

	Colon		Rectum	
	M	F	M	F
Northern Ireland (histological)	17.5	22.2	19.1	10.2
Northern Ireland (registered)	26.1	26.6	16.6	9.8
Scotland* (period 1978–82)	22.2	21.3	14.8	10.8
England & Wales* (period 1979–82)	17.6	17.1	15.2	9.6

\*Source: Cancer Incidence in Five Continents, Vol V.

World Health Organisation 1987. Data based on pooled rates from contributing registries.

## DISCUSSION

These observations have provided incidence data on histologically confirmed colorectal cancer in Northern Ireland, and also the opportunity to contrast these findings with the data recorded in the Northern Ireland Cancer Register. The concern that colorectal cancer is a particularly serious problem in Northern Ireland has been substantiated, and our findings come at an opportune time in view of the current interest in strategies for colorectal cancer prevention.<sup>6</sup> There is growing evidence that proximal and distal cancers may represent biologically distinct diseases,<sup>7</sup> and there has been renewed attention on regional variations in site distribution within the bowel.

It is not possible reliably to assess the site distribution of colorectal cancer from the Northern Ireland Cancer Register because over half of all colon registrations have site unspecified. However the findings of the histological case review and the pattern of age-specific incidence are consistent with the concept that the dominant aetiological influences may differ in the two sexes.<sup>5,8</sup> Women in Northern Ireland have higher rates of colon cancer at younger ages than men. Although the difference in rates is not significant the same pattern has been confirmed in many western developed countries in North America, Europe and Australia.<sup>8</sup> Local women have a greater proportion of proximal disease than men. This general distribution pattern is congruent with those described for medium and high risk countries such as in Great Britain, Scandinavia and New Zealand which has reputedly the highest mortality in the world.<sup>9</sup> Gender differences in the age-specific incidence rates have been attributed to physiological changes associated with the reproductive years which may modify risk status by altering bile acid secretion.<sup>8</sup>

It is harder to explain the proximal shift with age of colon cancer in females but not males. This is not to be confused with the apparently increasing proportion of proximal disease diagnosed in a number of countries in recent decades in Scandinavia and North America.<sup>10, 11</sup> Some have noted that this recently growing proportion of proximal disease appears to be more marked in the over 65 year age group<sup>14</sup> tending to support an aging gut hypothesis. However retrospective cohort and cross-sectional survey designs tend to be more prone to a number of biases. It is likely that proximal tumours have a longer sojourn time and become symptomatic at a later stage in their biological course.<sup>12</sup> Younger patients are therefore likely to have relatively fewer right sided lesions than their older fellows. Less than five percent of tumours in this histological series could not be sited due to lack of information on the operative request or pathology report. Their age distribution was no different to the anatomically sited cases. However a detection bias might still be contributing to the profile of laboratory cases as there were far more cases registered (over 65 yrs) than histologically diagnosed (1.75 cases registered per case histologically diagnosed). The shortfall in numbers (for those over 65 yrs) was least for males with rectal cancer (1.11 cases registered per case histologically diagnosed). Presumably rectal cancer requires less invasive investigation and is therefore more immediately detectable than more proximal disease.

The key finding in our study was the very high incidence of histologically confirmed colorectal cancer in Northern Ireland. How much credence can be placed on our estimates of incidence? Firstly, we have reported both histologically confirmed and registered cases of colorectal cancer using the age-standardised figure for age-groups 35–64 yrs as recommended by the World Health Organisation<sup>2</sup> to avoid the vagaries of diagnosis in the very old. Even so, the incidence of histologically confirmed tumours in Northern Ireland is as high as or higher than the registered rates elsewhere in the United Kingdom.

Secondly, the comparability of the incidence derived from the Northern Ireland Cancer Register with those of other United Kingdom registers can be judged against a number of indices of reliability which are used in the compilation of register statistics.<sup>2</sup> One such measure is the ratio of cancer deaths in a period to the number of registrations. From a recent statistical compilation of the Cancer Research Campaign<sup>13</sup> these ratios for colorectal cancer in the United Kingdom are: England 0.72, Wales 0.73, Scotland 0.65, and Northern Ireland 0.73. The proportion of cases which are registered by death certificate alone may reflect the extent of under-recording.<sup>2</sup> For gastrointestinal tumours in Northern Ireland this figure is 24%,<sup>14</sup> and for the regional registers elsewhere in the UK the variation is between 2% and 18% for colorectal cancer. Another index of reliability used by the World Health Organisation is the proportion of registrations which have been histologically confirmed. For the 35–64 yr age groups this varies from 66% to 99% of regional colorectal cancer registrations in the rest of the UK.<sup>2</sup> We have not attempted this form of validation and can only report that during our 3 year study period the ratio of histological diagnoses to registrations in this age-group was 521/603 or 0.86 to 1.

These observations suggest that the registered incidence of colorectal cancer in Northern Ireland gives a reasonable reflection of the excess of this disease above the rates in the rest of the United Kingdom. Although it has been generally recognised that mortality from colorectal cancer in Northern Ireland is high, our results indicate that this likely reflects a much higher underlying incidence.

Although the north and south of Ireland share a similar excess, the secular trends in the countries have not been identical.<sup>3</sup> Since it is conceivable that the risk factors for incidence may not exactly coincide with those for mortality,<sup>15</sup> further work is required to determine the important local determinants of this major public health problem.

We would like to thank the pathologists and surgeons who gave us access to their material and the staff of the Northern Ireland Cancer Registry Information Technology Team for providing age-specific registration details for the study period. Also Mrs Heather Porter for typing the manuscript.

#### REFERENCES

1. G.B. Office of Population Censuses and Surveys. Mortality Series DH1 no. 16: OPCS, London, 1984.
2. Waterhouse J, Muir C, Shanmugaratnam K, et al (eds). Cancer Incidence in Five Continents, vol IV. International Agency for Research on Cancer, World Health Organisation, Lyons, 1982.
3. Kee F, Collins B, Patterson C. Diet or diversity? Bowel cancer in the North and South of Ireland 1950-84. (in press).
4. Armstrong B, Doll R. Environmental factors and cancer incidence and mortality in different countries, with special reference to dietary practices. *Int J Cancer* 1975; 15: 617-31.
5. Barker DJP, Godfrey KM. Geographical variations in the incidence of colorectal cancer in Britain. *Br J Cancer* 1984; 50: 693-8.
6. Wahrendorf J. An estimate of the proportion of colorectal and stomach cancers which might be prevented by certain changes in dietary habits. *Int J Cancer* 1987; 40: 625-8.
7. Delattre O, Law DJ, Remvikos Y, et al. Multiple genetic alterations in distal and proximal colorectal cancer. *Lancet* 1989; II: 353-5.
8. McMichael AJ, Potter JD. Diet and colon cancer: integration of descriptive, analytic and metabolic epidemiology. *Natl Cancer Inst Monogr* 1985; 69: 223-8.
9. DeJong JW, Day NE, Muir CS, et al. The distribution of cancer within the large bowel. *Int J Cancer* 1972; 10: 463-77.
10. Halvorsen TB. Site distribution of colorectal adenocarcinomas: a retrospective study of 853 tumours. *Scand J Gastroenterol* 1986; 21: 973-8.
11. Snyder DN, Heston JF, Meigs JW, Flannery JT. Changes in site distribution of colorectal carcinoma in Connecticut 1940-73. *Am J Dig Dis* 1977; 22: 791-7.
12. Pfister DG, Horwitz RI. The rightward shift of colon cancer. Aging or artifact? *J Clin Gastroenterol* 1987; 9: 58-61.
13. Cancer Research Campaign. 1987, Factsheet 1.3.
14. Gavin A, Evans AE. The Northern Ireland Cancer Registry. *Ulster Med J* 1988; 57: 129-36.
15. Taylor JA. Oncogenes and their applications in epidemiologic studies. *Am J Epidemiol* 1989; 130: 6-13.