

# Colorectal Cancer: Incidence, Delay in Diagnosis and Stage of Disease

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**Abstract**—In a study of 445 patients with colorectal cancer referred to our center during a 3-yr period, we investigated the following parameters and their interrelationships: sex, marital status, ethnic origin, place of residence, stage of disease, delay in diagnosis and factors responsible for delay. Localized disease was found in 52% of the patients, regional disease in 29% and metastatic disease in 19%. The incidence of colorectal cancer was significantly higher in Jews of European (occidental) descent than in Jews of Asian or North African (oriental) descent or in Arabs. The median and mean ages were significantly higher in the occidental than in the oriental Jewish group and significantly lower in the Arabs than in the oriental Jews. Diagnosis was delayed for more than 6 weeks in 52% of the patients. Responsibility for the delay could be attributed to the patient in 54% of these cases and to the physician in 47%. Administrative factors were responsible for the delay in 26%. (In 27% of the above delayers there was more than one agent responsible for the delay.) On average, patients in whom diagnosis was delayed had more advanced disease than those without delay. Also, patients with advanced disease had a longer delay on average than those with localized disease. The stage of disease at diagnosis was more advanced in the oriental than in the occidental Jews. No correlations were found between delay in diagnosis and either age or sex. There were more widowers with delay (21%) than with no delay (16%). In patients living outside Haifa delay was more prolonged than in those residing in the city. Educational programs aimed at the population at risk of developing neoplasm and especially at those likely to undergo delay in diagnosis are recommended. Postgraduate courses should be designed to instruct physicians on how to minimize delay in diagnosis.

## INTRODUCTION

THE PROGNOSIS in patients with colorectal cancer can be substantially improved by presymptomatic detection. The 5-yr survival rate of asymptomatic patients who were nevertheless diagnosed at a cancer detection center was 72–80% as compared to 32% in patients diagnosed on the basis of overt symptoms [1, 2]. In symptomatic patients, however, the role of early detection is still a subject of controversy. Slaney [3], for example, found no evidence of improved survival in patients with short symptomatic histories, whereas Welch and Burk [4] noted an improvement in long-term survival in such patients and attributed it to early detection. In the present study of symptomatic patients diagnosed at our center, various epidemiological factors were investigated in relation to the stage of disease and to delay in diagnosis.

## MATERIALS, METHODS AND RESULTS

The study material consisted of 445 patients with colorectal cancer, all of whom were referred to our center during a 3-yr period, from 1980 to 1983. The Northern Israel Oncology Center is a regional center which serves the population living in the North of Israel. All patients diagnosed as having colorectal cancer are referred to us after surgery, for consultation regarding further treatment or follow-up. Of these patients, 277 had colon cancer and 168 had rectal cancer. Since the age, sex and ethnic origin of patients were similarly distributed we present these characteristics together in Table 1, except where stated otherwise. The statistical significance of the results was measured by the  $\chi^2$  test and Student's *t* test.

Patients (240 men and 205 women) were classified according to three clinical stages: I, localized disease, Duke's A or B; II, regional disease, Duke's C; III, locally advanced inoperable or metastatic disease, Duke's D. Fifty-two percent of the patients had localized disease, 29% had regional disease and 19% had metastatic disease. In addition, 259 patients suffering from colorectal cancer were also

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classified according to Duke's classification: 13 patients (5%) had Duke's A disease, 127 (49%) had Duke's B, 73 (28%) had Duke's C and 46 (18%) had Duke's D disease. Jewish patients comprised 94% of our study material and could be grouped on the basis of ethnic origin, as follows: occidental (Ashkenazi) Jews, i.e. Jews born in Europe or America or born in Israel to patients of European or American origin, and oriental (Sephardi) Jews, i.e. Jews born in Asia or North Africa or born in Israel to parents of Asian or North African origin. Occidental Jews accounted for 84% of our patients, oriental Jews for 10% and Arabs for 6%. The incidence of these ethnic groups in the general population in the same age group as that of patients is 64, 28 and 16%, respectively. The differences in ethnic distribution between the general population and our patients were statistically significant (Fig. 1).

In patients with rectal cancer there were more oriental Jews than occidental Jews with stages II and III disease: 72 vs 42% ( $P < 0.02$ ) and conversely fewer oriental than occidental Jews with stage I disease (Fig. 2). Amongst the occidental Jews with colon cancer more patients had Duke's C than Duke's D disease: 33.6 vs 14.4%, whilst more of the oriental Jews had more Duke's D than Duke's C disease, 33.3 vs 6.7%. Furthermore, significantly more oriental than occidental Jews had Duke's D disease ( $P < 0.01$ ) (Fig. 3). The age, ethnic grouping and countries of origin of the patients are shown in Table 1. Most of the occidental patients were born in Europe or America and most of the oriental Jews in Asia or Africa. In patients with colon cancer the median age of the occidental Jews was 67, the oriental Jews 60 and the Arabs 56 yr. The corresponding ages for patients with rectal cancer were 69, 61 and 46 yr respectively. For both types of cancer the occidentals were significantly older than the oriental Jews ( $P < 0.001$ ). The oriental Jews, in turn, were older than the Arabs, significantly so in patients with rectal cancer ( $P < 0.02$ ). These age differences between the ethnic groups reflected those in the general population, where the occidental Jews belong to the oldest age group, the Arabs to the youngest and the oriental Jews in between. The mean and median ages within each of the three ethnic groups were similar in stages I, II and III.

Patients were considered to be delayers if they had postponed seeking diagnosis for 6 weeks or more after first noticing their symptoms. If the physician took more than 6 weeks to arrive at a diagnosis he was considered responsible for the delay. As shown in Table 2, diagnosis was delayed in 233 patients (52% of the total). In 26% of these cases responsibility for the delay could be attri-

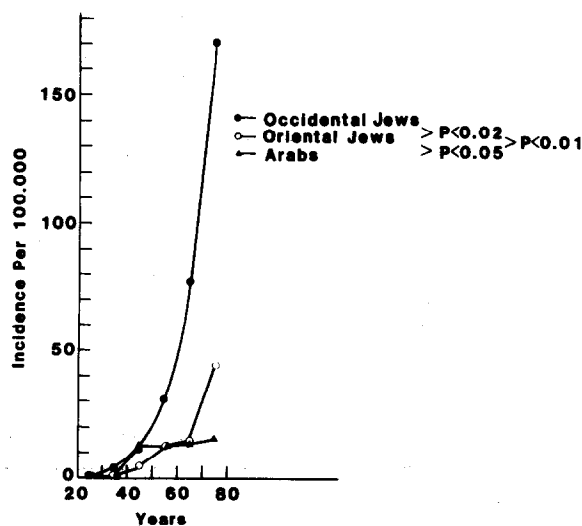


Fig. 1. Colorectal cancer in Northern Israel. Annual age-specific incidence rates by ethnic groups.

#### Rectal Cancer (149 pts.)

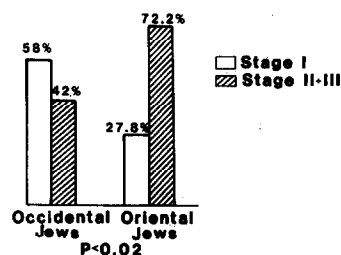


Fig. 2. Stage of disease and ethnic origin.

#### Colon Cancer (177 pts.)

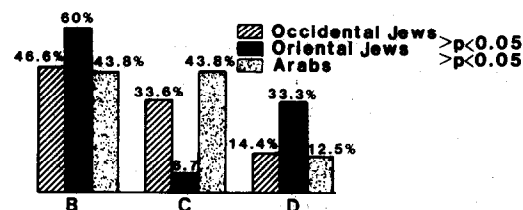


Fig. 3. Stage of disease (Duke's classification) and ethnic origin.

buted at least to some extent to administrative factors. Physicians and patients were responsible for delay in 47% and 54% of the cases, respectively. It should be noted, however, that in a number of cases (27%) more than one agency contributed to the delay.

Delay on the part of the patient was further categorized according to whether it occurred before or after consultation or both. Of 125 such patients the delay occurred before consultation in 37 (mean 7.4 months; median delay 5 months), after consultation in 25 and both before and after consultation in 63. Delay attributable to the physician occurred more often in patients with rectal than in

Table 1. Age and ethnic characteristics of patients

Country of origin	No. of patients	Percentage	Ethnic origin	No. of patients	Percentage	Age mean	Age median
Israel	54	12.1	occidental Jews	372	83.6	67.7±10	69
Europe and America	351	78.9	oriental Jews	44	9.9	60.8±12.7	62
Asia and Africa	37	8.3	Arabs	26	5.8	53.5±11.1	50.7
Unknown	3	0.7	unknown	3	0.7		

Significance of age differences between ethnic groupings: occidental Jews vs oriental Jews,  $P < 0.001$ ; oriental Jews vs Arabs,  $P < 0.02$ ; occidental Jews vs Arabs,  $P < 0.001$ .

Table 2. Delay in diagnosis and agent responsible

Agent responsible for delay	No. of Patients	Percentage
Patient:		
Before consultation	37	16
After consultation	25	10
Before and after consultation	63	27
Total	125	53
Physician:		
General practitioner	85	36.5
Hospital physician	18	7.7
Other physicians	6	2.6
Total	109	46.8
Administrative	61	27.2
Total delayers	233	52

In 62 (27%) delayers more than one agent was responsible.

those with colon cancer (50 vs 44%). The incidence of delay was significantly higher in patients with stage II than with stage I disease (60 vs 49%) ( $P < 0.05$ ). This tendency was especially pronounced among patients with rectal cancer (Fig. 4). Patients with Duke's C disease had a higher incidence of delay than those with Duke's B (45% vs. 30%,  $P < 0.01$ ) or Duke's A (2%) ( $P < 0.001$ ) (Fig. 5). When delay in diagnosis was attributed to the patient its duration in most cases was up to 6 months (59 of 88 patients; 67%). When delay was attributable to the physician in 55 of 109 patients (50.5%) it was less than 6 months. Age and sex had no effect on delay, but delay was significantly more prevalent in widowed than in married patients ( $P < 0.05$ ). Patients at a more advanced stage of disease were found to have undergone delay of longer duration on average. Among delayers with rectal cancer, less than 6 months' delay in diagnosis had been experienced by only eight of 18 patients (44%) with stage III disease as compared with 25 of 32 patients (78%) with stage I disease. The mean duration of delay of rectal cancer patients was  $4.6 \pm 3.8$  months (median 4 months) in stage I patients and  $8.9 \pm 5.9$  months (median 7.5 months) in stage III patients ( $P <$

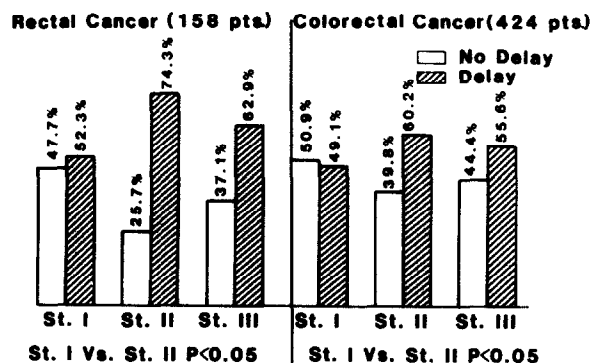


Fig. 4. Delay in diagnosis and stage of disease.

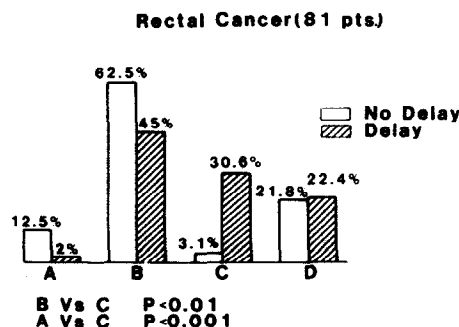


Fig. 5. Delay in diagnosis and stage of disease (Duke's classification).

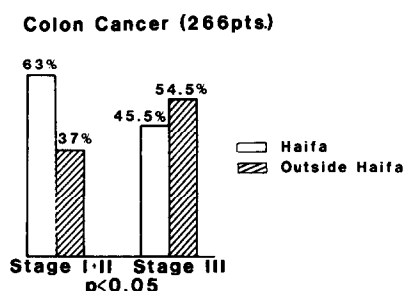


Fig. 6. Stage of disease and place of residence.

0.02). Delay was shorter on average in patients living in Haifa (4.8 months; median, 3 months) than in those living outside of the urban area (9.2 months; median, 4 months,  $P < 0.02$ ). In patients with colon cancer stage III disease was found more frequently in those living outside Haifa than in those living in the city (24 vs 13%,  $P < 0.05$ ) (Fig. 6).

## DISCUSSION

Colon and rectal cancer have been found to be related to both socioeconomic level and diet. The incidence of colon cancer is higher in higher income and better educated groups. It is relatively low in Seven-day Adventists, who restrict themselves to a lactovegetarian diet, and in Mormons, who generally consume a well-balanced diet of grains, fruit, vegetables and moderate amounts of meat. A positive correlation between fat intake and the incidence of colorectal cancer [5] has also been reported. The incidence rate of colorectal cancer varies in different countries, with the highest rate found in North America, the lowest in Asia and the Carribeans [6, 7]. In the region from which our study population was drawn the incidence of colorectal cancer was higher in Jews born in Europe and in their Israeli-born descendants than in oriental Jews born in Asia/Africa or Israel. In Arabs the incidence was lowest.

These findings must be explained by the fact that occidental Jews in general have higher income and educational levels and a tendency to eat more meat than the other ethnic groups under study. In a previous study of patients with breast cancer it was similarly found that occidental Jews had a higher incidence of disease than either oriental Jews or Arabs.

The results of our study show delay in diagnosis occurred significantly more often in patients with Stage II disease than in those with Stage I. Furthermore, the duration of delay was significantly more prolonged in patients with Stage III disease than in those with Stage I. Nilsson *et al.* [8] and Basset *et al.* [9] found no correlation between delay in diagnosis and stage of disease. In contrast and in agreement with our results, Welch and Burls [4]

and Pitluk and Potichu [10] and MacArthur and Smith [11] found that a prolonged history of illness was correlated to advanced disease.

Our finding that occidental Jews had less delay on the average than oriental Jews cannot be attributed to financial considerations as free medical services are available for all. A more likely explanation is one in terms of variations in outlook and behavior stemming from different cultural backgrounds, although difference in virulence of disease cannot be ruled out. The biologic behavior of the tumor has been found to be a prognostic factor in colon cancer [12].

The mean delay (median 5 months) in our patients prior to consultation was 7.4 months; however, diagnosis occurred in most cases within 6 months of symptom onset. In a study carried out in England, only 30% of patients with colon cancer presented within 3 months of feeling unwell or discovering symptoms and 25% had been symptomatic for 12 months [13]. In the study of Pitluk and Potichu [10] the average delay between the onset of symptoms and diagnosis was 6.4 months, and longer than 1 yr in 45% of the patients. Hultborn [14] reported a median delay of 6.1 months for patients with colon cancer and 6.8 months for rectal cancer. Holliday and Hardcastle [15] reported a mean interval of 7.5 months between onset of symptoms and treatment in colon cancer and 9.8 months in rectal cancer (median 5.5 months and 8 months respectively). Delays attributable to the patient and the family doctor were of almost equal duration.

MacArthur and Smith [11] found that 28% of their patients delayed more than 3 months before consultation (mean, 94 days; median, 31 days). After consultation only 32% were referred to a specialist immediately; 30% were delayed more than 3 months (mean, 120 days; median, 25 days). Whether the patients were examined by the doctor was associated with speed reference. The median delay of those examined was 2 days, and 89 days in 42 cases where no physical examination was done.

In our study diagnosis was delayed in 52% of patients. The patients themselves were responsible for the delay in 54% of these cases (125 patients) and physicians were responsible in 47% (109 patients). Of a study reported in the literature [14], 76% of the patients had previously consulted their physician and 50% had been seen on three or more occasions. Of patients with rectal cancer, 22% had not undergone rectal examination on consultation.

In the light of the above, it should be clear why only 42% of patients with colorectal cancer are diagnosed at an early stage of disease [16]. Of the patients in our study 52% had localized disease, 29% regional and 19% metastatic disease at the time of diagnosis.

Patients blamed the physician for the delay in 50% of the cases with delay in diagnosis. This finding should be interpreted with caution and verified by means of a careful prospective study as patients sometimes tend to blame their doctors without justification. Doctors' delays exist [17] and should be minimized, as according to reports in the literature there is a correlation between stage of disease and cure rate. Also, a correlation between delay and stage of disease has been reported. The 5-yr survival rate was 40% when diagnosis was delayed for 3 months and 25% when delayed for 7 months [1]. A study by Hughes *et al.* [18] yielded similar findings; the 5-yr survival rate was 57% when diagnosis was delayed for 12 months and 46% when delay was 3 months or less.

### CONCLUSION

The results reported in the literature as well as our own findings show that delay in diagnosis is still a significant factor in decreasing the chances of survival in patients with colorectal cancer. Patients, doctors and administrative agents alone or in combination may be responsible for the delay.

Patients should be educated to seek early consultation if suggestive symptoms appear. Physicians could also benefit from educational programs aimed at achieving intensive investigation and earlier diagnosis. Steps should be taken to overcome administrative hold-ups. The literature contains conflicting reports with regard to the effect of delay on the stage of disease at diagnosis and on survival. In our study patients with delayed diagnosis had more advanced disease, but this was statistically significant only in patients with rectal cancer.

It should be emphasized that not all of the patients with delayed diagnosis had advanced disease and not all so-diagnosed promptly had localized disease. It thus appears that the biology of the disease itself may be a factor in determining the stage at which it can be diagnosed. Since early diagnosis can do no harm and since survival rates are higher in patients with localized disease, we recommend that everything possible should be done to avoid delay in diagnosis. Since survival and cure rates are closely related to the stage of disease at diagnosis one might expect to find that early diagnosis would improve cure rate.

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