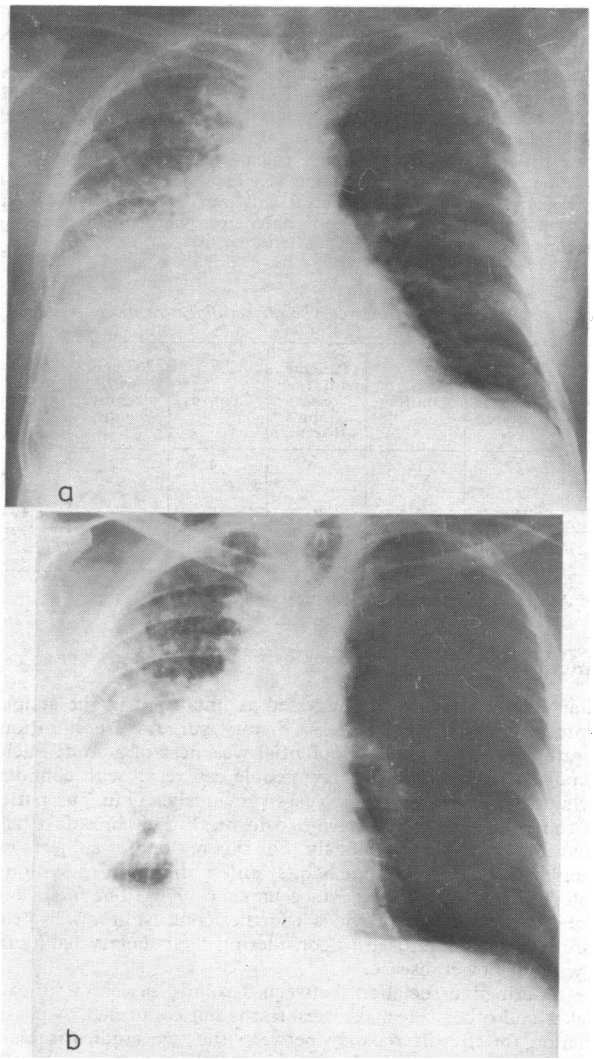
holiday in Spain. Soon after arrival he had an infected spot beside his nose and within a few days began to feel unwell. Malaise and dyspnoea increased but he stayed in his hotel until the return flight. On arrival home he was confused and febrile but had no chest pain, cough, or sputum. He started taking ampicillin four days after returning home and was admitted to hospital on the next day, 2 June 1977.

His fever of 38·5°C settled within three days but rose briefly to 38°C on days 7 and 11. He had an expiratory wheeze on both sides and crepitations on the right. Chest radiography (figure 1a) showed blotchy opacity on the right side. After five days of dry cough he produced green sputum, from which *Klebsiella aerogenes* and *Candida albicans* were grown (presumed to be superinfectants). Ampicillin, 500 mg 6-hourly, was continued until the 12th day after admission but the radiological signs resolved slowly (figure 1b). No diagnostic changes in antibody titres to influenza A, B, C, or psittacosis occurred over the next two weeks, and no cold agglutinins were detected. His initial WBC was 9700/mm³. All serum globulin fractions were raised, presumably due to his Hashimoto's disease.



Chest radiograph on second day of hospital admission (3 June 1977) (*a*) and four weeks later (*b*). Some shadowing and mediastinal spread persisted nine months later.

He had +proteinuria and +haematuria on admission, which cleared in five days. He was never oliguric but his plasma concentrations of urea rose to 26·5 mmol/l (159 mg/dl) and of creatinine to 512 μmol/l (5·8 mg/dl) on the second day of admission. Both concentrations fell slowly and were still slightly abnormal nine months later: plasma urea 10·1 mmol/l (61 mg/dl), creatinine 170 μmol/l (1·9 mg/dl); he had no proteinuria but an excess of hyaline casts in the deposit. Since his plasma urea and creatinine concentrations and the results of urine analysis and microscopy had all been normal on two occasions in the four years before his pneumonia, his renal impairment appears to be a late legacy of his acute renal failure.

In March 1978 a serum sample was examined for antibodies to the organism causing legionnaires' disease; by the indirect fluorescent antibody test it had a titre of 1/256, which strongly supports the diagnosis.

Comment

In the Philadelphia outbreak of legionnaires' disease "transient impairment of renal function was frequent and usually mild."[1] Four patients developed acute renal failure requiring dialysis. In three of these, and in our patient, there was no obvious precipitant such as hypotension or respiratory failure. It appears that the infection has a deleterious effect on renal function, which may be permanent. The clinical course is more suggestive of interstitial nephritis than of tubular necrosis but we did not perform a renal biopsy.

One other patient is known to have developed legionnaires' disease after visiting the same hotel in 1977.[4] The occurrence of two minor outbreaks four years apart in the same locality in one Spanish town should be a useful clue to the mode of spread. Contamination of a ventilation system was blamed for the outbreak at Pontiac.[5] Our patient was predisposed to infection by age and chest disease,[1] whereas most of his fellow travellers were probably young and healthy. Nevertheless, other cases have probably been overlooked, and their discovery might throw further light on the pathogenesis.

Application for reprints to DNSK.

[1] Fraser, D W, *et al*, *New England Journal of Medicine*, 1977, **297**, 1189.
[2] *British Medical Journal*, 1978, **1**, 2.
[3] *Lancet*, 1977, **1**, 1265.
[4] Lawson, J H, *Scottish Medical Journal*, 1978, **23**, 121.
[5] McDade, J E, *et al*, *New England Journal of Medicine*, 1977, **297**, 1197.

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Breakfast and Crohn's disease—I

A recent report by James[1] of a significant association between Crohn's disease and eating cornflakes for breakfast prompted us to study this association in a larger series.

Patients and controls; inquiry and results

A total of 100 men with Crohn's disease currently attending our outpatients clinic were subjected to a detailed dietary interview to elicit the same information about their breakfast eating habits as was employed by James.[1] A total of 100 controls was obtained from the visitors to the general wards of the Radcliffe Infirmary. None of them were suffering, or had ever suffered, from any major gastrointestinal disease. They were matched with the Crohn's disease group for age, sex, and social class according to the criteria employed by the Office of Population Censuses and Surveys (1970).

All the patients and the subjects in the control group were interviewed by PMR, using a questionnaire. This was designed to elicit all the items of information used by James[1] and also to obtain certain additional information. In view of the observations by Martini and Brandes[2] suggesting that a high intake of sucrose is associated with Crohn's disease, the use of sugar on breakfast cereals and in breakfast drinks was noted in detail. Details of the type and quantity of fluid consumed at breakfast were also recorded. In many of the patients with Crohn's disease the disease was of long standing and therefore the inquiry about their breakfast eating habits was directed at the period preceding the onset of symptoms. To make a fair comparison, the appropriate members of the control group were questioned about their breakfast eating habits at corresponding periods in their lives.

The table shows the data corresponding to those presented by James[1] in his table I. The chief finding is that in the present series there was no significant difference between the patients with Crohn's disease and the controls in respect of regular eating of cornflakes for breakfast. The two groups did not differ significantly in their consumption of other common breakfast cereals consisting of wheat, porridge, and rice. So far as bran and muesli are concerned, our results are diametrically opposed to those of James, in that regular bran and muesli eaters were confined to the control group. The difference in respect of bran is statistically significant and in respect of muesli is suggestive. Trowell[3] has suggested that Crohn's disease is one of the diseases of Western society that may result from eating a diet deficient in dietary fibre, so possibly the present findings are a clue worth pursuing. Naturally, a study simply of breakfast habits does not give an adequate picture of the diet as a whole.

Number of patients and control subjects who ate various cereals regularly or otherwise at breakfast

Frequency of consumption at breakfast	Cornflakes		Wheat		Porridge		Rice		Bran		Muesli	
	Patients	Controls	Patients	Controls	Patients	Controls	Patients	Controls	Patients	Controls	Patients	Controls
Regularly	47	39	36	27	27	23	13	7	0	6	0	4
Rarely or never	53	61	64	73	73	77	87	93	100	94	100	96
χ^2	1·31		1·81		0·43		2·00					
P value	>0·1		>0·1		>0·1		>0·1		P* = 0·014		P* = 0·061	

*Absolute P values calculated by Fisher's exact test.

We also obtained information on other foodstuffs which were eaten at breakfast. There was no obvious difference between the patients and the controls in respect of toast and bread, eggs, fried foods, and cereals in general. The patients were more likely than the controls to have taken milk as a drink but the difference was not statistically significant. They were also more likely to take sugar with their cereals but again the difference was not significant.

Comment

We failed to confirm the findings of James.[1] Moreover, the social class distribution is known for the economically active adult male population of Oxfordshire based on a 1 in 10 sample. There was no major difference in the social class distribution of the men patients and the general adult male population of Oxfordshire, suggesting that Crohn's disease is not specially likely to affect any particular social class, a conclusion which agrees with the findings of Kyle.[4]

We are grateful to the Head of Research and Intelligence, County Secretary's Department, Oxfordshire County Council for supplying us with the information on the social class distribution of the economically active population of Oxfordshire.

[1] James, A H, *British Medical Journal*, 1977, **1**, 943.
[2] Martini, G A, and Brandes, J W, *Klinische Wochenschrift*, 1976, **54**, 367.
[3] Trowell, H C, in *Refined Carbohydrate Foods and Disease*, ed D P Burkitt and H C Trowell. London, Academic Press, 1975.
[4] Kyle, J, *Gastroenterology*, 1971, **61**, 826.

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Breakfast and Crohn's disease—II

James[1] has reported that there is a highly significant association between Crohn's disease and eating cornflakes for breakfast. This report aroused considerable interest and has been discussed in both medical journals[2] and the national press.[3] If true, the importance of this association would be considerable, suggesting that dietary factors play an important part in the pathogenesis of Crohn's disease. We have therefore surveyed a larger series of patients, and in addition, as a guard against systematic bias, have included patients with ulcerative colitis as a contrast group.

Subjects, methods, and results

A total of 57 patients with Crohn's disease and 61 with ulcerative colitis were studied, and their breakfast habits compared with matched controls. The patients with Crohn's disease had an age range of 16-78 and on average 11 years had elapsed since diagnosis; 14 of them had presented after January 1976. Of the 57 cases, 22 had small-bowel disease, 13 large-bowel disease, 21 both small- and large-bowel disease, and one perianal disease alone. The patients with ulcerative colitis were aged 22-72. The controls (one for each patient) were matched for age (within five years) and sex, and were drawn from hospital inpatients and outpatients and staff. Patients and controls were asked questions from a standard form about their current breakfast eating habits. Details of everything they ate for breakfast were obtained, although only the answers relating to breakfast cereals were analysed. In addition, any change in breakfast habits around or after the onset of disease was recorded in those patients with Crohn's disease presenting after January 1976.

The results are shown in the table below. In keeping with James's usage, "regularly" means at least once a week, and "never" means that the subject denied ever eating cornflakes for breakfast in adult life. The "rarely" category includes all other possibilities. In the Crohn's subgroup there were two patients who had regularly eaten cornflakes until the time of diagnosis but then had stopped doing so. They are recorded as regular cornflake eaters. Wheat cereal, rice cereal, and bran consumption at breakfast was also analysed and no significant differences were found among the three groups.

Number of patients and their controls who ate cornflakes regularly or otherwise

	Patients with Crohn's disease	Controls	Patients with recent onset Crohn's disease	Controls	Patients with ulcerative colitis	Controls
Regularly	17	16	4	4	22	16
Rarely or never	40	41	10	10	39	45
χ^2	0·03		0·00		0·95	

None of these differences approach statistical significance.

Comment

Dietary factors have been suggested as important in the aetiology of Crohn's disease. Nevertheless, dietary surveys are notoriously inaccurate. The most obvious potential weakness of a study such as that reported by James is that few people can recall with confidence what they regularly ate several years previously. Thus our patients with Crohn's disease would have had to recall their breakfast habits of (on average) 11 years previously. For this reason our subjects were asked only about their present habits, unless the onset of symptoms of Crohn's disease was recent (since January 1976). The inclusion of cases of ulcerative colitis provides a further contrast group, of people who are possibly more used to considering their dietary habits than those without bowel disease.[4]

The described association between Crohn's disease and eating cornflakes and other cereals at breakfast is not confirmed. A possible explanation for the discrepancy between the two studies is bias in the questioning and recall of the Crohn's patients in James's study. Although the two series are not directly comparable, the fact that in our study there was little or no difference in breakfast eating habits between patients with Crohn's disease of long standing and those with it of recent onset suggests that the alternative explanation, of a sudden change of habits at the onset of the condition, is unlikely. Our results suggest that patients with Crohn's disease eat cornflakes and other breakfast cereals to the same extent as patients with ulcerative colitis and as controls. Nevertheless, a prospective study is necessary finally to answer the question.

[1] James, A H, *British Medical Journal*, 1977, **1**, 943.
[2] Ward, M, *Lancet*, 1977, **2**, 903.
[3] *The Times*, 9 April 1977, p 4.
[4] Sturdevant, R A L, *Gastroenterology*, 1977, **73**, 855.

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