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ABO BLOOD GROUPS AND CANCER OF THE STOMACH

In 1953 Aird *et al.*[1] reported data which showed that the incidence of carcinoma of the stomach is higher in those subjects who belong to blood group A than in those of blood group O. This paper provided a stimulus for several investigations, and by 1959 Lavenhar in a review[6] was able to list results from 12 different centers. These showed that the mean incidence of cancer of the stomach was 21 per cent higher in group A than in group O; the data therefore provide general confirmation of the findings of Aird *et al.* In one center with 1,146 cases, however, no difference between the two incidence rates was found, and in two other centers the difference was small and insignificant. In these circumstances it is worthwhile to investigate a suggestion first made by Jennings *et al.*[5] that the relationship between blood group and carcinoma of the stomach might vary according to the site of the lesion within the stomach. The present interim report is based on the first half of the data we are collecting in order to test this hypothesis.

MATERIALS AND METHODS

The analysis covers 707 cases of gastric carcinoma registered at the Division of Cancer and Other Chronic Diseases, Connecticut State Department of Health, during the period 1950 to 1953. An additional 439 cases registered during this period were omitted from the final analysis because information about blood group or site of lesion was not available.

Hospital records on each patient were consulted to obtain data on the site of the lesion. In 37 per cent of the cases the site was obtained from the pathologist's report, and in the remainder the decision was based on the findings at operation or at radiographic examination. Using the criteria of Billington,[2] we classified the site of the lesion as: (a) pylorus and antrum, (b) body and fundus, and (c) cardia. In 48 cases the involvement was so extensive that the site could not be specified.

Data on the age and sex of each patient were available at the Cancer Registry. The ABO blood group had previously been obtained by Eisenberg *et al.* in the course of an earlier investigation[8] on the same subjects.

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RESULTS

In Table 1 are the findings on the relationship between the site of cancer, the sex of the subject, and blood groups A and O. The results for blood groups B and AB are not included in this preliminary report, since the number of cases in these two groups is small, and neither this nor any previous investigation has led to any hypothesis relating these groups to carcinoma of the stomach.

The main point of interest is the relative frequency of blood groups A and O. In the total series studied there are 308 subjects belonging to

TABLE 1. SITE OF GASTRIC CANCER BY SEX AND BLOOD GROUPS A AND O

Site	*Males*			*Females*			*Total*		
	A	*O*	*A+O*	*A*	*O*	*A+O*	*A*	*O*	*A+O*
Pylorus and antrum	95	63	158	45	41	86	140	104	244
Cardia	21	20	41	18	8	26	39	28	67
Body and fundus	82	80	162	35	36	71	117	116	233
Extensive	9	19	28	3	9	12	12	28	40
Total	207	182	389	101	94	195	308	276	584

group A and 276 belonging to group O. It may be noted that in the general population O is more frequent than A. The analysis of the over-all ratio A:O is given in the paper by Eisenberg *et al.*[3]

In males, the ratio A:O is high for the pyloric group. If this group is compared with the remaining three, the difference is significant ($x^2_{(1)} = 4.65$; $P < 0.05$). In females the ratio is 1.1 for the pyloric group, which is about the same as the corresponding ratio for the total female cases. The ratio A:O is high for the female cardiac group but the number of cases involved is small.

Certain other findings may be referred to briefly. An analysis has been made of the data classified by site, by blood group, and according to whether the site of cancer was determined by the pathologist or otherwise; the method of diagnosis of site did not affect the relationship between blood group and site. Similarly, the fact that a subject was Italian, Polish, or other nationality did not influence the relationship between blood group and site.

DISCUSSION

Eisenberg *et al.*[8] compared the distribution of blood groups in the present series of cases with the distribution in a set of controls and found that group A was relatively more common in the patients and group O in the controls. From the results discussed above, it appears that the excess of group A in cancer patients is found mainly in male subjects with cancer of the pyloric region, and possibly in female subjects with cancer of the cardia. Three other workers have published data on this problem; their results and those of the present study are presented in Table 2.

TABLE 2. BLOOD GROUPS OF PATIENTS WITH GASTRIC CANCER ACCORDING TO SITE

	Frequency of site and blood group					
	Pylorus		*Body*		*Cardia*	
Author	*A*	*O*	*A*	*O*	*A*	*O*
Jennings *et al.*	42	20	18	23	10	6
Haddock *et al.*	87	118	*	*	*	*
Billington	96	53	47	154	50	24
White and Eisenberg	140	104	117	116	39	28

* Body and cardia combined: 109 A and 85 O.

In three of the four investigations there is an excess of group A in subjects with pyloric cancer and no such excess in cancer of the body of the stomach. This finding, however, is by no means securely established. One major difficulty is the exclusion of cases on whom information about blood group and site is not available. Another problem is that we are testing for relatively small differences in the presence of various sources of heterogeneity. In the present investigation it appears that the results vary somewhat according to sex. We have also noted some heterogeneity associated with age and with place of residence, these in turn probably being related to nationality. In none of the work so far reported have the cases been sufficient to control these various factors simultaneously.

All the data now available show that group A is more common than group O in cancer of the cardiac portion of the stomach. Even the pooled data, however, are inadequate for a definitive opinion on this point.

The findings in regard to cancer of the body of the stomach are contradictory. Billington reported such a large preponderance of group O that, in

his total material, the ratio A :O was not higher than the ratio in the general population. The present investigation does not support this finding.

The main interest in these investigations is the study of the relationship between blood groups and cancers of different portions of the stomach. The finding of a relationship with parts of the stomach, however, also throws light on the older problem of a relationship with the stomach as a whole. It is difficult to attack this latter problem by a retrospective investigation in a country such as the United States, because of the question of what constitutes a proper control group. One possible solution is a follow-up study, but until this is arranged, some information can be gained without the use of external controls by comparing the blood group distribution of patients having pyloric cancers with the distribution in patients having cancer of the body of the stomach.

SUMMARY

1. A series of 707 cases of gastric carcinoma was classified according to blood group, site of cancer, age, sex, and place of residence.

2. In the series as a whole, blood group A was commoner than blood group O, and the excess was most marked in males with cancer of the pyloric region.

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