retraction of the cheek and upper lip can be obtained by a long incision in the cheek sulcus from the malar ridge to a point across the midline of the incisor teeth or alveolus. The antrum is opened high up on the facial surface of the maxilla to expose the upper limit of the growth. The neoplasm is then excised, with a free margin of healthy tissue. The floor of the antrum and a large area of the hard palate are removed, the cheek is carefully examined, and any growth is widely excised by diathermy. The whole of the facial wall of the antrum is removed, then the square block of the alveolus and palate to be excised is marked out by cutting through the muco-periosteum with the diathermy needle. The diathermy incision is made transversely across the alveolus and palate to the midline behind the growth. A similar transverse incision is made in front of the growth, and the two incisions are joined by a cut along the midline of the palate.

The block of bone is removed by first dividing the bone with slightly angular bone forceps in front, then dividing the ascending nasal process transversely at the level of the attachment of the inferior turbinate, across the alveolus, and along the midline to the posterior cut. The posterior transverse incision through the bone is completed last, because haemorrhage from the descending palatine vessels is more severe and because it is more easily controlled when the block of bone has been removed. The window in the palate is closed by a permanent dental obturator made when the wound has healed. The fixation of the obturator is facilitated and the comfort of the patient increased if as much of the heel or tuberosity of the maxilla and of the alveolus of the incisor region is left, consistent, of course, with a complete removal of the growth.

Encouraging Results

At the operation it is often discovered that the tumour is deeper and more extensive than anticipated; on the other hand, cases which seem to be hopeless often do better than expected. The difficulty of early diagnosis and the inaccessibility of ethmoidal carcinoma make complete excision somewhat uncertain; nevertheless we are encouraged by the increasing number of successful cases in recent years. Out of 52 cases of all types of carcinoma Capps (1950) has reported 14 free from disease for five years or more. Three patients with lymphosarcoma all died.

Ohngren records 38 cases of carcinoma out of 104 free from recurrence after two years.

Windeyer and Wilson (1950) had 69 cases between 1925 and 1935; of 97% who were traced 18.8% survived the five-year period. Up to 1943 the percentage of three-year survivals was increasing in spite of the fact that all cases, however advanced, were being treated. The eight cases of sarcoma treated before 1937 did not survive the five-year period. However, operation relieves the patient, and he has the satisfaction of knowing that a determined effort has been made to rid him of the disease with some hope of success. The condition of the inoperable patient is truly a miserable one.

Summary

A brief review of the pathological anatomy of nasal carcinoma is given.

Carcinomata of the nose are divided into two groups—the extranasal and the intranasal.

The extranasal group consists of those growths which rise from areas outside the nose and later involve the nasal cavity. Carcinoma of the alveolus of the maxilla spreads upwards to invade the antrum. Carcinoma of the sphenoid, nasopharynx, and anterior fossa of the skull spreads downwards to the nasal cavity.

The intranasal group consists of growths which arise within the nasal cavity, such as the ethmoidal carcinoma.

The origin and spread of an ethmoid carcinoma is illustrated.

The early symptoms, signs, and diagnosis of these growths are described.

The treatment preferred is radical electrosurgery, and the principles of the operation are given.

I am indebted to Mr. C. P. Wilson and the Ferens Institute of the Middlesex Hospital for the opportunity of seeing a number of cases and specimens; also to Professor R. W. Scarff and Dr. A. C. Thackray, of the Bland-Sutton Institute, who reported on some of the microscope slides.

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A SURVEY OF 647 CASES OF LEUKAEMIA, 1938-51

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In view of the extensive literature on the subject of leukaemia, it is surprising how few reports have dealt with the relative incidence and comparative features of the different types of this disease in recent years. Standard works on haematology in Great Britain—for example, Whitby and Britton (1950)—still quote the survey of the London Hospital records of 1912 to 1927 (Panton and Valentine, 1929) for information on these points. Over the past few years an impression has been forming that in Scotland there has been both an increase in the occurrence of leukaemia and a deviation from the generally accepted incidence of the different varieties. The present report describes an investigation designed to supply information on these points.

Independent surveys have been carried out in two centres, Edinburgh and Aberdeen, of the cases of leukaemia appearing in hospitals over the fourteen-year period 1938 to 1951. The Edinburgh series (E) comprises cases seen in the Edinburgh Royal Infirmary, the Royal Hospital for Sick Children, and the other main hospitals in the Edinburgh area. A large number of these cases have been dealt with by the Regional Centre for Radiotherapy, situated at the Royal Infirmary. The Aberdeen series (A) includes cases seen in the Aberdeen Royal Infirmary, the Woodend General Hospital, and the Royal Hospital for Sick Children, Aberdeen.

It is believed that the combined series includes a very large proportion of the total number of cases of leukaemia occurring in the eastern half of Scotland during the fourteen years under review. Only those cases which were subjected to expert haematological study have been included in the series from both centres, and in a great many instances the data presented were provided by the investigational and diagnostic services of the University

Departments of Medicine in Edinburgh and Aberdeen. Bone-marrow studies have been included in the examination of a large proportion of the cases quoted.

The total number of cases of leukaemia in the combined series was 647, consisting of 440 cases in series E and 207 in series A.

Type Incidence

Cases have been classified, in the generally accepted manner, as lymphatic, myeloid, or monocytic, with further subdivision into acute or chronic forms in the lymphatic and myeloid varieties. No cases of chronic monocytic leukaemia have been encountered.

Table I shows the incidence of the different types in order of frequency for the two separate surveys and for the combined series. Chronic lymphatic leukaemia was clearly the

TABLE I.—*Incidence of Types of Leukaemia*

Type of Leukaemia		Series E	Series A	Combined Series
Chronic lymphatic	No. of cases	132 (30·0%)	75 (36·2%)	207 (31·9%)
	,, aleukaemic	18 (13·6%)	19 (25·3%)	37 (17·9%)
Chronic myeloid	,, of cases	122 (27·7%)	47 (22·7%)	169 (26·1%)
	,, aleukaemic	5 (4·1%)	4 (8·5%)	9 (5·3%)
Acute lymphatic	,, of cases	107 (24·3%)	37 (17·9%)	144 (22·3%)
	,, aleukaemic	31 (28·9%)	24 (64·9%)	55 (38·2%)
Acute myeloid	,, of cases	46 (10·5%)	24 (11·6%)	70 (10·8%)
	,, aleukaemic	12 (26·1%)	10 (41·7%)	22 (31·4%)
Monocytic	,, of cases	33 (7·5%)	24 (11·6%)	57 (8·8%)
	,, aleukaemic	9 (27·3%)	8 (33·3%)	17 (29·8%)
Total No. of cases of all types		440	207	647
,, ,, ,, aleukaemic cases		75 (17·0%)	65 (31·4%)	140 (21·6%)

Note: In each series the number of cases of each type of leukaemia is expressed as a percentage of the total cases of all types in that series, whereas the number of aleukaemic cases is expressed in each instance as a percentage of the number of cases of that particular type.

commonest, accounting for 207 (31.9%) of the total cases; chronic myeloid leukaemia was next in frequency with 169 cases (26.1%); then acute lymphatic leukaemia with 144 cases (22.3%), acute myeloid leukaemia with 70 cases (10.8%), and monocytic leukaemia with 57 cases (8.8%). It should be noted that the same order was found in both surveys.

The incidence of the aleukaemic form of the disease is also shown in Table I. Aleukaemia was defined simply as being present when the total peripheral white-cell count did not exceed 10,000 per c.mm. In the combined series, 140 of the 647 cases were aleukaemic (21.6%). Acute lymphatic leukaemia had the highest proportion of aleukaemia—55 out of a total of 144 cases (38.2%), and the lowest incidence was found in the chronic myeloid variety (5.3%). In acute myeloid and monocytic leukaemia 31.4% and 29.8% respectively were aleukaemic, and in the chronic lymphatic group 17.9% were aleukaemic. In the individual series the incidence of aleukaemia showed the same type variation, though there was throughout a higher incidence of aleukaemic forms in series A than in series E.

Age Incidence

The age incidence of chronic lymphatic leukaemia in the combined series of 207 cases is shown in Fig. 1. The range was from 23 to 84 years of age, while the average was 61.5 years. Series E and A agreed closely, the average ages being 60.3 and 62.5 respectively. The age distribution in the combined total of 169 cases of chronic myeloid leukaemia is shown in Fig. 2. Here the range was from 7 to 80 years of age, while the average was 49.8 years. (The average in series E was 50.1 and in series A 49.1 years.) Fig. 3 shows that the 144 cases of acute lymphatic leukaemia had an average age incidence of 20.4 years, with a range from 2 months to 81 years. (The two surveys gave averages of 19.4 and 23.6 respectively.) The histogram of the 70 cases of acute myeloid leukaemia is shown in Fig. 4. Ages ranged from 14 months to 80 years, and the combined

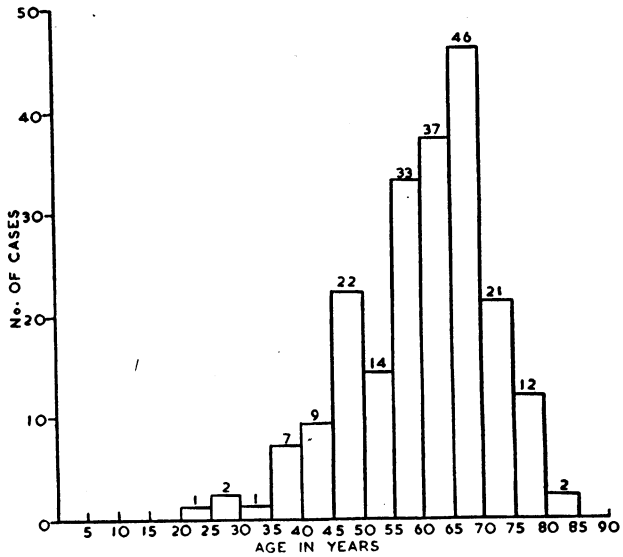

FIG. 1.—Age incidence of 207 cases of chronic lymphatic leukaemia. Range, 23–84 years; average, 61.5 years. Series E, 60.3 years. Series A, 62.5 years.

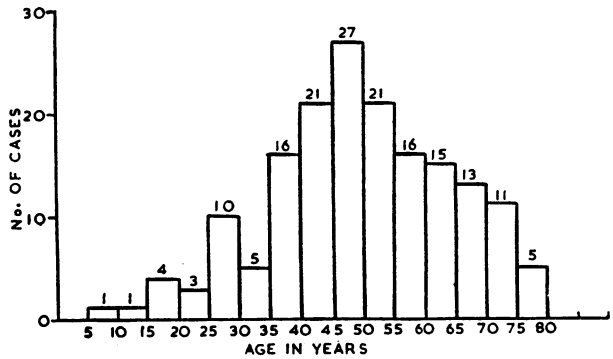

FIG. 2.—Age incidence of 169 cases of chronic myeloid leukaemia. Range, 7–80 years; average, 49.8 years. Series E, 50.1 years. Series A, 49.1 years.

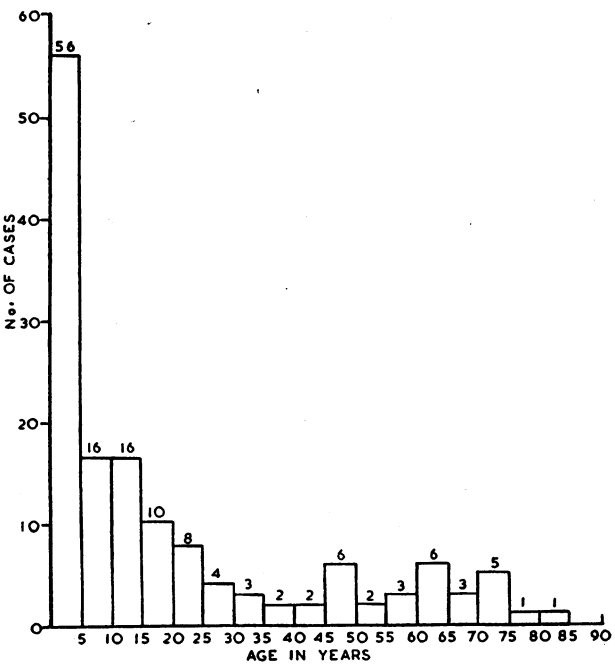

FIG. 3.—Age incidence of 144 cases of acute lymphatic leukaemia. Range, 2 months to 81 years; average, 20.4 years. Series E, 19.4 years. Series A, 23.6 years.

average was 38.9 years. (The separate averages were 37.0 and 42.6 years.) Monocytic leukaemia (57 cases) is similarly illustrated in Fig. 5. The range of ages was from 9 months to 86 years, with an average of 40.0 years (series E 38.8 and series A 41.8 years).

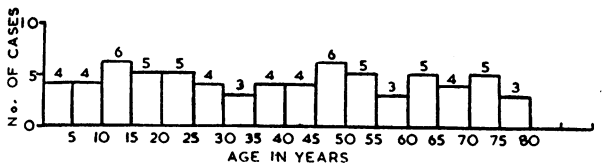

FIG. 4.—Age incidence of 70 cases of acute myeloid leukaemia. Range, 14 months to 80 years; average, 38.9 years. Series E, 37.0 years. Series A, 42.6 years.

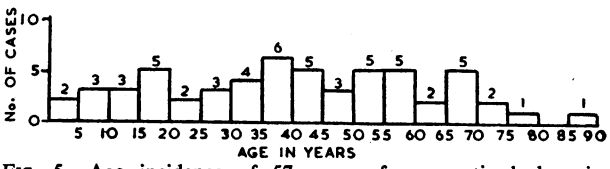

FIG. 5.—Age incidence of 57 cases of monocytic leukaemia. Range, 9 months to 86 years; average, 40.0 years. Series E, 38.8 years. Series A, 41.8 years.

Sex Incidence

The sex incidence in the two surveys and in the combined series is shown in Table II. The aleukaemic cases are also shown. The overall incidence was approximately 7 males

TABLE II.—*Sex Incidence*

Type of Leukaemia		Sex	Series E	Series A	Combined Series	Totals	
Acute	Lymphatic	M	58 (16)	20 (11)	78 (27)	M 142 (46)	M 352 (67)
		F	49 (15)	17 (13)	66 (28)		
	Myeloid	M	22 (5)	12 (5)	34 (10)		
		F	24 (7)	12 (5)	36 (12)	F 129 (48)	
	Monocytic	M	19 (6)	11 (3)	30 (9)		
		F	14 (3)	13 (5)	27 (8)		
Chronic	Lymphatic	M	84 (10)	46 (10)	130 (20)	M 210 (21)	F 295 (73)
		F	48 (8)	29 (9)	77 (17)		
	Myeloid	M	61 (1)	19 (0)	80 (1)	F 166 (25)	
		F	61 (4)	28 (4)	89 (8)		

The figures in parentheses indicate the number of the cases shown which were aleukaemic.

to 6 females (352 to 295). Acute leukaemia occurred in 142 males and 129 females. In chronic leukaemia there was a male predominance of 210 to 166. The only really impressive sex difference, shown in both series, was in the chronic lymphatic variety, where there were 130 males and 77 females. The sex incidence in the aleukaemic cases was remarkably equal except in chronic aleukaemic myeloid leukaemia, in which eight of the nine cases were female.

Haematological Features

The cases in both series were analysed in respect of the principal haematological findings. These conformed entirely to the expected pattern. The average initial leucocyte counts in the cases of frank leukaemia were as follows: chronic myeloid (160 cases), 237,000 per c.mm.; chronic lymphatic (170 cases), 144,000 per c.mm.; acute lymphatic (89 cases), 84,000 per c.mm.; monocytic leukaemia (40 cases), 72,000 per c.mm.; and acute myeloid (48 cases), 61,000 per c.mm. The two separate series were in close agreement on these figures.

Incidence of Leukaemia

In an attempt to determine whether there had been any real increase in the incidence of leukaemia over the period of the survey, the number of cases of all types detected annually was compared with the total number of admissions to the hospitals in which the cases occurred. This was done in both centres. The results are grouped in seven

TABLE III.—*Biennial Incidence of Leukaemia (All Types) in Hospital Admissions*

Period	Series E		Series A		Combined Series		Incidence
	No. of Cases	No. of Hospital Admissions	No. of Cases	No. of Hospital Admissions	No. of Cases	No. of Hospital Admissions	
1938–9	40	65,000	20	29,337	60	94,338	1/1,572
1940–1	51	59,793	20	27,091	71	86,884	1/1,224
1942–3	41	61,676	18	30,164	59	91,840	1/1,557
1944–5	64	62,353	26	32,455	90	94,808	1/1,053
1946–7	72	67,889	25	37,126	97	105,015	1/1,083
1948–9	91	71,865	50	42,406	141	114,271	1/810
1950–1	81	73,887	48	44,067	129	117,954	1/914

biennial periods from 1938 to 1951 in Table III. Sixty cases occurred in 1938–9, and there was an increase to 90 in 1944–5 and to 129 in 1950–1. Both surveys showed a similar trend. When related to total hospital admissions, leukaemia increased from an incidence of 1 in 1,572 in 1938–9 to 1 in 914 in the period 1950–1.

In both surveys the cases occurring in each two-year period were analysed in respect of the type of leukaemia. These results are given in Table IV, which shows a gradual

TABLE IV.—*Biennial Incidence of Different Types of Leukaemia (Combined Series)*

Period	Acute			Chronic	
	Lymphatic	Myeloid	Monocytic	Lymphatic	Myeloid
1938–9 ..	10 (3)	12 (1)	4 (1)	17 (4)	17 (0)
1940–1 ..	17 (5)	7 (1)	2 (1)	27 (4)	20 (1)
1942–3 ..	13 (3)	6 (1)	6 (1)	17 (2)	17 (2)
1944–5 ..	23 (5)	6 (1)	4 (3)	29 (3)	28 (0)
1946–7 ..	15 (6)	13 (4)	9 (1)	30 (6)	30 (1)
1948–9 ..	29 (16)	16 (9)	18 (7)	47 (11)	30 (5)
1950–1 ..	37 (17)	10 (5)	14 (3)	40 (7)	27 (0)

Figures in parentheses indicate number of cases which were aleukaemic.

but distinct increase in all types of leukaemia, especially in the last four years (1948–51). It will be observed that the increase in the chronic forms of leukaemia was approximately twofold, while the acute varieties showed a somewhat greater increase. The incidence of aleukaemic forms showed a corresponding trend, and, with the possible exception of the acute myeloid variety, there is no real indication of a disproportionate increase in this form of the disease. If the cases of acute and chronic lymphatic leukaemia are taken together the increase is about threefold, while the myeloid forms show a much less striking increase.

Discussion

Perhaps the most interesting feature of this study is the discovery that, in both surveys, chronic lymphatic leukaemia was the commonest type of the disease, and that the relative frequency of the different types was approximately 6 chronic lymphatic to 5 chronic myeloid to 4 acute lymphatic to 2 acute myeloid. This represents a considerable departure from the generally accepted statements that chronic myelogenous leukaemia is the most frequently encountered type of the disease, and that the acute myeloid variety is much commoner than the acute lymphatic (Whitby and Britton, 1950; Wintrobe, 1951). The latter views are certainly supported by most previous reports. A number of these, in which the classification used allows of comparison, are shown in Table V.

The unusual predominance of chronic lymphatic leukaemia in the present series is of much interest, and an explanation is not easily found. It is unlikely that there could have been any significant error in the diagnosis of this, the chronic type of lymphatic leukaemia. A geographic variation in the incidence of types of leukaemia is a possible explanation, and it is true that no large-scale survey of leukaemia in Scotland has previously been made. Indeed, the last major series reported in Great Britain was by Panton and Valentine in 1929 at the London Hospital. A more likely explanation, however, is that there has been a progressive increase in the occurrence of chronic lymphatic

TABLE V.—*Incidence of Different Types of Leukaemia in Published Series*

Author	Total No. in Series	Lymphatic		Myeloid		Monocytic
		Chronic	Acute	Chronic	Acute	
Ward (1917) ..	729	11%	—	34%	—	—
Panton and Valentine (1929) ..	172	14%	N.S.	51%	34%	N.S.
Rosenthal and Harris (1935) ..	455	23%	7%	35%	30%	2%
Leavell (1938) ..	478	27%	N.S.	38%	N.S.	N.S.
Wintrobe (1942) ..	163	33%	N.S.	36%	N.S.	N.S.
Bethell (1943) ..	495	44%		48%		8%
Sacks and Seeman (1947)	154	"Almost equal incidence"				N.S.
Present series (1952)	647	32%	22%	26%	11%	9%

N.S. = Not stated.

leukaemia over the past thirty years, and there is some evidence to support this suggestion. It may be observed from Table V that when the various series reported in the literature are arranged in chronological order there seems to have been a progressive increase in the proportion of the chronic lymphatic type. Furthermore, in the present series, when the biennial incidence of the different types is considered (Table IV), there has been a greater increase in lymphatic forms of leukaemia than any other.

With regard to the striking increase in acute lymphatic leukaemia in this series, as compared with previous reports, it must be admitted that the question of accuracy in diagnosis demands serious consideration. The difficulty of distinguishing the various types of acute leukaemia is well known, and there must be an appreciable margin of error. The likelihood of this error being significant is much reduced, however, when it is observed that there was agreement between series E and A on the proportion of the acute lymphatic group and on its placing in order of frequency. The cases in these two separate series were studied and classified by a number of different observers, and any error due to individual bias in interpretation must therefore have been minimized.

It is difficult to establish from the literature the relative frequency of aleukaemic forms of leukaemia. One source of confusion is the lack of any agreement on definition. Forkner (1938) suggested that aleukaemia (sub-leukaemia) could be defined simply as being present when there was no increase in the total number of leucocytes in the blood, and this definition has been adopted in this survey, accepting 10,000 per c.mm. as the upper limit. Rosenthal and Harris (1935) chose a leucocyte count of 15,000 per c.mm. as the dividing level, and of their 455 cases 23.5% were aleukaemic. On the other hand, the criteria adopted by Bethell (1943) were that at least 10% of leucocytes exhibited an abnormality on which the morphological diagnosis was based, and the total count did not exceed 10,000 per c.mm. Of his series of 495 cases 31.9% were aleukaemic. In the present series the overall incidence of aleukaemic forms was 21.6%. In the different types of leukaemia it was clear that there was a much higher incidence of aleukaemia in the acute forms than in the chronic. Approximately one-third of the cases of acute lymphatic, acute myeloid, and monocytic types were aleukaemic. About one-fifth of the chronic lymphatic cases were aleukaemic, and the lowest incidence was found in chronic myeloid leukaemia, in which aleukaemia was a rare phenomenon.

The observations made on the age incidence of leukaemia in the present study agree on the whole with previous observations. Chronic lymphatic leukaemia (Fig. 1) is shown clearly as a disease of later life (Wintrobe and Hasenbush, 1939). Chronic myeloid leukaemia had a maximum incidence in middle life (Fig. 2). It should be noted, however, that occasional cases may be found below the age of 20, as has been pointed out by Eisenberg and Wallerstein (1934), Keith (1945), and Wintrobe (1951). The age incidence in the cases of acute lymphatic leukaemia followed the expected pattern (Fig. 3), with the maximum incidence in childhood. Indeed, 56 of these cases (38.8%) were children under the age of 5, and 98 cases (68.1%) occurred in the first two decades of life. The disease may, however occur at any age, as was indicated by Kirshbaum and Preuss (1943). In the present series acute myeloid leukaemia occurred over a wide range of ages (Fig. 4) and was by no means confined to childhood. This has also been noted by Bethell. Monocytic leukaemia (Fig. 5) showed a very similar age distribution. Warren (1929) found that about two-thirds of a series of 113 cases of acute leukaemia of all types occurred over the age of 25. Similarly, Kaufmann and Lowenstein (1940) found that a series of 40 acute cases (all types) were almost equally distributed in the first four decades, with a declining incidence thereafter up to the age of 75. The present study would suggest that when acute leukaemias are grouped together the wide range of age incidence is mainly due to the cases of acute myelogenous and monocytic leukaemia.

The findings in regard to sex incidence of leukaemia are of some interest (Table II). Overall, males were more often affected in a ratio of 7 to 6. Rosenthal and Harris (1935) and Sacks and Seeman (1947) found a male predominance of 3 to 2. It has been stated that in chronic lymphatic leukaemia males are affected four times as frequently as females (Whitby and Britton, 1950). Ward (1917), Minot and Isaacs (1924), and Leavell (1938) all reported that about 75% of the cases of this form of the disease were male. In the present study males were affected only twice as often as females. A male predominance has also been reported in chronic myeloid leukaemia (Minot, Buckman, and Isaacs, 1924; Hoffman and Craver, 1931; Leavell, 1938). This was not found in the present series, in which the sex incidence in this type of leukaemia was almost equal. Acute lymphatic leukaemia showed in this series a slight male preponderance (7 to 6), which is not nearly so striking as the position in the chronic lymphatic form. The virtually equal sex incidence in the cases of acute myeloid leukaemia in this series is at variance with previous views (Kirshbaum and Preuss, 1943; Whitby and Britton, 1950). Again, no significant difference was found in the sex incidence in monocytic leukaemia. This is contrary to the report of Osgood (1937) that monocytic leukaemia is twice as common in men as in women.

There is very little information in the literature about the sex incidence in the aleukaemic forms of leukaemia. Table II shows that the overall male predominance of the total series was not reflected in the aleukaemic cases, in which there were 73 females to 67 males. It is interesting to note that in the rare cases of chronic aleukaemic myeloid leukaemia females were in a striking majority.

The question of whether leukaemia is becoming more prevalent or not has exercised a number of authors. Rosenthal and Harris (1935) noted an apparently rising annual incidence, but discarded the idea that there was any real increase in the disease. Powell (1940) and Kirshbaum and Preuss (1943) concluded that the apparent increase was due to improvement in diagnosis. Bethell believed, however, that there had been a real and progressive increase, especially in the acute forms of the disease. Sacks and Seeman (1947), in a comprehensive statistical study, calculated that the disease had almost doubled in incidence in the U.S. over the period 1920–40. They also showed that this increase could not be accounted for by changes in the age distribution of the population at large. It is therefore of much interest to find that leukaemia has increased almost twofold among hospital admissions in 1938–51 (Table III). For reasons already stated it is thought unlikely that there has been any great variation in standards of diagnosis over the period of this survey. This is supported by the results in Table IV, which show that the rise in numbers has affected all types of leukaemia and that there has been no disproportionate increase in aleukaemic forms such as might have been expected if improving diagnosis had been leading to more frequent recognition of the disease.

Further support for the belief that there has been a progressive increase in leukaemia in Scotland during recent

years is provided by the figures published in the Annual Reports of the Registrar-General for Scotland, which are available for the years 1938 to 1949 and which are shown in Table VI. This shows that there has been a gradual rise in the number of deaths from leukaemia during twelve of the fourteen years covered by the present study.

TABLE VI.—*Registrar-General's Reports (Scotland), 1938–49. Deaths from Leukaemia, at All Ages and of All Types*

Year	Deaths from Leukaemia	Year	Deaths from Leukaemia
1938	114	1944	149
1939	108	1945	148
1940	105	1946	168
1941	137	1947	162
1942	129	1948	153
1943	150	1949	201

On these grounds it is suggested that there has been a real and progressive increase in all forms of leukaemia in recent years in Scotland, and, in particular, an increased incidence of the lymphatic type of the disease.

Summary

A review of the features of 647 cases of leukaemia is presented.

This series was obtained by two separate surveys carried out in Edinburgh and in Aberdeen of the cases admitted to hospitals in these centres over the period 1938 to 1951.

Contrary to previous reports, the commonest type was chronic lymphatic leukaemia, followed by the chronic myeloid, acute lymphatic, acute myeloid, and monocytic types, in that order. About one-fifth of the total number of cases were aleukaemic. This phenomenon occurred most frequently in the acute forms of the disease and was least common in chronic myeloid leukaemia.

The age incidence of the chronic lymphatic, chronic myeloid, and acute lymphatic types conformed to the previously reported figures, but acute myeloid and monocytic leukaemia showed a much wider range of incidence than is generally quoted.

Males were more often affected than females, in the ratio of 7 to 6. The male predominance was most pronounced in the cases of chronic lymphatic leukaemia, and was less obvious or was absent in the other types.

Evidence is presented which suggests that there has been a twofold increase in the overall incidence of leukaemia over the period of this survey. There seems to have been a particular increase in the lymphatic type, but all forms of the disease have shown a rising incidence.

We would like to thank the members of the staffs of the hospitals in Edinburgh and Aberdeen for their kind permission to study and publish details of cases under their care. In particular, we are indebted to Professor R. McWhirter for records of many cases seen and treated in the Department of Radiotherapy, Edinburgh Royal Infirmary. Much valuable assistance was given by Professor L. S. P. Davidson and Professor H. W. Fullerton and by the haematological laboratories under their charge in the Departments of Medicine, Universities of Edinburgh and Aberdeen respectively.

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EFFECTS OF GLANDULAR FEVER INFECTION IN ACUTE LEUKAEMIA

BY

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Acute leukaemia is one of the most catastrophic diseases in medicine. Affecting chiefly the younger and middle-age groups, appearing without warning, and giving rise to an acute symptomatology which by its diffuseness indicates the generalized nature of the disease, it has hitherto defied all attempts at treatment. Such agents as deep *x*-ray therapy, drugs such as urethane and the nitrogen mustards, which have their place in the treatment of the chronic leukaemias, are worse than useless in the acute condition, in which their depressing action on marrow elements already gravely affected by the acute leukaemic process is often rapidly lethal.

The folic acid antagonists, of which aminopterin is an example, have been tried and, after the hopes aroused by early reports, have proved most disappointing. The short periods of partial remission which they have certainly produced in a small proportion of cases have been dearly paid for in toxic reactions which in their unpleasant features are excelled only by the acute leukaemic process itself. Blood transfusion in acute leukaemia is of doubtful value and seldom produces more than the most transient improvement. Substitution transfusion had a short vogue, but has nothing to recommend it; it can do nothing that simple transfusion will not also do. Simple transfusion, preferably with fresh blood, is very often performed in acute leukaemia, if only in order to do something. Opinions regarding its value vary. Whitby and Britton (1950) quote Dreyfus, who in reviewing the literature on remissions of acute leukaemia concluded that when such are recorded they have almost always followed the transfusion of blood or plasma. However, this may well be explained by the fact that such a high proportion of all cases of acute leukaemia do, sooner or later, receive transfusions. Wintrobe (1946), on the other hand, considers that, because of the disturbance to the patient and the temporary character of the effect produced, blood transfusion has little justification in acute leukaemia. My view is that, in the absence of distressing symptoms from granulocytopenia or thrombocytopenia, it is most doubtful whether transfusion in itself is valuable, or even humane.

It has seemed to me that, in the study of acute leukaemia and in the search for some effective line of therapy, insufficient attention has been paid to the spontaneous remissions which do from time to time occur, independent of any treatment, and which may last for a few months. Careful study of conditions under which such remissions occur, and search for agents