Spontaneous vaginal delivery without any intervention occurred in six cases (17.1%), with one stillbirth. Brow presentation was converted manually in nine cases (25.7%), and one early neonatal death occurred after a mid-forceps delivery. Lower-segment caesarean section was performed in 13 cases (37.1%). There was no foetal loss in 12 cases admitted with audible foetal heart sounds.

Maternal mortality and corrected perinatal mortality were 5.7% and 8.5% respectively.

Management of brow presentation has been discussed.

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ABO GROUPS AND RH GENOTYPES IN THE ELDERLY

BY

SHEILAGH MURRAY, M.D.

Director, Regional Transfusion Centre, Newcastle upon Tyne

The following series is reported in the hope that it will contribute something to the present picture about blood groups and disease associations, and perhaps help towards planning further work.

The study was started after a survey of ABO groups and Rh genotypes in paternal grandparents in cases of haemolytic disease of the newborn, a specially selected group of people in whom certain deviations in the proportions of ABO groups and Rh genotypes were expected. The differences which occurred, however, could not all be explained on this score, and it seemed desirable to investigate whether age selection was having an effect. Hence this study of other elderly persons was undertaken; but as certain disease associations with ABO groups had been reported it was decided to compare a group of in-patients in geriatric units with a healthy elderly group.

Material

In all, 633 persons over 64 years of age were tested. Investigations of 497 samples were made between April and July, 1958, and all patients available in the wards at the time of testing were used to form a "geriatric group" representative of the usual diseases of the elderly. The "healthy group" were mainly active members of "Over 60s" clubs, but a few were healthy donors who had been "retired" because they had reached the age of 65 years. An additional 136 persons were tested in July, 1959, to confirm the findings or otherwise, and as the same difference in blood-group proportions was apparent the results have been pooled.

The sex, age ranges, and mean ages were as follows:

Geriatric patients	{ 184 males ..	65-93 years.	Mean age 75.1 years
	{ 168 females ..	65-104 ..	" " 76.4 "
Healthy elderly persons	{ 125 males ..	65-89 ..	" " 71.6 "
	{ 156 females ..	65-82 ..	" " 70.7 "

The geriatric cases were placed rather arbitrarily into broad categories according to the recorded diagnoses, the miscellaneous group comprising all

conditions with fewer than three cases. Table I shows the wide range of illnesses, and the similarity in this respect between the male and female patients.

TABLE I.—Recorded Diagnoses and ABO Groups of 352 "Geriatric Cases"

	Male	Female	O	A	B	AB
Carcinoma	21	16	22	12	3	—
Congestive cardiac failure ..	16	16	17	11	3	1
Anaemia and blood diseases ..	7	12	11	6	2	—
Fractures	4	11	10	4	1	—
Coronary thrombosis	14	9	12	9	2	—
Cerebral thrombosis and hemiplegias ..	19	19	17	14	4	3
Bronchitis, pneumonia, etc. ..	16	8	9	11	2	2
Arteriosclerosis	4	12	10	3	2	1
Pernicious anaemia	—	6	4	2	—	—
Gall-bladder conditions	3	6	5	3	1	—
Arthritis	4	3	1	5	1	—
Diabetes	6	5	5	5	1	—
Haematemesis	7	4	5	4	2	—
Genito-urinary conditions ..	27	4	14	10	6	1
Miscellaneous (including disseminated sclerosis, senility, etc.)	32	36	37	22	6	3
Not recorded	4	1	1	4	—	—
Totals	184	168	180	125	36	11

The Rh genotype tests were performed using the four more common anti-Rh sera, and anti-e where necessary. Certain "expected errors" occur within different Rh genotype groups owing to the absence of anti-d serum, and these are dealt with later. As regards technical errors, identical Rh testing-sera, carefully checked for specificity, were used in the two groups of cases.

Results

ABO Groups

Among the group A and AB individuals the proportion belonging to the subgroup A₂, 22% in the geriatric group and 19% in the healthy group, was as expected. Table II shows the ABO distribution. There are no real differences between females in the geriatric and healthy groups. Among the males, however, there is a decrease in group O and an increase in group A in the healthy group compared with the geriatric group which is significant ($\chi^2_{(1)} = 5.165$, $P < 0.025$).

TABLE II.—*ABO Groups of 633 Persons Over 64 Years of Age*

Group	Geriatric Group						Healthy Group					
	Male			Female			Male			Female		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
O	94	51.1	86	51.2	180	51.1	46	36.8	75	48.1	121	43.1
A	64	34.8	61	36.3	125	35.5	58	46.4	61	39.1	119	42.3
B	22	11.9	14	8.3	36	10.2	14	11.2	15	9.6	29	10.3
AB	4	2.2	7	4.2	11	3.1	7	5.6	5	3.2	12	4.3

It is noted that the A/O ratio in the healthy elderly men, 46/37, is reversed compared with the healthy elderly females, 39/48, and with both the males and females in the geriatric group, 35/51, 36/51.

A certain validity is given to these ABO differences by comparing (Table III) the overall ABO proportions in the elderly persons with the group frequencies found in 1,482 new donors in Newcastle City tested over approximately the same period, and with the percentage figures from a large-scale survey of donors in this region by Fraser Roberts (1953). Agreement is close, and there is obviously no significant difference between the donor figures reported by Fraser Roberts and the overall ABO proportions among the elderly persons. However, when the same donor figures are compared (O v. A) with the healthy elderly males, the latter group again shows a significant increase in group A ($\chi^2_{(1)} = 6.005$, $P < 0.025$).

TABLE III.—*ABO Groups Percentage in Donors and Elderly People*

	Group				No. Tested
	O	A	B	AB	
Elderly persons	47.6	38.5	10.3	3.6	633
New donors, Newcastle City	50.4	36.7	9.7	3.2	1,482
Donors (Fraser Roberts, 1953)	49.5	38.6	9.1	2.8	54,579

Rh Genotypes

The Rh (D) negative proportion—that is, including samples belonging to subgroup Cde/cde or cdE/cde—was 14.8% in the geriatric group and 18.5% in the healthy group. The remaining Rh (D)-positive samples are shown as D/D homozygous or D/d heterozygous in Table IV and, for comparison, random proportions are shown taken from Race and Sanger (1954. Pooled results).

There is very close agreement between the overall proportions of homozygotes and heterozygotes among all the elderly persons and the random proportions. There is, however, a highly significant difference between the healthy and geriatric groups showing as a deficiency of heterozygotes D/d and an increased proportion of

homozygotes D/D among the healthy elderly persons ($\chi^2_{(1)} = 9.259$, $P < 0.005$). Again this is most apparent among the healthy elderly males ($\chi^2_{(1)} = 6.621$, $P < 0.025$), although the difference between males and females in this respect is not significant (interaction in Table IV), the latter showing the same trend.

TABLE IV.—*Proportion of D/D and D/d Among 528 Persons Over 64 Years of Age*

		Homozygote		Heterozygote		Total
		No.	%	No.	%	
Geriatric	Male ..	56	36.4	98	63.6	154
	Female ..	51	35.2	94	64.8	145
	Total	107	35.8	192	64.2	299*
Healthy	Male ..	55	53.4	48	46.6	103
	Female ..	58	46.0	68	54.0	126
	Total	113	49.3	116	50.7	229
All elderly persons: Grand total ..		220	41.7	308	58.3	528
Random ..		626	42.1	861	57.9	1,487

$\chi^2_{(1)}$ Male v. female 0.30, not significant
 $\chi^2_{(1)}$ Healthy v. geriatric 9.78, $P < 0.005$.
 $\chi^2_{(1)}$ Interaction (by difference) 2.03, not significant

* One R_2^2 excluded, not tested with anti-e. 12.11

Once more there is a reversal of a ratio among the healthy elderly men: D/D homozygote to D/d heterozygote, 53:47, compared with healthy elderly women, 46:54, and with male and female geriatric cases, 36:64 and 35:65 respectively.

As seen in Table V the increase in D/D homozygotes in the healthy male group was mainly caused by an increase in the number in the subgroup R_1R_2 , the proportion of which was 26.2%. The random proportions taken from Race and Sanger (1954) are also shown.

When anti-e serum is used, as in this series, the largest error involved when the most probable genotype in any reaction group is guessed is reduced from approximately 20% to 6%. This means that in a random sample approximately 12% of those thought to be heterozygous D/d might be homozygous D/D, and in approximately 14% the guess is wrong in the reverse direction. Thus, having regard only to the number in the two groups of cases, one or two in the geriatric group shown as homozygous might be heterozygous, but this would not alter the findings. However, there are more homozygotes in the healthy group and more heterozygotes in the geriatric group. Thus, although there is no way of showing either whether the "errors" occur as in unselected persons, or whether the "errors" are the

TABLE V.—*Rh Genotype Results of 633 Persons Over 64 Years of Age*

		R_2R_2	R_1R_2	R_1R_1	R_0r	R_2r	R_1r	Others	d/d	Total
Geriatric cases	Male {No.	1	25	30	2	27	69	1*	29†	184
	{%	0.6	16.1	19.4	1.3	17.4	44.5	0.6	(15.8)	
	Female {No.	3	25	23	1	19	74	—	23‡	168
	{%	2.1	17.2	15.9	0.7	13.1	51.0	—	(13.7)	
Total {No.		4	50	53	3	46	143	1	52	352
{%		1.3	16.7	17.7	1.0	15.3	47.7	0.3	(14.8)	
Healthy group	Male {No.	1	27	26	2	10	36	1 R_1R_2	22§	125
	{%	1.0	26.2	25.2	1.9	9.7	35.0	1.0	(17.6)	
	Female {No.	3	26	29	3	11	54	—	30	156
	{%	2.4	20.6	23.0	2.4	8.7	42.9	—	(19.2)	
Total {No.		4	53	55	5	21	90	1	52	281
{%		1.7	23.1	24.0	2.2	9.2	39.3	0.4	(18.5)	
Random {No.		38	257	327	39	216	606	4 R_1R_2	311¶	1,798
{%		2.6	17.3	22.0	2.6	14.5	40.8	0.3	(17.3)	

Percentages are of Rh (D) positive, except those in parentheses, which are overall Rh (D)-negative proportions.

* Not tested with anti- R_2 . † Includes 1 $R'r$ and 1 $R'r$. ‡ Includes 1 $R'r$. § Includes 1 $R'r$. || Includes 1 $R'R'$. ¶ Includes 17 $R'r$ and 13 $R'r$.

same in the two groups, it could be that one homozygote in the healthy group, but up to four heterozygotes in the geriatric group, are wrong guesses. This would somewhat reduce the significance of the findings.

Discussion

A slight but significant sex difference in ABO blood-group frequencies was recognized in 1943 when Fisher and Fraser Roberts, in a very large series, found the proportion of group A in men to be higher than in women, and that more of the latter were group O. This is very apparent in the healthy group in this series of elderly people but not in the geriatric group.

Age stratification of ABO blood group frequencies has also been looked for extensively (Fraser Roberts, 1948) and not found, but the author stated that the evidence covered adequately only donor ages approximately 18–60 years.

Aird *et al.* (1953) reported that carcinoma of the stomach is more common among group A individuals, and the evidence has been stated to be overwhelming (Fraser Roberts, 1959). Manuila (1958), however, thinks that the evidence for or against this association is not conclusive. The difference in group A proportions reported by Aird *et al.* between the gastric carcinoma cases and the hospital controls for Newcastle was less than the difference between the geriatric and healthy group in this series. Unfortunately their cases were not subdivided for age, although in a later report (Aird *et al.*, 1954) group frequencies by sex were given for some of the patients with carcinoma of the stomach drawn from a number of hospitals (locality unspecified). The authors noted that their figures did not exclude the possibility that the whole of the excess of group A in cancer of the stomach occurs in men, but thought this unlikely. In this report also it was noted that the gastric ulcer cases, which were drawn from three regions—London, Manchester, and Newcastle—showed that in both sexes the patients of group A were older than the patients of group O.

It is of interest also that in a series of 119 cases of gastric carcinoma (Jennings *et al.*, 1956) an association between group A and carcinoma of the pyloric end of the stomach was found, but only in men. And, again, in a study of blood groups in diabetes mellitus McConnell *et al.* (1956) found an excess of group A in diabetic men but not women.

In the present series the division is a simple one. One group was made up of in-patients in hospital, at least temporarily bedridden; the other of elderly people healthy enough to be active and ambulant. The significant change in the ABO groups—an increased proportion of group A—is localized to the healthy elderly male group. The series is reported in the hope that further work may elucidate whether it is mainly a northern phenomenon, and perhaps associated with the higher incidence of carcinoma of the stomach in the north, or whether some other selection is resulting in group A being more frequent among elderly people, and giving the appearance of carcinoma of the stomach, a disease of the elderly, being more frequent in group A persons.

So far as the Rh genotype differences are concerned, the heterozygote D/d, as in haemolytic disease of the newborn, again appears to be at a disadvantage, although among the homozygotes D/D in the healthy group it is the proportion of the "mixed" R_1R_2 which was most raised.

Summary

The ABO groups and Rh genotypes are reported on 633 persons over 64 years of age. These are divided into in-patients in geriatric units covering a wide range of illnesses, and a healthy elderly group. Significant differences in ABO distribution, showing as an increased proportion of group A, occurred in the healthy elderly male group. A significant increase in the proportion of homozygotes D/D among the healthy group is reported, most apparent among the males.

It is hoped that this series will help towards planning future work.

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Preliminary Communications

A New Chromosome Abnormality in Chronic Granulocytic Leukaemia

The presence of an abnormally small acrocentric chromosome (Ph¹ chromosome) has been described as a constant feature in the leucocytes of a high proportion of patients with chronic granulocytic leukaemia (Nowell and Hungerford, 1960a, 1960b; Baikie *et al.*, 1960; Tough *et al.*, 1961). We have confirmed this finding in four consecutive cases of chronic granulocytic leukaemia. In addition we now report a new abnormality occurring in one of these four patients. The leucocytes of this individual show a replacement of two of the smallest acrocentrics by abnormal chromosomes, one of which corresponds to the Ph¹, whereas the other is a minute fragment. The two abnormal structures are present either singly or in combination in the majority of the cells which have been analysed.

CASE REPORT

The patient, a man aged 34, was first diagnosed in August, 1954, as suffering from chronic granulocytic leukaemia. He was treated with splenic x-irradiation, ³²P, and busulphan, the disease remaining in good remission until March, 1961, when it entered an acute phase. After the administration of 6-mercaptopurine and prednisone a further remission occurred. Whereas in March, 1961, the marrow contained a high proportion of blast cells, which were also present in the blood, both marrow and blood showed a practically normal composition in June, and this remission has continued to date.