The leukaemias included 512 lymphatic leukaemias and 511 other leukaemias (so-called M series).

X-ray exposures which only involved the extremities (head and limbs) were reported more often by controls than cases, the control excess being confined to diagnostic radiographs which were taken more than 10 years before the closing dates (onset of symptoms or equivalent date for controls).

X-ray exposures which involved the trunk (chest and abdomen) were reported more often by M series leukaemias than other subjects, the excess for diagnostic x rays being confined to exposures which took place within eight years of the closing dates.

The difference between M series leukaemias and other subjects in respect of trunk x-ray exposures was greater for therapeutic than diagnostic exposures. For the latter type of exposure there was a peak incidence for M series leukaemias three to five years before the onset of symptoms (with no corresponding increase in the incidence of illnesses).

It was finally concluded that about 8% of leukaemias other than lymphatic leukaemias were caused by diagnostic x rays, and a further 3.6% by therapeutic x rays.

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"The design of an indicator is often—indeed usually—thought to be the business of the engineer, perhaps aided by someone—an artist or a 'stylist'—who adds an aesthetic touch, a twiddly bit, a strip of chromium, a dash of paint, or better still several dashes in clashing colours, of which a bilious yellow will be one. But in this problem of indicator design, machine and man meet in a relationship, for example, in the aircraft cockpit which must be regarded by engineer and human biologist together. Anatomy, physiology and psychology all come in to form what is sometimes known as human engineering, which means humanizing the machine, but not mechanizing the human. This attitude was present in embryo before the last war, during which it received considerable support from the armed Forces, and to-day they still possess permanent committee machinery for bringing together the engineering and biological points of view. Unfortunately, industry in general has been slower to grasp the importance of this relationship." (Bulletin of the North of England Industrial Health Advisory Service, March, 1962.)

MANAGEMENT OF ACUTE GASTRO-INTESTINAL BLEEDING MEASURING FAECAL BLOOD LOSS WITH ^{51}Cr

BY

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The validity of measuring faecal blood loss quantitatively by means of radioactive chromium is now generally accepted, and the method has been used in cases of chronic gastro-intestinal bleeding; the use of this method in acute gastro-intestinal bleeding has not been as extensively reported.

The premises which must be accepted are, firstly, that the greater part of the radioactivity in the gut must be excreted and not reabsorbed. This has been amply proved by Owen, Bollman, and Grindlay (1954), Roche, Perez-Gimenez, Layrisse, and di Prisco (1957), Ebaugh, Clemens, Rodnan, and Peterson (1958), and was confirmed when in two instances we introduced labelled red cells direct into the stomach and recovered all the activity in the faeces. Secondly, it must be assumed that only a small amount of ^{51}Cr which has been injected intravenously is found in the gut of normal subjects; published findings range up to the equivalent of about 1.3 ml. of whole blood excreted in the faeces per day (Roche *et al.*, 1957; Ebaugh *et al.*, 1958; Hughes Jones, 1958; Levin, Hart, and Bothwell, 1959; Cameron, 1960). As will be shown, this is generally less than the lowest activity measurable with our apparatus.

Most studies have been carried out on patients in whom chronic gastro-intestinal blood loss has been suspected, such as cases of hookworm disease (Roche *et al.* 1957), various other indolent gastro-intestinal lesions (Bannerman, 1957; Ebaugh *et al.*, 1958; Owen *et al.*, 1954; Hughes Jones, 1958; Levin *et al.*, 1959), and with ingestion of salicylates, steroids, and phenylbutazone (Scott, Porter, Lewis, and Dixon, 1961). From these papers there seems little doubt that the quantitative measurement of blood loss in the stools by the radiochromium method may be of value in managing and diagnosing cases of chronic anaemia.

Bannerman (1957) in a small series of cases suggested that the site of bleeding might be estimated by this method; Ebaugh *et al.* (1958) claim to have sited the bleeding by intubation in eight out of nine cases, and Levin *et al.* (1959) suggest that the use of gut markers may help in siting the bleeding-point.

Tudhope (1958) carried out a careful analysis of 30 patients with acute gastro-intestinal bleeding, using ^{51}Cr ; he placed emphasis on red-cell survival and volume measurements, but in some cases he measured faecal blood loss as well.

It is the purpose of this paper to evaluate the use of measuring faecal blood loss by means of radioactive chromium in the management and assessment of cases of acute gastro-intestinal bleeding. This work was carried out in a busy acute medical unit where prolonged studies were not practicable. Our object was to compare

the clinical impressions with the quantitative results in order to discover whether better management of the patient could be obtained.

Selection of Cases

Twenty cases were investigated. The criteria were a history of acute blood loss by either haematemesis or melaena at admission; in most cases the blood loss was witnessed either by the general practitioner or by us, and 19 had melaena stools on rectal examination. There was one in whom a history of collapse and anaemia, together with gastro-intestinal symptoms, was thought to be sufficient. The fact that the 20 cases represented only a small fraction of the total number admitted during the period of our study was brought about solely by restriction of time and beds. Our investigations were carried out at varying intervals after the acute bleed, as will be indicated, and the figures obtained were not allowed to influence the clinical management of the patients at the time, but have been analysed in retrospect. The patients form part of a larger number investigated mainly for chronic blood loss and not recorded here.

Method

Red cells from 20 ml. of the patient's blood were labelled with 100 microcuries of ^{51}Cr by a well-established method (Mollison and Veall, 1955; Veall and Vetter, 1958; p. 227). After labelling, the cells were washed twice, resuspended in saline and reinjected into the patients. No attempt was made to inject an accurately known amount, since the red-cell volume was not of interest in this series.

Blood samples were taken from the patient 10 minutes, one day, and four days after injection, and thereafter at intervals of a few days as long as stools were being collected. Each sample was measured for haematocrit value in a Wintrobe tube, and the bulk of the sample was lysed with saponin prior to measurement of its radioactivity. The observed haematocrit reading was corrected for trapped plasma according to the data of Chaplin and Mollison (1952). The activity of each sample was compared with that of a standard solution made by diluting 1 ml. of the injected suspension to 100 ml. with distilled water, adding 1 ml. of inactive 10% potassium chromate solution as carrier. The carrier was found necessary to give reproducible results. Samples were counted with a scintillation counter, initially using up to 10 ml. in flat-bottomed polythene tubes placed on the crystal container of a counter having a cylindrical thallium-activated sodium iodide crystal. More recently, samples of up to 3 ml. were counted in small polythene phials in a well-type scintillation counter.

Stools were either passed direct into a screw-capped waxed carton on a commode, or into a plastic bag placed in a bedpan, which was then transferred to a carton. The activity of each was compared with that of 50 ml. of the standard solution diluted to 100 ml. with tap-water in a similar carton, using a ring of six G26Pb counters in a lead-shielded housing (Veall and Vetter, 1952). In order to assess the effect of homogenizing on the count rate, six stools were counted before and after homogenization with tap-water (volume 170–300 ml.). The counting rates were the same within the experimental error, and therefore the standard solution was assumed to be directly comparable with normal stools.

To calculate the volume of red cells in the stools, the ratio of the activities per unit volume of red cells and standard solution was plotted against time, and from the resulting curve the volume of red cells equivalent to 50 ml. of the standard solution on any day could be determined.

The background of the stool counter is about 10 counts per second, and, counting sample and background to a total of 10,000 counts each, a rate of 0.4 count per second was accepted as the smallest counting-rate measurable in a sample. With the technique described, this corresponded to between 0.3 and 1.6 ml. of red cells, depending on the red-cell volume of the patient and the period of stool collection. This is an acceptable lower limit which excludes the level of activity found in the stools of normal people by other workers using this technique.

The activity in the stools was interpreted in terms of red-cell volume rather than whole-blood volume because no assumption need then be made about the relation of the observed venous haematocrit to the whole-body haematocrit reading.

Occult blood tests were carried out by a modified orthotolidine method.

Results

The results of the investigation are summarized in the accompanying Table. The first three columns give the age and sex of the patient together with the clinical diagnosis made. Most of the diagnoses were definite, but where there was a doubt a question mark is inserted (Cases 2, 12, 13, 16). Day one in the Table is within 24 hours of the bleeding episode, and thus the haemoglobin figures for that day will be largely inaccurate.

Eight of the 20 cases (1–8) bled significantly while in hospital. The remaining 12 did not show an appreciable amount of radioactivity in their stools. It should be noted that red cells in the stools usually arrived at least 24–48 hours after the injection of chromium in those cases with a lesion in the stomach or duodenum—even in Case 2, who had a small haematemesis on the day the chromium was injected. Case 6 bled slightly throughout the collection, and the small quantity of blood in the first stool specimen was probably due to bleeding piles, which could be seen on proctoscopy. Two cases (5 and 7) had a severe bleed which was quite obvious clinically. In Case 5 the red-cell content of the stools merely confirmed the clinical impression that gastrectomy was needed. Case 7 bled so severely that an emergency operation had to be carried out: collection of the stools at this time was not practicable and would have contributed nothing to the management of this case. Case 13 is of interest as gastro-intestinal bleeding was suspected, and he was admitted as a case of melaena; collapse occurred on the day the chromium was injected; as the patient was extremely pale and shocked he was treated by transfusion as a severe case of gastro-intestinal bleeding. The E.C.G. showed cardiac ischaemia, which on account of his age was understandable. However, no red cells could be found in his stools, and the E.C.G. subsequently revealed definite changes of posterior cardiac infarction.

The chromium was injected at varying times from the acute episode of bleeding, and was given in the first 48 hours in nine patients, from two to seven days in six patients, from eight to fourteen days in three patients,

No. and Sex	Age	Diagnosis	Date of Bleed	Days after Bleed													
				1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 M	66	Melaena. Chronic D.U. Diverticulitis	10.5.61	(102) Cr 0	(86) Cr 0	(90) 22	17	(94) 22	(88) 0	(84) 0	(74) 0	5.5 O.B. +	(80) 0 O.B. +	(86) 0	(78) 0	(72) 2.7	(76) 0
2 M	58	Haematemesis. ? Acute erosion of stomach	21.5.60	(71)	(59)	(45)		(49) Cr H	0	(40) 0 O.B. +++	51 O.B. +++	(47) 98 O.B. +++	18	(48) 3.3	1.0	(48) 0	0
3 M	74	Haematemesis. Melaena. Hiatus hernia	17.2.61	(76) Cr 0	(68) 0	0	(68) 1.8	(68) 0	(66) 0	(64) 0	(68) 1.0	(70) 10	0	(73) 1.5	(66) 0.9	(64) 0	(66) O.B.±
4 M	58	Haematemesis. Chronic D.U.	27.5.61	(74) Cr 0	0	(67) 0	(69) 0	(63) 3.3	(66) 4.4	(69) 7.2	(71) 4.1	19 O.B. -	(71) 5.1	(67)			
5 M	63	Melaena. Chronic G.U.	19.1.61	(53)	(48) Cr 0	(46) 4.5	(46) 5.0	(57) 105 T	(46) 38	(41) 283	(75) 108 T.G.	(68)		(77)	(74)	(74)	(74)
6 M	56	Melaena. Portal Hypertension. Thrombocyto- sis. Haemor- rhoids	21.7.61	(34)		(37) O.B. +++	O.B. +++	(39) T	(38)	(39) Cr 1.8	(42) 1.7		(44) 3.4	(49) 5.2 T	7.1	(46)	(42) T
7 F	78	Melaena. Chronic G.U.	8.6.61	(60) Cr 0	(40) ? T.G.												
8 M	55	Melaena. Acute gastric ulcer	24.8.61	(72) Cr 0	(73) 5.7	(67) 4.5	28.1	(68) 49.5 O.B. +++	(68) 2.6	(66) 0	(68) 0	(66) 0	(73) 0		(79)	(79) O.B. ±	(78)
9 F	73	Haematemesis. Chronic D.U.	2.4.60	(56)		O.B. +++	O.B. +++	O.B. +++	Cr 0	(66) 0	0	0	0	(67)		(71)	
10 M	53	Haematemesis. Chronic D.U.	7.4.60	(80)	(60)	(51)	(50)	(51)	(53)	(50)	(52) Cr 0	(54) 0	0	0	(51) 0	0	(57) 0
11 M	68	Melaena. Hiatus hernia	18.3.60	(73)		(62)				(60) Cr 0	0 O.B. +++	0 O.B. ++	0 O.B. ±	(70) 0	0.8	0	
12 F	35	Haematemesis. ? chronic D.U. Chronic iron deficiency anaemia	25.6.60	(78)		(70)			(58)	(62)	(63)		(60)	(61)	(57)	(68) O.B. +++	(61) O.B. +++
13 M	81	?Melaena. Anaemia (M.C.V. 110). Cardiac infarct	11.12.59	(43) Cr 0	0 T	T	(68)										
14 M	61	Melaena. Haematemesis. Anticoagu- lants for arter- ial thrombosis	15.9.60	(72)	(72) Cr 0	(67) 0	(81) 0 O.B. Neg.	0	0	(85)							
15 M	68	Haematemesis. Chronic G.U. Bronchitis	3.3.60	(36)			(50)	(57)	(53)		(58) Cr 0	0	0	0	(67) 0	0 O.B. +++	0 O.B. +++
16 M	51	Melaena. ? Gastric ulceration	19.11.60	(73)		(66)	(68)	(64)	(50)	(54)		(63)	(55)	(60)	(55)	(53) Cr 0 O.B. ++	(53) 0
17 F	71	Haematemesis. Hiatus hernia	22.12.59	(71)		(78)	(68)		(76)	(72)			O.B. +	O.B. +		(68)	
18 F	20	Melaena. Chronic D.U.	28.10.60	(44)		(53)	(48) T	(58)	(53)	Cr 0	(57) 0 O.B. +	(57) 0	0			(62)	(62)
19 M	70	Haematemesis. Chronic D.U. Hiatus hernia	8.10.59	(81) O.B. +++	(76) O.B. ++	(72)	(74)	Cr 0	0	0	0	0	(81)				
20 M		Melaena. Chronic D.U.	2.9.61	(84) Cr 0	0	(72) 0	(78) 0	(72) O.B. -	(76)								

Cr = Day chromium given. (100) = Haemoglobin %. 0 = ml. of red blood cells lost in faeces measured by radioactivity. O.B. ± = Occult-blood readings. T = Transfusion. G = Gastrectomy. H or M = Further haematemesis, etc.

Days after Bleed—continued																	Clinical Impression	No. and Sex
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
																	Slow improvement	1 M
0	0	(59)		(57)		(68)		(61)				(75)					Haematemesis 5th day Slow improvement	2 M
(74)	(72)		(74)														Improvement	3 M
																	Improvement	4 M
																	Slow worsening. Sudden bleed 8th day. B.P. 90/0. Gastrectomy 8th day	5 M
(48)			(48)		(48)												Has chronic anaemia with bouts of mel- aena. Also red blood in stools from haemorrhoids	6 M
																	Collapsed 2nd day. B.P. 70/0. Operation be- fore collection made	7 F
																	Improvement	8 M
																	Improvement	9 F
0	0	(59) 0		G													No improvement. B.P. cont 100/60-110/70. Gastrectomy 19th day	10 M
																	Improvement	11 M
(60) O.B. +++		(58)	(62)	(55)	Cr 0.3	(62) 0	(61) 0 O.B. ±	0 O.B. Neg.		(57)	(58)	(62)	(62)	(62)	(61)		Very slow improvement Probably chronic iron deficiency. Anaemia. Menorrhagia	12 F
																	Collapsed. Very pale. B.P. 50/0. No blood in stools. E.C.G.— Post. C.I.	13 M
																	Given vitamin K ₁ Rapid improvement	14 M
(69) 0 O.B. ++	0	0	(76) 0														Improvement	15 M
0	(62) 0	(71) 0		(62)	(68)		(68)			(78)	(76)						Slow improvement	16 M
	O.B. +++	(63) Cr 0	0	(63) 0	0	0	(74) 0	(71)					(70)				Laparotomy 1 week later. Very slow im- provement. H hernia not diagnosed clini- cally. Laparotomy	17 F
(72)	(75)		(77)	(81)	(83)												Slow improvement	18 F
																	Improvement	19 M
																	Quick improvement	20 M

Cr=Day chromium given. (100)=Haemoglobin %, 0=ml. of red blood cells lost in faeces measured by radioactivity. O.B.±=Occult-blood readings
T=Transfusion. G=Gastrectomy. H or M=Further haematemesis, etc.

and from fifteen to twenty-one days in two patients. A delayed test did not seem to influence the results significantly in this small series. Thus eight patients injected during the first week did not bleed significantly during that time; and neither of the two patients injected in the third week was bleeding. Case 2 almost certainly bled on the second and third days of admission although the chromium was not injected until the fifth day. This may well account for the discrepancy between occult-blood tests and radioactivity measurement on the seventh day.

The occult-blood tests have been included in the Table in most cases, and + + + represents a strongly positive reaction down to "neg.," representing nil. On the whole these tests bore out the radioactive findings except in Case 2 (as mentioned); in Case 4, where red cells were found in the stools with a negative occult-blood test; and in Case 15, where the reverse was true.

The haemoglobin values have been given as a percentage in the Table, not because we regard this measurement as an accurate or absolute one when measuring bleeding, but because it was useful to notice the trend in the haemoglobin figures during the patients' stay in hospital. Case 10 remained anaemic but did not appear to bleed into his gut. Gastrectomy was recommended because of his long history of indigestion, the grossly deformed duodenum, and the failure to recover well from a bleeding episode.

The last column in the Table gives some idea of the clinical impression we gained, though in ignorance of the results of the radioactivity in the stools.

The length of time of collection of stools varied from three to fourteen days.

Discussion

The method used was the generally accepted one in which stools were collected in plastic bags or in screw-topped cartons in a commode. The former method was used with ill patients, and was found ideal for collections starting in the first 24 hours. Collections were carried out for only a short length of time, and, in spite of the fact that bleeding may be intermittent and be separated by several days, we were therefore able to keep the investigation within the limits of a clinical application. Few drawbacks were experienced, but the difficulty in separating urine and faeces in some women made the possibility of error a real hazard in female patients, as radioactive chromium is largely excreted in the urine in normal subjects. We would envisage difficulties from this point of view if this measurement were used routinely.

Calculation of the volume of red cells in a stool from its observed radioactivity requires a knowledge or assumption of the time of transit of the blood through the gut. In experiments previous to this trial, 15–20 ml. of labelled blood introduced through a stomach-tube into two patients took a mean time of 32 hours to reach the passed stool. This figure was subsequently taken as the mean transit time, unless radioactivity appeared in the stools less than 32 hours after injection, in which event this shorter time was used. Previous workers have made a variety of similar assumptions; but, whatever convention is used, the error is not likely to be great, since the red-cell activity of a patient with a normal red-cell survival curve decreases by only 2–3% per day (Veall and Vetter, 1958, p. 246).

The transit time in the gut is a problem in the siting of the bleeding, because the appearance of the labelled blood in the stools gives no indication of when the bleeding has occurred. It is our impression that sudden large bleeds may well lead to the immediate appearance of blood in a loose stool, the patient even being incontinent, whereas small amounts of blood may not reach the stools until any time between one to four days, depending on the motility of the intestine; unfortunately, the very presence of blood in the gut may bring about decreased motility, and the use of barium, antispasmodics, and occasionally morphine will tend to delay gut-transit time further.

In view of this difficulty we cannot agree with Levin *et al.* (1959) that an oral carmine marker will give information about the transit time of blood in the gut accurate enough to site the bleeding; neither do we consider that the absence of radioactivity in the first stool passed after the injection is enough, on the evidence available, to suggest that bleeding is occurring only in the upper part of the gastro-intestinal tract, as both Bannerman's (1957) and our series are too small. In some cases, however, this deduction is feasible, and it is interesting to note that the only one of our cases with labelled red cells in the first stool had haemorrhoids as well as probable bleeding from the oesophageal region.

Bannerman (1957) pointed out discrepancies between labelled-red-cell loss and occult-blood tests carried out by the Gregersen benzidine test modified by Needham and Simpson (1952), and he stated that a bulky stool might in fact be only weakly positive for occult blood but might contain 20 ml. of red cells. It is not the purpose of this paper to compare the two measurements in detail except to record a disparity and to suggest the occult-blood findings should be assessed only in conjunction with the other clinical signs.

In Tudhope's (1958) careful study of 30 patients with acute gastro-intestinal bleeding, accent was put on measurements of red-cell volume and survival by means of ^{51}Cr , and these findings were correlated with physical signs. Among the 18 patients in whom he studied radioactivity in the stools, eight had no significant radioactivity during 14 days; in four slight loss of blood continued, with a total loss over 14 days of 20 ml. of red cells. Five suffered from a further haemorrhage while in hospital; in three of these the blood loss was obvious clinically and radioactively, and in two it was considerable but was manifested clinically by a failure of the haemoglobin to rise. Thus Tudhope suggested that the clinical impression was a good guide when taken in conjunction with measurement of faecal blood loss, although concomitant measurements of the red-cell volume, etc., give valuable information in these cases.

Our results in the matter of faecal blood loss are consistent with those of Tudhope, and tend to suggest that the measurement is not particularly helpful in most cases of acute gastro-intestinal bleeding if estimated without concomitant measurements of red-cell survival and volume. We do not believe, therefore, that there is any advantage in carrying out this investigation in the acute phase of the illness, because at this stage pulse, blood-pressure, and general clinical impression are probably of more help, and the variation in excretion times of labelled blood may entirely mislead the observer. Marked bleeding is more reliably diagnosed clinically. However, in those cases in which clinical improvement fails to occur as expected, and in which

continued occult blood loss is suspected, our impression is that the quantitative measurement of faecal blood may be of use in the management, and we would reserve this technique for such cases.

Summary

The literature associated with measurement of gastro-intestinal blood loss by means of radiochromium is briefly reviewed and the validity of the method mentioned.

Twenty cases of acute gastro-intestinal bleeding were investigated by this method and the results recorded.

The conclusions are that the quantitative measurement of faecal blood loss by this method does not help in the clinical management of most cases of acute blood loss, although the investigation may well be used to exclude continued chronic bleeding if the clinical signs are not improving as expected.

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RENAL DISEASE IN UGANDA

A RETROSPECTIVE STUDY*

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In Uganda, disease of the kidney, like disease of other systems, has a pattern similar to that found in Britain, but more exaggerated in its manifestations and differing in emphasis. A study of renal disease in such a different environment is therefore not without relevance to British medicine.

Davies (1949), extracting 2,994 Mulago Hospital necropsy records for 1931–45, found 301 cases of nephritis, mostly unclassified. Raper (1953), reviewing six years' post-mortem material at Mulago, found 136 cases of nephritis.

This retrospective study, which covers the whole spectrum of renal disease as found in the post-mortem room at Mulago, was made in order to see those aspects of special interest—pyelonephritis, hypertension, and the nephrotic syndrome—in their full context. It is a review of records, and, as such, uses the work of others, notably the staff of the pathology department at Makerere. Little statistical treatment of results has been attempted, for this would be misleading because of ignorance of the number at risk. However, some idea of the relative importance of types of disease will, it is hoped, emerge. In such a study it is difficult to draw definite conclusions, but an attempt has been made to describe the problems, and in some cases to suggest an answer.

Material

Case records of 1,100 Africans dying at Mulago between August, 1959, and November, 1961, were examined for renal pathology. Deaths in the first year of life and cases of accident were excluded. Necropsy is performed on approximately 50% of adult deaths (Shaper and Shaper, 1958). The ratio of males to females in this study was 4 to 1. The chief reason for this is the greater number of men than women admitted to the hospital (5 to 2, Shaper and Shaper, 1958). Conclusions other than general on the relative sex incidence of disease are seldom justified.

The records were examined for the macroscopic and microscopical appearance of the kidneys, also for the condition of the urinary tract as a whole, in an effort to determine whether chronic pyelonephritis was associated with obstruction to the flow of urine from urethral stricture, prostatic enlargement, etc. The urethra had not been examined routinely, so that it was difficult to exclude minor degrees of stricture, especially as gonococcal infection is so common in Uganda. The bladder and ureter were, however, examined in most cases, and therefore, using bladder hypertrophy or dilatation, hydroureter, and hydronephrosis as indices of urinary obstruction, cases of chronic pyelonephritis have been divided into primary and secondary groups—those unassociated with other lesions of the urinary tract, and those associated with some obstructive lesion. Some types of disease, including chronic pyelonephritis, have been divided into two groups, symptomatic and asymptomatic, the first presenting during life (and causing death) and the second discovered only at necropsy, death being due to other causes. Kidneys with leukaemic infiltration, cellular cloudy swelling, and acute necrosis were classed as "normal" for the purpose of this study.

The condition of the heart and blood-vessels was also noted. Left ventricular hypertrophy was used as an index of hypertension, supported whenever possible by clinical records of the blood-pressure. The condition of the blood-vessels, large and small, was of special interest in cases where hypertension had been present.

The liver pathology was noted in cases of nephrotic syndrome as being relevant to changes possibly associated with protein depletion.

Lastly, the clinical records, where available, were consulted for details of history, clinical examination, and laboratory findings. Urine examination, blood urea,

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