When a large number of estimations are to be made and a glass standard suitable for use in a colorimeter is not available, it is preferable to use a standard of blood of known Hb content similarly treated with acid. The standard made by dilution from a stock 3% solution of acid haematin (Cohen and Smith, 1919) has not been found entirely satisfactory, being usually more turbid than the fluid from a fresh blood, and the turbidity tends to increase with the age of the strong solution. As this is a thick suspension it is unlikely that the state of dispersion of the solution diluted from it would be identical with that of a freshly made suspension. The procedure therefore adopted was to prepare the acid haematin standard by appropriate dilution with N/10 HCl, from ox or human blood whose oxygen capacity had been determined when fresh by the Barcroft method, and which had been stored in the refrigerator, just before starting to draw the series of blood samples. This technique is justified by the observation that the rate of formation of acid haematin was unaffected by the storage of the blood, at any rate up to 2 weeks.

It has been further shown that it is permissible to use ox blood as standard when human blood is under test. Palmer (1918) stated that this was not so; but Cohen and Smith, who studied several species, did not agree with him. An example of our experiments is shown in Table III. It will be seen that

TABLE III.—Comparison between Samples of Ox and Human Blood. Ratios of Haemoglobin Content Calculated (a) from Total Oxygen Capacity, and (b) from Direct Colorimetric Comparison after Conversion to Acid Haematin

Species	g. Hb per 100 ml.	Ratios	
		(a)	(b)
Ox No. 2	12.35	1.00	1.00
" " 3	14.60	1.18	1.22
" " 4	13.00	1.05	1.03
Human No. 1 ..	16.35	1.32	1.36
" " 2 ..	12.20	0.99	1.02
" " 3 ..	10.50	0.85	0.855
" " 5 ..	9.20	0.745	0.72
" " 6 ..	10.40	0.84	0.83
" " 7 ..	11.05	0.895	0.91
Mean of human figures		0.94	0.95

the ratios calculated from oxygen capacity and by comparison after conversion to acid haematin are very similar. The experiments have included "normal" and weaker samples of blood; none have been made in the presence of abnormal pigments—e.g., COHb or MetHb.

Discussion

The disadvantages of the acid haematin method have been summarized by Clegg and King (1942). Wu (1922) showed that the colour obtained depended on the plasma proteins, but concluded that in all normal samples variations in protein and lipid content were insufficient to cause an error. In fact, his figures showed that the amount of plasma could be increased 3 or 4 times above the normal ratio without causing an appreciable change, though there was a 20% deficit in colour when plasma-free Hb was used. His results were obtained with sheep's blood; if applicable to human blood they would suggest that the method can be used accurately over a wide range of anaemic bloods (cf. Table III). Nevertheless Wu favoured the conversion to alkaline haematin because abnormal pigments such as COHb, MetHb, and CyanHb gave a depth of colour in acid up to 15% above that of HbO₂. It does not appear likely, however, that the amounts of these pigments which may be present in human blood would appreciably affect the colour.

Summary

Formation of acid haematin from ox and human whole blood reaches completion at room temperature (14° to 18° C.) in 2 hours; the same depth of colour is obtained in 10 to 15 minutes at 40° to 45° C. The latter procedure is recommended for routine technique, and the permanent standard should be calibrated accordingly.

Heating at 100° C. for 4 to 5 minutes causes an increase of some 25% in colour. Boiling should therefore be avoided.

A standard obtained by dilution from a 3% stock solution of acid haematin was not found satisfactory. An alternative procedure is suggested.

Ox blood can be used as standard when human blood is being assayed.

My thanks are due to Prof. R. J. Brocklehurst for his interest in this work.

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LOCAL APPLICATION OF SULPHANILAMIDE POWDER IN RADIOTHERAPY

BY

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Sepsis presents a constantly recurring problem in radiotherapy, and its prevention or treatment merits the most careful consideration. Descriptions have previously been given of the antiseptic action of certain acridine compounds, and the success of proflavine in radiotherapy has been stressed (Charteris, 1937; Young and Charteris, 1940). In view of the increasing interest in local application of this substance, it is gratifying to find that my early estimate of its efficacy remains unchanged, and that its proper use makes various radiotherapeutic procedures possible and safe. This is especially true as regards superficial ulcerating growths, also tumours in the nose and its accessory sinuses, and in the realm of gynaecology. I have used proflavine oleate 1% in liquid paraffin, and the original preparation has been improved by the addition of enough oleic acid to produce complete solution.

There is a further important field for antiseptics, however, in the form of powder preparations where the parts must be kept dry, and this refers particularly to the after-treatment of patients, in contrast to their preparation and actual irradiation, when proflavine in an oily vehicle is usually excellent. For dry applications sterile sulphanilamide powder was chosen. It has been used in a large number of cases since early in 1942, and proved most satisfactory. There are three main kinds of application.

Methods of Application

The first and most general of these is in the care of unbroken skin undergoing a dry reaction after radiotherapy. If moist desquamation is to be avoided the skin must be protected against friction and pressure, besides being kept clean and dry. For the latter purpose powder dressings are excellent, and not only is sulphanilamide powder suitable in this sense but it also eliminates the risk of chronic pustules forming. A special use is found in the case of reactions about the vulva or anus, or in any place where apposition of the parts makes a more severe reaction likely, apart from any local variation in tissue sensitivity: regularly changed dry applications on gauze will at least limit desquamation in such situations if carried out two or three times in the day, according to circumstances.

Where it has been necessary to subject skin to something approaching maximal irradiation in order to deliver an adequate "tumour dose," moist desquamation is inevitable, and its treatment presents the dual problem of minimizing discomfort and diminishing post-radiational stigmata so far as is possible.

Bland oily dressings of some sort, or even tannic acid preparations, are much used, but I should now prefer dry sulph-anilamide powder from both standpoints. Its direct application is obviously impracticable; but the affected part is first covered with moistened protective gauze tissue, which is allowed to dry in position, and the powder is then dusted on. Dressings can be carried out as often as necessary without disturbing the protective layer, much after the style of some skin-grafting procedures. The outer surface can be gently washed, dabbed dry, and again dusted from time to time, the whole being covered by gamgee and a bandage.

Finally, there is the case of a superficial tumour with ulceration. Where some form of radium therapy is called for, the use of proflavine oleate as described will usually permit treatment to be carried through for at least a week without change of dressings. Sulphanilamide powder becomes useful, however, after irradiation is concluded, both to control sepsis and to limit reaction by keeping the part as dry as possible. Liberal application under a plain dry dressing is excellent, and changes are as a rule only necessary every three or four days, which is a consideration in a busy out-patient clinic. The absence of purulent discharge is often remarkable, in contrast to what is seen with some other forms of antiseptic treatment. When a small unbroken neoplasm is treated its surface will become a temporary ulcer owing to regression even when surrounding normal skin is unaffected by moist reaction, and the powder method is very helpful here. Its adoption immediately after treatment is finished usually results in a clean dry protective scab over the actual lesion, and on the face no dressing may be needed. This scab falls off, leaving a healthy patch of skin with little evidence of what was previously present. At a later stage, when all reaction has died away, any irradiated skin is often somewhat dry; there is no objection then to the use of a simple lubricant like lanolin or vaseline.

It is appreciated that the subject of antiseptics in radiotherapy is a large one, and that many different substances may prove helpful, but these notes are given in the hope that they may be of some practical benefit, since my own experience has led to the regular employment of the methods in my department.

I have pleasure in acknowledging once more Prof. C. H. Browning's helpful suggestions on the use of antiseptics.

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THE RENAL FUNCTION IN MYXOEDEMA

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Means (1937) has stated that, except for albuminuria, the picture of nephritis is absent in myxoedema. Recently we (Beaumont and Robertson, 1943) described a case of pituitary hypothyroidism in which renal impairment was a marked feature, and we suggested that part of these renal signs might be due to the hypothyroidism. In the present paper seven cases of myxoedema have been studied. The findings are given in the accompanying Table. The second series of observations ("after thyroid therapy") were made three months after treatment was instituted, when the basal metabolism was constant on a maintenance dose of thyroid. In determining the basal metabolism the standards of Aub and DuBois (1917) were employed. The urea clearance of Möller, McIntosh, and van Slyke (1928) was confined to the maximum clearance in view of the errors consequent upon low urine output—i.e., all the tests were made during a diuresis. In carrying out the test of water excretion (dilution test) the subject drank a litre of water in a quarter of an hour, and the urine was collected over the next three hours. A series of five normal healthy subjects gave urine outputs of 840, 970, 1,370, 1,000, 920 c.cm.,

with a mean of 1,000 c.cm. The urine concentration test was carried out according to the instructions of Fishberg (1939): a urine concentration of over 1024 is considered normal.

A study of the results in the Table shows that the urea clearance in myxoedema is low and rises significantly after adequate thyroid therapy ($t=6.05$; $P<0.001$). Of the cases of treated myxoedema only one (Case 5) had a urea clearance within the range of Addis's normals (1917), and this was so when she was still myxoedematous. It would appear that, although thyroid medication improves the urea clearance, it remains subnormal.

Table of Findings Before and After Thyroid Therapy

Case	Basal Metabolism		Urea Clearance (per cent. of Normal)		Urine Output (c.cm.) 3 hrs. after Drinking 1,000 c.cm. Water		Highest Specific Gravity Urine	
	Before	After	Before	After	Before	After	Before	After
1	-41	-1	49	85	800	1,230	1025	1021
2	-31	+8	38	56	660	815	1026	1023
3	-32	0	56	71	1,070	970	1026	1012
4	-32	-2	48	56	672	1,094	1025	1018
5	-37	-9	100	118	1,310	1,360	1027	1014
6	-33	-3	50	75	795	1,310	1021	1018
7	-42	+4	56	78	1,330	1,175	1024	1019
Mean	-35	0	57	77	948	1,136	1025	1018

The water excretion is normal in myxoedema, and after treatment with thyroid no significant change occurs ($t=1.98$; $P=0.1$).

Patients with myxoedema are able to concentrate urine as efficiently as normal people. Treatment with thyroid produces a significant change in the ability to concentrate urine ($t=3.55$; $P<0.01$). As these observations were carried out at least six months after treatment was instituted, and when the basal metabolism was steady, the low specific gravity herein reported does not appear to be due to the diuretic action of thyroid, which is a feature when treatment is first begun.

No other evidence of renal impairment was found despite chemical and microscopical examinations of the urine. Albuminuria was not detected in any case.

Summary

The renal function of 7 cases of myxoedema has been studied before and after adequate thyroid therapy.

The urea clearance is diminished and rises after thyroid therapy. The urea clearance in treated myxoedema, however, still remains below normal.

The other tests of renal function, such as the water excretion and urine concentration, were normal.

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Principles for the prescription of quinine in Germany (*Dtsch. Arzteblatt*, Nov. 1, 1942, 72) include the following: (1) Quinine must not be used as a prophylactic against influenza. (2) It is not to be used as an analgesic or tonic. (3) In the treatment of cardiac arrhythmia, and especially auricular fibrillation, quinidine should be used so far as possible in the place of quinine. (4) The use of quinine as an "ecbolic" in midwifery can be continued. (5) So far as is necessary quinine can still be used besides the synthetic remedies for the treatment of malaria. (6) For the treatment of chills and influenza quinine is indispensable. There is no objection to the use of small quinine doses occasionally in influenza, in combination with ascorbic acid. (7) For the treatment of croupous and bronchopneumonia (also whooping-cough) the injectable quinine preparations can be replaced by the sulphonamides. Only, therefore, in isolated cases should bronchopneumonia be treated with quinine—for example, after operations or in whooping-cough. (8) In suppurating bronchitis and bronchiectasis the injectable quinine preparations are almost always replaced by guaiacol preparations or camphor in oil. Nevertheless, injectable quinine preparations can be used in isolated cases. (9) The use of quinine in sepsis, typhoid, and other general infections is now out of date and can be replaced by amidopyrine.