Commentary.

The blood sugar and glucose tolerance investigations in this case are of interest. It is generally agreed that hyperthyroidism and hypersecretion of the anterior pituitary lobe both tend to raise the amount of blood sugar and to decrease sugar tolerance, while, on the other hand, diminished function of the posterior pituitary lobe increases sugar tolerance. It would appear that in this case the combined influence of the thyroid and anterior pituitary lobe on the carbohydrate mechanism has outweighed the effect of diminished posterior pituitary lobe function, with the result that the blood sugar is somewhat raised and glucose tolerance slightly reduced. Similarly with the basal metabolism, the thyroid and anterior pituitary factors tending to increase the rate have to some extent overcome the tendency of the posterior pituitary dysfunction to lower it.

The explanation of the pituitary gland disorder is probably as follows: The increased secretion of the anterior pituitary lobe is of some years' standing and due to a functionally active adenomatous enlargement of this portion of the gland. The effect on skeletal growth is a tendency to "giantism" with mild acromegalic signs (enlarged hands and feet), thus following the rule that hypersecretion of the anterior pituitary lobe occurring before puberty results in giantism with occasional acromegalic features, while hypersecretion developing after puberty leads to true acromegaly. As the pituitary fossa is a closed box roofed over by the diaphragma sellae, and therefore relatively incapable of expansion, the effect of an increase in size of the anterior pituitary lobe is probably to compress the adjacent posterior lobe and thus to interfere with its functional activity. Such an occurrence would account for the indications of posterior lobe deficiency in the case.

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THE UREA CONCENTRATION TEST IN NEPHRITIS AND ITS PROGNOSTIC VALUE.

BY

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This paper does not aim at entering into a comparison of the various tests of renal inadequacy, but is an attempt to investigate and follow up a series of cases of nephritis, using the simplest test of renal function (the urea concentration test of Maclean and de Wesselow¹) and assessing its value for prognosis. When the opportunity occurred to us of investigating a series of renal cases in which, for various reasons, the most consistently useful of the "renal tests" (the non-protein nitrogen content of the blood) had to be omitted, it appeared to us of value to make a judgement upon them, basing it upon the urea concentration test figures, and then to follow up the cases with a view to an estimate of its prognostic value.

We have records of 156 of these cases, which had been previously diagnosed as nephritis on the ground of albuminuria, with or without other symptoms; 27 of them were found, after examination, to be suffering from something other than nephritis, and were therefore discarded.

Unless the patients were too ill to take anything but fluids, a simple hospital diet was given. Daily specimens of urine were examined, and each case was allowed to settle down into hospital régime before the urea concentration test was made.

The technique of the test is well known. The patient empties his bladder and then takes 15 grams of urea dissolved in 100 c.cm. of water. He passes urine at the end of the first hour and at the end of the second hour, and the total quantity passed in each hour is noted. The percentage of urea in each of the specimens is determined. When the amount secreted during an hour does not exceed 120 c.cm. a percentage of less than 2 in that specimen indicates renal inadequacy, while if the amount falls below 1 per cent. a very serious defect is present.

The patient should not take any fluid after 8 p.m. on the evening before the test, and it is advisable to collect the night urine from that time until the bladder is finally emptied just before the dose of urea is given in the morning. The reason for this is that in many of the cases the percentage of urea is higher in this specimen than in any of the test samples, even though there is no diuresis during the test period. This anomaly was present in as many as 31 per cent. of the cases described in this paper. The percentage of urea varied from 0.8 to 2.8 in these particular cases. Whenever it occurred the systolic blood pressure was above 150 mm. of mercury, though no relationship between these two facts is obvious.

Another point of interest concerns the diuretic effect of the urea. If there is any diuresis it usually occurs, as is well known, in the sample of the first hour. Sometimes, however, there is a greater output of urine in the second hour than in the first, while in rare cases diuresis occurs in both first and second hours. In cases of this type the third sample, at the end of the next hour, is of value. After a long experience of the test we believe that it is advisable to make the taking of a sample in the third hour a routine procedure.

We grouped our cases of nephritis into the following categories:

Group I (14 cases). Cases with high blood pressure (over 150 mm. Hg systolic) and efficient kidneys—that is, urea maximum of over 2 per cent.

Group II (35 cases). Cases with defective kidneys, but with only slight or no cardio-vascular changes (blood pressure under 150 mm. systolic).

Group III (73 cases). Cases showing definite renal and cardio-vascular changes.

Group IV (7 cases). Cases where renal inadequacy was associated with renal stone.

The after-histories of the patients in each of these groups were followed for a period of two years after the test had been performed. In Group IV no deaths occurred. The average percentage given by the urea concentration test was 1.3—the lowest being 1.1 and the highest 1.8. In Group I one death only occurred in the two years. This was a case with a blood pressure of 170/90 mm., and a urea maximum of 2.4 per cent.

An analysis of the urea maximum figures in the two main groups, showing renal damage (II and III), is given in Table I.

TABLE I.

Group II, defective kidneys with slight or no vascular changes:

Above 1.5 per cent. ...	6 cases
1 to 1.5 per cent. ...	22 "
Below 1 per cent. ...	9 "

Group III, defective kidneys with marked vascular changes:

Above 1.5 per cent. ...	24 cases
1 to 1.5 per cent. ...	37 "
Below 1 per cent. ...	12 "

In many of these patients the test was repeated from time to time, and the highest figure is used in the above table.

TABLE II.—Cases which Died within Two Years (Groups II and III).
GROUP II (5 cases).

No. of Case.	Blood Pressure.	Urea Concentration Test.	Time Lived.	No. of Case.	Blood Pressure.	Urea Concentration Test.	Time Lived.
30	140/110	0.5	1 mth.	118	130/90	0.65	9 mths.
32	140/90	0.6	2 mths.	60	125/85	1.0	10 "
142	135/95	0.6	12 "				

GROUP III (15 cases).

146	210/150	0.35	5 days	42	190/120	1.2	8 mths.
51	195/105	0.35	5 mths.	134	190/120	1.2	15 "
17	—	0.9	1 week	43	—	1.3	1 week
33	200/120	0.9	1 mth.	135	180/110	1.4	1 mth.
39	150/110	0.9	11 mths.	111	210/130	1.5	12 mths.
22	180/95	0.95	21 "	7	180/105	1.6	4 days
55	160/115	1.0	1 mth.	65	190/120	1.6	2 mths.
90	210/110	1.0	12 mths.				

An analysis of the cases which died within two years (Table II) shows that in Group II the length of time lived increases more or less uniformly with the rise in the figures of the urea concentration test, except for No. 142, where the duration of life was a little longer than in the others. Five of the cases in this group, with a urea maximum of under 1 per cent., had not died at the end of two years—three of the cases showing a concentration of but 0.7 per cent. or under.

Taking the deaths in Group III, an interesting contrast in the length of time lived is shown by the first pair of cases (146 and 51) in the table. Although showing a urea maximum of but 0.35 per cent. at the time of the test, yet No. 51 contrived to live five months. Similar contrasts are afforded by Cases 17 and 22, and 55 and 90. This difference is brought out more clearly still by a comparison of the four cases which died within a week of the test (Table III).

TABLE III.—Cases which Died within a Week of the Test.

Case.	Urea Maximum.	Time Lived.
146	0.35 per cent.	5 days
17	0.9 "	1 week
43	1.3 "	1 "
7	1.6 "	4 days

It is thus clear that for immediate prognosis the urea concentration test by itself is of no great help. Moreover, in Group III eleven cases showing a urea maximum of less than 1 per cent. were alive at the end of the two years.

An analysis of the death rates in Groups II and III (Table IV) shows that of the cases in Group II which had a urea maximum of less than 1 per cent., half had died within two years, while no deaths occurred in that period among the cases with a concentration higher than 1 per cent.

In Group III, where the nephritis is complicated by cardio-vascular changes, the figures are not so uniform, and of the nine deaths in the cases with a urea maximum of over 1 per cent., all with but one exception had a blood pressure of over 180 mm. Hg systolic, in three of which it was over 200 mm.

TABLE IV.—Death Rate in Groups II and III.

	No. of Cases.	Deaths.	Percentage of Deaths.
GROUP II.			
A. With urea concentration test 1 per cent. or below	10	5	50
B. With urea concentration test above 1 per cent.	25	0	0
GROUP III.			
A. With urea concentration test 1 per cent. or below	17	6	35
B. With urea concentration test above 1 per cent.	56	9	16

The test is thus of no great value for immediate prognosis; but, always granted certain reservations, it is a very definite help in forming a general prognostic judgement upon a nephritic case.

One of the unfortunate features of the application of biological, and especially biochemical, experiment to clinical work is that the results are often expressed in numbers; and the human mind seems to have a curious eagerness to endow such figures with absolute truth, and subconsciously to make mathematical expressions take the place of a wider and more surely founded judgement.

It is obvious that in investigating a complicated "system" like the condition produced by nephritis in the human body such a test as the urea concentration test is a physiological experiment in which many factors must necessarily be uncontrolled, and one, moreover, which, strictly speaking, tells us the response of the body only at the time of the test. The condition of the kidney which we then deduce may be, of course, permanent; on the other hand, an acute exacerbation may develop upon a chronic nephritis, or a marked improvement of a subacute nephritis may occur, and therefore a single urea concentration test may be very misleading if it is regarded in any absolute way. This is but to say that clinico-pathological knowledge and judgement are not displaced by tests whose results are expressed

in definite figures of so much per cent. Nevertheless, in the experience of many observers, as in our own, so comparatively crude a physiological experiment as the urea concentration test has received the pragmatic sanction of being found to work.

We would therefore conclude by summarizing our experience and opinion of the test, not merely in this admittedly restricted series of cases, but also in a large number of others in which blood analysis was available.

First, we would make it clear that we lay much more stress upon blood examination than upon any test involving urinary analysis.

The urea concentration test is quite as satisfactory as any of the urinary tests, and is, moreover, one which can easily be made in general practice. It must be interpreted only as an addition to the other physiological and pathological facts in the case.

Seeing that it is a somewhat crude physiological experiment, we shall probably be safe in taking into account only broad differences. In other words, a urea maximum of 2 per cent. or over indicates a kidney which at the time of experiment can concentrate urea satisfactorily. A urea maximum of under 1 per cent. shows a kidney which cannot. Between 1 and 2 per cent. the issue is not quite so clear, but we imagine that we shall be safe in putting it in these terms: below 1.5 per cent., strong presumption of kidney deficiency; between 1.5 and 2 per cent., possibility of renal deficiency.

Finally, in actual practice we would always have a blood analysis; but if this is not available, useful facts for prognostic judgement in a case of nephritis are afforded by the following routine:

(a) An analysis of the urea content of a series of specimens of ordinary urine. If these show an adequate urea percentage, then obviously a urea concentration test is not necessary.

(b) If the test is necessary, then the practitioner can make it himself, and form a judgement by adding the result to his other clinical facts. It is obvious that this judgement will be revised or confirmed by the further watching of the patient, the frequent observation of the urine and its urea content upon a known diet, and occasional repetition, when necessary, of the urea maximum concentration test.

REFERENCE.

¹ Maclean and de Wesselow: *Quart. Journ. Med.*, 12, 347, 1919.

THE RECORDING OF PERIMETRIC TRACINGS.

BY

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UNTIL comparatively recently, perimetric tracings have usually been taken with a circular arc of 180 or even more degrees, the eye of the patient being adjusted so as to occupy as nearly as possible the centre of curvature of the arc. In my early studies I happened to be with a teacher who often used a plane surface—in his case a large black-board—for the purposes of perimetry. When he did so he was, of course, using a tangent perimeter. This tangent method seems to have gone almost entirely out of use till it was revived some years ago by Bjerrum in his screen. More recently attention has been called to the advantages of tangent perimeters by several other authors, and notably by Drs. Sinclair and Traquair of Edinburgh.

The chief disadvantage of the tangent perimeter is that in the extreme periphery the tangent increases very rapidly, for the limiting value of the tangent of 90° is infinity, while that for 45° is unity. In the circular perimeter this difficulty is avoided, the graph being one in polar co-ordinates.

One of the advantages of the screen perimeter lies in the fact that as the eye which is being examined is not placed at the centre of a curve but at any point the examiner chooses to select, by increasing the distance between the screen and the eye the field corresponding to the retinal image may be conveniently magnified. This magnification tends to much greater accuracy of work, and tangent