

## A NOTE ON RENAL FUNCTION IN SCARLET FEVER.

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NEPHRITIS occurs as a complication of scarlet fever in about 10 per cent. of cases, and the type of the disease which is prevalent seems to influence the incidence. It seldom appears before the tenth day of the illness, and is most commonly seen during the third and fourth weeks. Children suffer more frequently than adults. Transient albuminuria, with no other symptoms of the graver condition, may be noticed during this period, and the question is raised whether this is to be regarded as a manifestation of renal involvement of a mild character.

Using the urea content of the blood as a test of renal function, an investigation has been carried out in 36 non-consecutive cases of scarlatina with a view to ascertaining if, during the "nephritic period," the kidneys are acting efficiently. Of the 36 cases examined, 28 were children aged 7 to 10 years, and in this group six developed nephritis of a mild character.

The method has been to obtain, and determine the urea content in, samples of blood at intervals throughout the course of the disease. The samples were all collected at the same hour of the day, the patient being in the fasting condition, and the urea content was estimated by the urease method. The urine in all cases was examined during the first ten days of the illness for evidence of pre-existing nephritis, but in no case was there any indication that this had persisted in a chronic form.

The patients were receiving a purely milk and farinaceous diet up to the twenty-first day; thereafter fish and white meat were added. It is evident, therefore, that the alterations in the blood urea recorded in our charts cannot be referred to dietary variations, inasmuch as they all occur before the twenty-first day of the illness. Moreover, they do not take the form of a gradual rise, corresponding to, say, an increased food consumption. Those patients who developed nephritis were at once placed on a diet in which the protein content was considerably reduced.

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Although it was not possible to obtain blood samples as frequently as might be desired, the number of observations is sufficient, it is believed, to warrant the conclusions drawn from them.

**Discussion and Conclusions.**—In scarlet fever, during the initial pyrexia, there is a tendency towards a high blood urea, although the increase is never very great. It is difficult to show any distinct relationship between the urea content of the blood and the degree of pyrexia, although, as is shown in Table I., the blood urea appears to reach its maximum value when the temperature has almost reached the normal level.

TABLE I.

Case No.	Day of Illness.	Temperature.	Blood Urea Content. Urea N., mgrms. per 100 c.c.
31	4	103	15
30	5	...	13
20	9	...	18
14	4	102	17
32	4	...	12
29	2	101	16
7	4	...	18
18	6	...	24
32	6	...	24
22	4	100	14
19	5	...	16
23	6	...	20
12	9	...	18
1	2	99	14
17	4	...	22
13	5	...	20
10	9	...	20

This early rise in the blood urea is temporary, and is followed, as is shown in the typical cases 31, 32, and 33 (Fig. 1) by a fall to the normal level.

At some time after the tenth day the majority of cases show a second rise in the blood urea, quite independently of whether clinical signs of nephritis make their appearance or not. Fig. 1 shows this very clearly for cases which did not develop clinically evident nephritis, Fig. 2 for cases which did. On the other hand, a few cases, typical examples of which are given in Fig. 3, showed no rise in the blood urea (and no nephritic symptoms) throughout the course of the disease.

Comparing Fig. 1 with Fig. 2, it will be noted that the main

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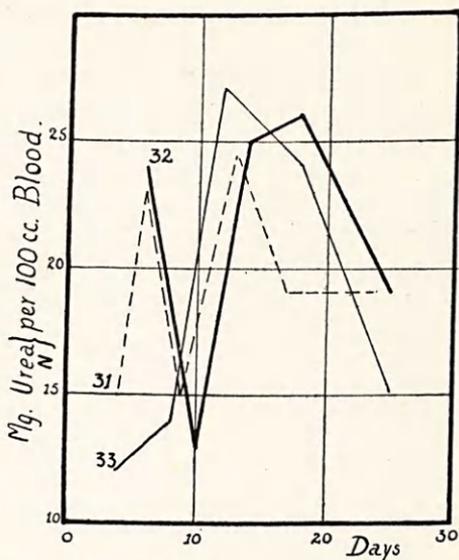


FIG. 1.—Non-nephritic cases. All cases apyrexial after seventh day.

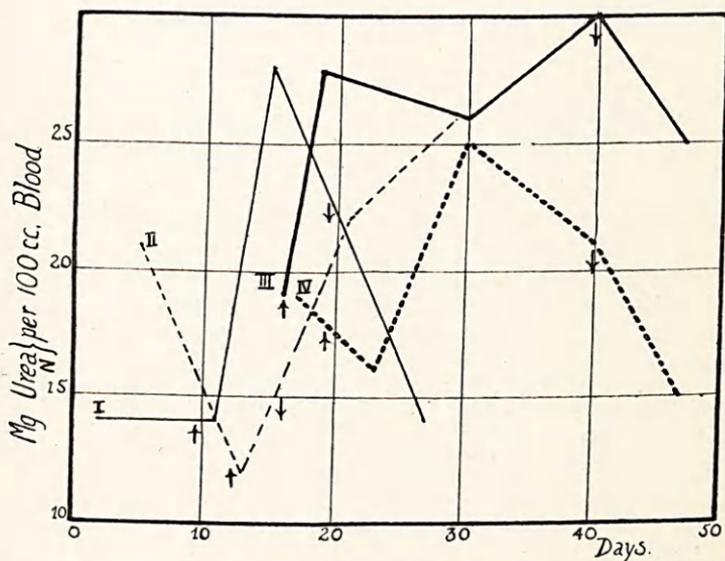


FIG. 2.—Nephritic cases. Onset of nephritis indicated by  $\uparrow$ , disappearance of albuminuria by  $\downarrow$ . A rise in temperature did not accompany the nephritis. Casts were found in the urine for varying periods after the disappearance of albuminuria, in two cases up to the time of discharge from hospital. Actual casts were in all cases few in number, red blood corpuscles, epithelial cells and debris predominating.

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difference between the blood urea curves of nephritic and non-nephritic cases lies in the rapidity with which the urea falls to normal levels. The fall is rapid in those cases which did not develop nephritis, much slower in those which did, although even this is no universal rule, for in Case I. (Fig. 2) in which the clinical signs of nephritis were quite distinct, the urea N fell in ten days from 28 to 14 mgrm. per 100 c.c. blood. A second point of interest is that in four cases out of six (in the other two it was not possible to obtain appropriate observations) clinical signs of nephritis—diminished output of urine, albuminuria, hæmaturia, casts, and slight œdema—appeared while the blood

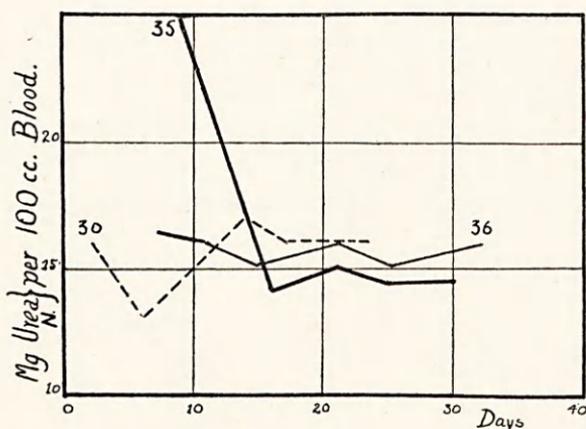


FIG. 3.—Non-nephritic cases. All cases apyrexial after seventh day.

urea was still low, though in every case there was a subsequent rapid rise. Both of these observations afford good reason for concluding that no warning of an impending nephritis can be obtained from examination of the blood urea content. Moreover, it is obvious that in this type of nephritis, urea retention must definitely be considered an effect of the nephritis. These results as to the rapidity with which nitrogen retention occurs after the appearance of clinical symptoms of nephritis are in entire agreement with those obtained on a single case of late scarlatinal nephritis by Veeder and Johnston.<sup>1</sup>

In such cases as are recorded in Fig. 1 (a rapid rise of the blood urea about the tenth day of the illness without any albuminuria) it may tentatively be suggested that this transitory retention of nitrogen may indicate a kidney impairment so

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slight as to show in appreciable degree none of the usual clinical signs of nephritis.

It seems desirable that further cases be examined in closer detail, not only as regards blood urea, but also as regards the nitrogen and chloride balance. It is hoped that such observations may shortly be made.

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REFERENCE.—<sup>1</sup> *Amer. Journ. Dis. Children*, 1920, 19-223