Date.	Temperature.	Pulse.	Respiration.	a-c Interval.
Feb. 23 ...	° F. 98.6	94	20	—
.. 24 ...	99	88	22	Less than $\frac{1}{2}$ sec.
.. 25 ...	99	88	24	—
.. 26 ...	100	86	22	—
.. 27 ...	99.6	82	20	Less than $\frac{1}{2}$ sec.
.. 28 ...	99	84	24	—
Mar. 1 ...	99	80	26	Over $\frac{1}{2}$ sec.
.. 2 ...	97.6	94	22	" "
.. 3 ...	98.4	88	24	—
.. 4 ...	99	92	24	Over $\frac{1}{2}$ sec.
.. 5 ...	99	92	28	" "
.. 6 ...	99.6	100	26	" "
.. 7 ...	101	96	24	" "
.. 8 ...	101.8	106	26	—
.. 9 ...	103.2	106	32	—
.. 10* ...	100	75*	30	Over $\frac{1}{2}$ sec.
.. 11* ...	101.2	74*	32	" "
.. 12 ...	100.2	104	34	" "
.. 13 ...	101	110	28	" "
.. 14 ...	100.4	100	32	" "
.. 15 ...	99.4	106	32	" "
.. 16 ...	99.6	102	32	" "
.. 17 ...	97.4	102	34	" "
.. 18 ...	98.4	98	34	" "
.. 19 ...	98	92	32	Less than $\frac{1}{2}$ sec.
.. 20 ...	98	94	22	" "
.. 21 ...	98	108	26	$\frac{1}{2}$ sec.
.. 22 ...	98.6	100	24	Less than $\frac{1}{2}$ sec.

Heart-block.

* Dropped beats.

polygraphic records myocardial involvement could not have been diagnosed until the dropped beats occurred. The irregularity of the pulse caused by failure of ventricular response to auricular contraction in heart-block can be distinguished, as it was in this case, from premature contractions (extra-systoles) by the fact that the weak heart sounds of premature contractions are absent in the long pauses. Polygraphic confirmation of this interpretation was obtained, and this is always advisable on account of the difference in the importance of the two conditions as regards prognosis and treatment.

Though the case was one of rheumatic heart-block, it developed apart from an attack of acute articular rheumatism. The evidence of rheumatic infection was the presence of numerous rheumatic nodules, and incidentally the attack of tonsillitis.

By analogy with similar cases, acute and chronic, which have been examined histologically, it is assumed that the pathology in this case is a round-celled infiltration in the bundle of His caused by the rheumatic infection.

The case emphasizes the damage which may be done to the heart of a rheumatic child apart from a definite attack of acute rheumatism. It is only by graphic records that a positive diagnosis of acute myocarditis can at present be made. Acute myocarditis may be present without involvement of the auriculo-ventricular bundle, when the diagnosis can only be inferred rather than proved.

MR. WILLIAM BRUCE CLARKE, formerly senior surgeon at St. Bartholomew's Hospital, left estate of the gross value of £16,596, of which £9,261 is net personalty.

The council of the county borough of St. Helens have confirmed a resolution of the Health Committee that midwives should be instructed to notify to the medical officer of health forthwith on being engaged to attend a woman in her confinement, in order that advice may be given to expectant mothers and suitable arrangements made in certain cases for their assistance.

THE INFLUENCE OF THE TOTAL FUEL-VALUE OF A DIETARY UPON THE QUANTITY OF VITAMINE REQUIRED TO PREVENT BERI-BERI.

BY

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F.R.C.S.

(From the Lister Institute.)

(Preliminary Communication.)

It is now taken as settled that beri-beri is essentially privatory in origin, resulting from the deficiency in the food supply of a substance the precise nature of which has not yet been ascertained.

If this simple explanation were complete, it would follow that the more thorough the withdrawal of the active substance, the speedier would be the onset of the disease and the more severe its effects. Several investigators, however (Maurer,⁶ 1907; Cooper,³ 1913; Caspari and Moszkowski,² 1913, and Funk,⁴ 1914), have shown that the onset of polyneuritis in birds can be hastened by increasing the ration of polished rice. From this it appears that when the food ration is increased by the addition of carbohydrate material, for example, polished rice, with a very low content of antineuritic substance, although the daily allowance of the essential substance is slightly increased, the development of polyneuritis is actually accelerated.

Analogous observations have been made in the course of the epidemiological studies of human beri-beri. Thus it has been found by nearly all observers¹ that in epidemics of beri-beri the well nourished are the first to succumb, and are actually more liable to the disease than the underfed. Similarly, under natural conditions men, owing to their larger energy output, partake of polished rice more freely than women, and are more liable to beri-beri. In institutions, however, where men and women have the same fixed ration they are equally susceptible to the disease. Again, in prisons and asylums, in which the dietary has been varied from time to time, every increase in the polished rice component of the diet, the ration of other foodstuffs remaining constant, has been followed by increased beri-beri.

From these observations Braddon drew the conclusion that in rice-eating communities the extent and severity of beri-beri vary directly with the quantity absolute or relative of polished rice consumed.

Admitting, then, that in the production of beri-beri a deficiency in the diet of a certain substance is an essential factor, it is evidently of practical importance to ascertain the part played by the substance in metabolism, and, if possible, to determine the quantitative relations which the intake of active material must bear to that of the other components of the dietary, in order that the requirements of the organism can be covered.

With this object in view a study has been made of the effect upon the onset of polyneuritis in birds of increasing the carbohydrate ration of the dietary, and the main experimental results are briefly summarized in this preliminary communication, and will be shortly published *in extenso* in the *Journal of Hygiene*. The observations were made at Seremban, Federated Malay States, during the years 1909-11, and at the Lister Institute during 1913-14.

It is now a well-established observation that chickens fed on $\frac{1}{2}\%$ their body-weight of polished rice develop polyneuritis in twenty to seventy days, whereas those fed on the same daily ration of unpolished rice (padi), "cured" or parboiled rice, and "fresh" rice (partly polished) remain free from the disease. Braddon found, however, that birds when fed on $\frac{1}{2}\%$ their body-weight of parboiled rice, which has been soaked for twenty-four hours in water and then strained off, develop polyneuritis just as when fed on ordinary polished rice, and epidemics of beri-beri have been traced to the practice of soaking unpolished rice prior to cooking, and discarding the water.

The effect of adding carbohydrate to a diet which itself was adequate to maintain birds in health was first studied, and experiments made on forty birds showed that, while chickens fed on $\frac{1}{2}\%$ their body-weight of padi remained free

from polyneuritis for at least sixty to a hundred days, when this ration was supplemented by $\frac{1}{3}$ the body-weight of washed parboiled rice or by $\frac{1}{10}$ the body-weight of polished rice the birds contracted the disease in twenty to thirty days.

Experiments were next carried out with the object of ascertaining more precisely what effect increasing the carbohydrate component of a dietary had upon the rate of onset of polyneuritis. In these experiments altogether thirty birds (chickens and pigeons) were employed.

It was found that:

1. Whereas pigeons fed on $\frac{1}{5}$ their body-weight of polished rice and $\frac{1}{2500}$ of dry yeast daily developed polyneuritis in from thirty-nine to ninety-five days, when the ration of rice was increased to $\frac{1}{10}$ the body-weight the birds fell ill in twenty-two to forty-six days.

2. While pigeons fed on $\frac{1}{10}$ their body-weight of polished rice and $\frac{1}{2500}$ of yeast developed polyneuritis in from thirty-two to forty-four days, they became affected with the disease in from fifteen to twenty-two days when the polished rice ration was increased to $\frac{1}{5}$ the body-weight.

3. Whereas chickens fed on $\frac{1}{4}$ their body-weight of polished rice and $\frac{1}{2500}$ of yeast did not fall ill with polyneuritis until from sixty-five to one hundred days had elapsed, when this dietary was supplemented by $\frac{1}{10}$ the body-weight of sago the birds contracted the disease in from thirteen to thirty days.

By doubling the carbohydrate ration of the dietary the rate of onset of polyneuritis was thus actually increased as much as from two- to four-fold.

The results so far obtained demonstrated that the amount of antineuritic substance required by the organism increases with the quantity of carbohydrate ingested.

There are at least two possible explanations of this phenomenon. First, the view already advanced by Funk (1914) that the active substance participates in some way in carbohydrate metabolism, and thus the more metabolic work the organism is called upon to undertake the greater its demand in respect of this essential substance. Secondly, that when large rations of starch are ingested the absorption of the antineuritic material is interfered with owing to the presence in the alimentary canal of excess of undigested carbohydrate.

Experiments were therefore next carried out to ascertain which of these was the true interpretation, and it was found that even when daily rations of polished rice as great as $\frac{1}{10}$ the body-weight were fed to chickens together with varying amounts of yeast, 93 to 98 per cent. of the starch was digested and absorbed, and the excreta were free from the antineuritic substance. It was also observed that *in vitro* starch did not absorb the substance from aqueous solution. Furthermore, pigeons fed exclusively on glucose, which is rapidly absorbed, developed polyneuritis. These observations exclude the physical factor, and show that the antineuritic substance is utilized in some way during carbohydrate metabolism.

Whatever be the mechanism involved, it is clear that for the maintenance of health the intake of active substance must be adjusted in relation to the ration of carbohydrate supplied, and it is when this necessary balance is not maintained in the dietary that beri-beri results.

The precise relation which must subsist between the supply of antineuritic substance and the amount of carbohydrate ingested has not yet been ascertained, nor has the corresponding relation for each of the other normal components of a dietary (protein and fat) been determined. Funk (1914), however, has made some experiments which indicate that protein and carbohydrate can be interchanged in a dietary without materially affecting the rate of onset of polyneuritis, whereas if these food materials be replaced by fat the disease develops less readily.

The fact that attention must be paid not merely to the absolute amount of antineuritic foodstuff incorporated in the dietary but also to the proportion which this bears to its total calorific value is of great practical importance in framing a dietary for the prevention of beri-beri.

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³Cooper, 1913: *Journal of Hygiene*, xii, 4, 436. ⁴Funk, 1914: *Zeit. physiol. Chem.*, 89, 3, 378. ⁵Maurer, 1907: *Muench. med. Wochenschr.*, liv, 371.

A CASE OF HYPOTHYROIDISM IN A MALE.

BY

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THE following case of hypothyroidism presents interesting features, as it exhibits many of the less well-known signs which have been attributed to a diminished secretion of the thyroid gland:

H. L., a man aged 28, who had previously always been in good health, consulted me on April 20th on account of a fainting attack on the previous day. He had been playing golf, when he suddenly felt very faint, and had to lie down on the links to prevent himself losing consciousness. This had occurred on the Sunday morning; he had played three rounds of golf on the Saturday, had felt perfectly well on that day and when he had commenced to play after breakfast on the Sunday. When the fainting attack commenced there was an immediate desire to go to stool, and he passed a watery motion. He felt better in the course of the next few minutes and resumed play, but had to abandon his game after another four holes, as the fainting again supervened. He then motored back to town, and I saw him on the following morning. He complained of abnormal sensations in the region of the heart, which he described as similar to cramp and associated with a great deal of apprehensive fear and some gastric discomfort.

He was a well-nourished man, with dark hair, prematurely grey over the temples, with a large amount of adipose tissue, especially over the shoulders, supraclavicular region, and abdomen. The pulse was 48 in the radial artery, and was thin, but regular. The blood pressure was 110. The area of cardiac dullness was increased to the right of the sternum, but the apex-beat was in the normal situation and no murmurs were audible over the various valves. There were no abnormal signs in the chest or abdomen, and the reflexes were normal.

The urine, except that the specific gravity was somewhat high, had no abnormal characters.

I advised complete rest for the next few days, a low diet, advised the patient to remain in bed, and ordered a purge.

Two days later the patient had a further attack of fainting, but did not lose consciousness. This came on while in bed, and I saw him before the attack had passed. The pulse-rate was then 44. This was temporarily remedied by the administration of ether, and with the increase in the rate of the heart's action the syncopal symptoms passed away. He was removed to a nursing home the following day. On admission the pulse was 48, the temperature 97°, and the blood pressure 110. I ordered a saline powder each morning on waking, consisting of magnesium sulphate and sodium sulphate aa gr. 40, sodium hyposulphite gr. 10, in a tumblerful of hot water, and dry diet, consisting of easily digested food, with all the necessary fluids between meals, and followed by a digestive mixture. This regime was followed for about a week, but no improvement was ascertainable either in the pulse-rate or in the subjective cardiac sensations complained of by the patient. The temperature remained subnormal, and the pulse varied between 44 and 52.

My attention was directed to the thyroid by the pads of fat especially noticeable over the supraclavicular region, and by the dryness and rough condition of the skin. It was not possible to detect the gland by palpation, neither did it become obvious on swallowing. Of further signs indicative of thyroid deficiency mention may be made of the weight of the patient (about 14 st.), his height being 5 ft. 11 in.; this weight was mainly due to excess of fat, which was typically myxoedematous in distribution. There were well-marked patches of psoriasis on the left upper arm and the right fibial region. The temperature, as has already been stated, was markedly subnormal and the heart's action slow. The hair, with the exception of the premature grayness over the temples, was normal, and there was no lack of lustre and no falling out. The nails were normal, and the teeth in good condition. The outer third of each eyebrow, however, exhibited the sign, upon which L. Levi and H. de Rothschild lay, emphasis—namely, a paucity of hair as compared with the inner and middle of the eyebrow. A Wassermann reaction made after the patient had been in the home a few days was negative.

The clinical picture just described led me to believe that the thyroid was the determining factor in the present condition, and I therefore prescribed 1 grain of the dried thyroid extract to be taken in the form of a cachet four times daily. He began to take it on the Saturday week after admission to the home, and no noticeable effect was ascertainable until the following Monday, when the pulse rose to 60, and the temperature became normal at one of the four-hourly readings. From this time onwards both the pulse and temperature steadily rose, until when the patient had been taking thyroid extract for three weeks the temperature was normal. During the first week of thyroid administration the pulse rose from 50 to 65 (approximately), the second week to 75, and the third week to about 85. The patient was now allowed to get up and to indulge in increasing amounts of exercise, which he was able to undertake without any fatigue, and without any return of the subjective cardiac sensations which had previously been