

Clinical Notes and Cases.

VARIATIONS IN BLOOD SUGAR IN A CASE OF DEPRESSION WITH DIABETES MELLITUS.

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SOME apology may at first sight appear to be needed for burdening yet further the literature on blood sugar in the psychoses. The following observations, however, require recording, in that they illustrate certain aspects of the relation of the behaviour of the blood sugar level to changes in mental state which are as yet obscure.

Many observations have been made on the behaviour of the blood sugar in different groups of psychoses. In a complete review of the literature up to 1930, Wilder states that in schizophrenia many cases frequently show a raised value, but in others the value is normal. He quotes observations of, amongst others, Heidema and Wuth. Similarly in other psychoses, e.g., in depression, he reports marked falls in the blood sugar level, quoting again different observers, including Mann in this country.

The following case, however, demonstrates a more immediate relationship between the behaviour of the blood sugar at a given time and the mental state at the same time.

A. P. W—, male, *æt.* 52, was admitted to the Maudsley Hospital on May 31, 1934. He had been referred by his doctor on account of severe depression following the serious illness of his wife some three months before. He had suffered from diabetes mellitus for nine years.

The family history showed one paternal aunt to have suffered from "melancholia", and the paternal grandfather was alcoholic. With regard to his personal history, childhood was uneventful. He seems to have had a good school record, and entered the service of a bank, in which he was at the time of admission. He was a hard-working and conscientious man with somewhat narrow interests. He had been married twenty-three years and had one son *æt.* 21. His wife developed cancer, and entered a nursing home three months before his admission. He had been formerly a moderate drinker but after his wife's departure drank more heavily. Beyond his diabetes there had been no serious illness. The diabetes had been well controlled by insulin (40 units a day) and diet.

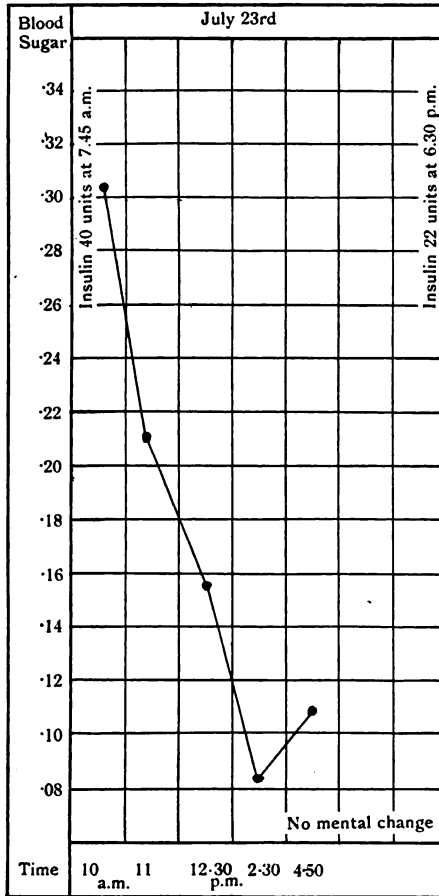
On admission he was depressed and agitated; he said the police were after him, the bank was dismissing him, neighbours shunned him and talked about him. He stated his bowels had not been open for some weeks. There was no sign of intellectual deterioration.

Physically, his radial arteries were somewhat thickened, his heart-sounds rather poor in quality. Blood-pressure 110/92. He had a severe diabetes mellitus, but

was free from diabetic stigmata. Other systems normal. Wassermann reaction negative. Blood sugar 220 mgrm. %.

He was put on diabetic diet and insulin (40 units a day), but this failed to control his diabetes, and on June 11 there was a heavy output of ketones and he was on the verge of coma. He was seen by Dr. Lawrence, of King's College

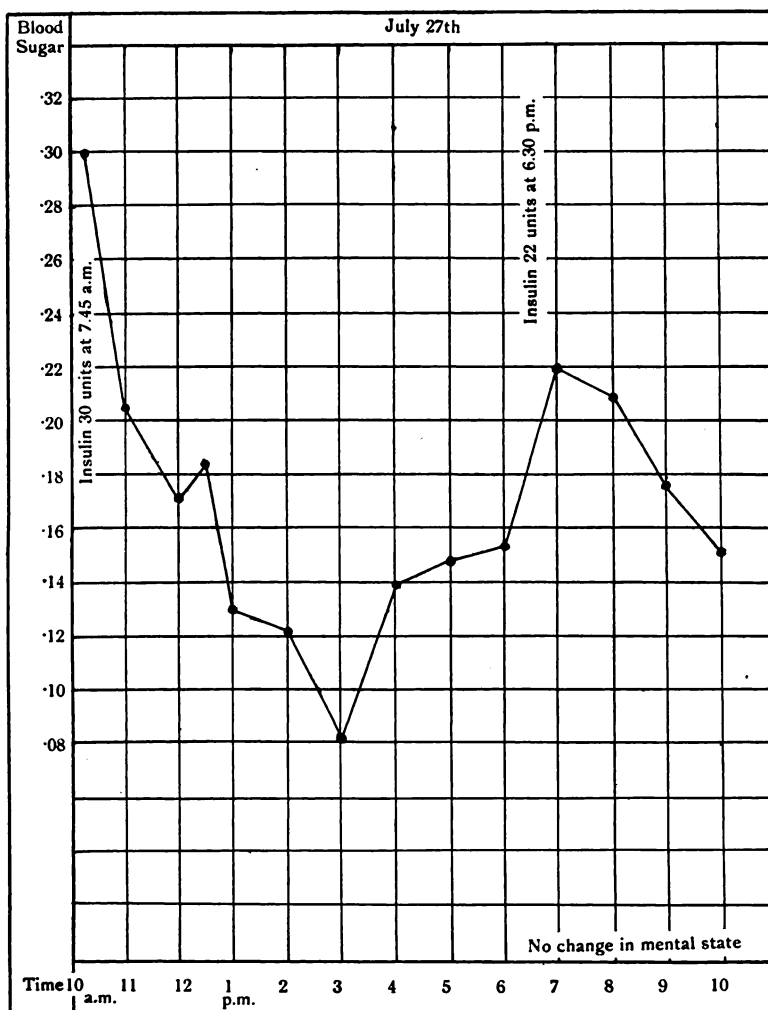
CHART I.



Hospital, who put him on emergency treatment—insulin 60 units a day and sugar—and in twenty-four hours he was out of danger. For a week or so he progressed quite well, but on June 18 he had a hypoglycæmic convulsion, epileptiform in character, in which he appeared to have auditory hallucinations. (This was observed by a member of the medical staff.) The next day he again had premonitory symptoms. He seemed anxious and had a rapid pulse. He was given 5 gm. of carbohydrate but two hours later the symptoms reappeared. This time, however, the psychic state was different. He appeared lively, talked easily, admitted that he no longer felt so depressed, claimed some insight and discussed his diabetic condition intelligently—in fact superficially his bearing would have passed for normal.

The dietary was now augmented by protein, and the insulin was reduced from 60 units to 52 units per day. The improvement noted was transitory, and thirty-six hours later he was again very depressed. A week later he developed paranoid ideas (into which he had a fleeting insight), in an anxious setting, and thought others were talking about him. So far the paranoid element had not been marked.

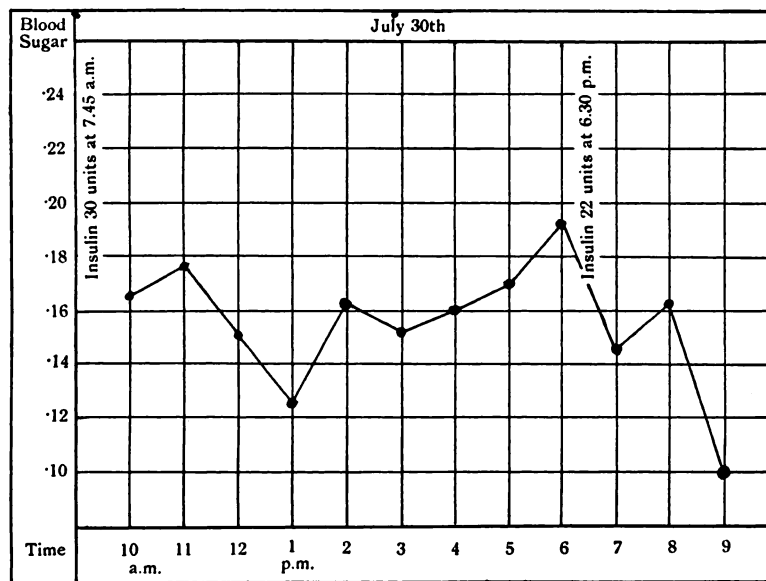
CHART II.



On the night of June 27 he became "noisy and restless", attempted to get out of bed, but unfortunately there were no further details of this phase. On July 15 he was noted as "brighter, is taking his diet better and is more active". These clinical phenomena suggested the desirability of making frequent records of his blood sugar and concomitant continuous observations of the mental state.

Accordingly preliminary records of his blood sugar variations on his ordinary therapeutic dosage of insulin (30 units a.m., 22 units p.m.) were taken. The first record was on July 23. Hourly blood sugar readings were taken and the mental state observed continuously. Chart I shows the fluctuations of his blood sugar. During this period no change in the mental state was observed. This was repeated on July 27 and on July 30, and readings were taken every hour from 10 a.m. until 10 p.m. on the 27th and until 9 p.m. on the 30th (Charts II and III). A chart showing considerable divergence from the first was obtained. During this period of eleven hours no change in the mental state, which was that of an apathetic depression, was observed. (Venous blood was taken in each case.)

CHART III.

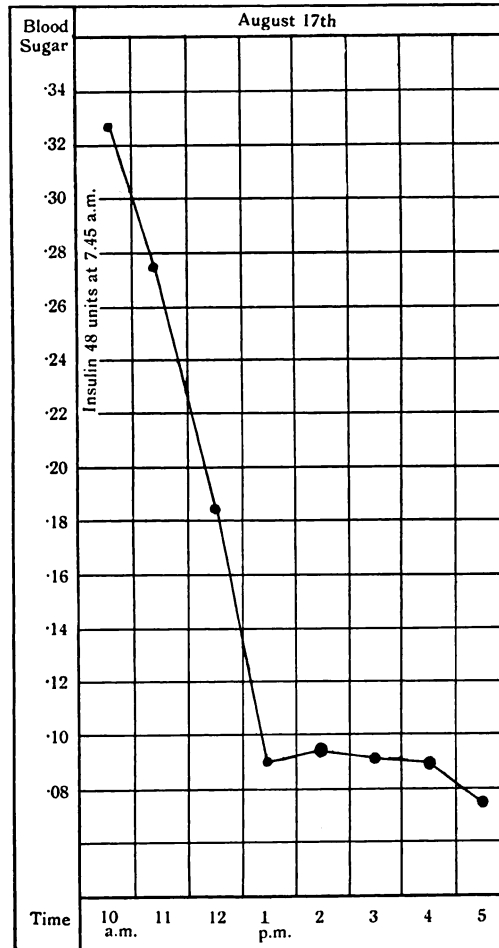


It was now decided to induce an artificial hypoglycæmia. Accordingly on August 17, at 8 a.m. 48 units of insulin were given instead of the usual 30. The blood sugar (venous blood) was taken at hourly intervals again from 10 a.m. until 5 p.m. (Chart IV), and the mental state observed continuously as before. This time, changes were observed. At 10.30 a.m. there was a definite increase in motor restlessness; he was anxious and tense and asked to be helped. At this time he was clear and in touch. There was no somatic evidence of hypoglycæmia, as on the previous occasions a month or so before. At 11 a.m. he was somewhat calmer but still perplexed. At 12 noon he became very anxious and apprehensive, restless and flushed, feared being sent to another ward, and wanted to go home. Subsequently no material change occurred in the mental state for the rest of the period of observation.

The experiment was repeated on August 27. This time capillary blood was employed, and 45 units of insulin were given at 8 a.m. There is a slight difference in the curves between capillary and venous blood which is irrelevant for present purposes (cp. Curves IV and V). At 10.30 a.m. he became, as before, more tense and anxious, saying, "I feel anxious; I don't know what it is; I want to go home". He was what is usually called "retarded", sticking to one topic, and had difficulty

in giving vent to his thoughts. There were no somatic concomitants. There was no essential change in his condition until 12.25 p.m., when he became flushed and perhaps just a little more agitated; he looked drawn and ill at ease. If the chart is examined here a further falling in the blood sugar level will be seen, achieving its maximum at 1 p.m. At this time he was much more flushed, was sweating a

CHART IV.

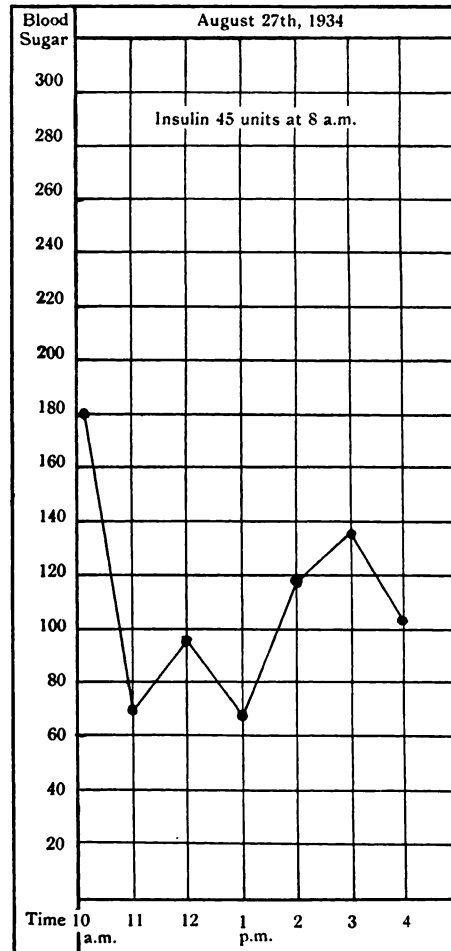


little, but was less restless, though the so-called "retardation" was much more marked and he could only give a mumbled, unintelligible grunt. At 2.15 p.m. he was much calmer, but still spoke in barely audible fashion—he was no longer flushed. At 3.30 p.m. he was much more agitated (coinciding with a further drop in the blood sugar), he was flushed and restless, wanting to get out of bed (this had not been previously observed the same day), wanted his bed moved to the open air, said some papers had arrived which demanded his attention (actually he was concerned at this time over some business connected with the will of his

wife, who had died after his admission). The "retardation" had disappeared. At 4 p.m. he was calmer, and remained so for the rest of the day. Unfortunately it was impossible to obtain further specimens of blood that day.

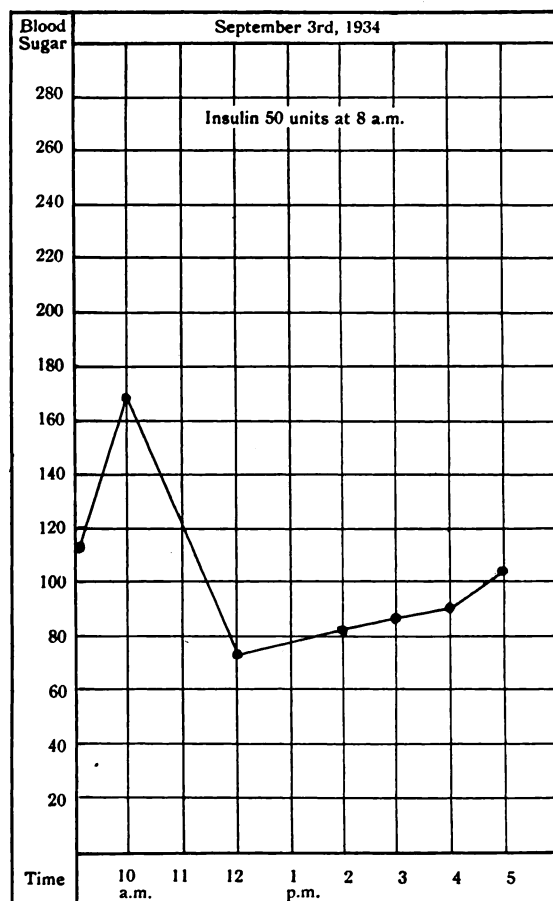
The experiment was repeated for the last time on September 3, after 50 units

CHART V.



at 8 a.m., and again using capillary blood (Chart VI). This time at 10.15, although tense and anxious, there was no restlessness, but he had difficulty in getting words out. This was his usual mental state. At 11.10 a.m. he was agitated, fidgety and restless, said "I don't know what to do", and seemed distressed. No somatic features. At 12 noon patient was flushed and very restless, rather more so than one hour earlier, again worrying over the documents he had to sign. (During this period a fairly rapid drop in the blood sugar level was observed.) At 12.30 the mental state was still the same, but he was less flushed. At 1 p.m. less restless;

CHART VI.



3:30 p.m. more apprehensive, asked what I was going to do to him, etc.; 5 p.m. little essential change, still apprehensive, anxious and inhibited.

CONCLUSION.

When the foregoing results are examined, certain conclusions emerge. First, associated with a fall in the blood sugar there is an increase of anxiety and restlessness, such as Guttman and Scherer also observed in their case; indeed in many respects the total clinical picture in both cases presents many points of similarity, except that in Guttman and Scherer's case the presence of hypochondriacal ideas at that age (sixteen) must be regarded as unusual, although the author has seen a severe hypochondriacal depression with bizarre bowel ideas and typical "involutional" content in a girl of twenty. The

hypoglycæmic seizure was epileptiform and auditory hallucinations were present. This was of familiar form. The second point which seems to emerge with some consistency from the experiments is that it is not the *level* of the blood sugar which matters—different levels were found at different times of the day (see Charts I and II) without any change in the mental state, but the *rapidity* of fall and also subsequent fluctuations which may occur.

With regard to the rapidity of fall, the maximum level, it will be seen, was reached much earlier with the excessive dose of insulin than in the earlier curves (I, II and III).

The author is indebted to Dr. Edward Mapother, Medical Superintendent of the Maudsley Hospital, for permission to carry out the experiments and to publish the result ; to Dr. Mann for friendly co-operation in carrying out the blood sugar estimation ; and to Prof. Mayer-Gross and Dr. Erich Guttman for much valuable assistance and many suggestions.

References.—(1) Guttman and Scherer, *Z. Neur.*, 1930, ix, p. 397.—(2) Heidema, (3) Mann, *S. A.*, (4) Wuth, quoted by Wilder, *L.*, *ibid.*, 1930, pp. 1 *et seq.*