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Some investigations on glucose tolerance in epileptics and patients with psychoses

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Abstract

An abnormal glucose tolerance is often found in patients with psychiatric or neurologic diseases, and the problem is then, what does this abnormal glucose tolerance mean and what is the relation between this and the patient's psychic state.

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SOME INVESTIGATIONS ON GLUCOSE TOLERANCE IN EPILEPTICS AND PATIENTS WITH PSYCHOSES.

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An abnormal glucose tolerance is often found in patients with psychiatric or neurologic diseases, and the problem is then, what does this abnormal glucose tolerance mean and what is the relation between this and the patient's psychic state.

Both abroad and in this country a great number of publications has been brought out, but it would be much outside the scope of the present study to deal with them, and reference may therefore be made to these works : P. J. REITER : Nogle undersøegelser over sukkerstofskiftet ved psykoser, 1925 ; H. I. SCHOU : Alimentary Hyperglycaemia in manio-depressive Psychosis, Acta psyk. et neur. Vol X, 1935, and H. I. SCHOU : Studier over den manio-depressive psykoses fysiologi, 1945, and ELLIOTT, PAGE & QUASTEL : Neurochemistry, pages 744—750, 1955.

Among the works which deal with the interpretation of the curve obtained in glucose tolerance tests, mention may be made of that by McCOWAN *et al.* (1931), who advocated the introduction of the so-called "hyperglycemic index" (H. I.), which is defined thus :

$$\text{H. I.} = \frac{100 \times (\text{blood sugar value after 2 hours} - \text{fasting blood sugar})}{\text{maximal blood-sugar value} - \text{fasting blood sugar}}$$

determined during glucose tolerance test (1 gm of glucose per kg of body weight). The values in a series of normal individuals varied from 0 to 10.

The authors further mentioned that investigations on a number of patients showed that the H. I. varied much with the psychic condition of the patients, the highest values being found in acutely depressed patients ; gradually as the patients improved the values approached the normal.

Subsequent studies, *inter alia* by TOD and co-workers, confirmed McCOWAN'S observations ; their paper comprised depressive psychoses and patients with the diagnoses "anxiety states".

The series of patients in the present study consists of 111 patients in

all (51 patients from the epileptics' departments, 27 from the departments for neurotics, and 33 from the psychiatric departments). The distribution with regard to H. I. is shown in Fig. 1. The diagnoses in the individual cases appear in Table 1.

Table 1. Distribution of Diagnoses in the Present Study.

Anxiety neurosis	8
Depressive neurosis	16
Hysteric neurosis	8
Psychosomatic neurosis	5
Manio-depressive psychosis	17
Psychosis of doubtful genesis	2
Schizophrenia	4
Epilepsy	51
total : 111	

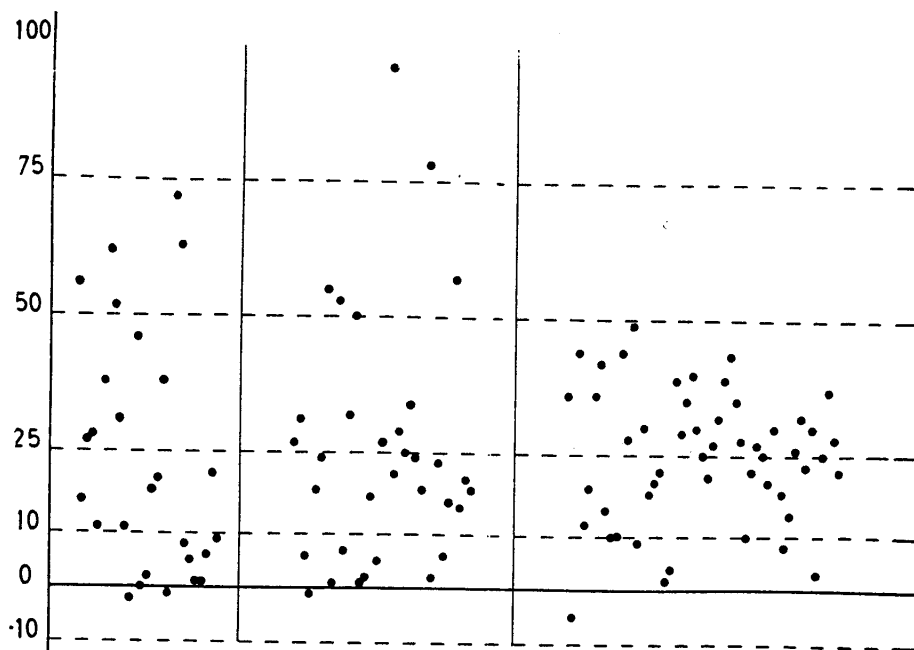


Fig. 1. Distribution of the hyperglycaemic index in a series consisting of patients from the department of neurotics (first column) the psychiatric department (second column) and the epileptics' department (third column). Ordinate : Hyperglycaemic Index (H. I.) Abscissa : Single determination.

The values given by REITER in 1925, Fig. 2, have been used for comparison. According to the author's statements, this series was distributed as shown in Table 2.

Table 2. Distribution of Cases in the Series Published by REITER in 1925. The asterisk indicates patients with manifest glucosuria.

Manic-depressive psychoses	36+7*
Syntonio psychopaths	3+5*
Schizophrenic	40+5*
Schizoid psychoses	4
Epileptics	15
Epileptoid psychopaths	2
Paralytics	15
Organic psychoses	15

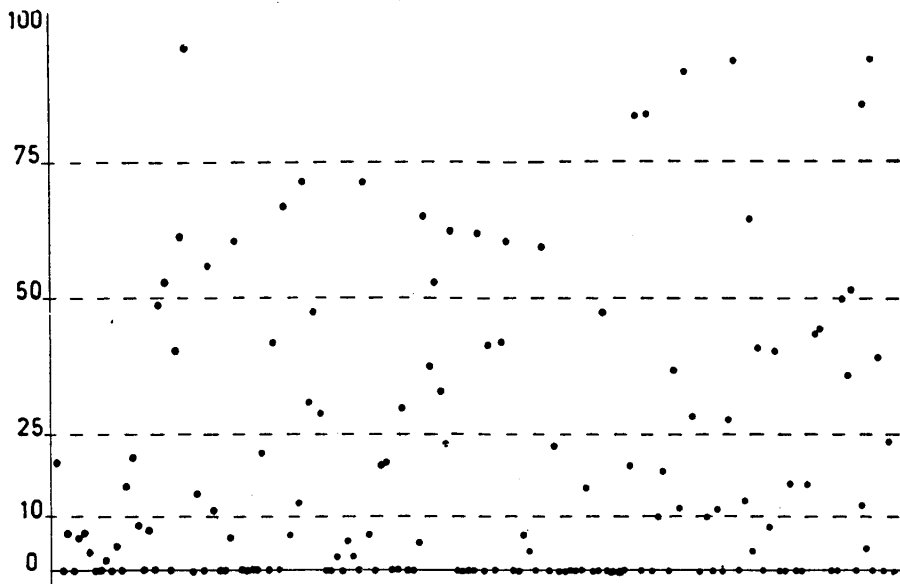


Fig. 2. Distribution of the hyperglycaemic index determined in Reiter's series.

It appeared from REITER's conclusions that normal conditions were found in one half of 36 manic-depressive patients, whereas the other half showed hyperglycaemia of all degrees and all types, from quite mild to definitely diabetic types. The possibility of any effect of phases, affective level or vegetative tonus anomalies could neither be definitely demonstrated or excluded, but was eclipsed by constitutional factors. Among

40 schizophrenic patients more than half were found to respond normally, whereas some responded (regardless of the course) hypoglycaemically. In some cases with pronounced affinity to catatonic and paranoid states, slight alimentary hyperglycaemia was generally found. In epileptics, hyperglycaemia and hyperglycaemia with a high incidence were demonstrated, the latter with pronounced relation to endocrine disturbances of more fundamental importance.

These conclusions correspond exactly to those we can draw from our results.

When REITER's series is analysed with the aid of the McCOWAN index, it appears that 66 out of the 148 patients examined were outside the limit of the normal series as this limit has been fixed by definition. In our series, 84 out of the 111 patients examined were outside this limit. There is thus apparently a certain divergence between the two series, but this is due to the great excess of epileptics in the series of "Kolonien Filadelfia".

It seems difficult to draw definite conclusions from the calculation of the hyperglycaemic index according to McCOWAN's method both with regard to the affective level of the patients and the prognosis. McCOWAN pointed out in his study that it should be possible by means of repeated glucose tolerance tests to find some suggestion as to the patient's state; as already mentioned, the acute depressions should thus have a highly increased index, which would decrease when the condition improved.

Our own series unfortunately contains only few duplicate or multiple analyses, and it shows distinctly that conclusions should not be too hastily drawn from these duplicate tolerance tests. A female patient was admitted here for the first time with the diagnosis of constitutional psychopathy and showed the indices 18 and 21 with some time's interval. The patient was discharged, but re-admitted soon after; the glucose tolerance then gave the following results: 6, 57, and 16, the last two values determined at an interval of one week.

REITER's series included three cases with duplicate analyses, Cases 12, 26 and 29: Case 12 with pronounced mania, 4.5, about 4 months later, pronounced melancholia, less than 0. Case 26 (circular psychosis), March 27, 1923, mania, 0; June 28, calm, even-tempered, 56. Finally, Case 29 with dementia paranoides, on both occasions the affective level was described as very hallucinated, absorbed in reacting on this: H. I. normal on both occasions.

SCHOU mentioned in his study (1945) that he had performed 120 tolerance tests in all in 10 patients with manic-depressive psychosis. In 8 of these the tolerance curves were found to be high (i. e. maximum value

over 200 mg per 100 ml, and two-hour value over 120 mg per 100 ml) in at least three of the 10 tolerance tests performed in each patient, though between these he also found normal curves. It was further pointed out that patients in the manic phase had a higher tolerance curve on the average than those in the melancholic phase. SCHOU's study shows a number of curves, and the interpretation of curves mentioned above also seems to agree with most of the analyses, the hyperglycaemic index can also be approximately calculated from these curves. The results found here apparently do not give the same distinction between the manic and the melancholic phases, the values are often identical, though in either case outside the normal range. The range of variation found in SCHOU's series, compared with the observations of other investigators makes it difficult to agree entirely with the author in his conclusion: "A single alimentary tolerance test is insufficient, and the value of several previous publications, e. g. REITER's, has thus been reduced".

It seems permissible to conclude from our small series and from the values stated in Danish and foreign literatures that an estimate of the value of the alimentary glucose tolerance test in psychiatry is very limited when the question is to establish psychiatric diagnoses, but in the case of organic disorders, hormonal disturbances etc., it may be of importance.

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