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**Physicochemical Changes in Blood Serum of Patients with Schizophrenia Treated by Hypoglycemic Shock.**

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Since the report of Sakel<sup>1</sup> on the successful treatment of certain cases of schizophrenia by producing a hypoglycemic shock with the use of insulin, there has been increasing interest in the study of the physiological, psychological and chemical changes that occur during the treatment.

Our previous studies on mental and nervous diseases have been concerned mainly with the physicochemical changes that occur in the blood serum during the different stages of acute insanities. With this previous experience we thought it of interest to study the changes that may occur during the shock treatment with insulin.

The method of treatment is, with slight modifications, essentially that suggested by Sakel.<sup>2</sup>

In the present communication we shall not be concerned with the clinical results or changes in the individuals treated, but exclusively with the changes observed at different periods of the treatment. This report includes the result of 23 different days of treatment of 8 patients. The bloods were taken during fasting (*i. e.*, before the insulin was given), during the coma or deep shock, and finally 15 to 20 minutes after the administration of glucose intravenously, given to terminate the shock or coma. At the same time that blood was taken for the study of the proteins, a sample of oxalated blood was also taken to determine the amount of glucose.

The methods used in this study are the same as those reported previously.<sup>3</sup>

We notice a change in the specific gravity at the time of the coma, which continues after termination. This increase we attribute to dehydration, which is probably due to the marked perspiration before the patient gets into shock. This loss of water can easily account for this change in the specific gravity. The changes in specific gravity at coma varied from a decrease of .0002 to an increase of .0026.

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<sup>1</sup> Sakel, M., *Wien. med. Wchnschr.*, 1934-35, **84-85**, 1211.

<sup>2</sup> Sakel, M., *Neue Behandlungsmethode der Schizophrenie* Verlag Moorits Perles, Vienna, 1935.

<sup>3</sup> Zozaya, J., *J. Biol. Chem.*, 1935, **110**, 599.

The changes in viscosity are not marked in the average figures but in individual cases there were times in which we observed a marked increase up to 0.15.

We notice a marked increase in the total protein at the coma, with a further increase at termination. This increase in part at least we attribute to the concentration of the blood by dehydration, but there is no doubt a further mechanism which actually increases the amount of total protein, for there is a certain shift in the proportions of the different protein fractions (percentage of total protein, of albumin, of pseudoglobulin, and of euglobulin). This increase becomes most marked after termination, at which time we observe in the great majority of cases a marked increase in the euglobulin fraction.

Of the 23 bloods examined, 17 showed a definite increase in euglobulin, or 74%. Of those which did not show the increase, 3 came from the same patient who never reacted favorably to the treatment.

This increase in the euglobulin we feel is the most significant of the changes observed, for it occurs immediately after the injection of glucose, the average increase being 0.39 gm., a significant amount.

With this change we observe the corresponding changes in "bound water" and "free water", the latter decreasing 2.6 cc. per 100 cc. of blood from the fasting time.

The albumin-globulin ratio can be seen to have changed from 1.86 during fasting to 1.57 after termination, with a slight decrease during coma.

The glucose percentage in the blood is interesting, for we observed as low as 9 to 48 mg. per 100 cc. of blood during coma. It is of interest to note that different individuals have different sugar levels during coma.

The changes in the cholesterol in the serum are slight and we do not give them any importance.