

Fluctuations of the Concentration of "Blood-sugar" in Vitro.***ISRAEL S. KLEINER.**

From the Department of Physiological Chemistry, New York Homeopathic Medical College and Flower Hospital, and the Biological Laboratory, Cold Spring Harbor, L. I.

In previous reports we have discussed the behavior of the blood-sugar under various conditions. It was first shown¹ that when blood from diabetic dogs was dialyzed against Ringer's solution the sugar dialyzed out at an irregular rate as compared with normal blood containing added glucose. (Hirudin, or novirudin, was used as the anticoagulant in all experiments.) In some instances, and especially when the determinations were made at short intervals, the curves were most irregular, sometimes apparently indicating a formation of sugar under the influence of dialysis. We therefore subjected diabetic blood to short periods of dialysis, after which the blood was transferred to a glass vessel and blood-samples were taken every 15 or 20 minutes. These blood-sugar curves also showed irregularities²; sometimes figures were obtained which exceeded the original values before dialysis. We have since studied this phenomenon further and wish to report the observation that this irregularity following dialysis almost invariably occurs in diabetic blood (dog or human) particularly if the initial sugar value is quite high. With concentrations of 270 mg. per 100 cc. or less, the fluctuations are not as marked, or may even be absent.

As a matter of routine we then conducted control experiments in which the blood was not subjected to dialysis or any other procedure, expecting a slow, regular, downward trend, due to glycolysis. We were surprised to find similar fluctuations in both dog and human diabetic blood, again noting that often the original blood-sugar value was exceeded and also that the greatest fluctuations occurred at the higher levels. Even normal blood to which glucose was added yielded similar irregular curves, but if no glucose was added there occurred only the regular glycolysis.†

The curves are not uniform in character; the peaks and troughs

* Aided by a grant from the Littauer Foundation.

¹ *J. Biol. Chem.*, 1918, **34**, 471.

² *Am. J. Physiol.*, 1929, **90**, 410.

† Thirty-one experiments were performed on blood from 12 diabetic patients; 25 on blood from 3 diabetic dogs; 18 on blood from 11 non-diabetic patients; and 18 on blood from 9 normal dogs.

do not fall at corresponding points. The fluctuations range from 10 to 40 mg. per 100 cc. (or even more) in 15 or 20 minute periods and are not due to the activity of microorganisms. Further studies on the source, identity, and behavior of this reducing substance are in progress.

5296

Value of Hexuronic Acid in the Treatment of Graves' Disease with Suprarenal Cortex.

DAVID MARINE, EMIL J. BAUMANN AND BRUCE WEBSTER.*

From the Laboratory Division, Montefiore Hospital, New York.

In 1921¹ and in 1924² we reported 20 cases of Graves' disease treated with a glycerol extract of fresh ox suprarenal cortex. This treatment produced very striking improvement in 12 to 15 days in the following particulars, namely (1) a gain in body weight, (2) a gain in muscle strength, (3) disappearance of diarrhea, (4) control of excessive menstrual flow and (5) a marked decrease in the metabolic rate, approaching normal after 2 to 4 months.

During the past 6 years we have treated approximately 50 additional cases by this method with the same general results.

In 1928 Szent-Györgyi³ isolated a hexuronic acid from suprarenal cortex which is easily destroyed by exposure to air. In the preparation of our suprarenal cortex emulsion any hexuronic acid present would probably be destroyed. We, therefore, thought that possibly more effective results might be obtained if our treatment with suprarenal cortex were supplemented by concentrates of freshly prepared hexuronic acid. The following are the results obtained to date:

Case I. Female, married, age 32, No. 18012. Patient had acute rheumatic fever in 1926 and diphtheria in July, 1929. Following the diphtheria, the patient noted weakness, palpitation, swelling of the ankles and sweating. Thyroid enlargement was noted in August, 1929, for which she was treated with Lugol's solution for 3 weeks. On admission the patient had all the symptoms of a severe Graves' disease in addition to a rheumatic cardiac disability.

* Fellow National Research Council.

¹ Marine, D., and Shapiro, S., *Endocrinol.*, 1921, **5**, 699.

² Shapiro, S., *Endocrinol.*, 1924, **8**, 666.

³ Szent-Györgyi, A., *Biochem. J.*, 1928, **22**, 1387.