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Studies in alimentary hyperglycemia and glycosuria.

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Using a modification of the Lewis and Benedict method¹ for the estimation of sugar in the blood the normal value seems to be between 0.09 and 0.12 per cent. Blood was examined in the morning before the patients had anything to eat or drink, the urine from a simultaneous half-hour period being tested for sugar.

Applying the above procedure it was found that in uncomplicated nephritis the blood sugar ranged from 0.12 per cent. in mild cases to 0.26 per cent. in severe cases with marked nitrogen retention. Cases of glycosuria upon admission were excreting anywhere from a mere trace to 6 or 7 per cent. sugar in the 24-hour specimen of urine. These cases seemed to fall into two distinct classes; (1) those having a normal or nearly normal morning blood sugar with urine sugar free by ordinary tests; (2) those having a high morning blood sugar (0.3 per cent. or over) and a comparatively small amount of sugar in the urine. In the former class were found the cases of "mild diabetes" and cases of hyperthyroidism; the latter class included cases with marked constitutional symptoms and definite signs of nephritis—"severe diabetes."

Tests of alimentary hyperglycemia and glycosuria were begun in the morning on an empty stomach. A specimen of blood and a half-hour specimen of urine were collected preceding the administration of a small quantity of glucose (30 to 90 grams in 400 c.c. weak tea). Following this the blood was tested at 15-minute intervals for the first 1½ hours and at ½ hour intervals for the succeeding 4½ hours. Half-hour specimens of urine were collected. The percentage of sugar was determined in the whole blood, plasma, unwashed corpuscles and urine. The units hemoglobin, percentage of corpuscles to whole blood and urinary se-

¹ Myers, V. C., and Bailey, C. V., *J. Biol. Chem.*, 1916, XXIV, 147.

cretion in cubic centimeters per minute were also determined in each specimen.

In an apparently normal subject the whole blood contained 0.12 per cent. glucose, the percentage in the plasma being slightly lower, and that in the unwashed corpuscles, slightly above that in the whole blood. The sugar in the urine was apparently about the same as in the plasma.¹ Following the ingestion of 75 grams glucose in 400 c.c. fluid the sugar in the blood rose evenly and rapidly, reaching its highest point in about 1 hour, returning to normal by the end of 2½ hours, falling below normal at the third hour, and from the fourth to the sixth hour retaining its normal level. The increase and decrease in the plasma seemed to be a little more rapid than in the whole blood, although the difference was very slight. The hemoglobin dropped 3 to 5 per cent. in from 15 to 70 minutes, then increased rapidly, later more slowly, reaching its normal in from 1½ to 3 hours. Urinary secretion decreased during the development of the hyperglycemia, increasing as the blood sugar decreased. The sugar in the urine apparently increased at the same rate as in the blood up to a concentration of 0.17 per cent. From this point the increase was much more rapid in the urine, so that when the blood sugar had reached its highest point, 0.23 per cent. at the end of one hour, the urine contained 0.9 per cent. sugar. The decrease in the urine sugar was rapid for the succeeding hour, then much slower, so that the normal concentration was not reached until about 6 hours after the ingestion of the sugar.

In a case of renal diabetes there was an initial hypoglycemia with a marked glycosuria (3 per cent.). The blood sugar curve was of the normal type, but the urine sugar curve abnormally high.

In a case of early diabetes the initial blood sugar and urine sugar values were normal. Alimentary hyperglycemia was rapid, the highest point being reached in about one-half hour, return to normal taking place in less than 2 hours. The urine sugar curve was abnormally high with a sluggish return to normal.

In diabetes of long standing without signs of nephritis, the initial blood sugar value was high (0.2 per cent.), the urine value normal. Blood sugar and urine sugar curves were of the previous

¹ See Myers, V. C., *PROC. SOC. EXPER. BIOL. AND MED.*, 1916, XIII, 180.

type, but the blood sugar curve was higher and of longer duration.

Cases of diabetes with signs of nephritis showed an initial high blood sugar with comparatively low urine sugar. The blood sugar curve increased at about the normal rate but return to normal did not take place before $4\frac{1}{2}$ to 6 hours. The urine sugar curve was low, the highest concentration being 1.5 per cent., although the blood at that time contained 0.31 per cent. sugar.

Cases of chronic nephritis showed an initial high blood sugar, 0.16 per cent., with urine normal. Alimentary hyperglycemia was delayed and prolonged, the highest point being reached in 2 hours and return to normal not taking place before 4 to 6 hours. The highest point in the urine sugar curve was 0.5 per cent., the blood at that time containing 0.37 per cent.

A case of chronic parenchymatous nephritis showed a constant glycosuria of 0.5 per cent. This was independent of the blood sugar up to the latter's concentration of 0.21 per cent. In a second test where the blood sugar reached 0.4 per cent. the urine sugar increased to 1.0 per cent., later decreasing and continuing at 0.5 per cent., the blood containing 0.2 per cent.

Cases of myxedema and hypopituitarism were also studied. In these cases the initial blood sugar and urine sugar values were normal. Alimentary hyperglycemia was delayed and prolonged as in nephritis and kidney permeability was greatly decreased.

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The digestibility and utilization of egg-proteins.

By W. G. BATEMAN. (By invitation.)

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Raw egg-white is found to be a decidedly indigestible substance. It may cause diarrhea in dogs, rats, rabbits and men when ingested in any large quantity. Its utilization by the body is poor since it is used only to the extent of from 50 to 70 per cent. Subjects can acquire a certain tolerance for the native protein after ingesting it for several days so that it no longer causes diarrhea and is somewhat better utilized.