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Effect of Saccharin and of Galactose on the Blood-Sugar.*

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Syllaba¹ reported the existence in man of a conditioned hepatic reflex by which a significant rise in the blood-sugar level is produced 5 to 15 minutes following ingestion of saccharin. According to his opinion, based on the study of 9 cases, this reflex is released partly by contact of the solution of saccharin with the walls of the small

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¹ Syllaba, G., *Guy's Hosp. Rep.*, 1930, **80**, 230.

intestine, and partly by a psychic reaction depending on the sweet taste of saccharin. More recently Pannhorst² reported observations on reflex hyperglycemia elicited by rinsing the mouth with a solution of saccharin.

Blöch and Weiss³ described a rise in the dextrose fraction of the blood, beginning 5 minutes after administration of 40 gm. of galactose to 9 patients with various diseases. They ascribed the early part of this rise to release of sugar from the liver. Harding and Grant⁴ obtained similar results in most of their subjects, but made no determinations at the 5-minute period. The last-named authors raise the question of galactose-dextrose conversion versus release of sugar from the liver as an explanation of the rise in the dextrose curve.

Twenty normal individuals were directed to drink slowly on the fasting stomach, 200 cc. of water containing 0.15 gm. of saccharin. This amount was chosen as approximating most nearly the taste of the solution used for dextrose tolerance tests. Specimens of blood were taken from a finger for blood-sugar determinations before and at intervals of 5, 15, and 30 minutes after the ingestion of saccharin. Capillary blood was chosen in order not to overlook minor additions of sugar from the liver which might have become obliterated during passage through the muscles if venous blood had been examined.

Forty gm. of galactose were dissolved in 400 cc. of water, flavored with lemon juice and administered by mouth on the fasting stomach. Specimens of blood were obtained from the cubital vein before, and 5, 15, and 30 minutes after, administration of galactose. The dextrose and galactose fractions of these blood samples were determined separately by Raymond and Blanco's⁵ modification of the method of Somogyi.

This experiment was performed on 21 normal individuals and on 14 patients with diabetes.

From the chart it is seen that after ingestion of saccharin there was no rise, but if anything a slight fall in the average blood-sugar of our normal subjects.

Following administration of galactose, a small rise in the average dextrose fraction of the blood was observed in normal individuals at the 15- and 30-minute periods. In our diabetic patients a considerable elevation of the dextrose fraction was seen, beginning 15

² Pannhorst, R., *Z. f. klin. Med.*, 1935, **127**, 688.

³ Blöch, J., and Weiss, M., *Z. f. d. ges. exp. Med.*, 1929, **69**, 453.

⁴ Harding, V. J., and Grant, G. A., *J. Biol. Chem.*, 1933, **99**, 629.

⁵ Raymond, A. L., and Blanco, J. G., *J. Biol. Chem.*, 1928, **79**, 649.

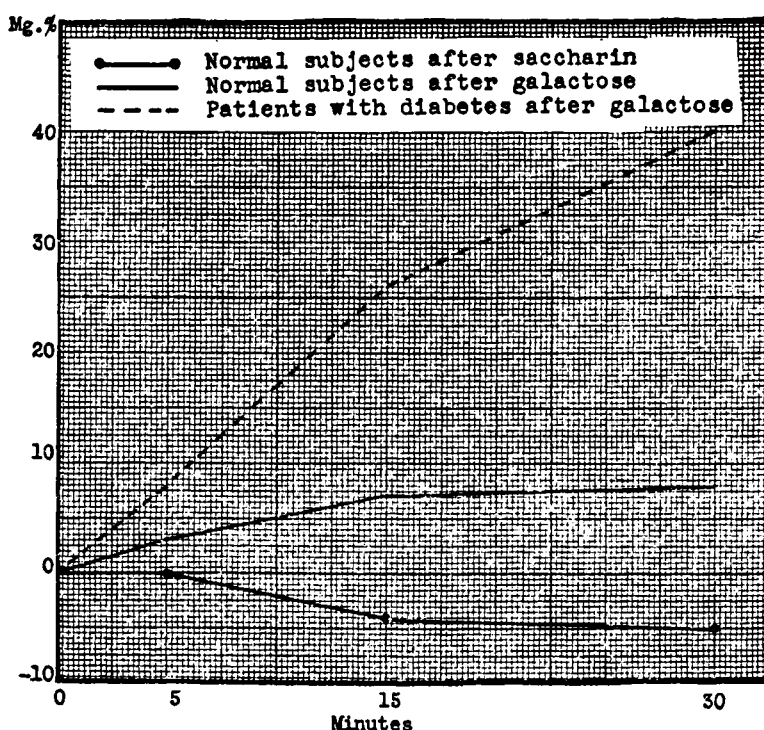


FIG. 1.

Chart showing composite changes in the total blood-sugar of 20 normal subjects after saccharin; and in the dextrose fraction of the blood of 21 normal individuals and 14 diabetic patients after galactose.

minutes after ingestion of galactose. Among 14 patients with diabetes, only one failed to show this.

In common with Roe and Schwarzman⁶ we ascribe this elevation of blood-dextrose to failure on the part of the diabetic organism to utilize dextrose formed by conversion of galactose. For this reason, the small rise in the dextrose fraction of the blood observed in normal individuals, if significant at all, must be likewise due to conversion of galactose. Our observation that only a few normal and diabetic subjects showed small amounts of galactose in the blood at the 5-minute period, while practically all had considerable amounts of this sugar in the blood at the 15-minute period, supports this view.

Our data on the galactose fraction of the blood, to be published later, confirm the finding of Roe and Schwarzman that tolerance to galactose is not disturbed in diabetes mellitus.

Conclusion. Following oral administration of either saccharin or galactose, no evidence was obtained of a reflex hyperglycemia.

⁶ Roe, J. H., and Schwarzman, A. S., *J. Biol. Chem.*, 1932, **96**, 717.