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Carbohydrate Utilization in the Hypophysectomized Dog.*

SAMUEL SOSKIN, R. LEVINE AND R. E. HELLER.

From the Metabolic Laboratory of the Department of Physiology, Michael Reese Hospital, and the Department of Physiology, University of Chicago.

We have recently demonstrated the existence of a direct relationship between the height of the blood sugar level and the rate of sugar utilization in normal dogs. We have also shown that this same relationship persists (with some quantitative differences) during the absence of insulin, after total pancreatectomy in dogs.[1] These facts render it imperative to consider the characteristic blood sugar levels of different physiological preparations in any attempt to compare their relative abilities to utilize carbohydrate. The present preliminary report concerns the influence of the removal of the hypophysis upon sugar utilization, in the light of the above considerations.

The utilization of carbohydrate at various blood sugar levels in eviscerated hypophysectomized dogs, was determined under the same nutritional and experimental conditions and using the same methods of calculation as detailed in our previous publication.[1] The animals had been hypophysectomized 4 to 8 weeks previously by a method slightly modified from that of Dandy.[2] The functional lack of the gland was indicated by the hypoglycemic effects of fasting[3] before the experiments, and its anatomical absence was confirmed by autopsy examinations after the experiments.

The results are plotted in Fig. 1, where they may be compared to the smooth curves representing our previous results in normal and depancreatized animals. It may be seen that the hypophysectomized dogs utilized less sugar than the normal animals, at any given blood sugar level. They also used less sugar than the depancreatized animals at the blood sugar levels ordinarily maintained by the diabetic organism (*i. e.*, above 350 mg. %). More specifically, the hypophysectomized dog at its usual post-absorptive blood sugar levels (35-55 mg. %) utilizes carbohydrate about one-half as effectively as the normal dog in the normal blood sugar range (60-

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1 Soskin, S., and Levine, R., *Am. J. Physiol.*, 1937, **120**, 761.

2 Dandy, W. F., and Reichert, F. L., *Bull. Johns Hopkins Hosp.*, 1925, **37**, 1.

3 Soskin, S., Mirsky, I. A., Zimmerman, L. M., and Crohn, N., *Am. J. Physiol.*, 1935, **114**, 110.

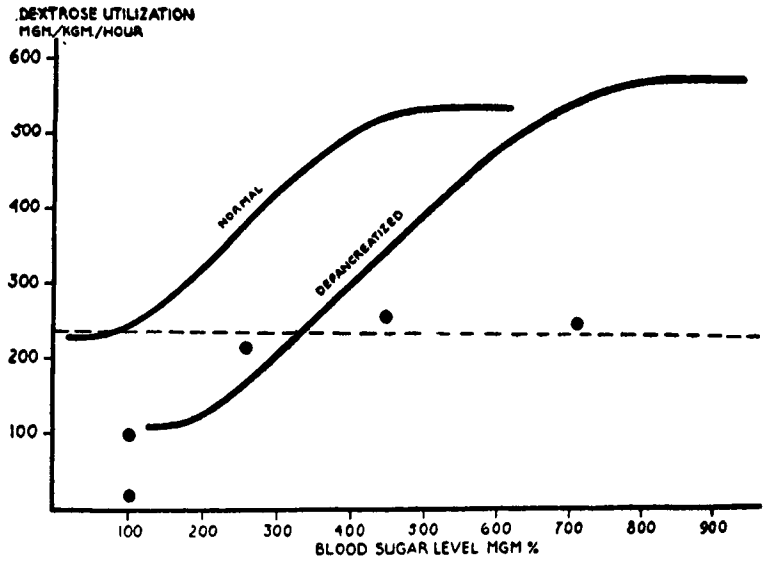

FIG. 1.

Each black dot represents an experimental result on a different hypophysectomized dog. The smooth curves, included for comparison, are derived from a larger number of similar experiments previously reported.[1] The broken horizontal line indicates the rate of dextrose utilization of normal dogs within the normal glycemic range.

80 mg. %). Within the range of blood sugar levels usually maintained by well nourished "Houssay" animals (350-550 mg. %)[4] the hypophysectomized animal utilizes sugar at rates which vary from that of the depancreatized animal to two-thirds of that rate.

Some of our data also indicate the modified intermediary processes which accompany the diminished use of carbohydrate after hypophysectomy. Thus, a comparison of the average rate of fall of muscle glycogen values, for all the experiments in our previous[1] and present work is as shown in Table I.

TABLE I.

	Av. Initial Muscle glycogen mg./%	Av.Final Muscle glycogen mg./%	Av. Decrease in Muscle glycogen mg./%/hour
Normal	511	355	43.1
Depancreatized	337	217	38.4
Hypophysectomized	584	570	4.1

A similar comparison of the average rate of rise in blood lactic acid levels is as shown in Table II.

[4] Soskin, S., Mirsky, I. A., Zimmerman, L. M., and Heller, R. E., *Am. J. Physiol.*, 1936, **114**, 648.

TABLE II.

	Av. Initial Blood lactic acid mg./%	Av. Final Blood lactic acid mg./%	Av. Increase in Blood lactic acid mg./%/hour
Normal	50.5	106.7	15.2
Depancreatized	118.1	183.2	21.0
Hypophysectomized	27.3	62.8	9.5

It is evident that the muscle glycogen of the hypophysectomized animal is relatively stable and is not as rapidly catabolized as in the normal and depancreatized animal.

Taking into account the influence of the blood sugar level upon the rate of utilization of sugar, our results clearly show the diminished utilization of carbohydrate by the hypophysectomized dog, as compared to both the normal and the depancreatized animal. These results are important in explaining the hypoglycemic effects of fasting in both the hypophysectomized and the hypophysectomized-depancreatized animal, and the amelioration of the diabetic syndrome in the latter animal. It is obvious that these effects of hypophysectomy cannot be due to an increased rate of sugar utilization. Sugar utilization is actually diminished and, therefore, the hypoglycemia and modification of the diabetes must be attributed to a proportionately greater decrease in the rate of new formation of sugar by the liver. This work confirms and extends our previous report upon the influence of hypophysectomy on gluconeogenesis in the normal and depancreatized dog.[3]

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A Method for Isolation of Ascorbic Acid Fermenting Bacteria.

ARTHUR ISAAC KENDALL AND HERMAN CHINN.

From the Departments of Chemistry and Research Bacteriology, Northwestern University Medical School, Chicago, Illinois.

The objectives of this preliminary communication are two: to describe a procedure for the isolation of ascorbic acid fermenting bacteria, from suitable material, and to describe briefly the results obtained with this procedure. This preliminary communication does not presume completeness either with respect to the types or strains of bacteria which may actually utilize ascorbic acid for energy, or with regard to the patterns of fermentation of this substance by specific strains of bacteria.