9225

Influence of Extracts of Anterior Lobe of Pituitary on Glucose Oxidation and Glycogen Storage.

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It was mentioned previously[1] that injection of an anterior lobe extract decreased very markedly the amount of carbohydrate oxidized by normal rats following glucose feeding. The present experiments were undertaken in order to see what was the fate of the glucose which failed to be oxidized.

Male rats* were fasted for 24 hours and were given an intraperitoneal injection of one cc. of anterior lobe extract† 1½ to 3 hours prior to the feeding of a known amount of glucose by stomach tube. The respiratory metabolism was measured for 3 hours after the glucose feeding by the gravimetric procedure of Haldane. The animal was then quickly anesthetized by injection of pentobarbital. The 2 gastrocnemii were removed for separate glycogen analyses, a blood sample was drawn from the *vena cava,* the gastrointestinal tract was removed for the determination of the amount of glucose which had not been absorbed and finally the entire liver was used for glycogen analysis. Details of the analytical procedures used are described in a previous paper.[1] Control animals were given an intraperitoneal injection of one cc. of extract heated previously for 15 minutes in boiling water. In a second series of experiments the same extract injections were given and in addition 0.05 units of insulin per 100 gm. rat were injected subcutaneously immediately before the glucose feeding.

The data in Tables I and II indicate that the animals injected with the active extract oxidized less glucose and deposited more liver and muscle glycogen than did the controls injected with the heat-inactivated extract. The amounts of liver and muscle glycogen and blood sugar present before the glucose feeding were determined in a series

[1] Fisher, R. E., Russell, J. A., and Cori, C. F., *J. Biol. Chem.*, 1936, **115**, 627.

* The rats used were of the Wisconsin strain and were obtained through the courtesy of Dr. Neff of Anheuser-Busch, Inc., after having been used for vitamin B assay.

† The extract was prepared by L. J. Wade from beef anterior lobes by the method of Evans, Cornish and Simpson.[2] The same extract was used for all experiments; it was kept frozen in small individual bottles until used.

[2] Evans, H. M., Cornish, R. E., and Simpson, M. E., PROC. SOC. EXP. BIOL. AND MED., 1930, **27**, 101.

TABLE I.
Average Values Obtained 3 Hours after Glucose Feeding.

No. of rats	Body wt., gm.	Liver wt., gm.	Blood sugar, mg. %	Liver glycogen, %	Muscle glycogen,* mg. %	O_2 used cc./100 gm./hour	Respiratory quotient	Remarks
9	120	5.89	204	2.99 ±0.55	940 ±145	188	.774	1 cc. active extract
7	130	5.95	125	2.24 ±0.23	798 ±150	175	.879	1 cc. heated extract
6	126	5.75	171	3.48 ±0.38	939 ± 76	196	.775	1 cc. active extract plus .05 units insulin
7	128	5.72	125	2.69 ±0.57	887 ±142	162	.898	1 cc. heated extract plus .05 units insulin

*Average of right and left gastrocnemius.

TABLE II.
Calculated from Table I. All values are given in mg. per 100 gm. rat per 3 hours.

No. of rats	Glucose retained in: Blood and tissue fluids	Liver	Muscle	Glucose oxidized	Total	Glucose absorbed	% accounted for
9	57	142	253	147	599	940	63.7
7	17	98	182	387	684	933	73.3
6	40	154	252	159	605	884	68.4
7	17	116	226	405	764	945	80.8

of control animals‡ fasted previously for 24 hours. The average values of 0.1% liver glycogen, of 434 (±52) mg. % muscle glycogen and of 90 mg. % blood sugar, when deducted from the corresponding values in Table I, permit a rough estimate to be made of the percentage of absorbed sugar that is accounted for by oxidation plus glycogen storage. In this calculation it is assumed that the muscles constitute 50% of the body weight and that the blood sugar is in equilibrium with 50% of the body weight. The percentages thus accounted for are entered in the last column of Table II; they are shown for comparative purposes only and are not meant to represent a balance for which a determination of glycogen deposition in the entire musculature and in tissues other than muscle would be required. Urinary excretion of sugar was determined in some animals but was found to be negligible.

‡ Some of these animals were injected with one cc. of active extract one hour before the sampling of the tissues with no apparent effect on the glycogen levels.

The blood sugar level and the O_2 consumption were higher in the rats injected with active extract than in the controls. The dose of insulin injected produced in both groups of animals only slight changes in carbohydrate oxidation and glycogen storage.

Summary. Rats fasted for 24 hours, when injected intraperitoneally with one cc. of anterior lobe extract shortly before glucose feeding, show a marked decrease in the amount of carbohydrate oxidized and a corresponding increase in the amount of glycogen deposited in liver and muscles, when compared with control rats treated exactly alike and injected with 1 cc. of heat-inactivated extract.

9226 P

Relative Effectiveness of Iodine in Thyroxin, Diiodotyrosine, and Potassium Iodide in Inducing Metamorphosis in Amphibia.*

ALLEN LEIN. (Introduced by Bennet M. Allen.)

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It has been demonstrated repeatedly by several workers that the tadpole test for thyroid is an extremely sensitive one, and this method has been used extensively in determining the amount of thyroid-like activity in various substances. Using this test, Swingle,[1] in a series of publications, advanced evidence which indicated that iodine appeared to function independently as a hormone without the intermediation of the thyroid gland. This hypothesis received confirmation from the work of several additional experimenters. Among the iodine-containing compounds used in these tests, thyroxin and diiodotyrosine, due to their chemical similarity, were considered to be of particular significance. It was shown that thyroxin and diiodotyrosine produce the same physiological response qualitatively but that the former is much more active than the latter.[2, 3]

The present work was undertaken in order to obtain quantitative data on the relative effectiveness, *per unit of iodine*, of thyroxin,

* The writer wishes to express his gratitude to Prof. B. M. Allen and Mr. Boris Krichesky for suggesting this problem and for their many valuable suggestions throughout this work.

1 Swingle, W. W., *Endocrinol.*, 1918, **2**, 283; *J. Exp. Zool.*, 1919, **27**, 397, 417; *Science*, 1922, **56**, 720; PROC. SOC. EXP. BIOL. AND MED., 1926, **24**, 205.

2 Gaddum, J. H., *J. Physiol.*, 1927, **64**, 246.

3 Romeis, B., *Klin. Wochensch.*, 1922, **1**, 1262.