Proceedings
of the
Society
for
Experimental Biology and Medicine

VOL. 69 NOVEMBER, 1948 No. 2

SECTION MEETINGS

CLEVELAND	
Western Reserve University	October 8, 1948
MINNESOTA	
Mayo Foundation	October 15, 1948
PACIFIC COAST	
University of California	October 2, 1948
ROCKY MOUNTAIN	
Colorado A. & M. College	October 30, 1948
WESTERN NEW YORK	
Cornell University	October 30, 1948

16664 P

Growth of Hypophysectomized Rats Injected with Growth Hormone and Fed on Different Proteins.

BACON F. CHOW AND ROY O. GREEP.

From the Department of Nutrition, E. R. Squibb & Sons, New Brunswick, N.J., and Harvard School of Dental Medicine, Boston, Mass.

A few studies [1-5] dealing with the relationship between the hypophysis and nutrition have been reported, but no systematic investigation on the nutritional requirements of hypophysectomized rats has yet been made. In this communication are recorded our preliminary results of the growth studies of hypophysectomized rats fed with proteins of different nutritive values.

Method. The procedure for the growth study is essentially that of Osborne and Mendel.[6] Five groups (10 animals each) of hypophysectomized rats were fed isocaloric diets containing 30% test proteins, 32% Amidex,* 24% Crisco, 2% Cod Liver Oil, 8% yeast, and 4% of a salt mixture. The vitamin supplements for each one hundred grams of the diet are:

	mg
Thiamine HCl	0.3
Riboflavin	0.3
Niacin	2.0
Pyridoxine HCl	0.2
Calcium pantothenate	2.0
Choline chloride	100.0

1 Lee, M. O., and Ayres, G. B., *Endocrinology*, 1936, **20**, 489.

2 Samuels, L. T., Reinecke, R. M., and Bauman, K. L., *Endocrinology*, 1943, **33**, 87.

3 Samuels, L. T., *Recent Progress in Hormone Research*, 1947, **1**, 147.

4 Gordan, G. S., Bennett, L. L., Li, C. H., and Evans, H. M., PROC. SOC. EXP. BIOL. AND MED., 1947, **65**, 317.

5 Gordan, G. S., Bennett, L. L., Li, C. H., and Evans, H. M., *Endocrinology*, 1948, **42**, 153.

6 Osborne, T. B., and Mendel, L. B., *J. Biol. Chem.*, 1926, **69**, 661.

* Amidex is dextrine obtained from Corn Products Refining Co. of N.Y.

Biotin	0.01
Folic acid	0.025
Inositol	10.0
p-Aminobenzoic acid	25.0

The food consumption and the weight of the test animals were recorded twice weekly. During the entire test period of three weeks, the animals received subcutaneously 0.1 mg of a purified growth hormone preparation, isolated from beef pituitary glands, every morning.

Results. The data (see the accompanying table) demonstrate that animals on a protein-free diet failed to survive for even a week in spite of their average consumption of approximately 5 g per rat per day. In contrast with this the normal, unoperated rats of the same age survived for more than 2 weeks on the same protein-free diet in spite of their gradual loss of weight. The weights of animals on the test protein diets increased significantly. The increase was the smallest for soya protein diet and the greatest for the casein diet, even though the animals on soya protein consumed approximately the same amount of food as the animals on either the vitamin-free casein or lactalbumin diets. After the second and third weeks of feeding, the food consumption by rats of all groups dropped markedly. The increase in body weights was likewise less pronounced than that of the first week and could not be accentuated even when another 0.1 mg of growth hormone was injected late in the afternoon. This seems to indicate that the submaximal growth is not due to the insufficiency of growth hormone.

Our preliminary data therefore leads us to believe that soya protein, which has been demonstrated to be inferior for normal rats, did not support the growth of hypophysectomized rats as well as the proteins of higher quality, such as casein and lactalbumin. However, in this experiment the superiority of lactalbumin over casein, so often demonstrated in the maintenance of or in the promotion of the growth of normal rats, failed to reveal itself in the growth of the hypophysectomized rats.

It has been demonstrated that hyperthyroidism[7-9] in rats may increase the requirements of some of the known vitamins and perhaps some unknown nutrient factors present in liver or yeast.

Since our growth hormone preparation was most likely contaminated with thyrotropic hormone, it is possible that our observed difference in the growth promoting properties of the samples of proteins may be explained not on the basis of the amino acid content but on the contaminating nutritional factors in the test proteins. In any case, our data demonstrate that the quality of proteins in the diet can affect the growth of hypophysectomized rats, and this factor must now be emphasized in the assay of growth hormone preparations.

TABLE I.
Food Consumption and Body Weights of Hypophysectomized Rats Injected with Growth Hormone and Fed Different Proteins.

	Weeks of feeding							
	0		1		2		3	
Protein fed	F.C.*	Avg wt in g	F.C.*	Avg wt in g	F.C.*	Avg wt in g	F.C.*	Avg wt in g
Protein-free	0	43.7	35	40.0	—	—	—	—
Soya protein	0	45.9	44	55.9	26	57.7	7.6	59.4
Crude casein	0	47.1	56	63.2	30	68.5	34	71.9
SMA vit.-free casein	0	45.5	47	61.3	24	66.3	25	67.5
Lactalbumin	0	44.8	40	58.9	22	64.0	20	68.8

* F.C. = average weight in grams of food consumed per rat per week.

7 Betheil, J. J., Wiebelhaus, V. D., and Lardy, H. A., *J. Nutrition*, 1947, **34**, 431.

8 Ershoff, B. H., PROC. SOC. EXP. BIOL. AND MED., 1947, **64**, 500.

9 Robblee, A. R., Nichol, C. A., Cravens, W. W., Elvehjem, C. A., and Halpin, J. G., PROC. SOC. EXP. BIOL. AND MED., 1948, **67**, 400.