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Thiamin Requirement of Albino Mice.

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Since the preparation of thiamin in pure form, no investigations of the thiamin requirement of the albino mouse have come to the attention of the writer. Previously, Beard¹ and Bing and Mendel² had determined that albino mice required yeast or a suitable extract of yeast or rice polishings for normal growth and prevention of polyneuritis, indicating that mice were susceptible to a deficiency of Vitamin B₁. Likewise Freudenberg and Cerecedo³ have recommended the white mouse as a test animal for antineuritic concentrates and recently Foy and Cerecedo⁴ have determined the growth response of the mouse to various combinations of crystalline B vitamins. In the course of other work at this laboratory it was found that the addition of thiamin to a diet adequate in the fat-soluble vitamins and minerals and containing autoclaved yeast as a source of water-soluble factors made the diet capable of sustaining normal growth in young mice. As a result of this finding it was considered possible to determine the minimal thiamin requirement of the albino mouse using normal growth as a criterion of adequacy.

Experimental. The mice used in these experiments were from a local albino strain used by other departments at this university for various types of investigation, and the strain had been inbred for several years at the time of writing. The normal growth rate was obtained by weaning the mice at 21 days of age on a commercial diet supplemented with occasional fresh meat and lettuce. The basal diet used in the rest of the experiments upon thiamin requirement consisted of sucrose 65, casein 18, butterfat 2, cod liver oil 1, Osborne-Mendel salts 4, and autoclaved yeast 10. The casein was extracted continuously for 96 hours with hot 96% alcohol, then twice with cold 60% alcohol for 16 hours each time. Dry powdered "Yeast Foam" was autoclaved for 5 hours at 15 lb pressure.

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¹ Beard, H. H., *Am. J. Physiol.*, 1926, **75**, 668.

² Bing, F. C., and Mendel, L. B., *J. Nutrition*, 1929, **2**, 49.

³ Freudenberg, W., and Cerecedo, L. R., *J. Biol. Chem.*, 1931, **94**, 207.

⁴ Foy, J. R., and Cerecedo, L. R., *J. Nutrition*, 1941, **22**, 439.

Mice weighing 9 to 10 g at 21 days of age were weaned on the basal diet. Crystalline thiamin was added to the basal diet after a depletion period of 9 to 11 days. The group at each level contained approximately an equal number of males and females. Rats, used as an additional control, were weaned on the basal diet when weighing 42-48 g and after a depletion period of 19 days were given crystalline thiamin as a supplement. Both rats and mice were weighed at 5-day intervals.

Results. Growth responses of mice are shown in Fig. 1. Weight changes are shown beginning at the end of the depletion period. When administration of crystalline thiamin was begun the weight

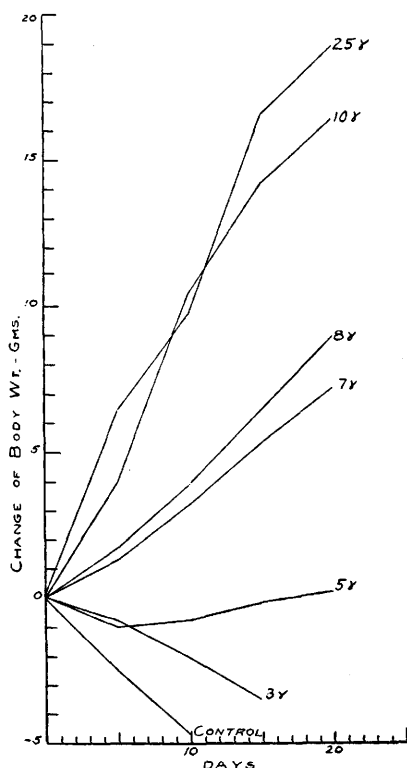


FIG. 1.

Weight change of albino mice receiving various amounts of thiamin. Curves represent average gain or loss of all animals in each group. Groups are as follows:

μg	Animals
3	11
5	9
7	11
8	11
10	3
25	3
0	4

of all animals had remained constant or had begun to decline.

Thiamin added to the basal diet is shown to produce growth in accordance with the amounts administered. Five micrograms per day per animal is sufficient for maintenance of body weight but insufficient to allow growth over the test period. Subnormal weight increases take place when thiamin is given at levels of 5 to 10 μg per animal per day. Ten micrograms daily produced normal growth. All animals receiving thiamin maintained a healthy appearance during the experimental period. No distinction is made between sexes because growth rates of both sexes are the same over the range indicated in this experiment.

Rat controls grew normally when receiving 10 μg of thiamin per day each. Basal diet controls lost weight and showed characteristic symptoms of acute thiamin deficiency after 15-20 days on the basal diet. The diet was thus shown to be deficient in thiamin as judged by the response of both rats and mice receiving it.

Summary. The amount of thiamin required for growth of albino mice has been determined. Five micrograms per mouse per day was found to maintain body weight attained at the time of weaning. Ten micrograms per mouse per day is the minimal level for normal growth. Less than 5 μg per mouse per day results in loss of weight and eventual death.

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Toxicity of Potassium and Phosphate for Normal and Adrenalectomized Rats.

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Several investigators¹ have shown that the potassium ion has a greater toxicity for adrenalectomized animals than for normal animals, and have suggested that this increase in toxic effects of potassium might be due to the derangement of normal relationships between extra- and intracellular electrolytes that follows adrenalectomy. In such a condition one might also expect the phosphate ion to have an increased toxicity since phosphate is an important intracellular anion with metabolism closely related in some respects to that of potas-

¹ Fenn, W. O., *Physiol. Rev.*, 1940, **20**, 377.