8256 P

Vitamin B_1 and Thyroxin.*

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Sure and Smith[1] reported on the protective action of vitamin B against the toxicity of thyroxin administered subcutaneously or orally to the albino rat.

In this investigation attempts were made to balance quantitatively the toxic influence of thyroxin given orally to the rat with a much more concentrated vitamin B_1 extract; also with Williams' crystalline vitamin B_1 (manufactured by Merck).

The vitamin B_1 concentrate was furnished by the Eli Lilly Research Laboratories and is a product that is being tested clinically. This preparation is indicated for parenteral use, each cc. containing 150 Sherman units of vitamin B_1.

Seventy sets of animals in groups of 4 were used for this study, which were litter mates of the same sex. In each set, animal A received a diet deficient only in vitamin B_1, which represented the negative control; animal B received the diet of animal A, and in addition a daily dose of thyroxin; animal C received the same diet, a daily dose of thyroxin, and a daily dose of either the Lilly concentrate or crystalline vitamin B_1; animal D received the same diet, a daily dose of either source of vitamin B_1, but no thyroxin, which represented the positive control. The thyroxin was given daily in doses ranging from 0.05 mg. to 0.2 mg. The Lilly vitamin B_1 concentrate was furnished in doses supplying 1.5 to 30 Sherman units daily. The crystalline vitamin B_1 was administered daily in amounts ranging from 1γ to 300γ or 0.001 mg. to 0.3 mg.

The criterion of complete protection against thyroxin poisoning was not only the ability of the animal to survive but also to make as good a growth as if thyroxin were not introduced as a supplement to the experimental diet.[2]

Lilly Vitamin B_1 Concentrate. The best protection (75 to 100%) was obtained on a daily dose of 0.05 mg. thyroxin. This was afforded by 7.5 to 15 Sherman vitamin B_1 units daily. About two-thirds protection, as judged by gains in body weight, was possible with a daily allowance of 15 units of vitamin B_1, when the daily

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1 Sure, B., and Smith, M. E., *J. Nutr.*, 1934, **7**, 547.

2 Sure, B., PROC. SOC. EXP. BIOL. AND MED., 1933, **30**, 779.

thyroxin dose was 0.1 mg. A daily dose of 30 vitamin B_1 units prevented loss of weight but permitted only little growth when the daily thyroxin allowance was 0.2 mg.

Crystalline Vitamin B_1. While 10γ (0.01 mg.) of crystalline vitamin B_1 seems to antagonize satisfactorily a 0.05 mg. thyroxin dose, complete protection against 0.1 mg. and 0.2 mg. thyroxin has not as yet been reached by as much as a 300γ (0.3 mg.) daily dose of crystalline vitamin B_1.†

Since 1 Sherman unit is equivalent to 2.5γ of crystalline vitamin B_1,[3] it has been possible for us to make observations on the biological value of the Lilly vitamin B_1 concentrate and the Merck's crystalline vitamin B_1, as indicated by unit doses. Since we are unable to secure the same increments of growth on higher doses of crystalline vitamin B_1 on our vitamin B_1 deficient diet[1] as Waterman and Ammerman,[3] and since there seems to be a supplementary relationship between the Lilly vitamin B_1 concentrate and the Merck's crystalline vitamin B_1, the evidence points to the existence of an essential component of the vitamin B complex for the mammalian organism other than vitamin B_1 and vitamin B_2 (the latter being furnished in abundance in our diet by 15% autoclaved beef),—possibly B_4, as originally suggested by Reader.[4]

8257 P

Enzymic Efficiency in Avitaminosis.*

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In previous studies[1] we found that in vitamin B deficiency there is a marked reduction in the efficiency of digestion of pancreatic lipase but no demonstrable disturbance in the activity of either trypsin or erepsin. We have now completed considerable work with other enzymes in vitamin A as well as vitamin B deficiency. A pre-

† Since this material went to press, we have found that a sufficiency of yeast in the diet or administered separately from the ration will antagonize the toxicity of as high a daily dose of thyroxin as 0.2 mg. to the extent of 75 to 100 per cent.

[3] Waterman, R. E., and Ammerman, M., *J. Nutr.*, 1935, **10**, 38.

[4] Reader, V., *Biochem. J.*, 1929, **23**, 689; *Ibid.*, 1930, **24**, 77, 1827.

* Research paper No. 382, Journal Series, University of Arkansas, Fayetteville.

[1] Sure, B., Kik, M. C., and Buchanan, K. S., *J. Biol. Chem.*, 1935, **108**, 19.