The actions of α-tocopherol and protein upon the incisor tooth of the rat, and the influence of vitamin A upon α-tocopherol activity

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In a previous paper (Irving & Budtz-Olsen, 1955) it was reported that hake-liver oil, when included in a vitamin E-free diet, abolished the prophylactic action of α-tocopherol. It was suspected that the large amount of vitamin A in the hake oil might be one of the factors responsible. In this paper results are presented to show that excess vitamin A can considerably modify the action of α-tocopherol.

The prophylactic action of protein added to a vitamin E-free diet was also described in the previous paper, when it was found that the enamel organ, but not the tooth colour, was protected. In this paper, a comparison of the curative actions of α-tocopherol and extra protein is reported. For tooth recovery protein was as effective as α-tocopherol, but the dialuric-acid test remained positive in rats on the diet enriched in protein.

EXPERIMENTAL

Animals. The experimental animals were 270 young albino rats, descended from ancestors of the Wistar strain. Both sexes were used indiscriminately, as the same results were obtained with either. The rats were put on to the experimental diet when they weighed about 50 g. Before that they and their mothers were fed on the Department's stock diet.

Diets. The diets were similar to those used by Irving & Budtz-Olsen (1955), consisting of potato starch, dried brewer's yeast and cod-liver oil, sometimes with dried egg albumin. They were given without restriction. The compositions of the diets and the times of killing are shown in Table 1. The α-tocopherol was administered as before, by mixing a 3 mg tablet of α-tocopheryl acetate (Ephynal, Roche Products Ltd) with 3 g of freshly made diet and giving it to the animal in the morning before it was fed. The vitamin A was in a fish-liver oil concentrate and was administered by pipette to the animals daily.

General treatment. The animals were weighed twice weekly. They were killed between 20 and 120 days after going on to the diet (see Table 1). Blood was taken for the dialuric-acid haemolysis test (György & Rose, 1949). The state of pigmentation of the upper incisor teeth was noted. After the animals had been killed, the upper incisor teeth with the surrounding bone were removed. One tooth was fixed in