

INTERACTION BETWEEN VITAMINS E AND K IN THEIR EFFECT ON ERYTHROCYTE RESISTANCE

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Keeping rats on a diet deficient in vitamin E leads to a significant increase in the degree of hemolysis of erythrocytes after treatment with hydrogen peroxide and dialuric acid. The degree of hemolysis after addition of synthetic vitamin K to the diet was 22% less (dialuric acid) and 40% less (hydrogen peroxide) than in the groups of animals receiving a diet deficient in vitamin E alone.

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Previous experiments have shown that administration of vitamin E (α -tocopherol) and vitamin K (vikasol) to guinea pigs completely prevented symptoms of vitamin K deficiency: a decrease in adenosine-triphosphatase activity of myosin and in the contractile power of myosin filaments, and a decrease in activity of ATP-creatine-phosphotransferase in blood serum and muscle tissue [1-3].

In the investigation described below the effect of vikasol (synthetic vitamin K) was studied on the lowered erythrocyte resistance characteristic of vitamin E deficiency [6, 8, 9].

EXPERIMENTAL METHOD

Male albino rats, divided into three groups, were kept on a synthetic diet deficient in vitamin E. Animals of group 1 (23) received 3 mg α -tocopherol daily, those of group 2 (21) received 2 mg of a water-soluble vitamin K analog (vikasol) daily, and the animals of group 3 (22) received no additions to their diet. One month later the resistance of the erythrocytes to hydrogen peroxide and dialuric acid was investigated by the methods of Gyorgy et al. [6] and Bunyan et al. [4].

EXPERIMENTAL RESULTS

The experimental results are given in Table 1.

These results show that keeping animals on a diet deficient in vitamin E led to a significant increase, regardless of the addition of vikasol, in the degree of erythrocyte hemolysis after treatment with hydrogen

TABLE 1. Effect of Vitamins E and K on Degree of Hemolysis of Erythrocytes ($M \pm m$)

Group of animals	Degree of hemolysis of erythrocytes (in %)	
	dialuric acid	hydrogen peroxide
Rats on diet deficient in vitamin E and receiving α -tocopherol (control; group 1)	0.9 ± 0.3	9.6 ± 2.7
Rats on diet deficient in vitamin E, receiving vikasol (group 2)	47.0 ± 8.3	47.8 ± 7.0
Rats on diet deficient in vitamin E (group 3)	69.0 ± 1.9	87.6 ± 1.5

Note. Differences between the mean results for groups 2 and 3 and group 1 (control) and also between groups 2 and 3 statistically significant ($P < 0.001$).

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peroxide and dialuric acid. However, the degree of hemolysis in the presence of vikasol was 40% less (hydrogen peroxide), and 22% less (dialuric acid) than in the group of animals receiving a vitamin E-deficient diet only.

Synergism of action of vitamins E and K discovered by the writer previously in relation to various biochemical indices thus also extends to resistance of the erythrocytes to hemolytic agents.

These results are in agreement with the observations of Lucy and Dingl [7], who concluded that several components of the isoprene series containing derivatives of vitamins E and K possess a stabilizing action on lipoprotein membranes.

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