FACTORS INFLUENCING THE SERUM CHOLESTEROL
AND β-LIPOPROTEIN LEVELS IN FASTING RABBITS

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The effect of starvation under ordinary conditions, in the presence of a deficiency of pyridoxine (administration of 4-deoxypyridoxine) and thiamine (administration of hydroxythiamine), and also during administration of neurotropic drugs (amphetamine, diazepam) was studied in male rabbits. Starvation for 7-10 days led to an increase in the serum cholesterol and β-lipoprotein concentration. Pyridoxine deficiency and administration of amphetamine caused a greater increase in the level of cholesterol and, in particular, of β-lipoproteins. Thiamine deficiency and administration of diazepam, on the other hand, had a restraining effect on the increase in the cholesterol and β-lipoprotein levels in hunger stress. Prophylactic administration of the preparation Aerovit helped to reduce the severity of the metabolic changes. The cholesterol concentration in the liver of the fasting animals was increased by an especially marked degree during amphetamine administration and pyridoxine deficiency; administration of Aerovit prevented the increased accumulation of cholesterol in the liver. Differences in the serum and liver cholesterol concentrations must be attributed to changes in cholesterol biosynthesis in hunger stress.

KEY WORDS: experimental hypercholesteremia; atherosclerosis; antivitamins; starvation; Aerovit.

It has recently been shown that the serum cholesterol and β-lipoprotein concentrations depend more on the intensity of endogenous cholesterol synthesis than on its intake. Cholesterol synthesis rises significantly in states of nervous and emotional stress [1-3, 9, 11]. Meanwhile, it is not yet clear why during exposure to comparable external factors, the degree of the changes in lipid metabolism should differ so substantially. It might be assumed from data in the literature that differences in the response of the body, in the form of increased cholesterol biosynthesis (hypercholesteremia), would depend on the functional state of the nervous system and also on the intake of certain vitamins [1, 3-5, 7, 8, 12-14].

These arguments served as the basis for an experimental study of the effect of a deficiency of thiamine and pyridoxine and also of administration of neurotropic drugs (amphetamine, diazepam) on hypercholesteremia induced by hunger stress in experiments on rabbits. The effect of administration of the vitamin preparation Aerovit on this index also was studied. According to clinical observations [6], Aerovit has a definite hypocholesterogenic action, but its effect on cholesterol biosynthesis induced by nervous and emotional stress has not been studied.

EXPERIMENTAL METHOD

Experiments were carried out on 108 male rabbits weighing 2.1-4 kg which were starved for 7-10 days [10]. During this period they received either water only or water with the addition of the test substances. To modify the functional state of the nervous system, some animals were given diazepam (0.2 mg/kg daily) or amphetamine (15 mg/kg daily) during the course of the experiment. Vitamin insufficiency was induced by administration of antimetabolites. Pyridoxine deficiency was produced by administration of 4-deoxypyridoxine (20 mg/kg daily) and thiamine deficiency by administration of hydroxythiamine (100 mg/kg daily). To reduce the severity of the changes in lipid metabolism the substance Aerovit was given (0.1 tablet per animal per day). This preparation is used to treat the disturbances of lipid metabolism in persons with nervous and emotional...
changes in the cholesterol and \( \beta \)-lipoprotein levels in rabbits after starvation for 7 days, after thiamine and pyridoxine deficiency, or after changes in the functional state of the nervous system are shown in Table 1.

It will be clear from Table 1 that starvation for 7 days was followed by elevation of the serum cholesterol and \( \beta \)-lipoprotein levels, probably because of increased biosynthesis of cholesterol; pyridoxine deficiency and administration of amphetamine led to a higher hypercholesteremia and, in particular, to an increase in the \( \beta \)-lipoprotein concentration. Thiamine deficiency and administration of diazepam, on the other hand, had a restraining effect on the increase in the cholesterol and \( \beta \)-lipoprotein levels in hunger stress. Indices of metabolism such as the ratio between the blood serum protein fractions and the total blood lipid level showed no significant differences from their values in starvation but without administration of the test substances. Administration of Aerovit for a longer period (up to 37 days) likewise was unaccompanied by any changes in lipid metabolism of satiated rabbits.

The effect of starvation for 10 days and the results of prophylactic administration of Aerovit on the development of hypercholesteremia and \( \beta \)-lipoproteinemia are demonstrated in Table 2. Administration of Aerovit led to a reduction in the severity of the metabolic changes and differences were particularly considerable between the cholesterol and \( \beta \)-lipoprotein levels on the fifth day of starvation: The cholesterol concentration in the rabbits receiving Aerovit was 118 ± 12 mg \%, whereas in the starved rabbits not receiving Aerovit the concentration was higher, namely 160 ± 15 mg \% (P < 0.05).