

THE EFFECT OF GLUTATHIONE, VITAMINS B₁₂ AND B₁,
AND RUTIN ON THE LEVEL OF CHOLESTEROL IN THE
BRAIN, LIVER AND BLOOD IN ALIMENTARY
HYPERCHOLESTERINEMIA

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In the light of existing data on the effect of lipotropic substances on cholesterol content in the blood in atherosclerosis [1, 2, 3], as well as data on glutathione inhibition of lipid accumulation in the liver in experimental hypercholesterinemia [4], we undertook to study the effect of vitamins B₁ and B₁₂, rutin, and glutathione as well on the cholesterol content in organs of chicks with experimental hypercholesterinemia.

EXPERIMENTAL METHOD

Two series of experiments were carried out on 266 12-day-old chicks. In each series they were subdivided into 8 groups. The first group were controls; their diet consisted of wheat porridge supplemented with 2.5% sunflower oil and green grass. The chicks of the remaining 7 groups received wheat porridge supplemented with sunflower oil containing 2% cholesterol and green grass for 18 days. The amount of food eaten and the food remaining were registered every day. At the time of the experiment each chick had received at least approximately 4.7 g cholesterol.

After 18 days, feeding with cholesterol was stopped and the degree of hypercholesterinemia was determined in part of the experimental chicks.

Subsequently, the second group received the usual ration. Two γ of vitamin B₁₂ (first series) and 0.1 γ vitamin B₁₂ (second series) were injected subcutaneously daily in chicks of group 3. Rutin was added to the diet of group 4 chicks at a level of 100 mg/kg weight daily. In addition to rutin, group 5 chicks were subcutaneously injected with glutathione at a level of 12.5 mg/100 g weight. Group 6 chicks were injected subcutaneously with 0.2 mg vitamin B₁, group 7 with a solution of glutathione (12.5 mg/100 g weight) and group 8 with vitamin B₁ and glutathione in doses indicated above. Chicks in the first series received the preparations described above for 15 days, part of the chicks in the second series for 10 days, and the remainder for 20 days after cessation of cholesterol feeding.

At the end of the injection period the chicks were decapitated, the liver and brain removed, these organs were weighed and dried in a thermostat at 105° to a constant weight. The organs were ground into powder, extracted with ether in a Soxhlet apparatus for 2 days. Cholesterol was determined in the ether extracts of liver and brain with a colorimetric method based on the Liebermann-Burchardt reaction. The cholesterol content in the blood of the chicks was simultaneously determined.

EXPERIMENTAL RESULTS

The results obtained are presented in the table. From these data it is evident that the cholesterol content increased (from 206 to 838 mg %) 4-fold in the blood of chicks receiving it in their diet for 18 days. A considerable accumulation of cholesterol (12.8%) also occurred in the liver (control 1.7%). The amount of cholesterol in the brain did not change.

At 10 days after the cessation of cholesterol injections its level in the blood decreased 2-fold and at 20 days approached the initial value (second group). Ten days after the cessation of cholesterol feeding its content in the liver decreased 2.3 times, in the following 5 days its level did not change, and at 20 days cholesterol still was at a level of 23.5% and surpassed the content in control chicks.

After 10-day injections of 0.1 γ vitamin B₁₂ under conditions of hypercholesterinemia (third group) the cholesterol concentration in the blood fell to the level of the control group. Cholesterol content in the liver was significantly decreased (2.9% in chicks receiving vitamin B₁₂ in comparison with 5.5% in chicks not receiving vitamin).

In the group of chicks receiving rutin and glutathione simultaneously (fifth group) for 10 days, the cholesterol content in the blood was lower by 27% and in liver by 34.6% in comparison with the group of chicks not thus injected.

The level of cholesterol in the blood and liver of chicks receiving rutin for 15 days in the food (fourth group) was lower than in the second group (in blood by 22.1%, in liver by 46%).

No significant change in cholesterol content of blood and liver in hypercholesterinemia chicks was observed when vitamin B₁ and glutathione or both combined were injected.

None of the compounds used caused any significant variation in the cholesterol content of brain.

From these data the conclusion can be reached that injection of vitamin B₁₂ and rutin plus glutathione into chicks with experimental alimentary hypercholesterinemia significantly accelerated the decrease in blood and liver cholesterol after cessation of cholesterol feeding.

SUMMARY

The paper deals with materials on the effect of glutathione, vitamins B₁₂ and B₁, rutin and a combination of glutathione with vitamin B₁ or rutin on the cholesterol level in the blood, liver and brain during alimentary hypercholesterinemia. Experiments were staged on 266 chicks.

Hypercholesterinemia was provoked by cholesterol-containing diet given for a period of 18 days. After the cessation of cholesterol administration, the chicks were given vitamin B₁₂ in a dose of 0.1 γ and 2 γ , 0.2 mg of vitamin B₁ subcutaneously, rutin with food – 100 mg per kg of body weight, glutathione – 12.5 mg per 100 g of weight and combinations of glutathione with rutin or with vitamin B₁ in the aforesaid doses for a period of 10, 15, and 20 days. The chicks were decapitated after suspension of this treatment. Cholesterol concentration was determined in the blood, liver and brain. As established, cholesterol feeding markedly increased its content in the blood and liver. After discontinuance of cholesterol administration its content in the blood and liver drops almost to the initial level in 20 days. The hypocholesterizing effect of vitamin B₁₂ given in a dose of 0.1 γ , of glutathione-rutin combination and of rutin alone was established. There were no changes in the cholesterol content of the brain tissue.

LITERATURE CITED

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