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## **THE STUDY OF STATE OF PROTEIN-LIPID PROFILE OF BLOOD IN AUTOIMMUNE PROCESS**

**Annotation:** The role of the protein-lipid blood profile in the developing of atherosclerotic affection vessels experimentally shown. The importance of autoimmune component is proved in the theory of atherosclerosis developing mechanism with of models maximal approximated to the natural human pathology.

**Keywords:** allergization, autoimmune, albumins, lipoproteins, phospholipids.

**Anmerkung:** Die Rolle des Protein-Lipid-Blutprofils bei der Entwicklung atherosklerotischer Befallsgefäße wurde experimentell gezeigt. Die Bedeutung der Autoimmunkomponente wird in der Theorie des Entstehungsmechanismus der Atherosklerose mit Modellen bewiesen, die der natürlichen menschlichen Pathologie maximal angenähert sind.

**Schlüsselwörter:** Allergisierung, Autoimmun, Albumine, Lipoproteine, Phospholipide.

### **RESEARCH MATERIAL AND METHODS**

Following the previously developed (2) principle, the reproduction of pathological processes in various organs according to the autoimmune type of organ-specific sensitization, we simulated autoallergic vascular lesions by specific immunization with tissue homoantigen. At the same time, the task was to identify the possibility of determining the formation of symptoms corresponding to the atherosclerotic process. Given that in the development of the last change in the

protein-lipid profile of the blood is characteristic, we have undertaken in this direction to study their shifts in Dynamics. Chronic experiments were conducted on 10 dogs immunized with vascular-tissue homoantigen prepared according to the method developed at our department.

The vascular-tissue homoantigen was administered subcutaneously five times at intervals of 2 days at the rate of 0.5 ml per 1 kg of animal weight. Fractions of lipids and phospholipids separated by thin-layer chromatography, refractometric concentration of total protein, protein fractions of blood serum, lipoproteins by electrophoresis on paper and in polyacrylamide gel. Studies were carried out in dynamics after the last immunization with vascular-tissue homoantigen, and later on the 15th, 30th, 45th, 60th, 75th, 90th day in the dynamics of the development of functional shifts. The results of the experiments were processed by the method of mathematical variational statistics.

## **RESULTS AND THEIR DISCUSSION**

In the report of immunization with vascular-tissue homoantigen in the content of blood lipids, there were distinct shifts that revealed certain patterns.

There is an increase in phospholipids and HFA after homoantigenic stimulation ( $P < 0,01$ ). Concentration of free cholesterol and triglycerides, starting from the homoantigenic period stimulation and during the entire period of the study are characterized by reaching their maximum by the end of the study ( $0.001$ ). On the part of cholesterol esters, there are slight fluctuations in their amount during the period of homoantigenic stimulation, on the 15th and 30th day after the last introduction of the antigen. Starting from the 45th day of the study, the concentration of cholesterol esters gradually increases reaching its maximum on the 90th day. Total lipids are characterized by a gradual increase over the entire study period ( $0.001$ ). Violation of lipid metabolism and fluctuations of its individual tests in the initial periods of sensitization can be considered as one of the manifestations of the general reaction of the body that occurs during the development of the disease, or the protective mechanism of the vascular wall in response to antigenic exposure, possibly causing some increase in intravascular lipolysis and an increase in the amount of heparin. The increase in the

concentration of lipids in the second half of the experimental autoimmune process may be due to a decrease in the activity of vascular wall enzymes as a result of the development of degenerative processes in them. Studies have shown that the level of total serum protein starting after the last administration of homoantigen during the entire study period tends to increase its amount, reaching its maximum on the 90th day (  $P < 0.001$ ). This increase in the total amount of protein may not be due to a true increase in blood proteins, but to a certain extent to hyperlipidemia (3), as a result of the disruption of the formation of a cholesterol complex with proteins in the direction of its effort. This gives grounds to consider changes in protein synthesis as one of the components of the compensatory reaction of the body, providing in a certain period of time the normalization of those who have been disturbed. metabolic processes in the development of an autoimmune atherosclerotic process (6). It is possible that one of the manifestations of changes in the biosynthesis of the protein of homoantigenic sensitization is the appearance of certain antigenic changes in the tissue of the vessels, which in turn can lead to the appearance of immunological reactions that occur during the development of the atherosclerotic process (7). It should also be borne in mind that the increase in the synthesis of the total amount of protein is probably closely related to an increase in the content of individual fractions of globulins ( $\beta$ ,  $\alpha$ ) due to their enhanced synthesis (9). On the part of protein fractions, a slight decrease in albumin  $\alpha_1, \alpha_2$  globulin fraction was revealed, which are held to the end. Studies have shown a gradual increase over the entire study period of the globulin fraction ( $P < 0.001$ ). The relative or absolute decrease in albumin and  $\alpha_1, \alpha_2$  globulin fraction is probably due to a decrease in the rate of their synthesis in the liver (6) during sensitization by angioantigen. In addition, a decrease in the number of albumins may be due to their accelerated decay - hypercatabolic hypoproteinemia. Increases in the content of  $\beta, \alpha$  the globulin fraction against the background of hypoalbumenemia in the early stages of homoantigenic sensitization can be assessed as a compensatory acceleration of their synthesis caused by an initial decrease in oncotic pressure. A further increase in the content of  $\beta$  and  $\alpha$  globulins is closely related to an increase in the synthesis of antivascular antibodies, or to an increase in the following changes in serum lipoproteins. After homoantigenic

stimulation, there is a slight increase in  $\alpha$  and a decrease in the  $\beta$  fraction, which again return to the background level on the 15th day of the study after the last introduction of the antigen. Starting from the 45th day of the study, the concentration of the  $\beta$  fraction of lipoproteins gradually increases, and the  $\alpha$  fraction decreases, reaching its maximums by the end of the study (P 0.001). Changes in lipoproteins divided into polyacrylamide gel are also characterized by a slight increase in the  $\alpha$  fraction lasting on the 60th day of the study (P 0.02).

Starting from the 75th day of the study, the concentration (activity) of the  $\alpha$  fraction begins to decrease with a gradual increase in the  $\beta$  fraction, which reaches its maximum on the 90th day of the study (P 0.001). The tendency to reduce the content of  $\beta$  lipoproteins in the first days of sensitization by vascular-tissue homoantigen can be explained by a sharp increase in the concentration of heparin in the blood, activating lipoprotein lipase, translating large molecules of lipoproteins into more finely dispersed. The basis of a persistent increase in the content of blood  $\beta$ -lipoproteins in the late stages of the experimental autoimmune atherosclerotic process is based on many factors, including violations of the process of biosynthesis and transformation of lipoprotein complexes that are constantly occurring in the body (9), as a result of inhibition of the decay of  $\beta$ -lipoproteins due to slowing down their circulation, a decrease in the activity of lipoprotein lipase, which may be due to both heparin deficiency and the presence of its inhibitors. The above indicates that the lipoprotein spectrum of the blood increases due to the same reasons that cause hypercholesterolemia and hypertriglyceridemia, since most of these components are part of the  $\beta$  - lipoproteins. Thus, the studies conducted indicate that the increased level of free cholesterol, triglycerides, the total protein of the serum of the blood, a shift in protein fractions and the  $\beta$  of lipoproteins, primarily indicates an accelerated endogenous synthesis of them during the autoimmune atherosclerotic process.

## FINDINGS

1. Autoimmune damage to the vascular wall contributes to a violation of lipid metabolism.
2. An increase in the amount of total protein and shifts in protein fractions ( $\beta$ ,  $\alpha$ ) is an indirect confirmation of the formation and presence of

antivascular antibodies that play an important role in damage to the vascular wall.

3. A reflection of the increasing deposition of the circulating immune complex in the vascular wall may be a parallelism in an increase in the concentration of a total protein and  $\beta$  - lipoproteins.

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