CHROMATOGRAPHIC INVESTIGATION OF FREE AMINO ACIDS OF THE HEART, KIDNEYS, AND BRAIN IN EXPERIMENTAL MYOCARDITIS

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In experimental myocarditis changes are observed in the protein and energy metabolism of the heart tissue, and these lie at the basis of the pathological lesion [1-3].

No information regarding the changes in the free amino acids in the tissues of the heart and other organs in experimental myocarditis could be found. Meanwhile, the quantitative and qualitative study of these most important structural parts of the protein in inflammatory lesions of the myocardium is in the author's opinion of considerable importance above all for securing rational treatment.

For this reason the changes in the content of free amino acids in the heart and other organs were studied in experimental myocarditis.

EXPERIMENTAL METHOD AND RESULTS

Experiments were carried out on 64 rabbits (29 experimental and 17 control), and those in each series were of the same sex and of approximately equal weight and age.

Experimental myocarditis was caused by a single intravenous injection of 25 mg of caffeine sodium benzoate and 0.2 ml of a 0.1% solution of adrenalin hydrochloride per kilogram body weight. The pathological changes in the heart were determined mainly on the basis of electrocardiographic studies. The free amino acids were determined on the 10th-15th day of the disease by T. S. Paskhina' paper chromatography method.

The content of most free amino acids in the heart tissue was increased in experimental myocarditis, particularly in the case of glutamic acid, the level of which was almost doubled by comparison with the controls ($P<0.05$). The content of serine, glycine, threonine, and valine also increased (from 24-59%). The content of the remaining amino acids was not appreciably changed (see figure).

The level of most free amino acids in the kidney tissues fell (see figure). The largest decrease was shown by the content of serine and phenylalanine ($P<0.05$).

The content of free amino acids in the brain tissue was not significantly changed.

What is the possible mechanism of the increase in the level of free amino acids in the heart tissue in the case of absence of such changes in the kidneys and brain in experimental myocarditis? To shed light on this problem the succinate dehydrogenase and cytochrome oxidase—enzymes of terminal biological oxidation—activity was studied in the tissues of the heart, kidney, brain, and aorta of rabbits with experimental myocarditis.

Where marked signs of experimental myocarditis were present, the activity of these enzymes showed dissimilar changes. In the heart tissue, where the level of certain amino acids was raised, and also in the tissue of the aorta, the succinate dehydrogenase activity fell. In the tissue of the kidneys, in which a decrease in the content of most amino acids was found, the succinate dehydrogenase activity rose. This suggests that depression of succinate dehydrogenase activity leads to a decrease in the formation of high-energy compounds, and this in turn disturbs the processes of resynthesis, and contributes to the increase in the level of free amino acids in the heart tissue.

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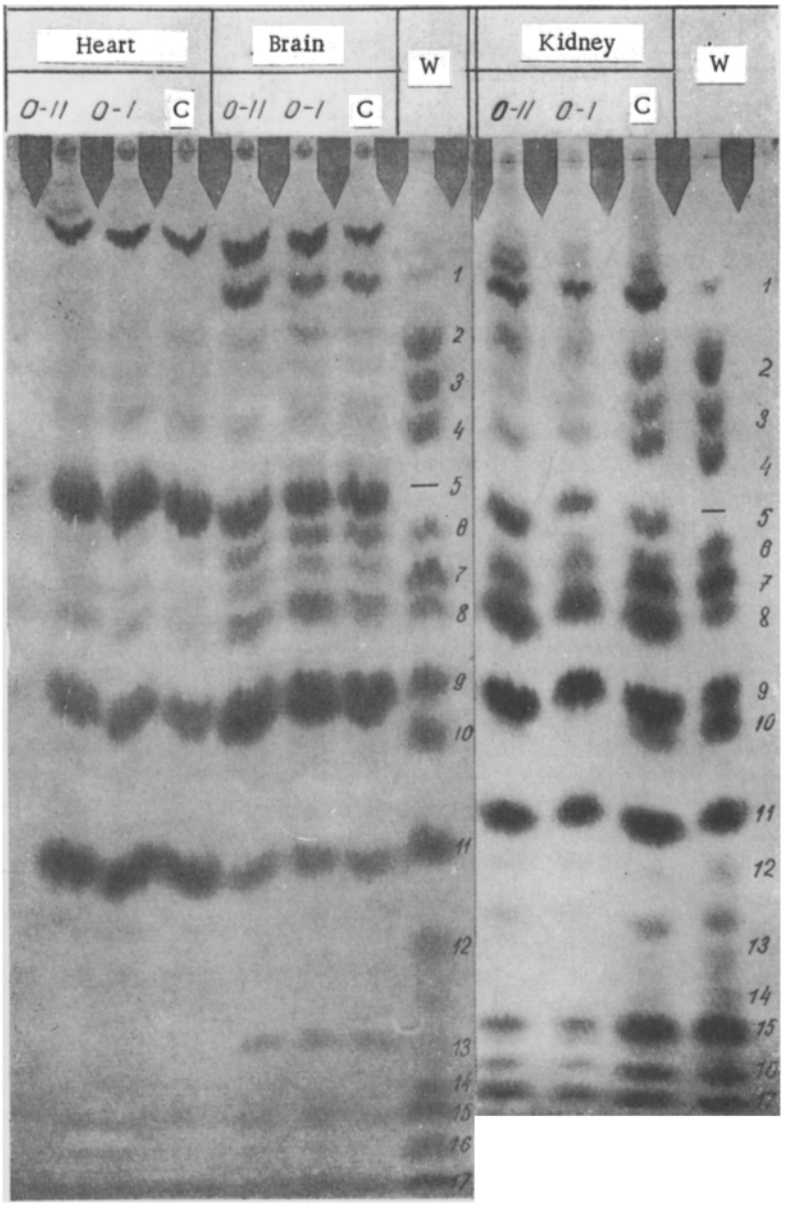

Content of amino acids in tissues of the brain, heart, and kidneys of rabbits with experimental myocarditis (0-I and 0-II) and in a healthy rabbit (C); W) witness (3.7 ml). Legend: 1) cystine, 2) lysine, 3) histidine, 4) arginine, 5) glutamine, 6) aspartic acid, 7) serine, 8) glycine, 9) glutamic acid, 10) threonine, 11) alanine, 12) tyrosine, 13) tryptophan, 14) methionine, 15) valine, 16) phenylalanine, 17) leucine, isoleucine.

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