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DISTRIBUTION OF ^{86}RUBIDIUM AND METIONINE ^{75}SELENIUM IN ORGANS OF RATS AFTER EXERCISE AND TREATMENT WITH PROTEIN HYDROLYZATE AND VITAMIN C

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SUMMARY:

Purpose of the study is to track in, the blood flow and the metabolism in 15 organs of experimental rats, which are subjected to severe physical strain, treated with protein hydrolyzate and vitamine C (Vit. C). The animals are divided into one control and 4 experimental groups. After 30 minutes of swimming they are treated with already used produces, methionine ^{75}selenium and and after another 2 hours of swimming, with ^{86}rubidium. After being euthanized with thiopental and an autopsied, the following organs are taken from the rats: pancreas, spleen, testicles, duodenum, a part of small intestine and colon, adrenals, kidneys, liver, lungs, heart, aorta, a piece of muscle, part of a brain and stomach. Percentage of the activity per gram of tissue is determined, of the total activity, of the two isotopes for every organ and them being compared. Physical strain deteriorates blood flow and reduces the accumulation of methionine ^{75}selenium, while the treatment with the hydrolyzate and Vit. C has a beneficial effect in almost all organs.

Key words: physical strain; methionine ^{75}selenium; ^{86}rubidium; protein hydrolysate; vitamine C

INTRODUCTION:

Severe physical activity or exercise in athletes represents one of the highest levels of extreme stresses to which the body can be exposed. For example, the metabolism of the body during a marathon increases to 2000 % above normal (1, 2, 3). Microcirculation also varies proportionally with exercise intensity. In untrained persons heart stroke volume at rest averaged 50-70 ml / stroke, increasing to 110 130 ml / stroke during intense physical activity. In elite athletes stroke volume from an average 90-110 ml / stroke increased to 150-220 ml / stroke (4).

Nowadays when due to sedentary lifestyles people actively seek forms of sport and exercise, these loads must be tailored to the specific plan developed by fitness or rehabilitation specialist for achieving the target set according to the client or patient (5-11). It is appropriate to use products with proven safety and the expected beneficial effects, such as a set of amino acids in the composition of protein hydrolysates, and Vit. C to assist the body in overcoming the high demands during exercise.

Purpose of this work was to trace changes in the microcirculation (at the level of ^{86}rubidium) (12, 13, 14) and metabolism (the accumulation of methionine ^{75}selenium) (15, 16, 17) in the body of experimental rats subjected to severe physical strain and treated with protein hydrolyzate and Vit. C.

MATERIALS AND METHODS:

Experiments were performed on 30 white male rats breed "Wistar" – 120-140 g b.w. divided into five groups – control and four experimental. Animals in experimental groups subjected the exercise of 30 minutes using the Avakian-Shirinyan method, then we treated i.p.: first group – only swimmers, second group – 1.5 / 100 g b.w. protein hydrolyzate, a third group – 0.2 g / 100 g b.w. Vit. C; fourth group – a combination of hydrolyzate and Vit. C in these doses. Two hours later the rats from all groups, including the control group (no treatment and swimming) were injected i.m. in the left hind leg 0.111 MBk / 100 g b.w. methionine ^{75}selenium. Three hours after the first after the second load test groups in described manner. Immediately thereafter the animals were anaesthetized with thiopental 0.2 ml (10 mg) i.p., are fixed on their backs and are injected in jugular vein 0.111 MBk / 100 g b.w. ^{86}rubidium, and after 45

s – lethal dose (20 mg) thiopental i.v. The animals were autopsied and the following organs were taken for assessment: pancreas, spleen, testes, duodenum, a piece of small intestine, a piece of colon, adrenal glands, kidneys, liver, lungs, heart, aorta, a piece of muscle, brain and stomach. Weight of all organs was determined by analytical balance and hydrolyzed with 2 N sodium hydroxide, then their radioactivity was measured with scintillation counter type of Analyser NC-107 double two minutes for each organ with or without aluminum screen (to determine the в-radiation of methionine ^{75}selenium). At the time, it was calculated percentage of activity per gram of tissue, total injected activity separately for ^{86}rubidium and methionine ^{75}selenium. Statistical analysis of the data was performed with Student's t-test.

RESULTS AND DISCUSSION:

In the control group (Fig. 1.) the accumulation of ^{86}rubidium is the highest in heart, aorta and adrenals and the lowest – in muscles, brain and testes. In swimming but not treated animals the rubidium distribution is lower or almost equal in most organs but aorta, heart and adrenals that are functionally more involved because of the stress caused by physical load and probably better vascularized at the cost of other organs (18, 19). Treated with protein hydrolyzate animals have ^{86}rubidium values near the controls for most organs while those treated with Vit. C – lower values most organs but adrenals and kidneys, compared to swimming, but untreated rats.

The combined use of protein hydrolysate and Vit. C does not lead to higher accumulation of ^{86}rubidium than treated with hydrolyzate only. The results show that the use of protein hydrolyzate has improved blood flow to the organs as its own usage as in combination with Vit. C. Therefore its effect supports the recovery of the blood flow to the organs making it suitable for use in such severe physical exertion.

The highest methionine ^{75}selenium accumulation is in the liver, kidneys and pancreas and the lowest – in the brain, muscles and testes of control animals while in all other organs of swimming, but untreated rats the uptake of methionine is lower compared to them (Fig. 2.). The distribution of metionine in animals treated with the protein hydrolyzate is lower or equal values compared to swam. The exception is the adrenal gland, which under severe stress are most active (20, 21). Treatment with Vit. C does not increase the accumulation of methionine, while the combination of protein hydrolyzate plus Vit. C gives values closer to those of the independent application of hydrolysis.

Fig. 1. Percentage of distribution of ^{86}rubidium in organs per gram tissue of total injected activity.

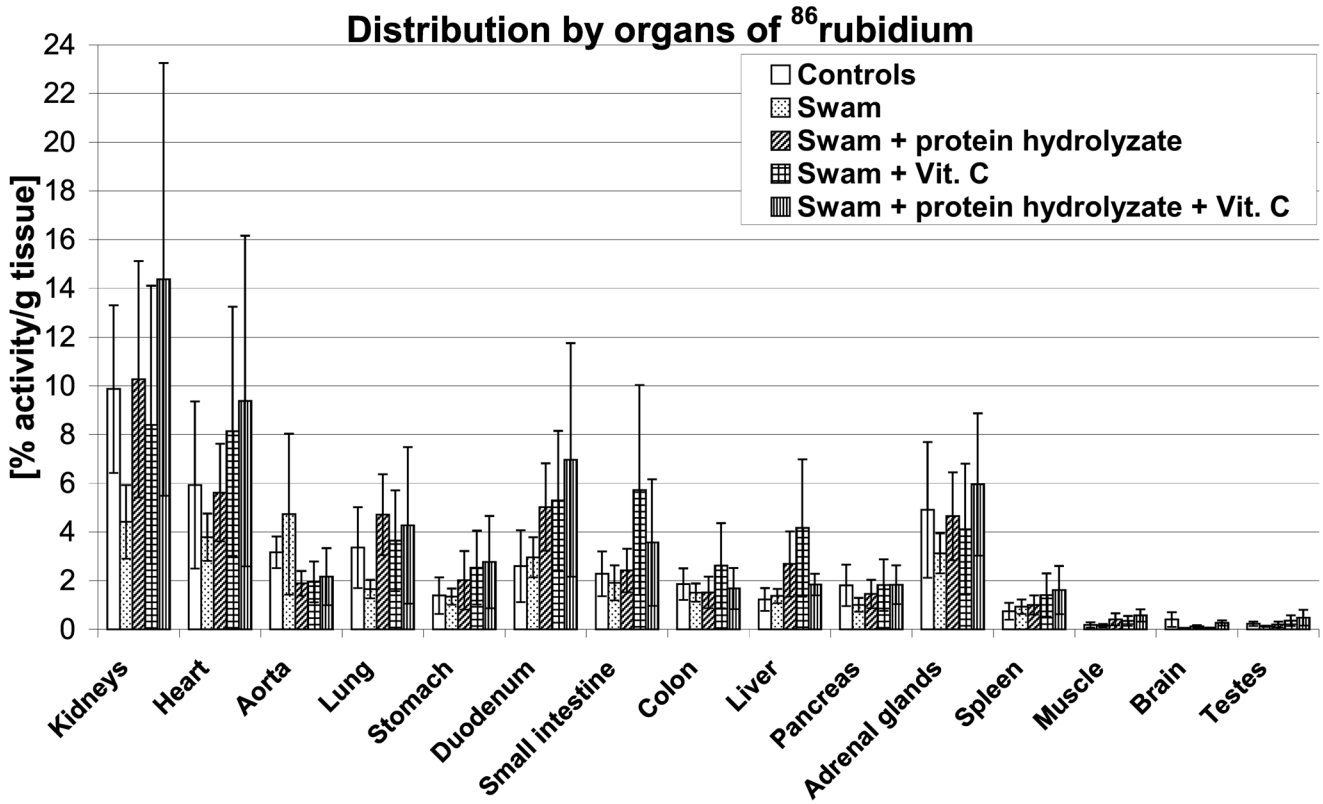
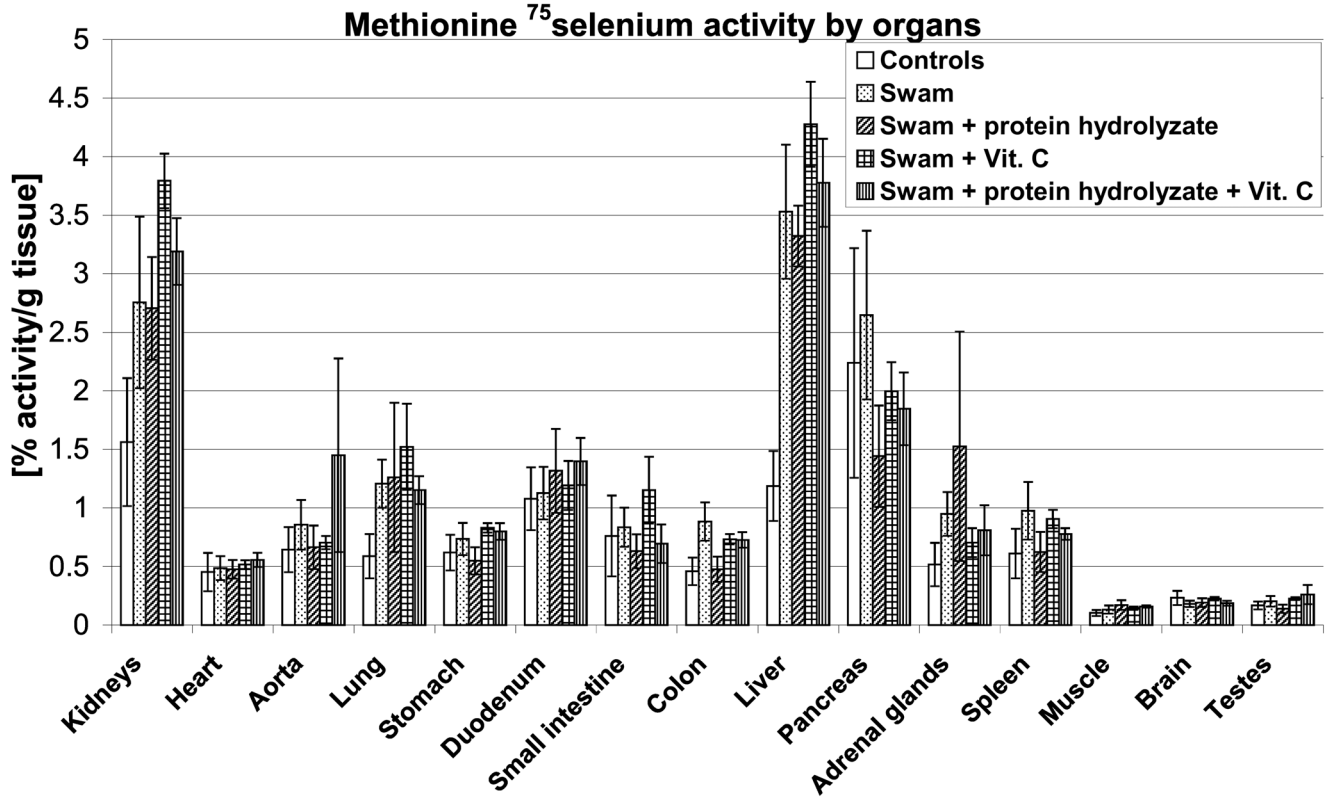


Fig. 2. Percentage of methionine ^{75}selenium activity per gram tissue of the total injected activity.



CONCLUSIONS:

1. During heavy exercise the accumulation of 86rubidium in various organs in rats reduces, which they associate with poor blood supply.

2. Treatment with protein hydrolyzates or combination of protein hydrolyzate and Vit. C improves blood flow to organs in physical exercise as measured by ^{86}rubidium as the sole application of Vit. C does not have this effect.

3. Severe physical exertion does not cause reduced accumulation of methionine ^{75}selenium in the bodies of experimental animals.

4. Application of protein hydrolyzate or co-administered with Vit. C reduces the accumulation of methionine ^{75}selenium in most bodies undergoing exercise animals as they absorb methionine from protein hydrolyzate.

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