

Aggressiveness of Sportsmen and its Biological Background

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ABSTRACT. Blood corpuscles of junior sportsmen while training have been studied by means of the method of light and electron microscopy. Different structural interest of blood corpuscles before and after training was shown. Structural indices from the side of blood corpuscles were examined from the position of functional indices of an organism. Different behaviour of *a*- and dense granules of thrombocytes was noted. © 2010 Bull. Georg. Natl. Acad. Sci.

Key words: *blood corpuscle, sportsman's aggressive behaviour.*

The problem of aggression in sport is analyzed in complex way: on the one hand functional indices and on the other hand morphological indices are taken into account. Such an approach enables us to fully depict the syndrome of aggression and reveal biological prerequisites, with the help of which it will be possible to identify the parallels between clinical state and physical loading.

Materials and Methods. Blood was taken in junior sportsmen before and after training for investigation. Blood corpuscles being dynamic indices of the changes of the organism were subjected to special examination by the method of light and electron microscopy.

Results of the investigations. The analysis conducted by the method of light microscopy show that the quantity of normocytes in junior sportsmen was 92 ± 0.1 ; after the training the quantity grew up to 98 ± 0.5 . The number of microcytes and macrocytes was a bit lower. Acanthocytes were not noted. Central uncoloured places on the surfaces of erythrocytes had one and the same diameter before and after training. Pathological forms of erythrocytes were not noted at all. Singular

sludges were noted on the side of erythrocytes. Their edges were well contoured. Erythrocyte bridges connecting erythrocytes were well noted.

On the side of neutrophils the cells of the 1st order prevailed (63%), not a large number of neutrophils of the 2nd order was noted (37%). Adhesion was lowered. Nuclear segments were dislocated, euchromatin prevailed. Intersegment bridges had filamentary structure. The segment's edge is slightly coiled. The number of azurophil granules is single. Lymphocytes prevailed in their little forms. Perinuclear oreole is not large. Euchromatin prevailed in nuclei. The edge of the nucleus is not coiled.

The "biological net" was absent in thrombocytes. The diameter of thrombocytes was not changed before and after training. Gigantic thrombocytes were single. A great number of *a*-granules were noted in the body of thrombocytes. Glycogen grains formed not large clumps, released mainly of *a*-granules. The release of dense granules was single. Single granules adhered to the surface of neutrophils and eosinophils. Pseudopodia were short. Adhesion of thrombocytes to other blood corpuscles was not noted. The bodies of thrombocytes were slightly swollen. The study of lymphocytes showed

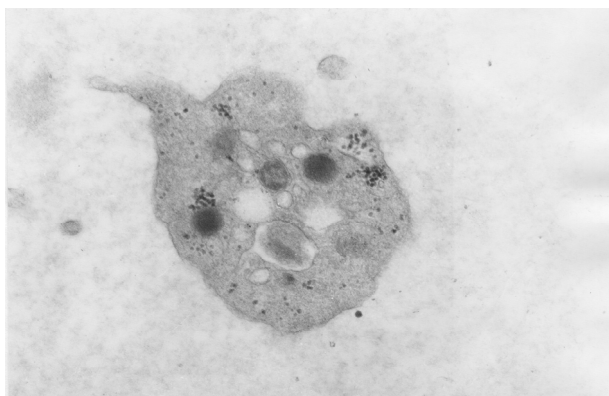


Fig. 1. Blood of junior-sportsman. Thrombocytes. Large number of α -granules. The release of α -granules from thrombocytes. Electronogram x 25,000.



Fig. 2. Blood of junior sportsman. Neutrophil. There are clumps of α -granules (dark) on the edge of the neutrophil. Electronogram x 25,000.

the euchromatin prevalence in the nucleus, the edge is well contoured. Perinuclear oreol is not large. Nucleoli are well contoured. Cytoplasm is light, organelles against its background are well observed. Granular endoplasmatic reticulum prevailed. Lysosomes are minute, well contoured. Golgi apparatus is presented mostly by fine cisterns. The edge of the cytoplasm is well contoured. Not a large number of α -granules is noted near the edge of cytoplasm (Fig.1).

Release of a large number of α -granules from bodies of erythrocytes during the trainings claims attention. Based on the data by V.Vashkinel (1998) α -granules contain biogen amines, particularly serotonin, having strong psycho-neurotropic action, and in dense granules – catecholamines (adrenalin and noradrenalin). Both types of granules represent the depot of both components, concentrated in thrombocytic granules. Release of serotonin and adrenalin affects all the functional abilities of the whole organism and especially the nervous system that plays an important role in emotional excitement. Growth of catecholamines (particularly adrenalin) lowers the threshold of excitation. Serotonin promotes the growth of activation of neurons and functional abilities of CNS. Regular trainings of junior sportsmen (practically healthy contingent) lead to the growth of activity of thrombocytes and release from their bodies (due to physical loading – trainings) α -granules in a large quantity (Fig.2).

Release of α -granules into blood plasma leads to the growth of serotonin concentration in the granules. It is known that all the granules, including α -granules, released into plasma, are easily destroyed. Serotonin

released from granules into blood plasma activates the neurons of CNS first on the level of conditioned and then unconditioned physiological reaction. By means of trainings it transfers the obtained physiological effect from the upper parts of CNS (brain cortex) to the level of its lower parts (subcortical structures, brainstem), which leads to the growth of automatism on the one hand, and on the other, it provides coordination in the functions of the entire system of the organism by means of CNS, realizing the skills obtained during the training.

The release of dense granules (in the norm) is single. Adrenalin released from dense granules must provide excitement of the sportsman. It is the substance with excitation impact on sympathetic nervous system, at that having significantly longer effect of excitement unlike the parasympathetic. Therefore regular sportsmen's trainings provide first conditioned and then unconditioned release of α -granules (mostly serotonin) creating for sportsmen already on the level of sport fighting strictly coordinated actions, realizing strength effect leading the sportsman to the fight for the leading position.

At the same time blood corpuscles should be mentioned. On the side of erythrocytes there is a tendency to the growth of normocytes during training, which is directed to the improvement of rheology [2]. Growth of the first order neutrophils and small forms of lymphocytes are also directed to normalize rheological function, which is very important in stabilization of homeostasis, thus promoting normalization of the function and all the systems of the organism in the fight for championship [3].

სამედიცინო მეცნიერებანი

სპორტსმენების აგრესიულობა და მისი ბიოლოგიური დასაბუთება

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სინათლის და ელექტრონული მიკროსკოპის საშუალებით შესწავლილია სისხლის ფორმირების ელემენტები სპორტსმენებში ვარჯიშის დაწყებამდე და ვარჯიშის შემდეგ. ყურადღება ძირითადად გამახვილებული იყო თრომბოციტებზე და მათ გრანულებზე (α - და მკვრივი გრანულები). მიღებულია, რომ α -გრანულები ვარჯიშის შემდეგ მატულობენ. ამ გრანულებში ძირითადად განლაგებულია სეროტონინი და მკვრივ გრანულებში – კატექოლამინები.

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