INTENSITY OF PRESYNAPTIC INHIBITION OF SPINAL CORD ALFA-MOTONEURONS IN ATHLETES DURING STATIC AND DYNAMIC MUSCULAR ACTIVITY

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Currently, there are no systematic data about changes in the mechanism of the presynaptic inhibition (PI) of the spinal cord alfa-motoneurons (MNs) in athletes during static and dynamic muscular activity.

76 male athletes 19 to 22 years old took part in the researches. These were sprinters, stayers, sambo wrestlers, and skiers, with various qualifications.

The method of assessment of the PI of homonymous and heteronymous Ia afferent fibers going from m. soleus (Sol) and m. quadriceps femoris (QF) to the Sol MNs was used (H. Hultborn et. al., 1987). The PI of Sol MNs was also assessed by the degree of Sol H-reflex amplitude suppression during homonymous vibration stimulation of t. calcaneus, and its recovery after the exposure (N. Anisimova et. al., 1987).

In order to reveal changes in the PI of Sol MNs under motion activity of various nature, sambo wrestlers performed the following motion patterns. In the 1st series, the athletes performed 10-repetition holding of a 40kg load in the back-lying position, by means of the plantar flexion of the foot; in the 2nd series, they performed 10-repetition holding of a load equal to 70% of the maximum voluntary contraction (MVC) until a failure in each attempt; in the 3rd series, the technical (TT) and strength (ST) training was performed.

The PI was recorded at rest, after the 3rd, 6th, and 10th static load attempts, at the 5th and 10th minutes of relaxation, and after TT and ST.

It was revealed that under homonymous and heteronymous conditioning stimulation of n. tibialis and n. femoris in the relative muscular rest condition, the PI of Sol spinal cord MNs is more significantly expressed in sambo wrestlers and sprinters than in stayers. This fact is an evidence that adaptation to muscular work of various nature affects the mechanism of PI of the spinal cord MNs.

The PI of Sol spinal cord MNs under homonymous vibration stimulation of t. calcaneus in the relative muscular rest condition is significantly more expressed in sambo wrestlers as compared to stayers. In the after-vibration period, the PI of the spinal cord MNs reaches the initial level faster in sambo wrestlers than in people training for endurance development.

Highly qualified sambo wrestlers are described with more expressed PI of Sol Ia afferent fibers and QF primary afferent fibers under homonymous and heteronymous electric stimulation and vibration exposure, which is an evidence of the PI mechanism dependence on the athletic qualification level.

In the process of repeated holding of a 40kg load by means of plantar flexion of the foot, and 70% of the MVC performed until a voluntary failure in people adapted to complex coordinated motion activity, it is established that intensity of the PI of the Sol spinal cord MNs increases. Static load equal to 70% of the MVC results in more significant increase. TT and ST result in unidirectional increase of the spinal cord 945;-motoneuron PI intensity, which is more significant after the strength training.

Keywords: Skeletal Muscle Fatigue, Motor System, Neuromuscular Physiology

12th Annual Congress of the ECSS, 11–14 July 2007, Jyväskylä, Finland