Міністерство освіти і науки України Комітет з фізичного виховання і спорту МОН України Сумська обласна державна адміністрація Управління молоді та спорту Сумської обласної державної адміністрації Національний університет фізичного виховання і спорту України Тартуський університет (Естонія)

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ІННОВАЦІЙНІ ТЕХНОЛОГІЇ В СИСТЕМІ ПІДВИЩЕННЯ КВАЛІФІКАЦІЇ ФАХІВЦІВ ФІЗИЧНОГО ВИХОВАННЯ І СПОРТУ

ТЕЗИ ДОПОВІДЕЙ
V МІЖНАРОДНОЇ НАУКОВО-МЕТОДИЧНОЇ КОНФЕРЕНЦІЇ
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І-66 Інноваційні технології в системі підвищення кваліфікації фахівців фізичного виховання і спорту : тези доповідей V Міжнародної науково-методичної конференції, м. Суми, 12–13 квітня 2018 р. – Суми : Сумський державний університет, 2018. – 298 с.

У збірнику розглядаються результати теоретичних досліджень і експериментальної роботи, які розкривають широке коло запровадження інноваційних технологій навчання та виховання для фахівців галузі фізичного виховання і спорту.

Для вчителів фізичної культури, викладачів фізичного виховання, тренерів і спортсменів, аспірантів, магістрантів, студентів закладів вищої освіти.

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BIOLOGICAL BASIS OF ADAPTATION TO PROFESSIONAL AND APPLIED PHYSICAL TRAINING

Polishchuk T., a senior teacher, Pesotskiy S., a senior teacher
Kharkiv National Medical University, Sumy State University
polischuk.057@gmail.com

Introduction. Adaptation is a major influence on the further development and improvement of the organism - a reaction in the behavior of the organism to adapt to the conditions of the external or internal environment. Adaptation can also be replaced by the word "stress" that occurs in the body before adapting to one or another factor that affects it.

Objective: To familiarize students with the concept of adaptation, the types and the effect of stress on the body as a whole and for its individual organs.

Presentation of research material. The functional system, which is formed in response to any physical activity, includes three levels: afferent, central regulatory and effector, which is the basis of the adaptive reaction of the organism. This chain is characteristic of many types of reflexes, but it is in the adaptation plan that it is the main one.

The afferent link of the functional system combines receptors, neurons, and afferent nerve cells in the central nervous system. They perceive the irritation from the external environment, the reaction of the organism itself and process the information received. Affective synthesis occurs not only before the beginning of motor activity, but also when performing the movement.

The central regulatory part of the functional system is represented by neurogenic and humoral processes of managing adaptive reactions. The neurogenic part involves motor reaction and mobilizes vegetative systems based on the reflex principle of regulation of functions. In the adapted organism, the neurogenic part of the link quickly and clearly responds to impulse by appropriate muscle activity and the mobilization of autonomic functions, and the unadapted organism does not have such

perfection, muscle movement will be roughly carried out, and vegetative provision will be inadequate. Humorous reactions through action on the metabolism of organs and tissues provide a more complete mobilization of the functional system and its ability to prolong the work at an elevated level.

The effector unit of the functional adaptive system activates the skeletal muscles, respiratory organs, blood circulation, blood and more. The effect of physical activity on the level of skeletal muscle is characterized by:

– number of activated motor units;

– the level and nature of biochemical processes in muscle cells;

– features of blood supply to the muscles, providing oxygen supply, nutrients and removal of metabolites.

Thus, the increase of force, speed and accuracy of movements, efficiency in their multiple execution in the process of adaptation is achieved by two main processes: the formation in the central nervous system of the mechanism of motion management and morphofunctional changes in the muscles.

Adaptation of the central nervous system is manifested in the automation of movements, while well-established motor skills are performed without control of the nerve centers. Accumulation of conditioned reflexes in the process of training contributes to the expansion of human capabilities in the process of performing complex movements. This contributes to the acquisition and accumulation of all those skills that a person needs for normal work and functioning as a unit of society. The notion of "adaptation" is closely linked to the notions of functional reserves, that is, the hidden possibilities of the human body that can be realized in extreme conditions.

Biological reserves of adaptation can be divided into cellular, tissue, organ, systemic and reserves of the whole organism. Each level inherits in itself the properties of the previous one, that by its integrity it shows in itself the unity of the whole human body.

At the cell level, this is the variation in the number of active functioning structures from the total number of those which is also

an increase in the number of structures in accordance with the level required of the body of the functional voltage.

At higher levels - reduction of energy consumption per unit of work, increase of intensity and efficiency of functioning of various organs and systems of an organism.

At the level of the whole organism, it is possible to implement integral reactions that provide the expansion of motor tasks of varying complexity and adaptation to extreme environmental conditions. They are the main factors that contributed to both the survival of man in ancient times, and in our days.

There are two types of adaptation reactions:

1. The formation of urgent adaptation reactions due to the magnitude of the stimulus, the fitness of the person, the ability of the functional systems of the body to effective recovery, and in general, quickly overcome. Urgent adaptive reactions can be divided into three stages.

The first stage is connected with activation of the components of the functional system, which ensures the execution of a given work, expressed in a sharp increase in heart rate, level of ventilation of the lungs, oxygen consumption, accumulation of lactate in the blood, and so on.

The second stage occurs when the activity of the functional system proceeds with stable characteristics of the main parameters of its provision, in the so-called steady state.

The third stage is characterized by a disturbance of the sustainable balance between the request and its satisfaction due to the fatigue of the nerve centers that provide the regulation of movements, and the exhaustion of the carbohydrate resources of the organism. Each transition to the third stage of urgent adaptation adversely affects the pace of the formation of long-term adaptation, and can also lead to negative changes in the state of various organs.

Each of the stages of urgent adaptation involves the inclusion of functional reserves - hidden opportunities acquired in the course of evolution and ontogenesis, to strengthen the functioning of their organs and systems in order to perform unusually large work, adaptation to extraordinary changes in the external and internal

environment of the organism. The first is mobilization in the transition from the state of relative rest to muscular activity and provides work until the appearance of compensated fatigue phenomena, as well as in the continuation of work in conditions of progressive fatigue. The second is the involuntary refusal to perform a given job in connection with the exhaustion of the relevant physical and mental resources. The third - mobilized by the body only in extremely extreme conditions, that may be highly dangerous to human's body.

2. Formation of long-term adaptation reactions takes place in four stages:

The first is the mobilization of the functional resources of the organism in the process of exercising certain direction in order to stimulate the mechanisms of long-term adaptation based on the summation of the effects of urgent adaptation.

The second – an intensive flow of structural and functional transformations in the organs and tissues of the corresponding functional system.

The third is sustainable long-term adaptation, which is manifested in the availability of the necessary reserve to ensure a new level of functioning of the system, the stability of functional structures, the close relationship of regulatory and executive bodies.

The fourth occurs under conditions of irrationally constructed, over-stressed workouts, malnutrition and restoration, due to which the wear of certain components of the functional system occurs. Rationally constructed training process involves the first three stages of adaptation. This is how the adaptation of individual organs, functional systems takes place, as well as preparedness as a whole is formed.

Conclusions. Increased environmental requirements relatively quickly lead to the formation of systems that provide an adequate adaptive reaction of the organism to new stimuli. However, for the formation of the perfect adaptation is not sufficient. It is necessary that in the cells, tissues and organs that create such a system, there are structural changes that increase its power and interaction between the components.