ADAPTATION MECHANISMS ARE USED BY THE BODY OF STUDENTS FOR RECOVERY AFTER PHYSICAL EXERTION

The study of the morphofunctional features of the body’s adaptation to constantly changing living conditions is considered one of the most important problems of biology and medicine today. The effectiveness of adaptive processes in the body is the primary basis of good health and high productivity. Therefore, the resolution of the unexplained issues of this problem is important for the prevention and treatment of diseases, the search for effective rehabilitation measures. Knowledge of the laws of adaptation of the human body (athlete) to physical exertion is an objective prerequisite for the effective use of physical exercises in the rationalization of physical training aimed at preserving and strengthening people’s health, increasing their work capacity, and implementing a genetically programmed longevity program. The defining function of muscle activity is the function of active regulation of the organism at constantly changing environmental conditions. The ultimate goal of this active adjustment is to maintain internal constancy environment, expanding the homeostatic limits of individual physiological constants, ensuring highly productive activity. The most effective means of adaptive change of a person's own nature is systematic physical training. High perfection of mechanisms of neurohumoral regulation functions; optimization of inter-system and intra-system connections; high development of self-regulation in the activity of functional systems. There is a direct relationship between the power of work and the perfection of mechanisms of regulation of functions: the more intensively the body functions under conditions of physical exertion, the greater the tension of regulatory systems; the more perfectly function regulation systems function, the body will be able to develop greater work capacity [1].

Key words: physical load, students, organism, adaptation, regulation.

Усюка Світлина. Адаптаційні механізми адаптації організму студентів до відновлення після фізичного навантаження.

Вивчення морфофункциональних особливостей адаптації організму до постійно мінливих умов життя вважається однією з найважливіших проблем біології та медицини сучасності. Ефективність адаптаційних процесів в організмі є нерозривною частиною здоров’я та його продуктивності. Тому вирішення нез’ясованих питань цієї проблеми є важливим для профілактики та лікування захворювань, пошуку ефективних реабілітаційних заходів, знання закономірностей адаптації організму людини (спортсмена) до фізичних навантажень є об’єктивною передумовою ефективного використання фізичних вправ у рационалізації фізичної підготовки, спрямованої на збереження і зміцнення здоров’я людини, підвищення її працездатності, реалізацію генетично запрограмованої програми довголіття. Визначальну роль у процесі адаптації відіграє саморегуляція. У процесі адаптації організм змінюється за рахунок наступних механізмів: зміни гомеостатичних меж індивідуальних фізіологічних констант, забезпечення високопродуктивної діяльності. Найефективнішим засобом адаптивної зміни власної природи людини є систематичні заняття фізичною культурою.

Висока досконаłość механізмів функції нейрогуморальної регуляції; оптимізація міжсистемних і внутрішньосистемних зв’язків; високий розвиток саморегуляції в діяльності функціональних систем. Між потужністю функції різних систем організму і його продуктивністю є пряма залежність: чим інтенсивніше організм функціонує в умовах фізичного навантаження, тим більше напружені регуляторні системи; чим досконаліше функціонують системи регуляції, тим більшу працездатність зможе розвивати організм [1].

Ключові слова: фізичне навантаження, студенти, організм, адаптація, регуляція.

Formulation of the problem. Thus, the efficiency of the regulation (management) systems, which ensure the body's adaptation to training loads, can be assessed by the level of intensity of the mechanisms of neurohumoral regulation of functions. The amount of functional reserves of the management system can be an objective, indirect indicator of the level of adaptation (physical preparedness) of the athlete.

Analysis of literary sources. The following researchers worked on this topic and examined it in detail: A. V. Maglioiany, G. B. Sapochnova, G. D. Galaitaty, L. A. Belova [1], M. P. Horobeby [2], Nesterova S. Yu [3], Raúl Martinez-Santos [4].

Thus, adaptation of the body to systematic physical loads (training) consists of metabolic, morphological, functional changes in the organs and tissues of the body, in the improvement of the mechanisms of neurohumoral regulation of functions. The final result of these changes is the functional effects of training, which are manifested in an increase in the fitness of the body - the functional effects of physical training (FET).

FET are indicators of training (special working capacity), they reflect the peculiarities of the morphofunctional state of various organs and systems of the body and are the result of systematic training. When assessing the level of functional fitness, separate physiological indicators of trained athletes are compared with the corresponding indicators of untrained individuals, as well as with model indicators of record-breaking athletes. The functional effects of training are determined by measuring the physiological indicators of the body's main systems at rest, when performing standard loads and maximum power loads.

Trainability at rest (the first functional effect training) is characterized by high efficiency of the functioning of tissues and organs of a physically trained person. This is due to the corresponding morpho-functional features of adaptation to systematic loads and the perfection of mechanisms of neurohumoral regulation of functions, which is higher than in untrained individuals. The
second functional effect of training is revealed in the conditions of performance of a standard non-maximum load. As a result of a more economical expenditure of energy resources, the dosed load is performed by physically trained persons always more efficiently (with a higher efficiency factor) than untrained persons. Athletes the processes of activation of vegetative and animal functions pass faster. They have a less high and more stable level of physiological reactions during the performance of a dosed load, and the restoration of the functions of organs and body systems after a test load is always faster. When performing dosed submaximal work, the increase in body temperature in physically trained persons is less pronounced than in non-athletes. This is explained by higher efficiency of the mechanisms of neurohumoral regulation of peripheral blood circulation, chemical and physical thermoregulation [2].

The human body is a rather complex structure, which is the most perfect, self-regulating and at the same time the most rational among all other living organisms. Any attempt to understand the human body leads to a detailed consideration of its elements: cell, tissue, organ, system. Each of these elements has its own structure, functions, modes of existence, that is, it is characterized by systemicity. Such systemicity in relation to the whole human organism is a complex structure of a system of systems - a "supersystem". A failure in the work of any subsystem automatically causes the restructuring of the supersystem (whole organism). The following systems function in the human body: the nervous system regulation, or nervous system; sensor systems (analyzers); the system of hormonal regulation, or the system of internal secretion glands (endocrine); blood system, circulatory system; cardiovascular system; lymphatic system; respiratory system; system of digestion, metabolism and energy; excretory and reproductive systems (genitourinary system); skeletal and muscular system (musculoskeletal system). Each of them performs its functions and determines the corresponding manifestations of vital activity.

The solid support of the human body is its skeleton, which consists of individual bones and connections between them (joints). Any movement in these joints takes place as a result of the actions of the muscles that are attached to the bones. Muscles act under the influence of nerve impulses (excitation) that come from the central nervous system (brain and spinal cord). In the muscles there are nerve endings that conduct motor impulses and cause muscle contractions. In addition, there are nerve endings in the muscles that perceive irritations of a different nature: temperature, pain, irritations associated with changes in metabolism. Each muscle has nerve endings that perceive so-called proprioceptive stimuli. The latter occur in the muscle itself when it is shortened or relaxation Perceiving proproceptive impulses, the central nervous system ensures consistency in the work of muscles and high coordination of body movements, at the same time awareness of the position of the body and its individual links in space occurs. Providing working muscles with nutrients and oxygen the motor apparatus performs with the help of the blood, circulation and breathing systems. With the participation of the same systems, the products of their metabolism are removed from the organs of the motor apparatus, which are then excreted from the body, mainly through the kidneys. Carbon dioxide is removed from the muscles through the lungs [4].

Thus, all systems of the body participate in ensuring effective motor activity of the body. The coordination function belongs to the nervous system and endocrine glands. In order for physical education classes to be effective, each specialist must have comprehensive and in-depth knowledge of the physiological mechanisms of functioning of organs and systems of the body, in particular, blood, circulatory and respiratory systems.

The impact of static loads on the human body has been studied not enough, which, of course, complicates the use of static exercises in health training. Insufficient development of static endurance of large muscle groups, especially back muscles, leads to increased loads on the spinal column and posture disorders. Highly effective static exercises that promote the development of large muscle groups are exercises for maintaining body weight in the position of lying on the back, lying on the hips, upper or lower half of the body. By developing the static endurance of the back muscles, such exercises contribute to the improvement of the mechanisms of vegetative support of the muscles stress by optimizing the functions of the cardiorespiratory system, improving the mechanisms of aerobic-anaerobic energy supply for muscle activity. Static loads (with the initial standing position) should not be performed until failure and exceed 70% of the maximum effort.

Functional effects of adaptation of the respiratory system to physical exertion. Indicators of the functional state of the respiratory system are widely used for testing the level of health, determining the effectiveness of health and sports training, scientifically based solutions to the problem of dosage of physical exertion. Energy is necessary for life. Body cells use oxygen to meet their energy needs. The final result of the oxidation of carbohydrates, fats and proteins entering the body with food is carbon dioxide. Thus, the normal functioning of the human body is related to the function of the lungs, which ensure continuous consumption of oxygen and release of carbon dioxide. Oxygen reserves in the body are very limited, and therefore a person’s need for it is much more important than the need for food, water or sleep. You can live without food for more than a month, without water for about 10 days, without sleep for several days, and without oxygen – only several minutes (records of pearl collectors - 15 minutes).

Breathing is a set of physiological processes that provide entry of oxygen into the body from the environment, its use by cells for the oxidation of organic substances and the release of carbon dioxide. The respiratory system also provides compensation for hypoxic and acidic phenomena. Upon reaching the lungs, oxygen passes into the blood, is delivered to the tissues, diffuses through the walls of the capillaries into the intercellular fluid and is used by the cells. Carbon dioxide comes from tissues into the blood, transported through the blood to the lungs, passes into the alveoli, and from there into the environment [1].

The most important factor in ensuring high quality professional training for university graduates is active educational, labor and cognitive activities students. This activity is a complex process in the context of objectively existing contradictions, which include: contradictions between a large volume of educational and scientific information and the lack of time to master it; between the objectively ongoing gradual, long-term process of developing the social maturity of a future specialist and the desire to as quickly as possible to assert oneself and prove oneself; between the desire for independence in the selection of knowledge, taking into account personal interests and rigid boundaries of the curriculum and training programs. These contradictions create high neuro-emotional tension, which negatively affects the health and, especially, the psychophysical state of students. Taking into
account and understanding by students of this kind of contradictions is necessary for the normal course of their educational activities. Student age is characterized by intensive work on the formation of one’s personality, development of behavior style. This is a time for young people to search for answers to various moral, ethical, aesthetic, scientific, general cultural, political and other questions. Student age is also the final stage of progressive age-related development of the psychophysiological and motor capabilities of the body.

Young people during this period have great opportunities for intense educational work and social and political activities. The difficulties of studying at a university are associated not only with the need for creative assimilation a large amount of knowledge, the development of skills and abilities necessary for the future profession, and their practical application. These difficulties are obvious. But there are also hidden difficulties which sometimes have a very significant impact on the studies and psycho-emotional state of students.

These include a number of circumstances in student life that seem insignificant when taken individually, but taken together give a negative impact an effect that can be called students' inability to study at a university. Among the reasons for this phenomenon, the most significant are the following: teaching methods and organization that differ sharply from school ones, requiring a significant increase in independence in mastering educational material; lack of well-established interpersonal relationships, and therefore group contact, which is typical for any emerging team; stereotype and the formation of a new, “university”- new concerns accompanying admission to a university, which more often arise among students living in a dormitory (self-care, independent budgeting, planning and organizing your educational and free time, etc.). Junior year students find themselves especially in a difficult situation. On the one hand, they must immediately engage in intense work that requires the use of all strengths and abilities; on the other hand, overcoming the novelty of the conditions of educational work itself requires a significant expenditure of body strength. The inclusion of students in a new system of life may be accompanied by nervous tension, excessive irritability, lethargy, decreased volitional activity, anxiety [3].

Conclusions: the current phenomena are associated with difficulties in the adaptation process. For the development of a specialist's personality, professional, socio-psychological, and didactic adaptation are of particular importance. Let's take a closer look at these conditional selected types of adaptation. Professional adaptation means identification (identification) of oneself with the chosen profession, with the social role that will be performed after graduation. This is the identification of personal qualities with the requirements of the profession and an actively positive attitude towards the chosen specialty. Of primary importance in this adaptation has the formation of a person’s professional orientation. At the end of the professional adaptation process, the student should receive a holistic understanding of the activity for which he is preparing. He must develop a professional the ideal as the orienting basis for his activities. Socio-psychological adaptation means the integration of the individual with the student environment, the acceptance of its values, norms, standards of behavior, etc. This leaves an imprint on the personality and determines a change in the direction of needs. The process of internal reorientation of the individual is influenced by factors of interpersonal relationships, during which attitudes are formed that satisfy personal status of the student, forming the level of his aspirations. As interpersonal relationships strengthen, the student actively participates in the activities of the educational team groups. Didactic adaptation involves increasing the level of mental and intellectual readiness of students for the specifics of university education. Low level of this readiness when entering a university leads to mental fatigue, weakening of memory, thinking.

Higher school requires a new type of educational behavior, more complex forms of mental activity. The psychophysical state of students is also reflected in objective and subjective factors. Objective factors include age, gender, health status, amount of study load, nature, and duration of rest. Subjective factors include motivation to study, level of knowledge, ability to adapt to new conditions of study at a university, psychophysiological capabilities, neuropsychic stability, personal qualities (character, temperament, communication skills), performance, fatigue. A serious test for the body is the information overload of students that occurs when studying numerous academic disciplines, the scientific level and information volume of which is constantly increasing.

A critical and complex factor in students overstrain is the examination period - one of the variants of a stressful situation, occurring in most cases under time pressure and characterized by increased responsibility with elements of uncertainty. The negative impact on the body is enhanced by the combined influence of several risk factors when they act simultaneously and become chronic character. To avoid health problems, you need to adhere to a routine, proper nutrition, sleep patterns and be psychologically calm.

Reference