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Features of Studying the Functional Reserves of the Athletes' Body in the Conditions of Karakalpakstan

Sultansuynov Azamat Sametovich., Kaipnazarov Polat Muratbaevich., Akimov Kurbaniyaz Djumaniyazovich
Teachers of Karakalpak State University,
Yergaliyev Azamat Risgali uli
Student of Karakalpak State University

Annotation. The article discusses the issues of studying the functional reserves of the athletes' body in the conditions of the Republic of Karakalpakstan. The authors noted that the functional reserves of the body of athletes engaged in various sports provide the possibility of changing the functional activity of its structural elements, their ability to interact with each other to adapt to the effects of environmental factors on the body.

Keywords: functional reserves, adaptive mechanisms, athletes, structural elements, physical activity.

Currently, one of the main problems of ecological physiology is the study of the functional reserves of the body of athletes engaged in various sports and their adaptive ability to changing living conditions. Adaptive reactions are carried out primarily by increasing the functional activity of organs and systems of the body. Under optimal conditions for the vital activity of the organism, adaptive reactions are minimized and energy is spent primarily on fundamental life processes. If the indicators of the impact factor go beyond the optimum, then the body uses adaptive mechanisms associated with high energy costs [1, 2].

According to available information, the main reserve capabilities of the athletes' body used for the intensity of human activity, in the most general sense, can be designated as functional. The hidden reserve capabilities of the athletes' body in the initial scientific works were used as a similarity related to the "vital forces of the body" [2, 5]. In the dictionary of physiological terms, the following definition is given: "Functional reserves are the range of possible changes in the functional activity of physiological systems, which can be provided by the activation mechanisms of the body [14].

Functional reserves in athletes can also be associated with changes in metabolism and energy, and functional reserves of the system and the body as a whole are formed due to the restructuring of regulatory systems and the inclusion of new additional structures in the functional system.

Well-known scientists N.A. Aghajanyan and A.N. Kislitsyn [2] define the functional reserves of the body as the potential ability of the body to ensure its vital activity in various extreme conditions. The functional reserves of the organism are understood as "the adaptive and compensatory ability of the organism as a whole, developed in the process of evolution, to increase many times the power of its functional activity in comparison with the state of relative rest" [6]. A.S. Mozzhukhin [11] defines the reserve capabilities of an organism as its latent capabilities (acquired during evolution and ontogenesis) to enhance the functioning of its organs and organ systems in order to adapt to extreme shifts in the external or internal environment of the organism. At the same time, as the main system-forming factor of the functional reserves of the athletes' body, the result of activity is considered, which ensures the adaptation of the body to various physical and psycho-emotional loads.

Reserve functional capabilities are manifested in changes in the intensity and volume of energy processes of metabolism at the cellular and tissue levels, as well as in the dynamics of the intensity of physiological processes of the body as a whole [9, 11].

The functional reserves of the body determine the range of reliability of its functional systems, in which, with an increase in physical or other load, there is no imbalance in the functions of organs and systems of the body. As you know, the potential of functional reserves are laid down in the human genotype. These possibilities are revealed in specific conditions of life and can change under the influence of purposeful training, forming real individual functional reserves of the body [7].

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The functional reserves of the body of athletes engaged in various sports provide the possibility of changing the functional activity of its structural elements, their ability to interact with each other to adapt to the effects of environmental factors on the body in order to ensure the optimal level of functioning of the body for these specific conditions and the effectiveness of its activities to achieve an appropriate result of adaptation.

According to R.M. Bayevsky [5], functional reserves are understood as "... informational, energy, metabolic resources of the body that provide its specific adaptive capabilities. In order to mobilize these resources when environmental conditions change, a certain tension of regulatory systems is necessary. It is the level of tension of regulatory systems necessary to preserve homeostasis that determines the existing functional state of a person."

The morphofunctional basis of the functional reserves of the body (FRB) are the structural and functional units of tissues and organs in the aggregate of all their constituent components and systems of regulation of their activity. Their functioning at a level that ensures the current needs of the body, maintaining its homeostasis and the proper amount of regulatory and adaptive capabilities, as a priority parameter of the sufficiency of the FRB. The sufficiency of the FRB available in the body determines the state of health and physical activity of the athlete.

It should also be noted that the functional reserves of the body have both a structural and a metabolic component and reflect the main parameters of changes in the current functional state of a person [3]. Adaptive capabilities are defined as a reserve of FR, consisting of information, energy and metabolic reserves, which are spent on maintaining the constancy of the internal environment of the organism and maintaining its balance with the external environment [1].

The possibilities of adaptation mechanisms are largely determined by the possibilities of mobilization of the FR, which can provide an adequate level of functioning of the body's organs and systems with optimal tension of regulatory mechanisms.

The body's response to environmental factors depends on the strength and time of exposure, as well as the adaptive capabilities of the body, which are determined by the presence of FR. The state of an athlete's integral organism, as an integral result of the activity of his organs and systems, is largely determined by the optimality of regulatory mechanisms and control actions, their ability to ensure the body's balance with the environment and proper adaptation to the conditions of existence.

In normal physiology, a living organism is an open thermodynamic system, the stability of which, in accordance with the laws of thermodynamics, depends on the balance of the amounts of energy entering it from the outside and consumed by it to maintain vital activity. The viability of the organism, i.e. its functional reserves, is largely determined by the reserves of energy necessary for the implementation of many processes that form the life support of the organism at all levels of its organization. Based on such opinions, G.L. Apanasenko [4] proposed the "concept of biosystem energy potential" and the "thermodynamic concept of health" based on the assumption of the existence of a certain evolutionarily determined threshold of biosystem energy potential (body reserve), above which neither endogenous risk factors nor somatic diseases are registered in humans.

The development of the methodology for assessing FRB, as well as functional states bordering between health and disease, is the most important scientific direction of clinical physiology, based on modern ideas about homeostasis, adaptation, theory of functional systems, mechanisms of regulation of human vital activity, within which the problem of health assessment is solved, methods of prenosological diagnosis and criteria for the development of disease risk are developed, which undoubtedly, it is relevant for clinical, preventive and insurance medicine.

Assessment of the level of FRB allows to identify persons at risk of developing pathological conditions, and in case of diseases, to predict the effectiveness of health and rehabilitation technologies [12, 13]. The degree of risk is determined, first of all, by the body's ability to resist pathogenic factors and its ability to adapt to changing environmental conditions, which is generally determined by its reserve of vital forces, or rather, functional reserves. Quantitative assessment of adaptive capabilities makes it possible to assess and predict the risk of developing diseases at the stage of occurrence of prenosological conditions [10].

The functional state of the body is an integral characteristic of the state of health, reflecting the degree of FR, which can be mobilized for adaptation purposes, as well as the ability of the athlete's body to ensure

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the implementation of adaptive reactions, which is assessed according to changes in functions and structures at the moment when interacting with environmental factors [8].

Thus, summarizing the above, we note that in the process of implementing adaptive reactions of the body, the transition from one functional state to another occurs as a result of changes in the level of functional activity of life support systems, the degree of functional tension of their regulation mechanisms and the state of the FRB. The study of functional indicators that allow us to characterize the state of the functional reserves of the body is a necessary condition for assessing the level of human health and the likelihood of risk of its violation or loss. It has been established that the level of respiratory-cardiac synchronization characterizes the degree of vegetative balance, and respiratory-cardiac relationships are extremely labile and integrally reflect systemic vegetative rearrangements occurring in the human body under various external influences.

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