



Physiology of Sports (Interpretation and Research)

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Annotation: The results of the sportsmen's training activity are defined, first of all, by the laws of physiology and in particular – by the laws of a man's organism development and adaptation. The analysis of widely spread ideas of adaptive process mechanisms helped to reveal groundlessness and absurdity of these ideas. The system laws of a person's organism adaptation determine the principles of the training level transfer from the training exercises to competitive ones and define the choice of the way of the training process organization.

Keywords: effectiveness of sportsmen's training, the laws of adaptation, theory and methodology of sport, specificity of the training loads, the laws of the training level transfer, the methods of sports training construction, a complex method of sports training construction.

Maximum efficiency in the education of highly qualified athletes can only be achieved through the use of evidence-based modern technologies of complex training of athletes. At the same time, it should be remembered that "Material" basis for increasing fitness and sports performance any athlete - a training process based on the general theory of sports and theory and methodology of the chosen sport. But the only thing you can rely on modern theory and methodology of sports - actually operating laws of physiology: laws of development and adaptation of the human body. Once L.P. Matveev (1965) declared that the biological process cannot be opposed to the pedagogical (and vice versa) – they are united both in form and in content [9]. The first one displays a complex of adaptive rearrangements in the athlete's body in response to the training load, the second reveals the essence of the training system itself [3]. And a little later N. N. Yakovlev (1976) wrote that training is an adaptive process, and about management training process said: "To successfully manage, you need to know the mechanisms" [19]. At the same time, the mechanisms for managing the training process can be based on only on knowledge of the laws of development and adaptation of the human body [11, 16, 17]

Judging by numerous publications, the vast majority of sports teachers are absolutely sure that the adaptation process proceeds according to the "scheme" - "stress - adaptation - maladjustment - readaptation. However, it has long been known that stress is not the only nonspecific adaptive response of the organism [7]. By making "stress" the only non-specific reaction of the body, the authors of the above "scheme" made the process of adaptation itself discrete, intermittent, depending only on the presence of a stressor, and this contradicts all the laws of nature. Life is "permanent adaptation ... to the conditions existence" - I. M. Sechenov (1863). From a broad biological point of view, the body is in constant action throughout its life unfolding external and internal factors of its existence" [1]. Nonspecific characteristics of the factors acting on the body (their size) cannot be considered in isolation from the specific qualities of these factors. Furthermore, non-specific properties of acting factors, including those that determine their specificity [16, 17]. And the body cannot react separately to non-specific and specific properties of acting factors. But there is no specificity in the above "scheme" at all, and, consequently, in this case it is completely incomprehensible how the process itself proceeds adaptation. "Disadaptation"



in the view of the creators of the "scheme" is a process that is reverse to the process "adaptation", its "destruction", which is generally possible only in connection with death organism. The use of the term "disadaptation" also indicates the prevailing understanding of adaptation as a process that occurs periodically. And should say that the emergence of the term "disadaptation" is closely related to the notion that adaptation is always the achievement by the body of some great possibilities, which is fundamentally wrong. The process of "re-adaptation" means "return" according to most organism to the previously achieved level of adaptation. But the human body is changeable - this is its inherent property, and therefore all subsequent adaptation cycles will not return to the "previously achieved level of adaptation", and the movement to achieve changed organism of new "levels of adaptation" (which are not at all obliged "exceed" in its parameters previously achieved). Thus, the "scheme" - "stress - adaptation - disadaptation - readaptation", guiding coaches and athletes to build a training process according to principle "the more the better" - is absurd from beginning to end and in no way reflects the real processes occurring in the body during its continuous adaptation to always complex acting environmental factors. And unshakable For adherents of this "scheme", we recall the statement of G. Selye (1960): "There is nothing more harmful to progress than the stubborn upholding of our preconceived notions" [15].

Adaptation is the process of specific adaptation of an organism to a constant complex environmental factors acting on it and the process of maintaining the structural and functional stability of the finally formed functional systems organism. Laws of adaptation: 1. The laws of adaptation are the same for all living things. organisms created in the same image and likeness. 2. The laws of adaptation are an integral part of the laws of development, maturation and aging of the human body. 3. Adaptation is a continuous process, ending only in connection with death organism. 4. Any living organism exists in four-dimensional space, and, consequently, the processes of its adaptation cannot be described linearly. 5. At the core the process of adaptation of a highly organized organism always lies in the formation absolutely specific functional systems, adaptive changes in components of which serve as one of the mandatory "tools" for their formation.

The system-forming factors of any functional system are the final and intermediate results of its "activity", which determines its absolute structural and functional specificity. 7. Systemic reactions of the body to a complex of simultaneous or (and) consecutive environmental influences is always specific, and the non-specific link of adaptation, being an integral component of any functional system, also determines the specifics of its response. 8. It is possible and necessary to talk about simultaneously acting dominant and situational afferent influences, but it should be understood that the body reacts always on the whole complex of environmental influences by the formation of a single specific given complex functional system. 9. Each functional system is extremely specific and, within the framework of this specificity, is relatively labile only on the stage of its formation (the ongoing process of adaptation of the body). The formed functional system (which corresponds to the state adaptation of the organism to specific conditions) loses the property of lability and stable, provided that its afferent component remains unchanged. 10. Any according complexity, a functional system can only be formed on the basis of "pre-existing" physiological (structural-functional) mechanisms, which, depending on the "needs" of a particular integral system, can be involved or not involved in it as its components. 11. Components functional system determine its "behavior" as a whole, while influencing each other, but the system as a whole always influences its components. Components. 12. The complexity and length of the "work cycle" of functional systems has no boundaries in time and space. 13. A prerequisite for a full-fledged formation of any functional system is constancy or periodicity action on the body of a standard, unchanging set of environmental factors, "providing" the same standard afferent component of the system 14. More one obligatory condition for the formation of any functional systems is participation in this process



of memory mechanisms. 15. The process of adaptation, despite the fact that it proceeds according to general laws, is always individual, since it is in a straight line depending on the genotype of this or that individual and realized within the framework of this genotype and in accordance with the conditions of the previous life of the organism phenotype [13].

In accordance with the presented laws of adaptation: 1. The body is always works as an integral mechanism and "forms" behavioral (motor) acts in strict accordance with the conditions in which it is placed; 2. System specific motor acts are formed as a result of their repeated correct repetition; 3. Any activity of the organism is extremely specific both in terms of its external parameters, and according to the structural and functional characteristics of this activity; 4. Adaptive changes underlying the growth of an athlete's fitness, are determined by the specifics of the training activity carried out by him. Since taking into account these regularities and in compliance with the principles of purposefulness and optimality of training loads, the training process should be built qualified athletes, and it is in this case that he will be the most effective [18]. It should be understood that the performance of each specific work organism is provided by a specific structural-functional complex organism and it is this structural-functional complex that "trains" in the process of performing a particular job. For the training of each of this complex the body spends its "adaptive reserve", which is far from unlimited. "For In order to expand in one direction, nature is forced to be stingy in another. (Johann Wolfgang Goethe). "If nourishing juices flow in excess to one organ, they seldom flow, at least in abundance, to another" (Charles Robert Darwin).

There is an immutable law of nature: "If something is added in one place, then in another the place will definitely decrease." In science, this law is better known as the conservation law. energy. According to this law, the more "non-specific" an athlete performs training work, the more damage is done to the main sports activity. This statement does not exclude the use in the training process additional non-specific exercises, but it should understand that "training transfer" can be not only "positive", but also "negative". Consequently, the group of additional training exercises must be selected and used in the training complex in such a way that each component of this complex of training effects on the athlete's body ensured precisely a positive "training transfer" to the competitive exercise [14]. The key to understanding the laws of "training transfer" lies in laws of system physiology, and in particular - in the laws of human adaptation organism [11, 13, 16, 17].

At the heart of an athlete's achievement of the maximum possible (at the moment development of his body) the level of fitness and achievement of the "peak of sports form" should be the construction of a specific functional system of a particular motor act. Figure 3 shows the dynamics of individual results swimming by an athlete of a distance of 50 m butterfly during the period of adaptation to the standard training load when using the complex method [2, 3, 20, 21] building the training process. There is a pronounced improvement in sports result in swimming by an athlete of a distance of 50 m in a butterfly way. Besides, in this experiment, the possibility was proved and the path and conditions for achieving athlete "peak fitness".

Thus, the physiologically substantiated construction of the training process is the most effective way to train highly qualified athletes. Accordingly, in the foreground in the construction of the training process are problems of specificity and optimization of training loads. At the same time, the choice method of constructing the training process should be carried out according to the criterion of the most effective for each individual sport.

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