



Dynamic control of indicators of functional and physical state of the organism of athletes engaged in cyclic and acyclic sports

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Abstract

Objective of the study was a comparative analysis of the functional and energy state of athletes involved in cyclic and acyclic sports.

Methods and structure of the study. Dynamic control of indicators of the functional and energy state of athletes was carried out using the "Omega-C" software package. The express diagnostics subprogram made it possible to assess the level of adaptive and energy capabilities of athletes to physical loads, to determine the level of functional readiness of athletes in the form of a quantitative integral indicator of the state of "sports form", the state of current fitness, to assess the energy supply of physical loads and the psycho-emotional state of the athlete.

Results and conclusions. It was revealed that in athletes of the 1st group C (cyclic sports) the efficiency of the heart in terms of power, economy and reliability is significantly higher than in athletes of the 2nd group A (acyclic sports). The results obtained indicate that in athletes of cyclic sports, the reserves of energy supply are higher and more economically spent after performing a standard load than in athletes of the 2nd group A. When determining the level of adaptive, physical and integral readiness of athletes in cyclic and acyclic sports, we it was found that the performed load test is not specific for the athletes of the 2nd group. In addition, their body is not adapted to perform such work, so running turned out to be a strong stress factor for them, which led to an increase in the tension index.

Keywords: *functional, energy state of the body, adaptation, cyclic and acyclic sports, heart rate variability.*

Introduction. Dynamic monitoring of the functional state of athletes involved in cyclic and acyclic sports is very relevant in sports. Sports activity, especially competitive loads, places extremely high demands on all functional capabilities of the body, therefore it is necessary to have sufficiently complete information about the dynamics of changes in the functional state and physical fitness of athletes that occur during training [2].

Objective of the study was a comparative analysis of the functional and energy state of athletes involved in cyclic and acyclic sports.

Methods and structure of the study. Dynamic monitoring of indicators of the functional and energetic state of athletes was carried out using the Omega-S software package. The express diagnostic subprogram made it possible to assess the level of adapta-

tion and energy capabilities of athletes for physical activity, determine the level of functional readiness of athletes in the form of a quantitative integral indicator of the "sports form" state, the state of current fitness, and assess the energy supply of physical activity and the psycho-emotional state of the athlete [3, 4].

Research results and discussion. To study the effectiveness of the cardiovascular system, 48 athletes of the 1st group C and 2nd group A underwent a 5-minute standard stress test with recording of heart rate indicators and recording of an electrocardiogram. Comparing the obtained indicators of the heart rate of athletes, it can be argued that athletes of the 1st group C have higher adaptive and adaptive capabilities than athletes of the 2nd group A. It should be noted that when athletes of the 1st group performed a standard load, the C was carried out in a comfortable,



aerobic zone energy supply of heart rate (167.7 ± 2.6) beats/min, and among athletes of the 2nd group A a high heart rate (183.2 ± 2.8) beats/min was recorded, i.e. the work was carried out in the aerobic-anaerobic and anaerobic energy supply zones.

Assessing the efficiency of the heart in athletes, it should be noted that in group 1 C the indicator of heart rate variability, at rest, the average RR interval was (976 ± 23.5) ms, after exercise it decreased slightly to ($927.5 \pm 35,4$) ms, this characterizes sufficient efficiency and reliability in the work of the heart. In athletes in group 2 A, the average RR interval at rest was (805.3 ± 17.6) ms, after the load there was a significant decrease to (727.9 ± 26.7) ms, which indicates a decrease in the body's performance athletes, severe fatigue and reaching the lower limits of the physiological norm.

The data obtained indicate that among athletes of the 1st group C (cyclic sports) the efficiency of the heart in terms of power, efficiency and reliability is significantly ($p < 0.001$) higher than among athletes of the 2nd group A (acyclic sports).

Consideration of energy supply in athletes of cyclic and acyclic sports after performing a standard load allowed us to identify the following features (see table).

The level of energy supply in group C before the load was within the physiological norm; after performing a standard load, this indicator increased, which indicates the mobilization of the entire energy system of the body, activation of the sympatho-adrenal system and an increase in the functional capabilities of the body (however, the differences between the background values and the parameters obtained after loading are not reliable). At the same time, in group A, the level of energy supply after performing a standard load, this indicator decreased, which indicates a decrease and depletion of the energy reserves of the body of athletes involved in acyclic sports (see table). Considering the energy reserves of athletes in cyclic and acyclic sports, it should be noted that athletes

in cyclic sports have higher energy reserves and are spent more economically after performing a standard load than athletes in acyclic sports.

In group C, the catabolism index after exercise increased slightly and amounted to 165.8 ± 14.1 c.u., this is due to the fact that the level of metabolism has increased and the body's work is carried out at a high energy level with high efficiency. In group A, the rate of catabolism at rest was lower and amounted to 131.4 ± 9.9 c.u., after the load it decreased to 103.3 ± 13.1 , which characterizes a lower level of metabolism and energy level in the body.

As can be seen from the table, in group 1 C the indicator of anabolism after exercise practically did not change, which characterizes the large energy resource of the body and its rapid recovery to the original parameters. In group A, the anabolism index before exercise was 137.5 ± 9.3 c.u., which is within the normal range. After the load, the anabolism rate decreased to (95.2 ± 5.6) c.u. ($p < 0.001$), this characterizes a certain phase of economization in the work of the body's energy systems due to a lack of energy resources. A study of the level of adaptation, physical and integral readiness of athletes of cyclic and acyclic sports to perform physical activity revealed that among athletes of group C, the indicator of the level of adaptation to physical activity at rest was (88.4 ± 2.4) %, and after performing the load it practically did not change (87.4 ± 2.1) %, indicating a high level of adaptation to physical activity. In group A, this indicator was slightly lower and amounted to (79.3 ± 2.1) %, after performing the load it decreased and amounted to (66.4 ± 2.3) %, which indicates the low adaptive capabilities of athletes of acyclic sports. Considering the level of fitness of the body in athletes of group C at rest, which was (95.3 ± 3.9) %, and after performing the load it increased slightly to (96.8 ± 1.0) %, indicating a high level of fitness of the body of athletes cyclic sports. In group A, this indicator was slightly lower and amounted to (87.4 ± 3.3) %, after performing the load it decreased significantly and amounted to

Energy supply in athletes of acyclic and cyclic sports at rest and after performing a standard load

Indicators	Sample			
	rest		load	
	C	A	C	A
C1 – level of energy supply (%)	78,3±5,4	71,9±4,1	80,7±5,8	61,5±4,36**
C2 – energy supply reserves (%)	86±5,8	76,8±3,34*	84,1±3,35	65,9±2,9**
Catabolism index (c.u.)	157,5±11,6	131,4±9,9	165,8±14,1	103,3±13,1**
Anabolism indicator (c.u.)	174,6±8,5	137,5±9,3**	167,6±14,9	95,2±5,6**

Note: * – $p < 0.05$; ** – $p < 0.001$ level of significance of differences between groups C (cyclic) and A (acyclic).



(64.5±2.3) %, which indicates a low level of training in athletes of acyclic sports to perform a standard load. The stress test performed is not specific for athletes of the acyclic group; their body is not adapted to perform such work, so running turned out to be a strong stress factor for them, which led to an increase in the tension index [1].

Conclusions. As a result of the study, it was revealed that among athletes of group C (cyclic sports), the efficiency of the heart in terms of power, efficiency and reliability is significantly higher than among athletes of group A (acyclic sports). Athletes of cyclic sports have higher energy reserves and spend them more economically after performing a standard load than athletes of group A.

The stress test being performed is not specific for athletes of group A, in addition, their body is not adapted to perform such work, so running turned out to be a strong stress factor for them, which led to an increase in the tension index.

The results obtained allow us to make recommendations for the coaching and teaching staff of acyclic sports on including aerobic function lasting at least 5 minutes in educational and training sessions.

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