PROGNOSTIC VALUE OF METABOLIC PARAMETERS AND INTEGRATED SCORING ASSESSMENT OF FUNCTIONAL READINESS IN ELITE CYCLISTS

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Abstract: The article is devoted to identify key factors of functional readiness in elite cyclists and to evaluate the effectiveness of an integrated scoring scheme for predicting competitive readiness.

Introduction

The functional readiness of athletes in cyclic sports is determined by a complex of metabolic and physiological factors, among which the anaerobic threshold, specific power and lactate tolerance are key [1, 2]. These parameters are directly related to resistance to high loads, and their interaction allows for an objective assessment of the body's condition [3]. An additional factor influencing the indicators is body weight, which determines the relative characteristics of power [4]. Modern research confirms the feasibility of using integrated assessment scales, which allows not only to objectify the level of functional readiness, but also to predict competitive results [5, 6].

Materials and methods.

The study included 43 elite male cyclists with an average age of 22.4 ± 3.1 years, who were at the stage of an active sports career and underwent a routine examination in preparation for competitions. For a comprehensive assessment of the functional state, a stepwise bicycle ergometer test with an increasing load was used, which allows determining individual values of the anaerobic threshold (AT). Testing was carried out on a modern bicycle ergometer with control of power and pedaling frequency; the moment of AT onset was recorded

by changes in the nature of the gas exchange curve and the dynamics of lactate concentration in the blood.

The lactate level was determined by enzymatic analysis of capillary blood taken from the earlobe at each stage of the test. This method has high sensitivity and specificity, which ensures the accuracy of the quantitative assessment of the metabolic response to the load and allows an objective assessment of the body's tolerance to an increase in lactate concentration. The calculation of the specific power (W/kg) was carried out based on the data of bicycle ergometry and anthropometric measurements of body weight, which made it possible to take into account not only the absolute strength performance, but also its relationship with the individual morphofunctional characteristics of the athlete. For statistical processing of the results, a correlation analysis (Pearson's r) was performed, aimed at identifying the relationships between the anaerobic threshold, lactate tolerance, specific power and body weight. This approach made it possible to establish the determining factors of functional readiness. Additionally, for the integral assessment, a point scale was used, including three key indicators - anaerobic threshold, specific power and lactate tolerance. This methodological approach provided the possibility of a comprehensive comparison of individual results and made it possible to use the system to predict competitive readiness and individualize training programs.

Results.

The analysis of the obtained data showed the presence of statistically significant relationships between the functional readiness indicators and the key parameters of metabolic endurance. Thus, the anaerobic threshold demonstrated the most pronounced correlation with the level of functional readiness ($r = 0.74$, $p < 0.01$), which confirms its leading role as a criterion for assessing the effectiveness of aerobic-anaerobic metabolism and a prognostic indicator of athletic performance. Specific power (W / kg) also turned out to be closely related to the level of readiness ($r = 0.71$, $p < 0.01$), which emphasizes the importance of taking into account body

weight when interpreting the results of bicycle ergometry and determining the athlete's potential.

Lactate tolerance demonstrated a reliable positive dependence ($r = 0.69$, $p < 0.05$), which indicates the importance of the body's ability to function effectively at high concentrations of fatigue metabolites. At the same time, body weight had a negative effect on relative power indicators ($r = –0.62$, $p < 0.05$), which indicates the need for strict control over athletes' weight in order to optimize their metabolic efficiency and achieve high competitive results. The use of an integrated scoring scheme for assessment, including anaerobic threshold, specific power and lactate tolerance, made it possible to significantly increase the accuracy of predicting the level of competitive readiness. The coincidence of the forecast with the actual results was 87%, which confirms the high validity of the proposed methodology. This approach can be recommended for practical use in the system of individualization of the training process and objective assessment of the athletic potential of cyclists.

Conclusions.

The key factors of functional readiness in elite cyclists are the anaerobic threshold, specific power and lactate tolerance. Body mass has a significant impact on relative indicators, which must be taken into account when interpreting the results. The use of an integrated scoring scheme for assessment allows predicting the level of competitive readiness and serves as a tool for individualizing training programs.

List literature .

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