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New stress-induced cardiomyopathy risk criteria in children and adolescents in high-achievement sports (Moscow)

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Immunological imbalance with the hyperproduction of proinflammatory cytokines, predominantly TNF- α , may be of importance in the pathological transformation of athlete's heart and development of "stress cardiomyopathy" in children and adolescents in high-achievement sports in the event of inadequate overexertion.

Objective: to establish risk criteria of stress cardiomyopathy in young athletes based on comparison of the "quality" of adjustment to maximum physical activity reflecting the degree of myocardial damage.

Methods. A total of 100 young sportsmen of high and intermediate athletic qualification, athletes 10-19 years of age were examined. The clinical and functional state of cardiovascular system was assessed along with the sufficiency of energy supply during peak activity using a gas analyzer; the titers of anti-endothelial, anti-cardiomyocyte and anti-smooth muscle antibodies, antibodies to the myocardial conducting tissues, the level of proinflammatory cytokines (TNF- α , IL-6,8), troponin I, heart fractions of LDH, CPK and CPK-MB were examined.

Results. In the beginner group, 5-fold increase in the level of TNF- α was observed in 3% of sportsmen, 3-fold increase - in 17%, while normal value - in 46%. In 67% of cases, the effective increase in the maximum physical performance (PP) >6 months of trainings and the improvement the oxygen transport system, the dynamics of immunological markers was characterized by a decrease in the early afterload level of proinflammatory cytokines. A significant negative correlation was obtained between the level of TNF- α at rest with athletes ($r=-0.7$) and the training load in hours per week ($r=-0.65$). A significant negative early afterload correlation was observed between the level of TNF- α and the maximum oxygen pulse ($r=-0.9$), the titers of anti-endothelial ($r=-0.67$), anti-cardiomyocyte ($r=-0.76$), anti-smooth muscle antibodies ($r=-0.89$), antibodies to cardiac conducting tissue ($r=-0.94$). Early afterload average values of the levels of proinflammatory cytokines and titers of anti-myocardial antibodies showed a statistically significant correlation with the training load in hours per week: $r=-0.79$ for TNF- α , $r=-0.94$ for IL-6, $r=-0.6$ for IL-8, which can serve as an objective criterion of the adequacy of the training process. The obtained data are the basis for changes in the intensity of training intensity and the objective criterion for cardiac protection.