



Proceedings of IBEC 2018, Beijing, China, October 23-25
OR-025

Association study between Chinese excellent long-distance female athletes' PGC-1 β genetic polymorphism and aerobic capacity

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Objective Peroxisome proliferator-activated receptor- γ coactivator-1 β (PGC-1 β) is mainly expressed in mitochondria-rich tissues, which involved in skeletal muscle mitochondrial biosynthesis and energy metabolism processes such as fatty acid transport and oxidation, hepatic gluconeogenesis. PGC-1 β is Previous studies have shown that this genetic polymorphism is associated with the athletic ability of elite endurance athletes. Therefore, based on the previous research, the relationship between PGC-1 β gene polymorphism and aerobic exercise ability of elite female long-distance runners was discussed to provide new effective indicators for athletes' selection of materials, and improve the accuracy and advancement of athletes' selection of materials.

Methods 56 Chinese elite female long-distance runners were selected, and venous blood was extracted to analyze the gene polymorphism of specific gene locus. The subjects were tested for aerobic endurance index and lung function index, wherein the aerobic endurance index included maximum oxygen uptake, relative maximal oxygen uptake relative value, anaerobic threshold and anaerobic threshold relative value, and lung function indicators including vital capacity, Time lung capacity, minute ventilation and maximum ventilation. Subsequently, the cross-sectional association study method was used to analyze the association between four genotypes locus of PGC-1 β including rs32579, rs2161257, rs1544744 and rs10783180 in 56 subjects.

Results 1) All four polymorphic locus were tested by H-W balance, indicating that the subjects were representative of the population. 2) rs32579 locus: There were no significant differences in lung function indicators and aerobic exercise capacity between different genotype athletes. 3) rs2161257 locus: There were no significant differences in lung function indicators and aerobic exercise capacity between different genotype athletes. 4) rs1544744 locus: There were no significant differences in lung function indicators and aerobic exercise capacity between different genotype athletes. 5) rs10783180 locus: There is a significant difference in the relative values of anaerobic threshold and anaerobic threshold between different genotype athletes. The anaerobic threshold of AG genotype athletes was 2156.35 ± 227.69 ml/min and the anaerobic threshold of athletes with GG genotype was 2143.41 ± 217.30 ml/min. So the anaerobic threshold of AG genotype athletes was significantly greater than the anaerobic threshold of GG genotype athletes. The Anaerobic threshold relative value for AG genotype athletes was 50.99 ± 3.99 ml/kg/min, while the anaerobic threshold relative value for athletes with GG genotype was 48.12 ± 4.25 ml/kg/min. The anaerobic threshold relative value of AG genotype athletes was significantly greater than that of GG genotype athletes. Other indicators showed no significant difference.

Conclusions The rs10783180 polymorphism is associated with the athletic ability of elite endurance athletes. The population carrying ag genotype may have higher anaerobic threshold value and relative value of anaerobic threshold, which may become more excellent endurance athletes. Rs10783180 polymorphic locus AG genotype can be used as a molecular genetic marker to predict the relative value of anaerobic threshold and anaerobic threshold of Chinese Han women's long-distance runners in northern China.