28th ECSS Anniversary Congress, Paris/France, 4-7 July 2023

Association of BDNF rs6265 polymorphism with Lithuanian elite athletes' status

Gineviciene, V., Anikeviciute, G., Sivaciova, M.O.

Vilnius University

INTRODUCTION:
Regular physical activities lead to an increase in brain-derived neurotrophic factor (BDNF) and other myokines concentration level in the blood serum, which determines the general physical and psychological health of a person. BDNF (encoded by the BDNF gene) is present in the blood both at rest and during exercise training, and is derived from several tissue sources (such as skeletal muscle, brain, vascular endothelial cells, peripheral neurons, blood mononuclear cells, platelets etc.) known to produce and release neurotrophic factors into circulation in response to exercise. The single nucleotide polymorphism (SNP, rs6265, C>T, Val66Met) in the BDNF gene affect the intracellular distribution, packaging and release of BDNF protein, and can affect neuronal adaptation and response to exercise, as well as the ability to activate the appropriate muscles and generate more power. However, the influence of this SNP on the characteristics of elite athletes remains not clear. The purpose of this study was to investigate the relationship of the BDNF rs6265 genetic variant with elite Lithuanian athlete status.
METHODS:
In the present study, BDNF rs6265 (C>T) polymorphism was investigated in 230 Lithuanian elite athletes representing three functional sports groups [endurance, N=59; sprint-power, N=87, and team sports, N=84], as well as in 230 control samples (non-athletes) from the Lithuanian population. Genotyping was performed using TaqMan Real-time polymerase chain reaction assay.
RESULTS:
The results of the case-control analysis showed that the frequencies of BDNF genotypes were significantly different in the general group of athletes (CC/CT/TT: 58.1/33.5/0.0%, p = 0.01) and in sprint-power group (CC/CT/TT: 63.2/36.8/0.0%, p=0.03) compared to the control group (CC/CT/TT: 74.3/23.9/1.7%). The findings indicated that the heterozygous CT genotype is more prevalent in sprint-power athletes (36.8%) compared with endurance athletes (28.8%) and controls (23.9%). The logistic regression analysis suggests that the odds ratio (OR) of CT genotype (vs CC+TT) and being an elite athlete was 1.6 (95%CI: 1.06–2.41; p=0.02). OR of sprint-power athletes harboring the CT genotype was 1.85 (95%CI: 1.09–3.15; p=0.02). Our results suggest that BDNF CT heterozygous athletes have a higher sprint-power ability than homozygous.
CONCLUSION:
Our findings provide support the hypothesis that the BDNF rs6265 polymorphism is associated with elite athletic status. The BDNF CT heterozygotes had a significantly higher prevalence among elite Lithuanian athletes (especially sprint-power oriented athletes) than in the control group. Possible explanations for heterozygote advantage of BDNF rs6265 variant for elite athletes are BDNF expression in brain and skeletal muscle (especially in the fast-twitch muscle fibers) during exercise training. Replication studies are needed to support our data and to fully understand the relationship between BDNF gene and physical performance of athletes.

Topic: Health and Fitness

Presentation Poster