MYF6 (MYOGENIC FACTOR 6) GENE VARIATION IN ATHLETES

Druzhevskaya Anastasiya1, Popov Daniil2, Lyubaeva Ekaterina2, Missina Svetlana2, Astenkova Irina1, Vinogradova Olga2, Ahmetov Ildus1

(St Petersburg Research Institute of Physical Culture1, SSC RF Institute for Biomedical Problems, Moscow2, Russia)

MYF6 gene is a member of the human gene family of muscle determination factors which are responsible for development and differentiation of the embryonic myoblasts. This regulatory factor Myf6 plays an important role in the maintenance of fully-differentiated myofibers and in regeneration of adult skeletal muscle. Myf6 has been identified as a positive regulator of muscle size. The aim of this study was to examine the association between C964T MYF6 gene polymorphism (rs3121) and physical performance, muscle fibre composition and other physiological parameters. Russian control subjects (n=182, CG) and athletes (n=563, 13 kinds of sports) were studied. Athletes were divided into five groups according to the nature of their physical activity. C964T MYF6 genotypes were determined by PCR-RLFP. Composition and cross-sectional area of muscle fibers were defined in samples of m. vastus lateralis of 54 non-athletes and 26 speed-skaters using immunoperoxidase immunohistochemical identification of myosin isoforms. The subgroup of 86 rowers was studied concerning the determination of physiological parameters. There was no significant difference in allelic frequency between common group of athletes and controls (C allele – 40% vs. 42% respectively). However, the frequency of MYF6 TT genotype was increased in athletes (38%) compared to CG (32%), but the significant difference was shown only in endurance-oriented athletes (EA) (43%) (P=0.044). We revealed significant difference in T allele frequency (64% vs. 50%; P=0.03) and TT genotype (43% vs. 24%; P=0.05) between EA in comparison with power-oriented athletes (PA). Moreover, T allele frequency increased with the rising of athletes’ skill level in EA (sub-elite 62.0%, elite 66.7%) and decreased the rising of athletes’ skill level in PA (sub-elite 63.8%, elite 50.8%). In non-athletes it was shown no significant difference in muscle fiber type composition and their cross-sectional area between MYF6 genotypes. In speed-skaters the mean percentages of cross-sectional area of slow fibers in MYF6 TT homozygotes (6196.2±378.7 mm²) were higher than in CC homozygotes (5280.3±163.9 mm²). Additionally, there was tendency to the increment of total cross-sectional area of all muscle fibers in TT genotype carriers in comparison with CC genotype carriers (12557.5±493.1 mm² vs. 11001.3±316.7 mm²). We revealed that in sub-elite rowers T allele was associated with higher values of maximum power out-put (CC: 341.2±5.3 W, CT: 372.5±9.1 W, TT: 386.1±6.7 W; P=0.0007), power at anaerobic threshold (CC: 250.8±9.0 W, CT: 287.6±11.3 W, TT: 293.8±5.8 W; P=0.035) and power at aerobic threshold (CC: 155.4±24.8 W, CT: 203.9±15.7 W, TT: 236.3±7.8 W; P=0.013). This corresponds to our data that T allele is associated with predisposition to endurance performance. In conclusion, MYF6 gene variation is associated with elite athletic performance.

Keywords: Polymorphism, Muscle fibres, Genotype

12th Annual Congress of the ECSS, 11–14 July 2007, Jyväskylä, Finland