Angiogenesis is a critical phenomenon in the adaptation to aerobic exercise training because a contributing mechanism to the training-induced increase in VO2max is an increase in skeletal muscle capillarity. Vascular endothelial growth factor (VEGF) has been identified as one of the key regulators of angiogenesis, because it plays a role in endothelial cell proliferation and migration. Several studies have shown that human VEGF gene polymorphisms are associated with VEGF gene expression and VO2max of untrained subjects. However, the influence of VEGF gene variants on physiological parameters of athletes and the distribution of VEGF genotypes and alleles amongst them has not been examined. The purpose of the study was to investigate the VEGF promoter G-634C polymorphism for association with physical performance in athletes. Nine hundred and eighty two male and female Russian athletes of regional or national competitive standard were recruited from endurance and power sports (biathlon, boxing, tennis, combat sports, cycling, ice hockey rowing, skiing, soccer, speed skating, swimming, track and fields, triathlon, weightlifting). VEGF genotypes and alleles were compared to 304 controls. Physiological parameters in 90 rowers were evaluated by PM 3 Rower Ergometer and MetaMax 3B Gas Analyzer. VEGF gene G-634C polymorphism was determined by PCR-RLFP. VEGF C allele frequencies were significantly higher (P<0.05) in endurance-oriented athletes (n=323, C allele – 29.4%) and group of athletes with mixed endurance/power activity (n=212, C allele – 30.7%) compared to controls (24.2%). Additionally, C allele frequency (31.5%) in elite endurance-oriented athletes was the highest. Consistent with these results, we found that male athletes with VEGF CC genotype had higher VO2max than did GG genotype carriers (5.5 (0.6) l/min vs. 4.9 (0.5) l/min; P=0.09). Furthermore, in male athletes VEGF C allele was associated with higher values of power output (CC+GC – 401 (31) W, GG – 371 (47) W, P=0.049). In conclusion, these data suggest that VEGF C allele may provide some sort of advantage for endurance-oriented athletes.

Keywords: Aerobic Power, VO2 Kinetics, Genotype