

Endothelial nitric oxide synthase g894t (rs1799983) gene polymorphism in polish athletes

Research Article

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Abstract: The NOS3 gene has been associated with athletic endurance performance and elite power athletic status. With respect to NOS3 G894T and its relation to athletic performance or status, results across various studies have not been consistent. Therefore, the lack of consistency among previous studies prompted us to design a case-control study in a Polish Caucasian population to examine the relationship between the NOS3 G894T polymorphism and athletes' status, *i.e.* type and intensity of exercise performed (power-oriented, "mixed" power/endurance activity, endurance-oriented) and the possible association between the G894T variant and athletic performance. The case-control study was performed in a group of 360 Polish athletes (cases) of the highest nationally competitive standard (male $n=156$ and female $n=67$) and 191 unrelated, sedentary control subjects. The G894T genotype and allele distributions differed significantly between power-oriented ($P=0.009$, $P=0.003$), "mixed" ($P=0.021$, $P=0.009$), endurance ($P=0.043$, $P=0.014$) athletes when compared to control subjects (P values for genotypes and alleles, respectively). There were no significant differences between elite and sub-elite athletes in any group. The over-representation of the GG genotype and G allele in all athletes suggests that the G894 allele may favour all types of sports, however, the strongest predisposition was seen among power-oriented athletes.

Keywords: Nitric oxide • Genotype • Genetic Variation • Athletes • Physical Fitness

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1. Introduction

Nitric oxide (NO) is a gaseous free radical that serves as a multifunctional messenger [1]. NO mediates crucial features of neuronal communication, blood vessel modulation and immune response [2]. It is a factor in common pathological conditions such as hypertension and atherosclerosis [3]. Nitric oxide is generated from arginine by a family of three distinct calmodulin-dependent nitric oxide synthase (NOS) enzymes (isoforms): endothelial (eNOS), neuronal (nNOS, or brain bNOS) [4] and inducible (iNOS) [2] and each of the isoforms is encoded by distinct genes

on different chromosomes, NOS3, NOS1, and NOS2, respectively [5].

Blood flow is essential for the delivery of nutrients, maintenance of fluid balance, and the removal of metabolites; the delivery of blood flow to skeletal muscle is, therefore, a prerequisite for maintaining physical activity [6,7]. Nitric oxide has been shown to be one of the most important intrinsic factors in regulating basal vascular tone, a balance between constrictor and dilator influences, however, the results regarding the increase in muscle blood flow with exercise (hyperemia) are less concordant [8]. Moreover, NO has been shown to exert several other distinct effects on various aspects

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