

## Association of the Val158Met Polymorphism of the *COMT* Gene with Measures of Psychophysiological Status in Athletes

E. V. Valeeva,<sup>1,2</sup> G. S. Kashevarov,<sup>3</sup> R. R. Kasimova,<sup>4</sup>  
I. I. Ahmetov,<sup>2,5</sup> and O. A. Kravtsova<sup>1</sup>

*Translated from Rossiiskii Fiziologicheskii Zhurnal imeni I. M. Sechenova, Vol. 105, No. 3, pp. 350–362, March, 2019. Original article submitted August 17, 2018. Revised version received December 25, 2018. Accepted December 29, 2018.*

Resistance to psychological stress, motivation, physical work capacity, and fatigue are genetically determined characteristics which are important for successful competitive activity in athletes. Polymorphism of the catechol-O-methyltransferase (*COMT*; regulates the function of the dopaminergic system) gene can generate individual differences in the development and manifestation of psychophysical qualities. The present study assessed the influences of the rs4680 polymorphism of the *COMT* gene on the psychophysiological status of 146 athletes of different specialties and qualifications. Athletes carrying the Met allele were found to have high psychological stability in the critical flicker fusion frequency test, which reflects the ability to form a task-appropriate functional system and maintain it for a longer period of time, as compared with carriers of the Val allele. Females (aged 10–19 years) showed higher rates of sensorimotor reactions in a simple visuomotor reaction test and a smaller number of accurate reactions in a moving object reaction test. Males (aged 12–19 years) carrying the Met allele were characterized by higher levels of personal anxiety on the Spielberg–Hanin anxiety scale. Thus, these studies demonstrate that the rs4680 polymorphism of the *COMT* gene influences the psychophysiological status of athletes.

**Keywords:** psychogenetics of sport, psychophysiological measures, anxiety, athletes, dopaminergic system, catechol-O-methyltransferase, *COMT* gene.

Most studies of the heritability of psychological, psychophysiological, neurodynamic, and sensorimotor measures conventionally address individual electroencephalogram measures or groups of measures, reflecting some proposed cryptic variable, such as properties of the nervous system [1]. However, there is a clear need for a complex approach to studies of psychophysiology addressing human personality and bodily characteristics and assessing the

capacity to realize abilities to carry out particular requirements, especially in professional sports.

Resistance to psychological stress, temperament and character features, the ability to cooperate, the ability to receive and process information, and mental capacity are parts of a very incomplete list of genetically determined signs of higher nervous activity with various levels of importance for successful sporting careers. As these signs manifest differently in different people (individual differences), it is important to identify polymorphism in the genes associated with different mental qualities (memory, thinking speed, attention, anxiety) and measures of emotional status in athletes (anxiety, affective arousal, fatigue). The biochemical variability of proteins, including enzymes, involved in the functioning of the neurotransmitter system, may also be determined genetically, which in turn is probably associated in some way with psychophysiological differences [2].

<sup>1</sup> Kazan (Volga District) Federal University, Kazan, Russia; e-mail: [vevaleeva@ya.ru](mailto:vevaleeva@ya.ru).

<sup>2</sup> Kazan State Medical University, Kazan, Russia.

<sup>3</sup> Ak Bars Kazan Hockey Academy, Kazan, Russia.

<sup>4</sup> Educational and Scientific Technology Center for Sports Training, Volga State Academy of Physical Culture, Sport, and Tourism, Kazan, Russia.

<sup>5</sup> Sports Biochemistry Sector, St. Petersburg Research Institute of Physical Culture, St. Petersburg, Russia.