

Since time immemorial people have always been interested in finding out why some humans are more brave or adamant and consistent than others and why some of them are more successful, but some are a total failure. Until recently mental traits of this kind were primarily explained by the so called upbringing which scientists would term the so called environmental factor. However, nowadays it is very well known that an image of 'who we are and how we behave' is influenced by a compilation of environmental and genetic factors, which, to put it simply, should be recognised as predispositions inherited from our ancestors, including these predispositions which make us prone to certain kinds of behaviour. What is more, in the context of the then numerous scientific theories, it was very often the so called 'genetic factor' which should have been regarded as a key determinant of our behaviours, reactions and decisions made. Numerous aspects should be taken into account in these deliberations - e.g. the phenomenon of equifinality emphasizing that there are a lot of alternative paths to reach a championship in sport. Efficiency is determined by numerous qualities at the physical, mental and fitness level, and last but not least genetic, and these factors should not be investigated separately.

One of the most striking cases, which confirm the above theory, includes motivations for doing an athletic training by sportsmen who do sports commonly regarded as extreme or dangerous, e.g. martial arts. This seems to be confirmed by what is said by trainers who claim that competition in such sports is won with the mind and not the power of muscles.

The primary academic aim of the project is to recognise the genetic foundations for the dopaminergic theory of motivation and thrill seeking by means of studying genotypes, alleles, haplotypes and DNA methylation as well as personality traits measured by means of psychometric tests in sportsmen doing particular sports.

Our choice of the genetic determinants of the dopaminergic system disorders for the main topic of our project study was influenced by a wide spectrum of influence which the system has on the functions of an organism connected with its adaptive response to an athletic training. It is the very adrenergic system, whose main component is dopamine, that physiologists call the "work and fight" or even the "fight and flight" system. Primarily, hormones produced by the adrenal medulla are secreted in response to stress including extreme physical effort. As a result, not only is a decision to fight made, but also a string of physiological reactions, including an increased blood pressure, widened bronchi and energetic substrates mobilized, is triggered.

The studies proposed in this project will be carried out on homogeneous groups of sportsmen who do sports associated with extremity, including martial arts. This approach will allow to perform a genetic analysis of the factors associated with motivation for entering sporting competition, typical of this group of sportsmen, in the context of individual gene variants, complex interactions between particular genes and DNA methylation levels (a factor determining availability of genetic material for subsequent stages of genetic expression) within the regions of genes encoding receptors as well as the dopamine transporter. A relationship between the so called sport phenotype and genetic variability of the receptor and dopamine transporter encoding genes will be studied while analyses are performed.

In a broader perspective, studies of this kind are a valuable source of information on the role and importance of genetic studies in modern-day sport, as well as an explorational analysis (i.e. with no hypotheses assumed) of numerous likely associations between the haplotypic make-up and personality traits which are important in terms of sport, which seems to play a key role not only in sports, but also in public health in general, medicine and other academic fields, including economics.