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Editorial

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Can Neurogulin 1 be an Important Biomarker for Creativity in Sports?

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DEAR EDITOR

Sport genomics covers all the scientific studies including predisposition to athletic performance, non- contact injuries and sports psychology (1). To date, many different groups have reported genetic biomarkers effecting cellular and molecular mechanisms of exercise biology. Best results came from the studies including individual sports like boxing, athletics, and weight- lifting, rather than team sports like football, basketball. Endurance, VO2 capacity or sprinting abilities are important for individuals success in sports, but they are also important for team sport, completing a task during a game requires successful endowments for individuals properties. In addition to these, team sports require additional properties like mental willingness, or creativity, which are hard to analyze when compared to endurance or sprinting capacity.

Here, we want to suggest a new molecule, and its' coding gene, for sports science, that effects individuals mental culture. Neuregulins or neuroregulins are a family of four structurally related proteins that are part of the EGF family of proteins that has functions on cell-cell signaling process. It also plays a critical role in the growth and development of multiple organs. The gene responsible for this protein is neurogulin 1 (NRG1), locating at 8p12, spanning approximately 19 exons. There are some functioning single nucleotide polymorphisms (SNPs) on the gene which alter the gene metabolism. According to alternative promoter, NRG1 codes for different kinds of isoforms, classified as types I, II, III, IV, V and VI.

NRG1 was before linked with schizophrenia and bipolar disorder (BPD), and also for psychosis, which affects glutamatergic neurotransmission, glial functioning and synaptic plasticity (2). One common polymorphism on the gene, rs6994992, before linked with creativity in 200 healthy participants with high intellectual and academic performance (3). Other studies including the same SNP of the gene associated the gene withlower premorbid IQ, an increased risk of psychosis (4, 5), lower working memory capacity, spatial working memory in a general population sample (6), higher sensitivity for heavy criticism during interpersonal interactions (4), reduced white-matter density (7), and decreased activation of frontal and temporal cortexduring cognitive tasks (4). Rolstad *et al.* (2015) analyzed 114

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bipolar and 104 healthy subjects and concluded that the risk variant of the rs35753505 SNP of NRG1 was associated with increased performance in several cognitive domains and IQ (8). But the molecular mechanism indicating how Neuregulins affect creativity is still unclear. Most of the studies were conducted on individuals who have neurodegenerative illnesses, or prone to them; but not enough studies were carried out in athletes, or in healthy subjects (9).

Not only the physical properties, but also cognitive abilities and intelligence are important features to have optimal athletic performance. May be the term, Athletic Quotient (AQ) will be standardized for sports activities. Kamkary, Akbari, and Shokrzadeh (2012) summarized the studies that reflect the importance of IQ in team sports. Therefore, it is important to give attention to genetic components related with memory, creativity and IQ (10).

The mentioned SNP, rs6994992 of NRG1, may help us to explain how some players in team sports can dictate the game with sensible actions. Analyzing the functioning SNPs of the gene, and the level of the protein will be the topic of our future studies, which we consider as an important part of our psychological sports genomics studies.

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