Uniting sport medicine and sport science: The paradigm of sport genetics

Klissouras Vassilis, Missitzi Julia
Ergophysiology Laboratory, Department of Sport Medicine and Biology of Exercise, University of Athens, Greece

Predictive syntheses for the optimisation of human performance is the ultimate goal of Sport Medicine and especially so of Sport Science. Division between the two disciplines is a perennial source of misunderstanding. It is only one way to unite the two individual disciplines. It is to view the boundary between Medicine and Science not as a territorial line but as a broad and most unexplored terrain awaiting cooperative entry from both sides. The misunderstandings arise from ignorance of the terrain, not from a fundamental difference in mentality. The two fields share the following challenges: First, to grasp through scientific endeavour the fascinating interplay of genes and environment in building the elite athlete and second, to consider bioethical questions in an age of potential genetic enhancement of performance.

The key to understanding peak sport performance is revealing the relative influence of genes and environment on bodily functions, processes and adaptations, which are linked to the athlete’s physiologic limit. Two research strategies have been used to elaborate the role of genes in human phenotypic variation: The measured genotype and the unmeasured genotype approach. The former includes direct measurement of genetic variation at the protein or DNA level, while the latter approach estimates the relative contribution of the genetic variation of the phenotype variation by studying twins as well as expended family data. Taken together twin studies converge on the conclusion that not only genetic influences are significant, but also they are substantial, accounting for the most part of individual differences in most phenotypes related to human performance. The focus of current research is to identify particular genes for the determinants of performance and to elucidate pathways of physiological development leading from genes to particular traits and abilities.

Genetic knowledge will change the world profoundly and, no doubt, will shake the foundation of sport. Our professions will be called upon to take a position stand on the frightening issue, with scientific and ethical complexity, of genetic manipulation of athletic attributes. Genetically modified athletes: To what end?

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References