Commentary
Volume 12:4, 2022

Journal of Sports Medicine & Doping Studies

ISSN: 2161-0673 Open Access

Sports Genomics Perspectives

David D. Frisbie*

Department of Clinical Sciences, Colorado State University, USA

Introduction

The increasing quantity and quality of sporting tournaments has raised the demand for scientists to enhance existing methods for understanding athletic potential and to drive the development of new suggestions for athletes to improve both health and athletic performance. Sport and exercise scientists use physiological, biochemical and biological variables to evaluate athletes' adaptability to training and competition. Exercise physiologists have just begun to unravel the cellular and molecular reactions to exercise that contribute to whole-body adaptation. An growing variety of post-genomic analysis approaches have been explored in the hunt for novel markers in sports that may be used to assess changes in the physiological and functional status of the human body in recent years Genetics, genomics and other multi-omics are among the most rapidly expanding scientific subjects, spurring innovation in a wide range of industries, including sport and exercise science. A number of problems, however, remain unresolved, both scientifically and practically. Sport medicine, traumatology and applied sports sciences, in particular, may benefit from genomics data due to the possibility of personalizing training programmes and nutrition, though there is also concern about potentially illicit uses of genetic information for performance enhancement, such as gene doping.

In this study, we give a viewpoint on the current level of sports genomics as well as a variety of prospective uses for genetic data in elite sport. We discuss the current understanding of genetics in modern sport, including numerous recent large-scale studies that have effectively found and reproduced the relationships of genetic variations with athletic performance traits. Following that, we look at recent researches that have looked at the possibilities of using genetic information to supplement injury prevention and pre-participation screening. We will also discuss the impact that advances in bioinformatics and omics approaches (such as transcriptomics, proteomics and metabolomics) are likely to have on how we understand athletes' physiology and whether information gained through these approaches could help to improve athletic performance.

Description

The first significant book on the genetic impact to human sports performance, Genetics of Fitness and Physical Performance by Bouchard and colleagues, was not released until 1997. Roth produced another beginning level textbook, Genetics Primer for Exercise Science and Health, a decade later, with the first studies in the topic published in the 1990s by Montgomery and others. Sports genomics has improved significantly since the 1990s, owing primarily to technology breakthroughs and the resulting reduction in analysis costs. In 2019, the most recent collective monograph describing this advancement as well as current understanding of molecular genetic methods and their applications to human performance and physiological features was released [1].

Sports genomics is a scientific discipline that focuses on the organization and function of the genome in elite athletes, with the goal of developing molecular methods that can be used for sports medical practices, personalized exercise training, nutrition prescription and the prevention of exercise-related injury and/or disease. Kinesiogenomics is a new subject of medicine that combines kinesiology (the scientific study of human movement) with genomics [2].

Human physical performance characteristics (PPTs) and adaptations to exercise training are both the consequence of the interplay of various intrinsic and extrinsic variables, including those classified as environmental, genetic, anatomical, physiological and psychological. Common sequence variation in human genomic DNA contributes to individual variance in a wide range of features.

These include muscle fitness, exercise behavior, the potential for cardiorespiratory, cardiovascular and metabolic adaptations to acute exercise bouts and responsiveness to persistent training in connection to sport and exercise. Many physiological and performance-related characteristics are heavily influenced by genetics. Indeed, there is evidence that hereditary variables can explain 60% of the variance in baseline aerobic capacity and cardiac function, 70%–90% of the variation in anaerobic power and 50%–70% of the variation in muscular strength. Furthermore, it is well established that many of the essential biological processes that underpin sports performance, such as skeletal muscle energy metabolism, mitochondrial biogenesis, muscle, bone and cartilage formation, tissue oxygenation, erythropoiesis and angiogenesis, are genetically influenced [3].

As a result, research to discover particular genes and their variations contributing to top performance, which may explain disparities in physiological capability amongst elite athletes, is becoming more common. The use of genetic information to improve sports performance and avoid injuries has been advocated in recent years. It has also been shown that epigenetic factors, which regulate gene expression without changing the DNA sequence, play a crucial role in the response to exercise training and the risk of injury or illness. It has been demonstrated that epigenetic markers of training adaptation are preserved in skeletal muscle even after periods of detraining, implying that epigenetic processes support the human body's innate ability to "memorizes" training adaptations [4].

A novel kind of epigenetic marker known as the chromosomal conformation signature has recently generated promising findings in medical research and may potentially be used to study whether changes in genome conformation are involved in controlling exercise response. While technological advances continue to aid in the discovery of new biomarkers related to sport and exercise, the ability to maximize favourable aspects of the microbiome, genome, epigenome and other omics factors to positively impact human PPTs is dependent on a combination of biomarker knowledge and appropriate environmental factors, such as effective training programmes. Adherence to these well-established principles is expected to boost the efficacy and applicability of personalized medicine for elite athlete training and management to a larger extent than plans based only on genetic data [5].

Conclusion

Exercise and sport-specific training stimulate multiple biochemical networks, which contribute to the human body's complicated but coordinated reaction

***Address for Correspondence:** David D. Frisbie, Department of Clinical Sciences, Colorado State University, USA,E-mail: daviddfrisbie@gmail.com*

Received: 04 April, 2022, Manuscript No. jsmds-22-66845; **Editor assigned:** 06 April, 2022, PreQC No. P-66845; **Reviewed:** 12 April, 2022, QC No. Q-66845; **Revised:** 18 April, 2022, Manuscript No. R-22-66845; **Published:** 25 April, 2022, DOI: 10.37421/2161-0673.2022.12.252

to disturbances in homeostasis and mechanical stress. The advancement of omics technology has opened up new avenues for research into the molecular pathways underpinning sports performance. Technological improvements in genome-wide association studies and gene expression profiling have each added to our understanding of the genes, pathways and biological networks involved in the response to exercise, as well as the presence of individual diversity in training responses. Sports genetics and genomics may one day help individuals attain better overall health and wellbeing outcomes.

In athletic settings, genetic information has the potential to identify individuals with a natural proclivity for success in specific athletic activities. It may also be useful for athletes seeking to understand and improve specific performance attributes where their genetic proclivity is less favorable. Furthermore, genetic information has the potential to aid in injury prevention tactics as well as the recovery process once an athlete has been injured. More collaborative research is needed to confirm the possible impact of genetic variations in athletes from various sports backgrounds in order to discover more useful indicators of athlete health and performance.

Conflict of Interest

None.

References

1. Pickering, Craig and John Kiely. "The development of a personalised training framework: Implementation of emerging technologies for performance." *J Funct Morphol Kinesiol* 4 (2019): 25.
2. Baumert, Philipp, Mark J. Lake, Claire E. Stewart and Robert M. Erskine, et al. "Genetic variation and exercise-induced muscle damage: implications for athletic performance, injury and ageing." *Eur J Appl Physiol* 116 (2016): 1595-1625.
3. Goodlin, Gabrielle T., Andrew K. Roos, Claire Hawkins and Stephen Baur, et al. "Applying personal genetic data to injury risk assessment in athletes." *PLoS One* 10 (2015): e0122676.
4. Kim, Stuart K., Thomas R. Roos, Andrew K. Roos and Marwa A. Ahmed, et al. "Genome-wide association screens for Achilles tendon and ACL tears and tendinopathy." *PLoS ONE* 12 (2017): e0170422.
5. Pokrywka, Andrzej, Edyta Majorczyk and Agnieszka Zembroń-Łacny. "Review genes in sport and doping." *Biol Sport* 30 (2014): 155-161.

How to cite this article: Frisbie, David D. “Sports Genomics Perspectives.” J Sports Med Doping Stud 12 (2022): 252.