
Involvement Of Genetic Technology In Sports Doping

With technology readily advancing, athletes are racing to get their hands on anything that may give them an edge to take out the competition. Gene doping is a resultant of gene therapy. However, instead of injecting DNA (deoxyribonucleic acid) into a person's body to restore function related to a damaged or missing gene, as in gene therapy, gene doping involves the process of inserting DNA for the purpose of enhancing athletic performance.

We now have genetic technology that is capable of enhancing our very physiological and psychological nature; increasing height, muscle and influencing our moods. The question that is proposed is to decipher whether or not it is ethical to create these super athletes. This is a classic case of science moving faster than our morals can be coded.

There are two main methods of genetic editing in athletes that have been recently brought to light. One is somatic therapy. Somatic gene modification deals with the treatment or changing of gene cells in an adult. The modifications that occur as a result of this type of gene therapy are restricted to only the individual and cannot be inherited by any future offspring. The second method is germ line therapy. This brand of gene editing affects future generations of the test subject. This type of therapy is initiated prior to birth in the embryonic stages. The primary use of germ line therapy is to counteract genetic disorders and potentially harmful diseases, however it won't be long before its application makes its way into the sporting world.

The founder of the anti-ageing company BioViva, Elizabeth Parrish says that had given herself two methods of experimental gene therapy. One of these methods have the ability to disrupt the breakdown of muscle tissue. Your muscles can stay strong without exercise and grow faster if you do exercise.

As to whether athletes have yet used genetic enhancement to improve their performance is unknown. To date no athlete has either tested positive to gene doping or has willingly told the public that they are gene doping. Sports authorities are scrambling to take care of this situation and to maintain the integrity of sport and create a fair playing field for all competitors.

New methods of testing potential guilty genetic enhancers is currently in development by Australian molecular biologist Anna Baoutina. She is a member of the National Measurement Institute, and she worked on identifying added copies of a gene by the name of Erythropoietin (EPO). This hormone has the capability to increase the production of red blood cells. Red blood cells are what carry oxygen through our entire body, so for endurance athletes this becomes invaluable. Athletes would gain advantage for any high intensity workouts, increasing aerobic

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capacity. Understanding the characteristics of the gene doping techniques enables testing strategies to be designed to determine this specific gene enhancement.

Does this prevent future risks of having gene therapy a process within the sporting world? Negative. In 2003 the World Anti-Doping Agency (WADA) added gene doping to its banned substances list and stated that athletes testing positive for genetic enhancement would suffer the same consequences as people who test positive to performance enhancing drugs. In 16 years only one method has been designed to test athletes for genetic manipulation. The International Olympic Committee specified that athlete's blood were taken for testing of potential gene doping at the 2016 Rio olympics. There were zero positive results returned.

Other genes besides Erythropoietin also have the potential increase the quality in athletes' performance in sport. Potential genes added directly to the muscle are now undetectable in the bloodstream. Currently the only method to detect them would be to have the removal of portions of muscle tissue from athletes, which is obviously not an acceptable practice.

However, it gets worse for the doping authorities in their endeavours to tackle the sporting cheats. The introduction of a gene editing technique known as CRISPR, is 'a simple yet powerful tool for editing genomes' (Livescience, 2018). CRISPR technology has the ability to make changes as elusive as changing a single DNA letter in a sequence, boosting athletic ability of what normally humans would be unable to experience.

What's more, CRISPR is now utilised to alter specific gene activity without changing any DNA sequence, rather just by changing chemical tags, which as a collective is known as the epigenome. These chemical compounds are not part of the DNA but are attached. Epigenome editing could be even more useful for treating diseases than genome editing, as the epigenome set is responsible for giving instructions for the turning on or off of genes and manages protein production in particular cells. (Genetic Home Reference, 2019). The scientific hope is that epigenome editing will improve health outcome by switching on and off genes. Once this manipulation becomes popular among the medical, you can bet that epigenome doping kick-off in sport too.

Currently it is believed that regime to prevent current doping may not be as effective as we hope to believe. A vast majority of athletes who engage in conventional doping would certainly get off scott-free. An anonymous survey done in 2011 suggested that about 30 percent of athletes engaged in doping, while tests were successful in catching two percent. These figures will only become less favourable for the anti doping agencies once gene doping and epigenome doping reaches the sporting world.

So what should we do? Accept that gene doping is going to make its way into the sporting world

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and let the cheaters get their way? Or will we plant the foot down and fight against the outbreak of gene dopers and punish those who taint the professionalism of sport.

Arguments for the legalisation of conventional doping, start with the fact that people who want to play the game fairly are basically forced to dope, even if they did not want to do so, just to stand a chance against those who are improving their performance unnaturally. This is being morally objectionable to the athlete, as you would be practically forcing them to accept potential health risks that would come with doping, to even stand a chance of winning.

However, participating in many sports is already inherently risky. For instance, there is a large amount of evidence that soccer, rugby league, boxing and American football can cause brain damage, even given the implementation of play amendments to counteract these findings. Should we ban them?

The 2011 survey as referred to previously, should reason to suggest that many, if not most athletes thought they had to dope to have any hope. Allowing specifically approved forms of gene doping under medical supervision could reduce the risks users face, not increase them. And the outcome? Human strength and endurance limits are pushed to their utmost.

Gene doping however, is not all bad and has the potential to do good. It can make athletes healthier and more injury free improving not only their quality of performance, but their quality of life. University of Florida, is developing gene therapies for muscles, has said that it would be morally wrong to stop athletes having a treatment that may have the potential to positively effect their health. Lee Sweeney member of the university of Florida stated in a BBC interview "I think it's unethical to withhold from someone something that would actually allow their muscles to be much healthier now and in the future."

Then there is the argument that people will lose interest in athletics if any form of doping is legalised. This is unlikely. Why? It is equivalent to arguing that better swimwear would decrease the legitimacy of the sport and become less entertaining. Will you stop watching the Olympics if I tell you athletes are permitted to use very effective performance enhancers simply because it is impractical to ban it?

Finally, we have to consider fairness. Many bring forward the argument that any form of doping provides competitors with unnatural unfair advantage over other competitors. But sport already shows elements of disparity. Athletic performance is guided by genetics and environment. Some people are more genetically gifted than others, some people have more desirable environmental factors than others that allows them to pursue their sport; money, location, resources, support, age.

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Traditionally, we recognise the inequality of one simple genetic difference: people with a Y chromosome generally compete separately from those with an X chromosome. Some sports such as wrestling also divide into weight categories. The Australian Institute of Sport (AIS) recognises that talent identification via genetic testing for predicting sports performance is an emerging market, even without scientific backing. But this is just the tip of the iceberg: more than 200 gene variants have been linked to outstanding sporting performances. People with the alpha-actinin-3 gene for example are predisposed to be either a sprinter or an endurance athlete. A highly documented example of a naturally occurring gene mutation is the story of the cross-country skier Eero Mäntyranta, who had “a mutation in the EPO gene that increased his level of red blood cells. Eero competed at four Olympics, winning seven medals.”

Athletes have limited options to compete against such an advantage. Athletes can boost red blood cell amounts by sleeping in expensive altitude tents or, coming to our old friend Erythropoietin gene doping. An ethicist by the name of Julian Savulescu at the University of Oxford, argues that “it would be fairer to set a maximum permissible red cell count based on safety and let athletes boost their red cell count by any safe means – including the injection of the hormone Erythropoietin.”

High performance sport is an extremely competitive environment. Like it or not, gene doping and epigenome doping are coming. Sporting authorities cannot stop them, whatever they prophesise.

References

- <http://www.nature.com/scitable/topicpage/genetic-inequality-human-genetic-engineering-768/>
- <http://www.nature.com/scitable/topicpage/sports-gene-doping-and-wada-764/>
- <https://www.newscientist.com/article/2100181-gene-doping-in-sport-could-make-the-olympics-fairer-and-safer/#ixzz5xlXLFUp>
- <http://www.livescience.com/5879-crispr-explained.html> (Livescience, 2018).
- <https://ghr.nlm.nih.gov/primer/howgeneswork/epigenome> (Genetic Home Reference, 2019).

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