Should Athletes Be Allowed to Enhance Their Genes?

So-called gene doping is banned in sports, but some philosophers argue that it's the way of the future

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Scientists first developed gene therapy techniques in the 1990s, exploring ways to treat disease by modifying malfunctioning cells. In 1997, a team at John Hopkins University edited genes to create what the media called "Schwarzenegger mice," which had twice the normal amount of muscle.

The researchers' goal was to develop treatments for muscle-wasting conditions, including old age, but the same technique could theoretically be used to add muscle bulk to athletes, a concept called gene doping. Doctors could, theoretically, inject cells with enhanced genes into the relevant body part or use a benign virus to deliver modified cells. These superhumans could be the elite athletes of the future — athletes who perform faster, higher, and stronger than any "natural" human ever could.

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There's no evidence that anyone has tried this procedure — which has never been tested — but in 2003, the World Anti-Doping Agency (WADA) proactively banned gene doping. The ban includes any use of polymers of nucleic acids (DNA and RNA) or analogues, gene-editing agents designed to alter genome sequences or gene expressions, and normal or

genetically modified cells. Like other drugs and methodologies banned by WADA, these techniques are prohibited because they have the potential to enhance performance, could represent a potential health risk to the athlete from an unproven technology, and violate the "spirit of sport."

But is it right to dismiss gene doping in sports so quickly? What if gene-doping techniques were intrinsically different — and safer — compared to other doping techniques? And given the drive for perfection that governs elite sports, is enhancing performance all but inevitable?

In a new paper entitled "Enhancing Evolution: The Transhuman Case for Gene Doping," British bioethicist Andy Miah explores the question from a philosophical perspective, rather than a legal one. The first fallacy is WADA's attempt to protect the "spirit of sport," defined as values like ethics, fair play, excellence in performance, and health. "One could envisage a system of pro-doping which preserves fair play — even enhances it," says Miah, currently the chair in science communication and future media at the University of Salford in Manchester. "Thus, the sports world may just allow all athletes to use whatever enhancements they wish, or even just the ones currently prohibited by WADA."

A pro-doping system would actually encourage "excellence in performance," because it would help athletes reach levels never before seen in competition. Even the idea that "clean" sports are good for athletes' health isn't necessarily the case. "At an elite level," Miah writes, "so many players are injured either through incident or over-training/competing... [E]ven the IOC [International Olympic Committee] recognized that there is a greater prevalence of some health risks resulting from elite sports participation."

The way anti-doping agencies conceive of health care also plays an important role. Their perspective is that of the traditional medical industry, which believes medical interventions are justified only if a

person suffers from an illness, injury, or disease. Legitimate medical treatment can only be a necessity, not a choice.

An alternative is to view athletes through the lens of transhumanism, a philosophical movement that regards the development of technology not as something that should be separate from nature, but as a process interwoven with our own biological evolution as a species. Sports are just another area in which humans can use technology to transcend their limitations. Gene-editing techniques would become one of the "natural" technological and biological tools our species uses to adapt and evolve — no different, in a way, than the modern training equipment athletes now employ. "Humanity's desire to evolve or transcend its biological limits — typified by the pursuit of elite sports — provides a foundation for pursuing radical biological interventions, such as gene doping," Miah writes.

He argues that gene therapies could eventually be safer than the pharmaceuticals many athletes use, legally and illegally. "At the moment, we rely heavily on synthetic products and substances and things that are less likely to be consistent within our own individual physiology," Miah says. "Genetics offers the possibility of allowing us to both repair but also enhance by using elements that are already within our bodies."

Miah's position has its critics, including among scientists who are actually doing work on gene therapy. Lee Sweeney, director of the Myology Institute at the University of Florida, was one of the scientists who developed the "Schwarzenegger mice." He draws the line at the use of gene editing for performance enhancement.

"My interest is using the techniques to combat disease and improve the quality of life of people, especially as they get old," Sweeney says. "I am not against using the same approaches that are used to treat disease for gene doping in sports per se. I am against using an emerging and uncertain technology that could have long-term unwanted side effects—

and even short-term negative consequences—in otherwise healthy people before that technology is proven safe."

There is little substantial research into the safety of gene doping, but two studies published in *Nature* last year found that gene editing may weaken a person's ability to fight off tumors. Others have expressed more profound concerns: Academics and religious leaders have called gene editing "a new name for eugenics" and a contravention of the Hippocratic oath, which requires that doctors first do no harm. Miah's approach, they argue, could revitalize some of the dark eugenics projects of the 20th century, in which researchers in the United States as well as Nazi Germany identified a selection of specific human traits that could be cultivated to supposedly improve the human species.

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Marcy Darnovsky, director of the Berkeley, California–based nonprofit Center for Genetics and Society, says she supports gene editing for medically justified treatments "as long as it can be shown to be safe and effective." But as gene editing becomes more widespread, it could lead to not just enhanced athletes, but athletes who could be designed from birth to be fully optimized.

Darnovsky warns against the use of gene-editing techniques on embryos, eggs, or sperm and says that enhanced humans could be disastrous for a society where inequality is already on the rise. "There is a serious risk that heritable genetic modification would be widely taken up by those who could afford the cost, that their 'upgraded' offspring would be treated as if they were biologically superior to other children," she told me. "The ensuing dynamics would exacerbate inequality and

discrimination, fracture society, and increase the prevalence of admittedly eugenic concepts and practices."

Sweeney says that modifying the genes of individuals who cannot consent — like unborn children — will be greatly debated. "Of course, if it is a life-threatening or debilitating genetic disease, there is no debate," Sweeney says. "But once this door is open, as it now is, it becomes a debate as to where the line is drawn as to what is disease — or at least genetic handicaps — and what are enhancements that we should not attempt to alter for someone who has no say in the matter."

A more philosophical critique holds that human evolution is always vulnerable, with the flourishing of the species limited by external factors — and that's a good thing. From this perspective, held by philosophers like Martha Nussbaum and Erik Parens, the fragility of the human condition is crucial and central to what it is to be human, rather than something we should disregard in a quest to transcend our biological limits. Perhaps battling our imperfections—and achieving sporting excellence despite them—is part of the challenge of being human.

Finally, there is the question of whether the values of elite sports really do encourage gene doping. Pierre de Coubertin proposed the Olympic motto "*citius, altius, fortius*" ("faster, higher, stronger") in 1894, when the French baron dreamed of bringing the ancient Olympic Games back to life. While the motto's simplicity captures the aspirations of the Olympics, perhaps even de Coubertin underestimated humanity's desire to transcend its own physical limitations.