



## Gene doping, internet and polycontextuality: Elite sports of the next society

**Swen Körner, 25 Sep 13**

**There are many fields of human endeavor – physical or creative – in which the individual's genetic make-up plays a decisive role in ultimate results. The ability to isolate and replicate certain genetic properties may well represent the ultimate in human enhancement. Gene doping, however, cannot be viewed in isolation. It occurs within the context of the complexity of the genome; the apparently contradictory pressures of elite sport and societal fairness; and the ever increasing information exchange facilitated by the internet.**

In hardly any other part of society is the idea of 'pushing the boundaries' as obvious and concrete as in modern elite sports: in competitive sports the boundaries of today are frequently the mediocrity of tomorrow. In some disciplines such as cycling, the 100 meter sprint or the pole vault we can observe rates of performance enhancement between 24% and 221% since the first modern Olympic Games in 1896[1]. As such, performance enhancement is a well-known phenomenon in elite sports. However, some methods of performance enhancement are prohibited and sanctioned as doping. This article argues that doping in elite sports is highly functional; and that, as such, gene doping becomes a logical extension of this process. This paper will (1) give a brief description of main structural features of modern elite sports; (2) illustrate gene doping as 'functional illegality'; (3) identify the challenges in isolating molecular target points and address the serious consequences for modern sports and society; (4) consider gene doping in the context of sport and wider society; and (5) seek to understand polycontextuality and the role of the internet in the future of elite sports.

### **(1) Elite sports: producing differences**

Elite sports are a function system – as are arts, economics, politics, science or religion. They encapsulate achievement in modern society, which, at least since the 19th century, has viewed its future as open, shapeable and capable of constant improvement. Science is built on the concept of scientific progress; economics seeks to achieve sustainable growth; education views the human being as malleable and improveable; and sports, especially elite sports, are the embodiment of the principle of enhancement of the human body.

In contrast to the tendency towards equality and quota systems in other parts of society, elite sports highlight differences. At the end of each match, race or competition, the certainty of a result has been achieved where there should have been no certainty beforehand. The result demonstrates the difference between superior and inferior bodily performances. Based on a fictional starting point of equality, elite sports produce personally attributable differences.

When performances are measured, comparisons are the result. Human enhancement becomes a logical consequence. Elite sports are based on comparisons and enhancement. Elite sports are concerned with performances and their comparison in their pure form; they are self-referential, and not a means to an end. Results create the possibility of comparing performances beyond time and space. As 'brilliant abstractions'[2] they allow for the comparison of past and present, of the living and dead – and they motivate individuals to improve upon them. This anti-egalitarianism within elite sports often causes sportsmen or women to be praised in the language of ancient heroes. The elite athlete becomes a hero, who promises superhuman potential.

However, in contrast to the ancient heroes, these sportsmen/women are subject to a double-expectation that is full of tension. Athletes are supposed to deliver top performances with moral purity - they should abide by a code whereby certain forms of enhancement are banned. The ancient hero was not always a moral hero. The modern elite athlete, however, is expected to be just that. He or she is a role model, the embodiment of sporting fair play, a unique function within modern society.

Elite sports takes place in the narrow corridor between moral certainties and the comparison and coding of superior and inferior performance. The support system of an elite athlete consists typically of medical doctors, exercise scientists, physiotherapists and even psychologists to help development beyond limiting physical and mental processes. Ethics counselors or philosophers are not part of this contingent. Enhancement is the great aspiration of modern elite sports. It is easy to see how individuals are drawn into valuing physical over moral performance; and so turn to cheating and doping.

## **(2) Doping: push of a button technology**

In order to improve performance, elite sports look to technology. Technology offers a straight forward promise: to isolate simple cause and effect relationships within the complex system of human physiology. Technologies promise control, regulation and prognosis. They allow differences and enhancement beyond a point where the potential of human physiology and biomechanics is exhausted.

This is the basis for the close relationship between elite sports and doping. It is the promise of 'functional simplification in the medium of causality'[3], and of the precise turning on and off of enhancement capacities. The use of EPO, for example, leads to an increase in red blood cells, which in turn leads to a heightened capacity for oxygen intake, which ultimately leads to an increased probability of athletic success. However, doping, like technology, does not always deliver – the belief that doping is always effective in the desired manner lacks empirical support. Doping has non intended side-effects, which in turn, in order to become controllable, require the costly use of more technology to allow containment. For example, the thickening of the blood caused by EPO needs to be contained by the application of blood plasma expanders or legal blood thinners.

## **(3) Gene doping**

The most promising form of illegitimate performance enhancement is gene doping. The World Anti-Doping Agency listed gene doping as a prohibited method in the World Anti-Doping Code over ten years ago. The term "gene doping" is used in a narrow and a wide sense of meaning. In a narrow sense it is to be understood as the precise transfer of genetic information (DNA or RNA) into a cell, organ or organism by gene and cell therapeutic procedures. In a wider context, gene doping means the targeted expression of gene activity by other means, for example by taking pharmacological agents.

There is some disagreement among medical professionals as to the potential and the risks of gene doping. We are still in the early days of gene-therapeutical research. Nevertheless, the image of a genetically cloned athlete has already entered the public imagination. Despite such Frankenstein visions, three molecular target points of gene doping have been identified.[4] The first is the specific control and improvement of energy supply through the overexpression of fat- and glucose-transport proteins. The therapeutic application of FATP1, CD36 or GLUT is intended for the treatment of obesity and diabetes; it may, however, be an effective enhancer of sports performances.

A second likely early application in the field of gene technological enhancement concerns regulation of the oxygen supply. Since the isolation of the human EPO gene in 1983, attention has been focused on strategies to increase the concentration of erythrocytes, which indirectly lead to an improvement in oxygen uptake and transport capacity. Numerous doping cases of recent years have featured the use of pharmacologically produced EPO, particularly in intensive endurance sports. The next stage involves gene therapy methods for intramuscular administration of the EPO gene, which has already been part of an investigation of a prominent former athletics coach (under the brand name Repoxygen™, Oxford BioMedica).

Finally, the skeletal muscle system is likely to be a main target point for gene doping methods. Genetically engineered growth hormones such as HGH (Human Growth Hormone) and IGF-1 (insulin-like growth factors) are already in use. The next likely target will be technologies to build muscle. These include the overexpression of the receptor protein PPAR-delta or through the blockage of the extracellular messenger myostatin by inhibiting RNA. The conversion of type II muscle fibres (fast fibres) into type I fibres (slow fibers) by modulation of PPAR delta receptors as well as the inhibition of the myostatin gene through inhibitory RNA lead to a hypertrophy of the muscle and an increase of the number of fibers (hyperplasia). Both processes have already been demonstrated in animal experiments ('marathon' and 'knock out' mice) and have been partially converted into clinical trials.

The use of methods and substances for the modification of gene activity is, despite a few promising results in animal and clinical studies, linked to risks that are difficult to calculate. Known side effects such as immune reactions or uncontrollable cell growth hint to potentially massive health problems which could ultimately lead to death.[5] Unlike conventional doping, gene doping is not a simple cause and effect technology. It interacts with the tremendous complexity of the most important reference point of living creatures, their genetic code. Gene doping must also take place amidst the numerous variables that contribute to athletic success, such as genes, training, nutrition, environmental and social conditions.

The elite sports system is a part of the modern society which holds up performance, its comparison and enhancement within a rigid logic of competition and records. The idea of fair play has to be contrasted with the Olympic motto 'citius, altius, fortius'. There is an inherent tension in sportsmanship between enhancement-promoting expectations of top performances and the moral dimension of anti-doping. Indeed, doping seems to increase inversely proportional to its abatement – the more prevention and control, the greater effort is put into beating those controls.

It is known from empirical doping research that the tension between the expectation of a continual inflation of performance standards and the limitations of human physiology creates an atmosphere in which a relatively high percentage of elite athletes dope. For German elite sports there are estimates of doping prevalence of between 6 to 45% depending on the sport.[6]

On the basis of current doping practice, the probability of an individual turning to gene doping is quite probable. As we know from crime research, it is an opportunity structure consisting of easy availability, low controls and high gratification which increases the likelihood of criminal behavior. Even if its exact dimensions are currently only vaguely predictable, gene doping promises a kind of push the button technology which according to the 'law of increasing penetrance of residuals'[7] will bring human performance enhancement into the microcosm of genes.

#### **(4) Consequences**

Gene doping promises the continuation of athletic enhancement by innovative means. More discreet than the secret use of beta-blockers, gene doping applies where the legitimate enhancement and training reaches their boundaries. To a degree even more than conventional doping, gene doping raises questions which may affect the whole of society and overstrain organised sports.

1. For elite sports there are fundamental questions about the image of its sportsmen and women. *Homo sportivus* is somewhere between the reasonable man with rational motives, the gentleman who has to act in a fair manner and the image of the human being as a mortal engine (Hoberman).
2. For sports and society there are questions of incentive and performance structures. How much should be sacrificed or risked in getting to the final? How should rewards be structured?
3. Gene doping will provoke new discussions about banning and controlling enhancement products within sport. The boundary of doped or not-doped is super-coded on the one hand; but on a fine line on the other. Maximum permissible values are currently frequently used as a proxy to predict doping. However, these values are based on the perception of natural boundaries, a product of biostatistically determined normal ranges. The control system itself draws the lines upon which it is based; and sometimes it shifts them.
4. In order to sanction gene doping in organised sport, a court-proof verifiability of tests is needed. There thus have to be judicially accepted natural and artificial boundaries.
5. Gene doping encroaches on sensitive issues relating to genus. Gene doping challenges, with a radical manner so far unseen in conventional doping, the entire occidental semantic of the human being, its nature and dignity. The crucial processes around gene doping do not influence the nature of the human being but the social interpretation of these processes. A genetically engineered over-expressed glucose transport protein means nothing in and of itself; the activated biochemical processes will be unimpressed. They just keep on going. Only society will be impressed with the final sporting results. Moreover, society's vision of the human physiology is plastic and not fixed. We regard human beings like sand castles. They may wash away with the next tide or turn into new

shapes.

In blurring the boundaries of naturally-grown and man-made, celebrated by some, rejected by others, modern elite sports in the age of gene technology is an experimental and trend-setting field.

### **(5) Polycontextuality and internet**

Gene doping can be understood, in the phrase of Niklas Luhmann, as 'functional illegality'.<sup>[8]</sup> Many fear gene doping will be the next crisis of modern sport. This in turn fuels expectations among commentators. Society is hooked on the needle of communication and doping is its dope. Gene doping is a logical extension of doping; and can be placed within the polycontextual context of social reproduction. Just as science, education or economics builds on previous achievements, so does doping.

Within the context of doping, the role of the internet becomes important. The next society, according to Peter F. Drucker, defines itself through the establishment of a new communication technology.<sup>[9]</sup> With the availability of printing press, for example, opinions suddenly became fixed and reproduceable – one could place them next to each other and compare them. As a result, traditional authorities, such as priests, churches, universities and scholars lost their exclusive rights to knowledge and knowledge production. Like the printing press in the 15th century, the internet is paving the transition to the next society and a new need for control. The production of knowledge as well as the distribution of correspondent technologies is now polycentric. In terms of doping, self-prescription may increasingly become the norm. Doping will take place on the backstage of sports. The anonymous seclusion of social networks allows for the exchange of knowledge beyond political, societal, or even medical controls. The traditional knowledge asymmetries between layperson and expert will become blurred.

The results of anti-doping scientific studies or pharmaceutical research can be easily discussed in internet chat rooms. The resultant unintended side effect of anti-doping research is its contribution to the advancement of the very development it is supposed to limit. The knowledge produced about the effects of doping helps strengthen the contextual understanding of doping. This is the risky constellation for the management of doping and anti-doping in elite sports within our next society.

*Swen Körner was a speaker at the Centre's conference Human enhancement technologies: pushing the boundaries.*

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