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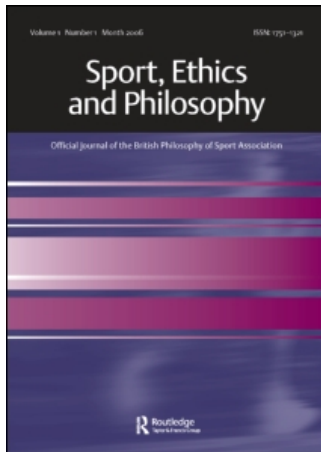
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GENETICS, BIOETHICS AND SPORT

Andy Miah

This paper considers the relevance of human genetics as a case study through which links between bioethics and sport ethics have developed. Initially, it discusses the science of gene-doping and the ethics of policy-making in relation to future technologies, suggesting that the gene-doping example can elucidate concerns about the ethics of sport and human enhancement more generally. Subsequently, the conceptual overlap between sport and bioethics is explored in the context of discussions about doping. From here, the paper investigates the ethics of gene-doping, arguing that a straightforward mapping of medical ethics onto sport ethics is not justified. In conclusion, it argues that gene-doping is consistent with a broader ethics of enhancement within elite sports. Moreover, the increased legitimacy of lifestyle medicine in society is likely to reduce the relevance of an anti-doping programme that is concerned with protecting the integrity of an alleged natural athlete.

Resumen

Este artículo considera la relevancia de la genética humana como un caso de estudio a través del cual pueden desarrollarse conexiones entre la bioética y la ética deportiva. Inicialmente presenta la ciencia del dopaje de los genes y la ética de la creación de políticas al respecto en relación a tecnologías futuras, sugiriendo que el ejemplo del dopaje de genes puede despejar preocupaciones acerca de la ética deportiva y el mejoramiento físico humano en general. A continuación, el campo conceptual común entre deporte y bioética es explorado en el contexto de debates acerca del dopaje. En conclusión, argumenta que el dopaje de genes es consistente con una ética más amplia del mejoramiento dentro de la élite. Además, la creciente legitimidad de la medicina sobre el modo de vida en la sociedad es probable que reduzca la importancia de un programa anti-dopaje que se preocupe de la protección de la integridad de un supuesto atleta natural.

Zusammenfassung

Dieser Aufsatz sieht in der Humangenetik ein geeignetes Fallbeispiel zur Darstellung der Verbindungslinien zwischen Bioethik und Sportethik. Zunächst soll das Feld Gendoping und die Ethik der politischen Entscheidungsfindung, im Hinblick auf Zukunftstechnologien im Zentrum der Diskussion stehen. Hierbei wird unterstellt, dass das Beispiel Gendoping zum einen, sowohl die sportethischen Bedenken, als auch die Fragen nach Leistungssteigerung des Menschen im Allgemeinen, verdeutlichen kann. Anschließend werden im Rahmen der Dopingdiskussion die theoretischen Anknüpfungspunkte zwischen Sport und Bioethik untersucht. Des Weiteren analysiert dieser Artikel die ethischen Implikationen des Gendopings, wobei behauptet wird, dass

die direkte Übertragung der Medizinethik auf die Sportethik nicht gerechtfertigt ist. Schließlich wird argumentiert, dass Gendoping in einem weiten Ethikverständnis konsistent ist mit der Bewertung der Leistungssteigerung im Leistungssport. Nicht zuletzt wird durch die steigende Akzeptanz der Lifestyle Medizin in der Gesellschaft die Bedeutung der Anti-Doping Maßnahmen wahrscheinlich abnehmen. Denn jene Maßnahmen haben zum Ziel die Integrität des vermeintlich natürlichen Athleten zu schützen.

摘要

本文將人類基因視為一個個案研究，將生物倫理學及已發展的運動倫理學聯結起來。首先，探討的是基因禁藥科學和未來科技相關政策決定之倫理學，而指出基因禁藥的範例，可以更具一般性地闡釋關於運動倫理學以及提高人類能力的課題。接著，探討了運動與生物倫理學之間重疊的部份。本文調查了基因禁藥的倫理學，認為直接將醫學倫理學套用在運動倫理學的做法，是值得爭議的。本文的結論提出，基因禁藥的課題，和存在於優秀運動員內部的廣泛的倫理學課題是一致的。進一步而言，社會生活中逐漸增加的醫學合法性，很可能會減少了反禁藥計畫的措施，這個措施是與保護宣稱合乎自然的運動員之純潔性是有關聯的。

KEYWORDS human enhancement; bioethics; sport; genetics

Introduction

In the last five years, the application of gene transfer technology to sport has gained the attention of many sporting and non-sporting institutions around the world. In 2001, the International Olympic Committee (IOC) Medical Commission convened a working group to examine the emerging applications of gene therapy for sport (International Olympic Committee 2001). During the same year, the Australian Law Reform Commission (ALRC) published a draft paper on the legal implications of using genetic information, one section of which is devoted to sport (Australia Law Reform Commission 2001). In 2002, the World Anti-Doping Agency met at the Cold Spring labs in Banbury, New York, in the first of its discussions on how genetic technology might be used for doping. As well, the United States President's Council on Bioethics held two meetings where sport was a focus for their discussion (US President's Council on Bioethics 2002a; 2002b). In 2003, the American Association for the Advancement of Science held a symposium on the science and ethics of gene technology and sport (AAAS 2003). Further, the ALRC published its final report, *Essentially Yours*,¹ which highlights sport as a key area of concern. In February 2004, the AAAS met again to discuss the matter (Kane 2004) alongside new research from growth-factor gene scientist Lee Sweeney, whose publication in the March edition of the *Journal of Applied Physiology* (Lee et al. 2004) suggests further how gene-doping might arise. Also, the Netherlands Centre for Doping Affairs and the World Anti-Doping Agency held another workshop on gene doping, this time in the Netherlands.¹ Some scientists even speculated that genetically modified athletes might be present at the Athens 2004 Olympic Games. Most recently, WADA held its second landmark meeting on Gene Doping, where it developed its 'Stockholm Declaration' (World Anti-Doping Agency 2005). One of

the major outcomes of this meeting was to urge against the use of genetic tests in sport, at a time when the first commercial test for performance genes had just been made available: '7. The use of genetic information to select for or discriminate against athletes should be strongly discouraged. This principle does not apply to legitimate medical screening or research.'

This all takes place now in a climate of greater uncertainty about the role of anti-doping in elite sport. As a further threat to WADA's aspirations, towards the end of 2003, a syringe filled with unknown designer steroid tetrahydrogestrinone (THG) caused concern in the sports world when it was left anonymously at Don Catlin's international doping lab at UCLA. This occurrence reinforced the concern that anti-doping tests continue to lag behind the many number of possible methods athletes are actually using to alter their performances. For many, gene-doping might soon be one of those methods, and the desire for WADA to ensure it is ahead of the 'cheaters' is central to why these discussions are taking place now.

This paper argues that gene-doping will make explicit the inadequacies of the ethical foundation of anti-doping policy, which demand that it cannot be construed as merely another form of doping. Additionally, by opening up the anti-doping debate to broader bioethical concerns, gene-doping provides a case whereby a more informed and rigorous approach to establishing what is valuable about sport can develop. Indeed, at present, anti-doping rests firmly on a restrictive application of medical ethical principles. This approach has omitted to utilise the academic literature in the philosophy of sport, which has developed over the past 30 years (alongside but separate from the same development in bioethics) as well as critical positions in bioethics. The paper first presents an overview of the science of gene-doping with an initial response to the concerns that discussion about this matter should not be taken seriously. It then explores the rich connections that exist between bioethics and sport ethics, which suggest fruitful links between these two areas of research. Subsequently, a review of the gene doping debate is provided followed by a response and proposal for how the discussion might be best advanced.

The Science of Gene Doping

The scientific perspective on possibility of gene-doping is mixed. Many scientists regard the genetic modification of athletes as nonsense and completely lacking scientific credibility. In 2001, at a seminar on 'genes in sport' at University College London, renowned biologist Steve Jones likened gene-doping as 'the same ballpark as the babbling nonsense talked about a baldness cure based on gene therapy'.² There are good reasons to support such scepticism, given the limited success of gene transfer technology over the last 30 years. If these scientists are correct, then it is easy to sympathise with concerns that serious ethical discussion of these matters is not possible to justify. Indeed, one of the criticisms raised about the present United States President's Council on Bioethics is precisely of this nature. (Turner 2003) In a world where there exist far more real harms and suffering which could be alleviated by medical technology, research and policy, to discuss something so trivial as genetically modified athletes, seems misguided.

Yet there are good reasons to suppose that the application of some scientific studies can have implications for identifying 'performance genes' or finding ways of modifying human performance in sport. Indeed, it is the potentially unsafe use of this technology

that gives rise to the ethical concern in the sports world. There is a fear that athletes will try to genetically modify themselves and, in the process, significantly harm themselves. Indeed, many of the supporters of anti-doping have a serious concern that it leads to athletes killing themselves, as was most visibly shown by the death of Tommy Simpson in 1967 during the Tour de France. Currently, research implicated for gene doping includes modifications to growth factors such as IGF-1 (Lamsam et al. 1997; Barton-Davis et al. 1998; Martinek et al. 2000; Goldspink 2001), PGC-1alpha (Lin et al. 2002), recombinant EPO (Svensson et al. 1997) and the ACE gene (Gayagay et al. 1998; Montgomery et al. 1998; Montgomery et al. 1999; Brull et al. 2001). In addition to these methods of modification, scientists are also working towards identifying performance genes which, while not requiring any bodily manipulation, might allow talent scouts to identify who will be the next generation of elite athletes by examining a genetic profile (Rankinen et al. 2006). Indeed, being able to utilise genetic screening is seen also as a way of ensuring that athletes do not participate in sports that are genetically risky for them, such as is the concern about head trauma in relation to boxing (McCroly 2001).

There are also good reasons to ignore the scepticism surrounding gene-doping or, at least, to recognise that the criticisms of this *imagined ethics* appear to emerge from a view of bioethics based on health-care priorities, which is only part of what matters to the development of informed ethical arguments about medicine. The ethical debate about gene-doping is more than just a discussion about what is ethical in sport and medicine, or how sport can be protected from another illegal form of performance enhancement. It is also about more than the allocation of medical research funding. However, one cannot ignore the lure of anti-doping research funds for genetic scientists, some of whom might rely on such funds to pursue their research into genetics. Indeed, the apparent interest of such scientists in sport might actually be little more than scientists trying to gain funding for research they see has value outside sport entirely, as might be said of work concerned with growth factors. The ethics of gene-doping is about further questioning what it is that is threatened by new technology. Sport offers a rich, human and social context where what matters most is placed into question and it is not entirely unfamiliar to bioethicists.

Sport and Bioethics: A Familiar Past

In the 1990s, sport was a key agenda item in the Hastings Center's project on the '*Prospect of Technologies Aimed at the Enhancement of Human Capacities*', which gave rise to the volume edited by Eric Parens (1998). In this text, frequent references to sport help to elucidate what it is about enhancement that people find so alarming. Discussions describe how enhancement appears to undermine human excellence, the intrinsic value of our practices, or the means-end progression from novice to expert (Brock 1998; Cole-Turner 1998) In so doing, enhancement is described as 'cheating' the activity, or undermining its value, even contributing to human suffering by leaving our cultural pursuits more impoverished (McKenny 1998). On such a view, sport is characterised as having value partly because of the *chance factor* or, as Parens describes it, 'fragility', which this is threatened by enhancement technologies (Parens 1995).

A number of these issues have been raised elsewhere in literature on philosophy of sport, where, since the 1980s, arguments have been made about the problem with doping (Brown 1980; Hoberman 1992). Indeed, the problem of doping has featured in the Hastings Center Report before. In 1983, Thomas Murray described the 'coercive power of

drugs in sport', arguing that 'the use of performance enhancing drugs is ethically undesirable because it is coercive, has significant potential for harm, and advances no social value' (Murray 1983, 30). This was followed shortly by another Hastings collaborative publication, which included a chapter on drugs and sport ethics (Murray 1984). Soon after, Norman Fost developed his 'sceptical view' on banning drugs from sport (Fost 1986). Sport has also been used to question the limits of health and to argue in favour of understanding health as a socially constructed idea, to the extent that the pursuit of health as a justification for using genetic technology is misleading (Sade 1995; Boyd 2000). In contrast, Chadwick uses sport as a basis for questioning the limits of health care, asking whether athletes who take greater risks with their health should be entitled to the same level of care as low risk-takers (Chadwick 1987).

Sport is also used in bioethics as a paradigmatic example of unethical practice for medical therapy, where, for example, genetic modification in sport would not be acceptable, since sport is too trivial an activity to require the use of such important and expensive technology (Glover 1984). Glover even uses sport as a hypothetical test case for what the future might look like where genetically modified athletes are the norm. He argues that such modifications would lead to sameness and make sport uninteresting, since sport is the kind of activity that relies on creating differences. Ledley uses sport as an unethical example of genetic modification, arguing that it would not satisfy Rawls's conditions of fairness by furthering 'inequalities in opportunity without a tangible prospect of benefiting those who remain at a disadvantage of furthering a state of equal basic liberties' (Ledley 1994, 161). Similarly, Little argues that sport is a useful case to explain the limits of fairness. She argues that it is unreasonable to expect fairness in sport and, for this reason, unfairness in genetic capacity is not a basis for utilising technology that might correct this inequality (Little 1998).

There is a lot to argue with in these uses of sport as an example to support bioethical conclusions. For example, sport is often used to portray a dystopian future, where genetically modified athletes are imagined as inhuman or superhuman and where this has resulted from maniacal parents hell-bent on making sure their children succeed. Indeed, one might account for the considerable press coverage that genetically modified athletes has created on this basis. In contrast, sport is also often used as a basis for justifying enhancement technology, as if genetic modification is just another way that people can go about improving health and prospects, like placing our children into sports clubs (Soderberg 1998).

With the exception of Tamburrini and Tännsjö's anthology (Tamburrini and Tännsjö 2005), it is intriguing that this use of sport in bioethics has emerged almost without recourse to literature within the philosophy of sport, which, since 1972, when Paul Weiss founded the Philosophic Society for the Study of Sport (now the International Association for the Philosophy of Sport), has been debating the ethics of performance. Literature has challenged whether doping really undermines the means-end distinction and even questioned whether this matters, since there are many other examples of legal performance-modifiers that have a similar effect but which do not cause alarm. Sport ethicists have also challenged the concepts of 'cheating' and 'fair play', arguing that sport provides unique examples where these ideas do not fit with traditional interpretations (Simon 1991; Loland 2002). Even Parens's concern (Parens 1995) for the value of fragility and chance appear in Bailey (1980), when debating what conditions are worth controlling within the sporting contest to ensure fairness but to preserve spontaneity and surprise.

Despite this lack of conversation between these two areas of philosophical enquiry, there are important overlaps between what each has written, as these examples suggest. Further support can be found in Juengst's articulation of intrinsic value in sport (Juengst 1998), which is complemented by Morgan's application of MacIntyrean articulations of sport ethics (MacIntyre 1985; Morgan 1994), where the practice of sport is defined by the distinction between internal and external goods. Where technology seems to undermine the internal goods by collapsing the distinction between the novice and the expert, this is when sports must re-consider the value of the innovation, though this can comprise innovation in technology as well as rules. However, clearly not all examples of technological innovation have this effect on sports.

Gene-doping

In 2003, the World Anti-Doping Agency included a prohibition of gene doping in sport within its international anti-doping code, which reads as follows:

II. PROHIBITED METHODS....

C. GENE DOPING

Gene or cell doping is defined as the non-therapeutic use of genes, genetic elements and/or cells that have the capacity to enhance athletic performance. (World Anti-Doping Agency 2003)

The kind of arguments used to justify this reaction is not complicated to review. While the WADA code makes reference to the 'spirit of sport' that is threatened by doping, the overwhelming concern about doping remains that the use of an experimental science such as gene transfer would be significantly dangerous and medical malpractice partly for this reason. It would also be performance-enhancing, which means that two of the three criteria within the WADA code are already engaged, even before considering the moral concerns. As such, policy relies on a straightforward medical-ethical model, where therapeutic applications of medicine are acceptable and enhancement or non-therapeutic applications are not. On this basis, it might suffice to respond by utilising Juengst's criticism of applying the medical model to inappropriate contexts, such as sport (Juengst 1998), and to argue that sport should not be subject to similar standards. Yet, further criticisms can be made on the basis of how this discussion has evolved.

Very little debate has taken place about gene-doping within the sporting world outside WADA. Indeed, in 2003, when WADA distributed copies of its 2004 anti-doping code, it became very clear how sport policy debate takes place on a more local level. Before that time, no sports federation mentioned anything about gene-doping and yet, once the draft was available, it was possible to find references to it almost immediately in the websites of sports federations. There is, I suggest, no critical ethical community within sports federations that informs this conversation. Indeed, I would argue that WADA begets such a situation, as its hard-line policy of 'comply, or you can't play' applies to all federations who hope to participate in international competition, driven largely by an interest to maintain Olympic sport status.

It is important to remember that WADA emerged out of the International Olympic Committee and has been chaired from its inception by Richard W. Pound, estranged

(and re-embraced) executive of the IOC who, among other things, was largely responsible for making the Olympics a financially viable entity through his negotiation of broadcasting rights during the Samaranch reign. Indeed, the establishment of WADA emerged partly out of a crisis with the IOC credibility and, perhaps more importantly, after the 1998 scandals of the Tour de France where the culture of doping was made so visible and endemic. The criticism of the medical model of ethics in sport can be seen as a broader limitation of anti-doping, which emerged in the post-war climate of medical ethics. The beginning of anti-doping, with the establishment of the IOC Medical Commission in the 1960s, gives some indication of the kinds of values that would underpin the ethics of performance enhancement in elite sport.

These various circumstances have limited how the ethics of performance enhancement have been formulated and, specifically, how gene doping is theorised within anti-doping policy. A number of reactions to this can be made. First, it can be contested that the medical model of ethics is not appropriate to apply to sport, as articulated by Juengst (1998). On this basis, Juengst argues that the ethical concerns specific to practices cannot be applied in a top-down fashion. One sporting example of how this might arise entails the relationship between the athlete and the physician, whose relationship might be regarded as different from a standard patient-doctor relationship. Very often, the athlete's physician has an interest in making the athlete well for competition, rather than simply well. Indeed, medicine is often used in sport to diminish pain sensations to permit an athlete to play through injury. While this might be considered questionable on the standard medical model, the appropriateness of this model might not apply here.

Second, the so-called ethical community within sport that is in need of protection by anti-doping policy makers is largely imagined, and it is unreasonable to assume that there is a clear ethical voice about performance modification. Indeed, a lesser-known attempt to provide such a voice was the OATH initiative – Olympic Athletes Together Honourably. Now seeming to have disappeared entirely from history, OATH comprised a diverse range of people – academics, scientists, athletes – who set about creating a lengthy manifesto on sport ethics. Despite its being presented to the IOC in 2001, OATH disappeared due to lack of funding. One might argue that if such a voice cannot receive the support it deserves, then it cannot be assumed that there is a clear commitment to democratise sport ethics. To further support this claim about an imagined ethical community, one might pose a case that tests this singular voice. For example, what should be the ethical stance taken on something like hypobaric (altitude) chambers (Baker and Hopkins 1998; Levine 2006) or the FastSkin swimming suit from Sydney 2000 (Magdalinski 2000), each of which also enhance performance? For these examples, and many others like them, the presumed ethical conclusions are far less straightforward and, if genetic modification were able to avoid the doping-like rhetoric, it might be regarded with similar ambiguity. Indeed, the tendency to frame gene-doping as just another form of doping has jeopardised the debate about its value considerably.

A third criticism of how gene-doping has been theorised so far concerns the broader implications of genetics. The successfulness of policy on gene-doping must acknowledge the broader bioethical ramifications of genetics. If one contrasts the development of the gene-doping debate with the discussion about drug use in sport, obvious discrepancies appear. Whereas it is possible to claim that anti-doping policy has been of critical importance to governmental debates about drug abuse, no such links appear with regard

to gene-doping. Indeed, the (potentially problematic) example of the US President's Council on Bioethics does not find gene doping to be obviously unethical at all (US President's Council on Bioethics 2002a). Rather, its use might be seen as consistent with an *ethics of technologisation* in sport, which appears to reflect current values in elite sport. In contrast, with regard to anti-doping more broadly, WADA has long-established links with governments of Olympic nations, as well as institutions such as the European Union and the United Nations in its 'fight' against doping. Yet, in relation to gene-doping, WADA does not appear to be in dialogue with bioethical committees, legal authorities, think-tanks or governmental advisory boards. In this sense, policy-making concerning gene-doping has the potential to be inconsistent with broader bioethical and bio-legal decisions concerning acceptability. Indeed, the legal disparities between sporting authorities and wider social obligations to athletes' rights is precisely what is discussed by the ALRC (Australia Law Reform Commission 2003). Recognising this broader context is crucial for sports authorities and should not permit them to implement a fixed policy on the role of genetics in sport performance.

A final response to the debate on gene-doping is related to my previous claim, though it relies significantly on conjecture. If it is reasonable to imagine that gene transfer technology will play a greater role in society in the future, then it is unreasonable for anti-doping policy to rely on essentialising human performance in the way that it currently does. Thus, the ethics of sport based on some notion of 'natural' performance becomes increasingly difficult to sustain as more diverse kinds of human arise from the use of medical technology. While claims about a natural human do not feature quite so clearly in anti-doping discussions any more, an appeal to 'God-given talents' remains critical to how anti-doping is justified. Admittedly, this is partly why there is such concern about genetic modification; because it challenges this naturalness. Yet, this ethical view of sport performances appears unsustainable in an age where various reproductive technologies disrupt the notion of the natural considerably. This need not be seen as an affront to anti-doping policy, indeed, quite the contrary. It can provide a basis for recognising why many kinds of performance enhancement do not challenge the value of sport performance at all. Genetically modified athletes will still need to train hard to be elite and it would be no short cut to an elite performance. While this defence also applies to the drug-use case, genetic modification does not have the anti-social baggage that drugs have. As such, it would be premature to dismiss its value as a life-enhancing or, more accurately, health-enhancing innovation for society and sports.

Clearly, there are further ethical arguments that must be considered in a response to gene-doping, which I have not addressed here. I have not yet mentioned the challenge to 'fair play' that gene doping might yield. As well, I have not mentioned ethical concerns about the coercive and potentially divisive consequence of accepting genetically modified athletes into competition. Yet, with the social force that anti-doping has, it is no small task to suggest that its ethical basis might need revisiting. However, I would suggest that my proposal for reform is modest and should not be construed as an 'anything goes' argument. Rather, a straightforward dismissal of gene-doping, as is taking place in current sport policy, is not sufficient and will encounter difficulties for the reasons I have outlined.

Beyond these arguments, there are still gaps in the ethical discourse concerning gene-doping. For example, no prohibition or statement has been made about the ethics of using genetic information to select elite athletes. Thus, investment into identifying performance genes, which might be correlated with elite performance capacities, is not

considered to be a prohibited use of the technology. This is interesting, since precisely this application is criticised by the Australian Law Reform Commission, which argues that it could seriously compromise the legal status of the athlete (Australia Law Reform Commission 2003). In its report, the ALRC questions whether sports authorities would be legally permitted to request such information. Also, the WADA position derives from a concern about somatic-cell modification and the use of pharmacogenomics, which might yield 'wonder-drugs' that are undetectable. It is not directed to the prospect of germ-line cell modification. While the scientific reaction might be that there is no need to consider this prospect yet, it has already been identified that WADA is not aiming to develop policy based on present-day applications of genetic technology. Rather, it is supposed to be about the business of developing a robust ethical policy for gene transfer technology. For this reason, the ethical status of genetically modified embryos might be worth considering, particularly since the unsustainability of a prohibition on such athletes further reveals the weakness of the current strategy. In short, it is not acceptable to prohibit genetically modified humans from participating in sport, just because they were born that way.

Conclusion

In part, the reasons for wanting to defend gene-doping emerge out of my concern for the methodological limitations of anti-doping and the desire to see anti-doping embrace a broader bioethical debate about genetics, the ethics of enhancement and the use of medicine in sport more generally. The kinds of arguments that have emerged in the last 40 years of bioethical discussion have not informed the ethical discussion about doping in sport very much at all, which seems very unfortunate. Within academic ethical debates, neither have links been made to critical developments in bioethics. For example, despite numerous allusions to the importance of establishing the value of 'humanness' as a basis for what makes sport special, there have been nearly no references to bioethical discussions about humanness, dignity or personhood. This is not to say that anti-doping has been critically informed by academic debates in the philosophy of sport either. Far from it. Part of the explanation for this is historical, though much more of it would appear to be institutional. Sport philosophers have rarely published in medical journals and scientists concerned about ethics have rarely engaged with (and are often dismissive of) sport ethics or bioethics. Yet sport offers a particularly rich context where one can develop an ethical critique of genetic technology (Miah 2004; Tamburrini and Tännsjö 2005). In this sense, philosophy of sport offers something useful to the development of bioethics, as the references to it suggest. For one thing, the global context of sport raises challenging philosophical issues about the universality of moral principles – are sport ethics universal? In a world that remains befuddled by the human cloning debate and the internationality of ethics related to human genetics, WADA is bypassing that confusion and asserting what is right and proper for humans by prohibiting gene-doping on the basis of a contested assumption that there are unified codes of ethics in sport.

The prospect of gene-doping can make it impossible to avoid making these connections between bioethics and sport ethics. Inevitably, any policy concerning the use of genetic technology in sport will find itself beholden to broader bioethical policies about the use of gene transfer technology. For example, in a world that permits the use of gene transfer technology for therapeutic purposes, it would be inconceivable that sports

authorities could prohibit such athletes from competition, just because they were genetically modified. In this respect, gene-doping is unlike any other method of performance enhancement in sport. Moreover, the world of sport is reacting to gene-doping in a way that is unparalleled by any other form of doping. For once, it has an opportunity to derive ethical guidelines before the technology is realised, a problem that has inhibited much of its strategy for other methods of doping. Yet, there are good reasons for avoiding the straightforward classification of genetic modification as any other form of doping, which I have tried to outline here.

None of the discussions about gene doping have even considered the debates taking place in the AAAS, the ALRC or the US President's Council. Yet, each of these organisations presents quite different accounts of the critical ethical issues arising from gene technology in sport. If the WADA prohibition can be seen as a precautionary statement, then this need not be a lost opportunity to use gene-doping as a means to re-evaluating what matters in sport, bearing in mind that it might have changed since anti-doping began. However, the ethical debate about gene-doping must take place on a far wider scale, and anti-doping policy-makers must be prepared to accept that it might be a far better strategy to seek ways of legitimising such methods of performance enhancement rather than ban them. The genetically modified athlete is not somebody who can straightforwardly be labelled as a 'cheat' and this is critical to realise when beginning to discuss the ethical implications of this technology. After all, genetically modified athletes might not have altered themselves at all, but might have been brought about by the *knowledge* provided by genetics. Alternatively, if we are discussing whether a genetically modified athlete should be allowed to compete or not, it is important to recognise that the discussion might involve the offspring of genetically modified humans. As such, we would only indirectly consider such persons to be genetically modified and the extent to which they could be labelled cheats becomes far more complex, even if they have a competitive advantage in sport.

These concerns are consistent with a further criticism of anti-doping that, predominantly, it continues to penalise the athlete in the 'culture of doping' as described by Lord Charles Dubin in his post-Ben Johnson report (Dubin 1990). Dubin's conclusions were significant for identifying that it is not just the athlete who creates the doping culture of sport. Rather, it is a range of people and professions that make it possible. Houlihan (1999; 2004) has written extensively on the weaknesses of solely targeting and punishing athletes, stressing the importance of education and sanctions for people within the athlete's entourage, including team physicians. Yet, athletes remain the target for criticism when doping cases arise. One of the most recent examples of this was tennis player Greg Rusedski's positive test for nandrolone, which illustrates the inadequacies of the 'anti-athlete' approach to doping. While there was no question about whether the results were reliable, it transpired that the consumption of the substance arose from a nutritional supplement, which was distributed by the Association of Tennis Professionals. Rusedski could not be held responsible for having tested positive. The Rusedski case provided unequivocal evidence that the very standards required of athletes by sports authorities to ensure they do not consume prohibited substances are not met by the institutions themselves who set them. As such, the moral high ground so often taken against the 'guilty' athlete overlooks the more detailed and complex circumstances within which positive tests arise and the conceptual difficulties with establishing what constitutes an ethically permissible method of performance enhancement in sport.

NOTES

1. See www.genedoping.com
2. D. Powell, 'Spectre of gene doping raises its head as athletes see possibilities', *The Times* (London), 29 November 2001.

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