

## 5 On the presumption of guilt without proof of intentionality and other consequences of current anti-doping policy

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### **The globalisation of anti-doping**

The use of performance-enhancing substances has been endemic in elite sports since the very beginnings. In the first half of the twentieth century, sports organisations such as the IOC and the IAAF responded little to doping practices among athletes, probably because of the limited pressure from public opinion and the limited means available at that time to impose a ban and to control athletes for the use of doping. In the second half of the twentieth century, increasingly powerful biomedical inventions with potential performance-enhancing effects were quickly adapted to and adopted by elite sports (for example, recombinant human EPO<sup>1</sup> in the 1980s and 1990s). Following a series of widely publicized doping scandals and public outrage, in the last decades of the twentieth century an increasingly strong movement advocating doping-free sports has developed. One probable reason for the increasingly negative public opinion of athletes who dope is the similarity between the image of the doped athlete and the negative image of the illicit psychotropic drug user. Anti-doping accelerated with the inception of the World Anti-Doping Agency (WADA), which celebrated its 10-year anniversary at the end of 2009. WADA aims at harmonizing anti-doping practices worldwide and is helped by the fact that an increasing number of UN member states now have signed a UNESCO anti-doping convention (UNESCO 2005).

### **The symbolism of harmonized anti-doping**

The objective of anti-doping efforts is to rid elite sports of the use of doping. Anti-doping policy at the international level is typically punitively focused. Mainly based on surveillance, in-competition testing and unannounced out-of-competition testing for substances in urine or blood, the objective is to identify all cheats and to exclude them from competition for the benefit of the 'clean' athletes and the spectators. For the system to be successful, it needs to catch all offenders and to exclude false accusations of 'clean' athletes. In the end, the IOC, which is a main driving force behind this globalization of

anti-doping efforts, wants to be certain that the public only admires 'clean' athletes winning Olympic medals.

At first glance, the objective of doping-free sports seems rather noble, and the globalization of anti-doping policy governed by WADA the appropriate means to reach that objective. But, as Amos concludes:

Anti-doping policy is fraught with confusion and ambiguity, even in the most basic and fundamental issues. To look at anti-doping policy today, with its universal code and a level of governmental agreement and cooperation not often seen, it is easy to assume that no such problems exist. The degree of consensus is largely a result of unity in public opinion regarding the issue of performance enhancing substances in sport. This unity of public opinion is, in turn, largely a result of the power of symbolism in doping discourse.

(Amos 2009: 316)

Amos argues, then, that the public validation of anti-doping is in part skewed by the public's grasp of the issues, which are themselves mediated by WADA. The symbolism of harmony has its roots in the strong negative image that public opinion has of the user of illicit psychotropic substances, which has been transferred on to that of the doping athlete. One problem that threatens to undermine this symbolism of harmony is that current anti-doping policy has a number of operational problems that lead to unintended negative side effects. As Amos shows, the definition of doping in public discourse is different from the operational definition of doping by WADA in the World Anti-Doping Code. The code defines doping in a much broader way. One consequence of this arises when, for example, WADA punishes athletes found to have doping substances in their body, regardless of whether they had intended to improve their performance via the forbidden substances. In contrast, it is reasonable to suppose that public opinion would not condemn athletes in such circumstances.

The application of the code is sufficiently problematic that it warrants critical analysis of the reasons for current anti-doping policy and reflection on possible alternatives. In previous publications, I have, with co-authors, developed arguments undermining the basis for present anti-doping policy in elite sports, and the reader is referred to those papers (Kayser et al. 2005, 2007; Kayser and Smith 2008; Kayser 2009). The aim of the present essay is to further highlight some limits and side effects of present anti-doping policy rarely discussed in the extant literature.

### **Consequences of current operational doping and anti-doping definitions**

At first glance, developing and implementing anti-doping policy in elite sports seem simple. All that is required is a definition of doping, a no-doping rule,

methods to make athletes obey that rule, and the imposition of sanctions when they do not. However, there are difficulties in defining what doping is, and the methods used to impose the rule are inherently limited in what they can achieve. As Møller commented, in its main document, the code, WADA uses a circular definition of what doping in sports is:

Doping is defined as the occurrence of one or more of the anti-doping rule violations [. . .] Doping is simply defined as infringement of WADA's doping regulations. In other words, doping is whatever WADA at any moment assesses it to be.

(Møller 2009: 4)

Methods and substances that are not allowed are listed on the Prohibited List, which is updated on an annual basis by WADA. WADA uses three criteria, of which at least two must be met, for inclusion on the prohibited list: the method or substance must have performance-enhancing effects; it must pose a health risk or at least have the potential for such; and it must be against the 'spirit of sport'. These criteria lack clear-cut boundaries, and especially the 'spirit of sport' argument is heavily influenced by time-dependent cultural specificity. For instance, if these three criteria had been used at the beginning of sport in Victorian times in England, physical training would not have been allowed, because it was at that time against the 'spirit of sport' (training was considered cheating: a form of ungentlemanly conduct), it has performance enhancing effects and, if used in excess, it potentially poses a health risk. The inclusion of the 'spirit of sport' criterion allows WADA the flexibility to include substances on the list that do not, or only partially, comply with the two other criteria, such as, for example, derivatives of cannabis (marihuana, hashish).

An illustrative example of what the consequences of present anti-doping policy can be for athletes is the story of Zach Lund, an American skeleton athlete (head-first sleighing), who was prevented from participation in the 2006 Turin Winter Olympics when finasteride was found in a urine sample in late 2005. On the basis of scientific evidence from WADA-funded research published later (Thevis et al. 2007), early in 2005, WADA put finasteride on the list of forbidden products as it was thought to be useful in masking anabolic steroid use. Lund had been using finasteride since 1997 because of hair loss (alopecia) and had always informed the doping control officers of his use of this compound. He was not aware of the inclusion of finasteride on the list of forbidden substances in 2005. Interestingly, he was repeatedly tested in 2005 after the inclusion of the drug on the list and never found positive, but, in November 2005, he was. When the USA anti-doping agency decided to treat Lund leniently because there was clearly no intention to dope, WADA appealed and asked the international Court of Arbitration in Sport (CAS) in Lausanne in Switzerland to judge the case just prior to the beginning of the Turin Winter Games, where Lund was a likely medal contender, in order to

exclude him from participation. The CAS judgment stated that it was unlikely that Lund had intended to use finasteride to hide steroid use and that Lund was not in any way 'performance enhanced' because of his use of finasteride. The CAS nevertheless declared Lund guilty of a doping offence, even though it expressed its own uneasiness with this ruling (CAS 2006). Lund was sent home on the very opening day of the Turin Games with his name tarnished. In 2008, WADA then decided to take finasteride off the list again, stating that new laboratory techniques had rendered finasteride useless as a masking agent. Lund's request that his record be cleared was refused, leaving the possibility that, upon a second offence, he could be banned from sport for life. This case shows how the strict application of anti-doping policy can cause harm to athletes who did not intend to dope. Even though WADA, in a document published a posteriori, regrets this aspect of its fight against doping, it prefers to remain firm:

While WADA can understand the discomfort of those athletes who neglected to obtain a TUE [therapeutic use exemption] and consequently were sanctioned for taking alpha reductase inhibitors [e.g. finasteride], one has to keep in mind that the List is prepared on existing science and that anti-doping science progresses quickly for the benefit of clean athletes worldwide [. . .] As in every area of society, one has to abide by the rules in force at the time of the particular event.

(WADA 2009a: 2)

This case is not an isolated one. Similar cases happen regularly. Pluim (2008) analysed doping cases over a 5-year period (2003–7), published by the International Tennis Federation. WADA uses the principle of 'strict liability', where an athlete is responsible for the presence of a forbidden substance in her/his urine or blood, no matter how the substance came into the body. In this way, there can be no excuses, and the procedure of accusation of doping is greatly simplified. On the other hand, this simplicity comes at a price: it may lead to damage to what will widely be conceived of by public opinion as innocent athletes. For the majority (68 per cent) of the forty doping cases in tennis over that period, it was ruled by the sanctioning bodies that there was no intent to enhance performance or no (significant) fault or negligence (Pluim 2008). Nevertheless, sanctions were applied, with significant negative impact for the players with regard to their notoriety, income and career.

These examples show how the operational definition of doping by WADA, which includes the principle of strict liability, regularly leads to the conviction of athletes who had no intent to improve their performance by using forbidden substances or methods. These are athletes who are punished who are not 'guilty' (in the sense of actually being performance enhanced) and without direct intentionality (in the sense that they willingly used forbidden substances to improve their performance). It thus seems as if, in the name of the 'spirit of sport', the sports establishment considers it justified to sacrifice

in principle innocent athletes (innocent in the sense that they were not performance enhanced, nor had any intent to become performance enhanced). Furthermore, today's anti-doping policy tends to reverse the 'innocent until proven guilty' rule, as presumption of innocence is replaced by suspicion of doping for any extraordinary athletic achievement.

### **Surveillance in sports**

Another controversial aspect of present anti-doping policy is the obligation of elite athletes to inform the anti-doping authorities for one hour a day, 365 days a year, where they will be, to allow unannounced out-of-competition testing. Athletes have to inform four times a year, for three months in advance of their plans, and use electronic and paper-based means to inform the authorities of any changes. According to WADA, this 'whereabouts' rule is an essential cornerstone of anti-doping, as it prevents out-of-competition doping in preparation for competition. In order to force athletes to comply, a rule states that three missed tests within an 18-month period constitute a doping offence. Athletes regularly have problems keeping the authorities well informed, and cases of suspension because of three missed tests are not uncommon. The case of Yanina Wickmayer, a talented young tennis player from Belgium, is an example of the problems that may arise. At the end of 2009, she was suspended for a year when she failed three times to inform about her whereabouts when she entered the Women's Tennis Association Top 50 and thus became obliged to inform about her whereabouts. She was able to defend herself in a Belgian court, pointing out the shortcomings and administrative errors of the official bodies overseeing her whereabouts obligations and had the ban overturned, allowing her to play again, but her image was probably tainted forever (BBC 2009). There are other examples of athletes who were judged to have committed a doping offence because of three missed tests, some of whom probably tried to escape doping controls but others were athletes who just failed to be sufficiently meticulous. The whereabouts rule may now also apply to non-adult athletes. In 2009, in the Netherlands, a talented 13-year-old girl speed skater, Dominique Lommers, was told to enter the Dutch whereabouts programme when her 15-year-old brother was provisionally found guilty of a doping offence. The parents refused to enter the whereabouts programme, while accepting regular doping controls, but Dominique Lommers was nevertheless excluded from participating in junior-level competitions, a decision that was later overturned (NRC 2009).

Generally, the whereabouts rule seems accepted by athletes, although they obviously have no choice. In fact, many athletes agree with the principles behind the rule, even if they do not like it (Hanstead and Loland 2009). Critical voices are regularly heard, as in early 2009, when several high-level athletes such as Rafael Nadal publicly voiced their discontent about the whereabouts rule, complaining about its excessive intrusion into the athlete's private sphere and the practical difficulties of keeping one's information up

to date. WADA's reasoning is pragmatic, arguing that it is a free choice for the athlete either to abide by the rules or to choose another activity. However, since being an athlete has become a profession, its regulation should also abide by general law regulating other professional activities. Currently, discussions are underway between the European Commission and WADA to study the whereabouts rule's potential incompatibility with European law.

### **The limits of laboratory testing technology**

A further problem of current anti-doping policy concerns the testing for forbidden substances in bodily specimens. The ideal situation would be black and white: the forbidden substance is present or is not present. Those two extreme cases exist, but there is, depending on the substance, often a large area of uncertainty. This is true for most biomedical tests in general, including those used for clinical reasons. A test can be positive (showing the presence of a substance) when it is indeed present (true positive) or not present (false positive); conversely, a test can be negative when there is indeed no substance present (true negative) or when in fact the substance is present (false negative).

The basic descriptors of a test are, hence, sensitivity (proportion of actual positives that are correctly identified as such) and specificity (proportion of negatives that are correctly identified, e.g. the percentage of samples without the substance that are identified as not having the substance present). Anti-doping policy enforcers need to keep false positives as low as possible, while striving for the highest sensitivity possible. The problem is that the probability for false positives rises with the number of tests performed, as well as with a drop in prevalence of actual doping (Pitsch 2009; see also Chapter 4). It is very likely possible that false positives have already occurred, even though there is animated debate between scientists on the level of certainty for that statement (Beullens et al. 2006; Berry 2008; Lundby et al. 2008). WADA does not want to publish the results of the quality of the tests used by the WADA-accredited laboratories. It argues that this would permit athletes to tailor their doping practices to the available testing technology. At first sight, this seems reasonable, but, at the same time, it leaves room for doubt about the impartial nature of anti-doping testing. The absence of transparency is not a good gate-keeper for quality assurance.

In order to overcome some of the limits of the single tests that just compare the findings to some pre-set level based on cross-sectional population data, individualized longitudinal blood analysis has been introduced under the name 'blood passport' (Sottas et al. 2010). The idea is that doping can be recognized from certain patterns of change in blood values over time. In late 2009, the first case of an athlete accused of doping on indirect evidence from her blood values was announced. Claudia Pechstein, a very successful German speed skater, was frequently tested throughout her career, but never failed a test. On the basis of fluctuations in the number of young red blood cells

in her blood, she was declared guilty of doping (CAS 2009). This case is interesting because it is the first time that an athlete has been considered guilty of doping on indirect evidence indicating the use of a substance that, in itself or its metabolites, was not identified, even though there remains quite some scientific doubt on the probability that Pechstein did indeed use forbidden substances or methods. Although the blood passport approach will certainly add to the pressure on athletes not to dope, there probably will also be athletes who find ways to get away with it. In any case, the blood passport will also, by definition, be limited in what it can detect. Recent findings indicated, for example, that the measurement of total haemoglobin mass with CO rebreathing<sup>2</sup> is unable to detect 50 per cent of those on EPO maintenance treatment (Lundby and Robach 2010), making it a questionable means of surveillance or detection. As EPO testing in urine also poses quite some challenges, leaving leeway to get away with a well-dosed regime (Lundby et al. 2008), it remains uncertain how much can be gained with the longitudinal testing, while it may, at least in theory, further expose athletes to the risk of false accusations.

As one can see, with present anti-doping policy, athletes who try to play the game according to the anti-doping rule risk significant harm, whereas there very likely still are athletes who dope but get away with it. Of course, today's anti-doping policy has certainly changed doping practices. Certain types of doping cannot be used anymore because they would be uncovered, but other types can still remain undiscovered. The purpose of anti-doping, the celebration of 'clean' athletes with a strong degree of confidence or even certainty, thus remains an unreached objective. Rather perversely, then, one is forced to question still whether the champions are 'clean'; a question that will unfortunately remain unanswered. It could be argued that public opinion has become even more sceptical about the 'cleanliness' of today's champions, which would be contradictory to WADA aims.

How many dopers are actually caught? According to WADA statistics, about 1–2 per cent of tests are positive, a proportion that has not changed much over the last 10 years. A recent study, however, indicates that prevalence might be much higher (Striegel et al. 2009). That paper reported data from Germany indicating less than 1 per cent of doping, according to official test results, but an actual prevalence of doping eight times higher when estimated by using a randomized response technique, which allowed the bias introduced by ordinary questionnaires on sensitive issues to be circumvented.

Anti-doping advocates thus find themselves in a difficult position with regard to the efficient achievement of their goals. The objective of present policy is to be certain that winners are 'clean', but this objective cannot be fully reached. Because of the limits of surveillance and laboratory testing, one cannot be sure that winners are 'clean'. The fact that it is impossible to be sure that the winners are 'clean' sets doping apart from other transgressions in society. Society can accept transgression as long as it continues functioning, the prevalence of transgression remains limited, the cost of repression is

acceptable, and the rule is generally accepted by the population. Drunk driving is repressed, and rightly so, but not totally eradicated. The cost of alcohol for society can be considered high, but a pragmatic approach, with a strong harm-reduction component, allows that cost to the individual and society to remain as low as possible.

The claim that the 'war on doping' is increasingly successful is likely to be correct in elite sports. Even if we accept this proposition, however, it remains problematic that the possibility that, among the winners of competitions, there may still be dopers who were simply not discovered can never be fully excluded. In fact, the media and the public increasingly suspect that any extraordinary performance is not just the result of rule-abiding training and 'clean' competitive effort. Indeed, being a successful top athlete today often implies bearing a lasting burden of potential guilt. However, being forced to doubt the 'cleanliness' of our champions directly undermines the goal of elite sports, the celebration of 'clean' champions, a central tenet of the 'spirit of sport'.

### **Elite sports and general society**

WADA and the IOC continuously try to find ways to increase the pressure on athletes not to dope. The whereabouts rule was one such way. Another way being used now is to oblige countries that would like to host the Olympics to comply with a series of conditions that include the introduction of specific doping laws. In some countries, doping has become a transgression of criminal nature that comes with law enforcement practices including house visits, searches, stiff fines and imprisonment. Present anti-doping policy is centred on zero-tolerance and repression. According to anti-doping policymakers, a combination of information, education and repression will lead to drug-free, elite sports competition.

WADA believes that a long-term solution to preventing doping is through effective values-based education programs that can foster anti-doping behaviours and create a strong anti-doping culture.

(WADA 2009b)

One problem for the creation and maintenance of a strong anti-doping culture anchored in anti-doping legislation and law enforcement is the gap that comes to exist between this specific social practice (elite sports) and what happens elsewhere in society.

In general, in society performance enhancement is becoming rather common. For example, a poll in 2008 by the premier scientific journal *Nature* reported that one in five of the 1,400 readers who participated in the poll used or had used performance enhancing drugs (Maher 2008). The drug methylphenidate (Ritalin) was the most popular, with 62 per cent of users, while 44 per cent reported taking modafinil (Provigil). Reasons advanced were



focus, attention, long working hours or jet lag. To illustrate the variation in how society views performance and other enhancement behaviour, Table 5.1 lists several common examples. With the exception of the cyclist, who is clearly transgressing the current no-doping rule in his sport, the other cases are more complex. Concepts such as fairness v. cheating, natural v. unnatural, or healthy v. unhealthy are not easily applied to several of these examples to classify them as either acceptable or unacceptable. As it is very likely that biomedical searches for new therapies will yield more substances and technologies also having extra-therapeutic potential, their extra-therapeutic use is to be expected, especially if the side effects were to remain limited (Cakic 2009). It is both simplistic and illusory to declare that all extra-therapeutic use of substances is illegitimate. Rather, a pragmatic approach is needed, based on regulation of use at the lowest cost to the individual and to society.

Zero-tolerance for doping in sport is thus in contrast with the rather lenient position of general society with regard to cognitive and other types of performance enhancement outside sport. In this regard, it is of interest that the scope of anti-doping policy does not appear to remain restricted only to elite sports and may have consequences outside elite sport. Anabolic steroid use has risen over recent decades but was forced underground with the criminalization of its trade and dangerous practices, akin to what can be observed for psychotropic illicit drug use (Kayser 2009). Anti-doping also leads to excessive surveillance practices, it may be causing more (unintended) harm to society than it prevents, and it might present a slippery slope towards the generalization of anti-doping practices in society at large. Perhaps it is useful to underline that those involved in anti-doping are full of good intentions and driven by positive ideals. To strive for utopia is, of course, to act in a wonderful cause. The problem is that it may well be possible that, in the context of present anti-doping policy, striving for a (utopian) cure may turn out to be worse than the disease and lead to dystopia.

### **Doping is cheating**

On a final note, one of the arguments often made is that doping is cheating and therefore cannot be permitted. Apart from the fact that rules can change, and the anti-doping rule can therefore change too, the cheating argument would seem valid, as sport involves playing by rules, and not playing according to the rules undermines the very nature and purposes of the game. However, the moral outcry over doping offences is in great contrast to how sports organizations and the public deal with other forms of cheating in sports. In fact, cheating is also part of sport. Good examples are the famous 'hand of God' goal of Diego Maradona in 1986 and the control of the ball using his hand by Thierry Henry, which allowed France to qualify for the 2010 Football World Cup in South Africa at the expense of Ireland. In both cases, the players got away with it, as the referee did not see the hand-ball, and the rule

Table 5.1 Performance enhancement in and outside sport: some examples

Case	Evidence for performance enhancement	Evidence for health risk	Against the spirit (of sport)	Comments
Jane, 21 yrs, medical student, active life style, takes methylphenidate when preparing for difficult exams.	Methylphenidate may have a slight effect, more in those who are somewhat limited.	Occasional use of methylphenidate is probably without much health risk.	Forbidden in competitive sports, not outside sports. But in some countries voices are heard asking for compulsory testing in students.	Jane is an example of a modern achiever, conscious of her limits, eager to succeed; she has adopted a healthy life style with a balanced diet and regular physical activity. She is a coffee drinker, aware of its performance-enhancing effects. She is an informed occasional user of a performance-enhancing drug. The effectiveness of methylphenidate is probably limited, especially in the intellectually gifted, and placebo effects are likely to play a role.
Daniel, 23 yrs, Professional cyclist, takes multivitamins, magnesium, iron, caffeine, and low-dose EPO, to keep an edge and be at the front.	Multivitamins are probably not a good idea, magnesium is probably unnecessary, iron is possibly necessary, caffeine and EPO both have a proven performance-enhancing effect.	It is not well known what the effects are of long-term use of any of these compounds. Iron can be dangerous. High-dose EPO is very dangerous; risk of long-term use of low dose in healthy subjects is unknown.	Any use of a compound on the list of forbidden substances is a breach of the no-doping rule and hence a violation of the spirit of sport.	Daniel is not an exception but rather quite a typical example of a sub-elite cyclist. The actual prevalence of doping in cycling is unknown, but anecdotal and indirect information indicates that doping continues, albeit at 'lower' intensity now that regular testing prevents certain classic 'gross' types of practice.

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<i>Case</i>	<i>Evidence for performance enhancement</i>	<i>Evidence for health risk</i>	<i>Against the spirit (of sport)</i>	<i>Comments</i>
Joseph, 32 yrs, commercial, fitness club member, takes anabolic, steroids for appearance purposes.	Anabolic steroids amplify training-induced muscle growth.	Excessive use of anabolic steroids can potentially be dangerous but this risk has been exaggerated. It is possible that low-dose use comes with acceptable risk.	Not as long as users do not participate in competitions falling under WADA anti-doping rules. However, there are frequent calls to test for anabolic steroid use in students and fitness clients. Anti-doping Denmark has already introduced testing of fitness clients.	The use of anabolic steroids is frequent in the body-building milieu. The main problem is its medically unsupervised nature and the uncertain origin of the substances that are used. Present ways to deal with the potential health problems related to anabolic steroid use vary between exclusion from health services to special steroid clinics and syringe exchange programmes.
Harry, 45 yrs, manager, inactive, obese, takes sildenafil, for his sex-life.	Sildenafil (Viagra) is a success. It clearly helps men with erectile problems.	Sildenafil has systemic effects and can be very dangerous in subjects with underlying cardio-vascular disease.	WADA is currently observing sildenafil because of its potential performance-enhancing effects for endurance exercise in hypoxia but it is not on the list of forbidden substances yet.	Harry has an unhealthy lifestyle which probably is a reason for his need for sildenafil. Because of his unhealthy lifestyle he is at increased cardio-vascular risk and sildenafil exacerbates this risk. The best for Harry would be to change his lifestyle.

Catherine, 52 yrs, scientist, takes modafinil when needing to work hard and concentrate on papers or grants.	Modafinil is used to treat narcolepsy but helps healthy subjects to stay awake.	Modafinil has few side effects and is generally well tolerated.	Modafinil is forbidden in competitive sports.	Catherine is an achiever. As a successful scientist she is under continuous pressure to produce high-level science. Regular deadlines for grant proposals have led her to integrate some controlled use of modafinil into her life. She thinks it helps her more than drinking coffee, also because coffee makes her tremble and induces arrhythmia. She is an informed user.
Paula, 65 yrs, retired, takes female hormones, for menopause symptoms.	Hormone replacement therapy is effective for many of the symptoms of menopause.	Hormone replacement increases the risk of breast cancer, heart disease and stroke and regular medical control is necessary.	The hormones used here are not forbidden.	Hormone replacement therapy is mostly for the comfort of women who go into menopause and experience hot flashes and vaginal dryness. It also helps against osteoporosis. Its use is prevalent in affluent society. It is an example of the use of medication where it is not so obvious to distinguish between therapeutic v. non-therapeutic use and natural v. unnatural.
John, 75 yrs, retired, amateur athlete, takes testosterone, growth hormone, and EPO, to continue competition in good shape, participates in the world masters games.	At his age the use of testosterone, GH and EPO certainly has an important performance-enhancing effect.	There is not enough known about such use at an advanced age.	Yes. The world masters games adhere to the WADA anti-doping code and some testing has been introduced in 2009.	This case is rather exemplary of what the evolution of performance enhancement in society may look like in the future. On balance it would seem that a combination of regular physical training, a healthy diet and well-chosen and medically supervised pharmacological anti-ageing treatments is probably a better scenario than that of the general behaviour of the ageing population, the majority of whom have an inactive lifestyle, an unhealthy diet and suffer from associated chronic disease such as diabetes and cardio-vascular disease.

is that the referee has the last word. Cheating in sports as such thus seems not to be such morally reprehensible behaviour. But doping cases are treated much more aggressively, probably because of the strong emotional value of the image of the doping athlete and its similarity with that of the drug addict (Amos 2009). Indeed, it seems as if the 'war on doping' and the 'war on drugs' are, in fact, part of the same endeavour, anchored in a public opinion strongly condemning any behaviour that looks similar to using illicit psychotropic drugs. However, the most successful way of dealing with psychotropic drug use in society is not to strive for full eradication but rather employ harm-reduction approaches and regulate use (Wood et al. 2009). By contrast, current anti-doping policy, punitively conceived, is in danger of becoming so radical that it appears justifiable to use any means to reach its goals. It would be a terrible setback for the pragmatic regulation of illicit psychotropic drug use in general society if the anti-doping approach were to become an inspiration for the control of drug use in society in general. This prospect is not as far-fetched as it may seem. One can think of urine controls for students, to check for cognitive-enhancement drugs, or for fitness clients, for anabolic steroids. I doubt that this is the best way to go. I call on anti-doping policymakers to become more pragmatic and to choose regulation and harm-reduction strategies to replace the presumption of guilt without proof and other side effects of current anti-doping policy.

## Notes

- 1 EPO: erythropoietin, a pleiotropic hormone that stimulates the production of red blood cells by the bone marrow.
- 2 CO rebreathing: by having a subject inhale a known small amount of carbon monoxide, a gas that strongly binds to the oxygen-carrying molecule in the blood's red cells, i.e. haemoglobin, one can calculate total haemoglobin mass from the resulting relative amount of CO-haemoglobin measured in a blood sample.

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