

Doping and drug testing

Anti-doping work must be transparent and adhere to good scientific practices to ensure public trust

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Support plays an important role in society: It is a major social and economic activity, it contributes to public health, it is entertainment, and achievements in amateur and professional sports are sources of motivation and pride. In popular sports, the rewards in the form of prestige, fame and revenues can be significant. Some athletes are therefore tempted to cheat and use performance-enhancing drugs, even when it may seriously threaten their health. Yet, doping is not just a health issue; it is unfair to other athletes and in complete opposition to the idea of competitive sports that the best shall win in a fair contest.

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Doping in sport is illegal. Most governments have signed a UN convention against doping, but some are rather lenient or negligent in their attitude. For many countries, achievements in sport are closely tied to national pride, and the temptation to use prohibited methods can therefore be stronger than respect for the rules or concerns about the health of athletes. Anti-doping regulations based on strong scientific and legal principles can therefore help to prevent abuse and ensure fair contests for athletes in all disciplines.

The World Anti-Doping Agency (WADA) regulates the use of performance-enhancing

substances through rules set down in its code, which is signed by most countries. However, it remains a problem that violators can use illegal drugs, yet avoid being caught for doping, and therefore, athletes can sometimes win by unfair means. At the same time, it is important that the net to catch violators is not too fine—that attempts to increase the sensitivity of the test methods do not undermine specificity—so that innocent athletes are accidentally caught. To ensure correct and justifiable decisions to ban athletes from competitions, anti-doping work must adhere to the best scientific standards for producing evidence. The work must be of indisputably high quality so that the results are seen as scientifically sound and procedurally legitimate. Below, we discuss cases where two WADA-approved laboratories have demonstrated a lack of adherence to good scientific practice, with serious consequences.

An irregular case

In 2011, Erik Tysse, a speed walker from Norway, was sanctioned for using the drug CERA—an analogue to EPO—and his appeal was rejected by the Court of Arbitration for Sport (CAS). As we have documented elsewhere [1,2], the data presented by the WADA-approved laboratory in Rome lacked rigour, quality and reproducibility. Importantly, after three analytic tests of the same urine sample that yielded incompatible results, the WADA laboratory incorrectly interpreted the images as positive and presented manipulated image data as evidence for the CAS. Our two publications [1,2] present and describe the data from the laboratory in Rome along with our detailed

evaluation of the laboratory's conclusions. The irregularities of this case have also been discussed elsewhere [3,4].

We believe that the data and the conclusions from the CAS would never have been accepted by a peer-reviewed scientific publication for two reasons: First, the methods used were not reproducible and the results, obtained by two different methods, were not consistent with each other [1]. Second, the data therefore do not support the conclusions. It is troublesome that it is possible to sentence an athlete based on inconclusive evidence under a varnish of objective science. Furthermore, data used for a conviction in court should be scrutinized even more thoroughly than data published in scientific journals, since the consequences can sometimes be dramatic.

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We have for several years tried to obtain information and documentation that could help explain the inconsistent results presented by the Rome laboratory—from both the International Association of Athletics Federation (IAAF) and WADA. In particular, we have asked for the original data and a copy of the laboratory report in which important information had not been masked, which was the case for the hearing before CAS. Neither WADA nor IAAF have

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answered our pleas, let alone released the requested information, which is essential for an independent evaluation of the analytic tests. One response, though, was a letter from the WADA-approved laboratories to commercial companies that had advertised in *Lab Times*, which published our findings. The implied message was that WADA-accredited laboratories—who made sure to note that they were good customers of these companies—would consider not buying equipment from them in the future if they, the companies, continued to advertise in the journal [5]. There is no doubt that the recipients and the journal interpreted this letter as threatening.

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Another response is statements by representatives of WADA laboratories that they have an ethical code that prohibits them from responding to external parties. We agree that WADA laboratories do need a code of ethics, but we have not been able to obtain a copy of such a document, which allegedly prohibits scientists in WADA-accredited laboratories from discussing their work with the scientific community. It is not easy to understand how such a ban on communication, which jeopardizes the rule of law for the athlete in question, can be rooted in a code of ethics. Furthermore, a code of ethics should not condone the writing of a threatening letter to companies that advertise their products in a scientific journal.

Interpretation of evidence

After publishing the details on the Tysse case, we were contacted by Steven Colvert, an Irish sprinter, who had been convicted of using recombinant EPO (rEPO). As in the Tysse case, the evidence presented during the hearing in Ireland showed inconsistent results from the analyses performed. Our criticism and arguments have been described in more detail elsewhere [6] and this case has also received attention in international media (<http://www.newswee>

[k.com/steven-colvert-epo-world-anti-doping-agency-sport-509189](http://www.newswee.com/steven-colvert-epo-world-anti-doping-agency-sport-509189)). The A- and B-Sample Analytical Reports and the Hearing Transcript on which his conviction was based have been published on his own web page, stevencolvert.ie. There seems to be no disagreement between us and WADA about the factual basis for our arguments, but the interpretations differ significantly. The entire case rested on an interpretation by the WADA-approved laboratory in Cologne that a slight tailing or spreading of the bulk of the EPO detected in their SAR-PAGE analysis (modified SDS-PAGE) of Colvert's urine was caused by rEPO. This tailing is not at all obvious and not much different from that observed in parallel lanes where the urine of athletes deemed to be free of rEPO had been used. The WADA laboratory argues that, in order to identify a positive sample by this method, one needs to be an expert with a long experience. The laboratory referred to their own experts who could, presumably, separate a positive from a negative sample in situations where most people could not see a difference [7]. The Cologne laboratory's experience in interpreting such gels was deemed sufficient by the court, even though the method was neither reproducible nor quantifiable and the criteria are not formally documented to allow independent verification.

It is particularly relevant to review the following statement from CAS in 2001: “A sample cannot be declared positive or negative depending on the subjective opinion and/or experience of the laboratory staff according to the maxim ‘I know it when I see it’. Rather, it is imperative that the laboratory applies reliable and verifiable criteria, making it possible for third parties to objectively understand the conclusions reached” (<http://jurisprudence.tas-cas.org/Shared%20Documents/343.pdf>). This statement is clear, correct and commendable. However, in the Colvert case, the laboratory did exactly what CAS has decided is not acceptable. Needless to say, this was an important element in the conviction of Colvert.

WADA and the Russian doping scandal

It is now widely published and not seriously contested that anti-doping laboratories in Russia changed and substituted urine and blood samples from Russian athletes to hide that they were doping, as documented in the two McLaren reports

(https://www.wada-ama.org/sites/default/files/resources/files/20160718_ip_report_newfinal.pdf; <https://www.wada-ama.org/en/resources/doping-control-process/mclaren-independent-investigation-report-part-ii>). According to a number of independent reports, the Russian athlete Yulia Stepanova and her husband Vitaly warned WADA in 2010 about doping among Russia's Olympic athletes and that the government and the Russian anti-doping agency were complicit. They supplied WADA with evidence through hundreds of emails. The Stepanov family is now in safety somewhere. In 2012, the Russian athlete Darya Pishchalnikova was reported to make similar approaches to WADA and gave them revealing information. This is her story, in short, as described in *The New York Times*: “Darya Pishchalnikova had won a silver medal 4 months earlier at the London Olympics. She said that she had taken banned drugs at the direction of Russian sports and anti-doping authorities and that she had information on systematic doping in her country. Please investigate, she implored the agency in the email, which was written in English. I want to cooperate with WADA, the email said. But WADA, the global regulator of doping in Olympic sports, did not begin an inquiry, even though a staff lawyer circulated the message to three top officials, calling the accusations ‘relatively precise’, including names and facts. Instead, the agency did something that seemed antithetical to its mission to protect clean athletes. It sent Ms. Pishchalnikova's email to Russian sports officials—the very people who she said were running the doping program”. In April 2013, she was banned by the Russian Athletics Federation for 10 years (http://www.nytimes.com/2016/06/16/sports/olympics/world-anti-doping-agency-russia-cheating.html?_r=0).

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Surprisingly, in spite of having been notified of a systematic abuse of the anti-doping system in Russia as early as 2010, WADA took no action. On the contrary, the

WADA-approved laboratory in Moscow maintained its accreditation and relationship with WADA until late in 2015, at which point the mismanagement of the Moscow laboratory became newspaper headlines worldwide (https://www.washingtonpost.com/sports/olympics/wada-heard-of-russian-doping-in-2010-didnt-investigate-until-media-reports/2016/06/02/9ec77acc-28e7-11e6-b989-4e5479715b54_story.html; <http://www.sportingintelligence.com/2016/07/25/exposed-the-story-behind-the-story-of-russia-doping-and-the-ioc-250701/>). It appears, therefore, that WADA supports their laboratories even when poor performance is demonstrated, which questions whether the results or interpretations that the laboratories publish or present in court can be trusted.

A matter of due process

Many scientific journals request the raw data in cases of doubt to guarantee their authenticity and correctness and to exclude data manipulation. In contrast, digitally manipulated data are obviously acceptable and sufficient in anti-doping hearings, as both published evidence and material presented during the hearing [1,2]. Since digital manipulation of gel images may include the cutting out and realignment of individual lanes, it is obvious that even minor displacements of the lanes may have dramatic effect on the outcome in cases where minor displacement of a band is taken as evidence for doping. Therefore, it is essential that the original images of the gels are made available. If good scientific practice had been applied in the trials against Tysse and Colvert, much of the evidence presented should have been disregarded.

With the current anti-doping system, the court leans heavily on the material supplied by the WADA-approved laboratories, their results and their conclusions. The defence is, in practice, left to argue against an inadequate legal procedure; the technical aspects are dominated and determined by the WADA experts. This asymmetry is a threat to due process. It is problematic that the anti-doping legal system allows WADA laboratories to play two distinct roles: first as objective drug testers and also as partisans in arbitration supplying the prosecution with laboratory data and interpretations. It is fair to say that the laboratories have a conflict of interest when trying to

straddle both of these roles. Furthermore, it is a worrisome aspect of the anti-doping judicial system that it is up to the accused athlete to prove her/his innocence when a WADA-approved laboratory has tested a sample and found it positive. This principle, termed strict liability, is in conflict with the public court system of most countries, in which the prosecutor is responsible for proving guilt. Importantly, to our knowledge it has not been tried whether the principle of strict liability is in conflict with the *European Convention for the Protection of Human Rights and Fundamental Freedoms*.

WADA-approved laboratories are not kept accountable for the evidence they deliver in court. We believe that the principle of strict liability combined with the weight of the evidence supplied by the laboratories have resulted in convictions of innocent athletes. Therefore, the possibility to challenge the evidence is essential. Furthermore, it appears that a strong presumption of guilt upon a positive drug test has removed the pressure on WADA to produce reliable and uncontested results. In our own experience, there is no room for a meaningful discussion of the uncertainties of scientific investigations in a hearing, since the actual data and conclusions of the relevant WADA laboratory are taken to represent the unimpeachable facts of the matter.

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A dependable and robust court system should provide checks and balances that make sure that controversial and erroneous decisions can be revised. In the anti-doping system, there is, in practice, no such mechanism. After a decision by the CAS in Switzerland, the only further possibility is the Swiss legal system which, with very few exceptions, has shown little interest in participating in sports jurisprudence and the chances of receiving a fair and objective treatment in this system are small.

The prospects of successfully bringing anti-doping conflicts into the civilian court system appear to be absent. We would argue that this is an unworthy, awkward and untenable situation in which to place an athlete. Importantly, it dramatically reduces the athletes' recourse to a fair trial. It is, of course, regrettable if an athlete who is guilty of doping can avoid punishment, but it is much worse when an innocent athlete is convicted without realistic chances of having the case overturned.

Stronger sanctions require better evidence

Some argue that current doping sanctions are too mild and too short. This argument has its merits, since the offence is grave and doping can stimulate the physical performance for many years. It is therefore fair that dopers are excluded for longer times than the duration of their acquired benefits. But with more severe punishment and longer exclusion times, it becomes even more important that the evidence on which convictions are based is scientifically sound and can survive challenges. Therefore, measures to improve the competence and the procedures of drug testing must be installed along with instruments to ensure the rule of law. If the WADA and the sport governance institutions of the Olympic movement continue to disregard common and important rules of fair treatment, the rule of law for athletes remains an illusion. Information and forensic evidence used to convict athletes accused of doping should be available and open to criticism and discussion. This is presently not the case.

After this manuscript was submitted for publication, we noted a letter published on the home page of the society for the scientists employed at the WADA-accredited laboratories, WAADS (www.waads.org). This letter, authored by the society's president, Christiane Ayotte, does not argue with our scientific, legal and ethical issues and has been discussed by us elsewhere [8,9].

Conflict of interest

The authors declare that they have no conflict of interest, but two of them (TS and BØ) served as expert advice for Erik Tysse in the hearing in CAS. None of the authors have received any financial remuneration in these matters.

References

1. Nissen-Meyer J, Boye E, Østerud B, Skotland T (2013) WADA-accredited doping analyses cannot always be trusted. *Lab Times* 2013-1: 18–23
2. Nissen-Meyer J, Boye E, Østerud B, Skotland T (2015) Problems at a WADA-accredited anti-doping lab: Puzzling Discrepancy. *Lab Times* 2015-5: 18–23
3. The Guardian (2016) <https://www.theguardian.com/science/political-science/2016/jul/25/can-anti-doping-bodies-maintain-their-scientific-integrity-the-answer-is-troubling>
4. Pielke R Jr (2016) *The edge: the war against cheating and corruption in the cutthroat world of elite sport*. Berkeley, CA: Roaring Forties Press
5. Editors (2015) Only a few. . . *Lab times* 2015-6: 3
6. Nissen-Meyer J, Boye E, Østerud B, Skotland T (2016) Another troubling doping case is questioning WADA's credibility again: Borderline Analysis. *Lab Times* 2016-5: 16–19
7. WADA (2016) Hearing transcript, p. 85 <http://stevencolvert.ie/wp-content/uploads/2016/02/Transcript.220615.pdf>
8. Nissen-Meyer J, Boye E, Østerud B, Skotland T (2016) EPO control in doping laboratories is absolutely no joke. *Lab Times* 2016-6: 18–23
9. Ayotte C (2016) EPO testing in anti-doping laboratories is no joke. *Lab Times* 2016-6: 26–28