The Quest for Clean Competition in Sports: Are the Testers Catching the Dopers?

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The practice of using prohibited substances to enhance sports performance (typically referred to as “doping”) is a very old practice that has been with us for centuries. To ensure harmonized, coordinated, and effective antidoping programs, the World Anti-Doping Agency (WADA) was created as an independent agency. The WADA publishes a list of prohibited substances annually, and the presence of any prohibited substance or metabolite in an athlete’s sample constitutes an antidoping rule violation. Over the years, testing programs have continued to expand, and WADA-accredited laboratory testing has increased 40% over the last 3 years. The issue of sports doping has gained widespread attention, and the public seems to be continually reminded of athletes who dope and the potential growing problem of doping at all levels of competition. Surprisingly, an athlete has come forward and stated that it is impossible to win a cycling event like the Tour de France without doping. In this Q&A article, 4 leaders with different roles in the antidoping effort have been asked to comment on the success of antidoping programs and major challenges facing antidoping programs, elite athletes, and laboratories in the fight to maintain fair and clean competition.

According to WADA statistics, only a small percentage of athletes who are tested test positive for prohibited substances. Do you believe that the use of prohibited substances is more widespread?

John A. Lombardo: Establishing the prevalence of prohibited-substances use by results of drug testing would be similar to establishing the prevalence of driving under the influence of alcohol by the number of arrests for drinking and driving.

A common goal of all drug-testing programs is to level the playing field so that athletes do not feel they have to use performance-enhancing drugs or prohibited substances to be competitive. Drug-testing programs serve the dual purpose of identifying those who attempt to gain an advantage over their competitors by using prohibited substances or techniques, and deterring their use by athletes by increasing the risk with disciplinary actions.

Although I do believe that the use of prohibited substances is more widespread than the number of athletes who test positive in the various drug-testing programs, without the presence of drug-testing programs the use of performance-enhancing substances and techniques would be without risk and would be unbridled.

Larry D. Bowers: The statistics are somewhat misleading, since they combine all sports and we know that some sports have a higher incidence of performance-enhancing drug abuse than others. The statistics also combine in- and out-of-competition test results, and we know that some drugs are not easily detected in competition. Finally, the objective of an antidoping program is deterrence, and if we were 100% effective at deterrence, we would have no drugs detected. This does not mean that we would not test, however, since the threat of being caught is critical for achieving the perceived deter-
rence. I do not believe that we catch everyone who cheats with drugs, so the incidence in some sports is higher than that reflected in the WADA statistics.

Julie Chu: Yes, I do. Although I believe that there are more clean athletes than athletes using prohibited substances, there are probably more who dope than the numbers indicate. Unfortunately, winning has consumed some athletes and forced them to find new ways to hide their use of prohibited substances. I also think that some sports may be more prone to doping than others because of the culture and the physical demands associated with specific sports.

David A. Cowan: WADA figures reveal that 278,000 samples were tested in 2009, with the figures increasing marginally over the years. This is the total number of tests conducted by WADA-accredited laboratories during (or in) competition and out of competition. It includes both Olympic and non-Olympic sports, as well as many professional sports. Clearly, it represents a tiny fraction of the number of top-level athletes competing on multiple occasions throughout the year. Furthermore, some of the WADA’s prohibited substances are taken out of competition, when fewer tests are conducted, and this gives further opportunities for cheating athletes to avoid detection. Thus, this leads me to believe that the use of prohibited substances is greater than the numbers indicate. Nevertheless, with more-intelligent testing, the chance for the cheating athlete to evade detection is decreasing, and I am optimistic that we are moving toward the position that the small percentage of athletes who test positive will better represent the true number of cheating athletes. Then we will have better achieved our goal of deterring drug misuse in sport.

What do you think needs to be done to get athletes to stop using prohibited substances?

David A. Cowan: We need more-intelligent testing to target those athletes at risk for drug misuse. We need better surveys of prevalence to perform such testing. This will include better determination of the numbers to be tested, the sports, the locations, and the timing of testing. Some athletes train in remote areas, and the number of samples collected at these locations is considerably smaller than collected in more-accessible regions. This enables the cheating athlete to take substances that have short half-lives and a longer duration of activity in order to escape detection by current testing methodologies. Obviously, more research into the use of surrogates as evidence for the use of prohibited substances, as well as the use of individual rather than population reference ranges, will aid detection. We also need more-robust prosecution of cheating athletes, as well as better education of athletes and their entourages. With all of these factors better optimized, athletes will better understand why drug misuse is undesirable and will not take the risk of detection and the penalties that detection will incur.

Julie Chu: I think harsher punishments for athletes who test positive for prohibited substances should be implemented to deter them and others from doping. However, there is a gray area when it comes to harsh punishment, because some athletes test positive out of ignorance rather than intentional use. Specific circumstances should be taken into consideration when deciding the punishment for a doping violation. Random testing needs to continue so that athletes will be more hesitant to use performance-enhancing drugs. I also think that sports with the highest rate of positive drug tests should be tested more frequently than sports that historically have had fewer positive tests.

Larry D. Bowers: We need to fine-tune the perceived deterrence model to make it more effective. This is particularly challenging given the history of certain sports and the different sociological and cultural factors involved in international competition. We need to be unpredictable in the timing of sample collection and continue to improve testing technologies. The sanctions imposed for violating antidoping rules must be sufficient to deter athletes from doping. In some sports, we need to work with young athletes to change the culture of the sport. Breaking the rules is wrong and should not be tolerated by fellow competitors. It is clear that some athletes get advice from medical professionals and researchers on what to take, how to take it, and how to potentially beat drug tests. This is being done without regard for the athlete’s safety, and this unethical behavior needs to be stopped. Health professionals need to make athletes aware of the risks associated with drug abuse.

John A. Lombardo: There are athletes who would never use prohibited substances, and there are those who believe they need to use prohibited performance-
enhancing substances to compete. There are also a number of individuals who convince the athletes that with their guidance the athlete can use prohibited substances and avoid detection, which occurred in the Bay Area Laboratory Co-operative scandal.

As an athlete weighs the risks vs the benefit of using prohibited substances, the risks include adverse health effects, and discipline and censure for testing positive. The benefit is a higher level of performance, which may translate into fame and/or fortune. Many athletes feel they are invincible and do not heavily weigh adverse effects in their considerations about prohibited substances. This leaves drug testing as the major risk or deterrent against the use of prohibited substances. Athletes must believe that drug-testing programs can detect drug use. Since many of these substances are used during training, in addition to testing for their use during events, an aggressive year-round drug-testing program is imperative to stop the use of prohibited substances.

When an elite athlete tests positive for a prohibited substance, how do fellow athletes feel about this?

Julie Chu: It depends on the circumstances. If an athlete tests positive for a prohibited substance but it is clear that it was unintentional, then other athletes feel empathy toward the athlete. However, if an athlete knowingly uses a prohibited substance, then I think the athlete should be severely punished. I do believe that there are more clean athletes than those who take prohibited substances. So, for all those athletes who rely on their natural talents, hard work, and motivation, it is not fair that others cheat and obtain a competitive edge by doping. I think there is very little tolerance for doping among athletes who truly maintain and value the integrity of the sport.

Do you believe that testing programs provide significant deterrence in preventing athletes from doping?

Julie Chu: I believe that drug-testing programs help keep athletes on track and are a good deterrent for those who might consider doping. However, athletes who are obsessed with the results—and will do anything to win—will find ways to dope regardless of testing programs. Therefore, I think research is important in the antidoping movement to make sure that laboratories maintain state-of-the-art technologies to rapidly adjust to new developments in the field of performance enhancement.

As an elite athlete, is there anything you would like to change that you believe would help maintain clean competition?

Julie Chu: I think the more athletes are exposed for doping to the mainstream media and the public eye, the more athletes will be deterred from using performance-enhancing drugs. So when a doping violation is announced and made public by the popular press, the reputation of the guilty athlete is damaged, which could be a powerful deterrent for other athletes who do not want to tarnish their sport legacy. I hear about 1 or 2 doping violations each year, but I assume there are more doping violations than that. If this is the case, then athletes who are banned from competition for doping should be widely publicized. If only a handful of people are aware of an athlete’s ban, then this is not much of a deterrent, since the athlete can distort the truth and blame their absence from competition on other factors, such as injury.

What do you think will be the next challenge in the struggle to maintain clean competition?

John A. Lombardo: Identification of the endogenous substances that control muscle development and function is important for the treatment of those who suffer from muscular dystrophies and other, similar conditions. As these substances are developed for therapeutic uses, they may also be used by athletes to enhance performance. Endogenous substances also present a challenge for drug-testing laboratories and programs.

Larry D. Bowers: The biggest ongoing challenge is finding a reasonable funding level for antidoping activities, including scientific research. When one professional athlete makes 5 to 10 times the budget of a national antidoping agency, something is out of balance. From a scientific viewpoint, I think the next 2 biggest challenges are hormone receptor modulators and protein pharmaceutical agents. There are dozens of structures for hormone receptor modulators that can affect a single biological pathway. The difficulty with protein therapeutics is their relatively short half-lives, making collection of a representative sample and assay sensitivity a challenge.

Bernard Kohl tested positive for erythropoietin during the 2008 Tour de France and discussed his doping regimen at a recent US Anti-Doping Agency workshop. Can you comment on his use of prohibited substances and methods to gain a competitive edge?

Larry D. Bowers: Kohl’s admissions allow us to get a detailed view of the sophistication of doping schemes. He admitted to using erythropoietin and Mircera to stimulate red blood cell production, which in turn allowed collection and storage of his blood for later reinfusion. Normal safeguards for ensuring the safe storage of blood were not followed. He also used plasma expanders to disguise the infusion of red blood cells, and
growth hormone and thyroid hormones were used for weight control. Surprisingly, he injected insulin after training or a stage of a multistage race to speed recovery, which is a potentially deadly practice. Kohl also used testosterone and corticosteroids, indicating that a cocktail of endocrine and metabolic factors were used, with unknown long-term health effects. All of this to chase the fame and fortune associated with sports.

Do you think that adequate research is being done to develop tests to detect the use of prohibited substances and methods?

David A. Cowan: I am encouraged by the level of funding, especially by WADA and the Partnership for Clean Competition (PCC) to plug the loopholes and further improve the sensitivity of laboratory analysis to detect the use of prohibited substances. Although in some areas laboratory analysis is ahead of or alongside the cheats, in other areas we lag behind. However, there are now many fewer loopholes than existed some 10 years ago.

John A. Lombardo: Refining present analytical techniques and developing new testing methods is the key to maintaining effective drug-testing programs. Identifying changes in specific elements in the athlete’s steroid profile consistent with the use of prohibited substances will be a valuable addition to the drug-testing program armamentarium.

Coordinated efforts in specific areas of research have led to steady advances in the sensitivity of urine and blood tests. To the benefit of all, there seems to be increased cooperation between scientists and labs, and also increased involvement of scientists whose work has not previously been applied to performance drug testing.

The addition of the PCC, founded by the National Football League, Major League Baseball, the US Anti-Doping Agency, and the US Olympic Committee, offers a cooperative funding source that is dedicated to research in this area. There always seems to be more research that needs to be done, but I am optimistic that this important part of doping control will continue to advance and be supported.

Larry D. Bowers: New drugs are constantly being produced to treat human diseases, and some have the potential for abuse by athletes. As new compounds emerge, they must be detected to deter their use by athletes, and there is a continual effort to use the best technology to identify prohibited substances. In addition to relatively basic research, there is also a need to fund transformation of “proof of concept” research into laboratory tests. So there are many problems with potential interest to clinical chemists and toxicologists, and very limited funds to investigate them. In recent years, antidoping research in the US has been funded by the PCC. The PCC budget is about $3 million per year, but to really fund innovative solutions more partners and an annual budget of $10 million per year are required.

What is the biggest challenge you face managing a WADA-accredited laboratory?

David A. Cowan: Currently, my biggest challenge is organizing our work to deal with the samples to be collected at the London 2012 Olympic and Paralympic Games. This requires a considerable scale-up of our normal operation. At the same time, it is enabling us to reevaluate the analytical methods at our disposal, purchase more modern, sensitive, and efficient scientific instruments, and develop (in line with the Olympic motto, Citius, Altius, Fortius) faster, more sensitive (higher), and more robust (stronger) methods. We aim to have the very latest and best technologies at our disposal to be able to deter cheating athletes from coming to London to compete.

Do you have any additional comments?

Julie Chu: I do not know if the problem of performance-enhancing drug use will ever be solved. There will always be athletes who push the boundaries of fair sport in hopes of being recognized as a winning athlete. However, the more we expose athletes who dope and make it known that clean athletes and sports fans do not support such behavior, the more successful antidoping programs will be.

I favor random drug testing but always fear that I will test positive for something I did not know I took because of new things that are being added to the prohibited list all the time, despite being an athlete who is against doping. So every time I get drug-tested, although I know I have not intentionally taken anything prohibited, there is always something in the back of my head questioning if somehow I will test positive for something I did not know I took. I understand that it is the responsibility of the athlete to know what goes into their body, but cases of unintentional ingestion of a prohibited substance that result in long bans from competition make me sad. I would caution other clean elite athletes to be extra careful to ensure that no prohibited substances enter their body.

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