

# PRACTICAL APPLICATION

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## Contamination of Supplements: An Interview with Professor Ron Maughan

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This issue of *IJSNEM* features two articles related to supplement use by athletes. In one (Morrison et al. 2004), people who undertake regular exercise in a gym were found to report the use of a wide variety of supplements. The other paper (Goel et al. 2004) dealt with one of the issues that a sub-group of athletes need to consider before deciding to take supplements—the risk of a positive drug test if the product contains substances banned by the anti-doping codes under which their sport is conducted. This issue received much publicity earlier in the year when top tennis player Greg Rusedski tested positive for the steroid nandrolone as the result of inadvertent intake via a contaminated supplement. In this article, Professor Ron Maughan, Chair of Sports Nutrition at Loughborough University in the United Kingdom, advisor to the British Olympic team, and co-editor of *IJSNEM*, provides his insight on this important topic.

*Ron, what is the evidence that supplements can be a cause of inadvertent doping outcomes for elite athletes?*

It seems very likely that *some* of the positive drug tests that have been reported in the last few years are the result of inadvertent doping due to the ingestion of prohibited substances that are present in otherwise legitimate dietary supplements. The presence of a range of different anabolic androgenic steroids as well as prohibited stimulants has been reported by a number of different laboratories around the world.

It is perhaps worth adding that no one has provided any evidence that the positive test recorded by Greg Rusedski was the direct consequence of taking a contaminated supplement. Therein lies the difficulty.

*What types of products seem to be contaminated and what are the banned substances that are commonly involved? How does the contamination occur?*

Contaminants have been found in many different products. The largest survey was from the IOC-accredited laboratory in Cologne. They looked for steroids in 634 different products and found about 15% to be contaminated with steroids with possible contamination in a further 10%. No names of products have been released, but contaminated products are known to include commonly used products such as vitamins, minerals, and protein powders as well as more exotic herbal products.

There seem to be 2 different causes of contamination. One is simply poor practice on the part of manufacturers and distributors, allowing cross-contamination

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between products. This may occur, for example, when powders are made into tablets or capsules. If the same machinery is used, small amounts are carried over from 1 production run to another. A positive test for nandrolone can occur from ingestion of only 1 to 2 micrograms of nandrolone or one of the related 19-Nor steroids (some of which are sold as supplements). That is a vanishingly small amount, but it can have devastating consequences for an athlete. In other cases, substantial amounts of steroids and stimulants have been found even though they are not declared on the label. In these cases, it seems likely that unscrupulous manufacturers may have added active ingredients to products that are otherwise unlikely to be effective.

Either way, there is no way for the innocent athlete to know what is there—they have to trust the supplier.

*Couldn't we get rid of the problem by adjusting the testing threshold for substances like nandrolone? Surely a little bit of a pro-hormone in the urine is a sign of contamination and isn't creating an unfair advantage for the athlete involved. Could this not be the end of the story?*

No, unfortunately, it is not as simple as that. If an athlete injects nandrolone, the urine will contain nandrolone metabolites for many weeks or months. It is not nandrolone that is measured in the urine, but rather its metabolite 19-norandrosterone (19NA), and a level of more than 2 ng/mL is a positive test for nandrolone. The values of 19NA are high initially after injection, but will fall quickly and there will be several weeks when low levels, similar to those after ingesting dietary supplements, are detected. In any case, there are reports of very high values (over 600 ng/mL) after ingestion of contaminated supplements. There is no way of telling from a single sample whether the athlete innocently took a contaminated supplement that morning or had injected nandrolone some weeks beforehand.

*Could an athlete organize to get their supplements tested to ensure that they aren't contaminated? Would that help? Or could they just provide evidence that their supplements were contaminated if an inadvertent doping positive was recorded?*

That sounds like a great idea, but, sadly, it does not work, for several reasons. There is evidence that some tablets within a single bottle may contain prohibited substances, while others are free from contamination. Suppose that the tablet selected for analysis is OK. How can anyone guarantee that the others are OK too? If you test all the tablets, there is nothing left for the athlete to take. Remember, too, that the analysis is expensive.

Many athletes keep a sample of their supplements—1 pill or capsule, or a little powder from the bottom of the bottle. This is a waste of time, as any evidence of contamination in these would not stand up in court. There is nothing to stop the athlete who tests positive from assigning a little of the drugs they have been taking to a bottle of supplements. Any analysis has to be on an unopened bottle that has no signs of being tampered with.

*How do expert groups like the national governing bodies, the national Olympic federations, or the IOC currently advise elite athletes to manage the risk of supplement use? Are athletes happy with this advice?*

The advice is often just to avoid supplements, and that is not helpful. It is certainly not what athletes want to hear. Athletes want to take supplements and will do so regardless of warnings. We have to work with athletes to make sure that they weigh

the costs and benefits of supplement use. If there is little benefit and a big risk, it's just not worth it. Unfortunately, we cannot quantify the risk, so the sensible athlete will err on the side of caution. There's too much at stake.

*What have some countries or bodies done to address the problem? Are there any solutions that are even partly useful? Are there any tactics that are problematic?*

There have been attempts in Australia, The Netherlands, Germany, and elsewhere to try to find a solution. You and the Australian Institute of Sport are to be congratulated for taking a lead in this area, both with working with the Australian Sports Drug Agency to come up with a supplement awareness and testing scheme ([http://www.asda.org.au/athletes/supplement\\_info.htm](http://www.asda.org.au/athletes/supplement_info.htm)) and in developing a supplement program for your own athletes (<http://www.ais.org.au/nutrition>). I know that you are well aware of the practical difficulties in making these schemes work. The solutions that have been tried rely on manufacturers being willing to have their products tested and to pay for this testing. The fact that the manufacturers are willing to do this is at least a sign that they have some confidence in their products. This assumes, of course, that the samples tested are picked at random from sales outlets rather than being supplied by the manufacturer. Keeping information databases up to date is a real problem: it takes resources that should be used elsewhere, and few organizations have the spare capacity that is needed. These schemes should, of course, be funded by the manufacturers and distributors who profit from the sale of supplements, but not all are willing to contribute.

*You recently attended the International Symposium on Supplements in Sport held by the World Anti-Doping Agency and the Canadian Centre for Ethics in Sport. Who is WADA? What are they doing to address this issue?*

WADA is the World Anti-Doping Agency and is responsible for all aspects of doping issues in sport. The meeting they convened was very helpful as it brought together representatives of all of the national and international agencies with an interest in this issue, including representatives of sport, government, the dietary supplements industry, nutritional and analytical sciences, as well as the anti-doping agencies. It was recognized that everyone with an interest in the integrity of sport and the welfare of young sportsmen and women has to recognize their responsibilities and work to find a solution. Only if all of these groups work together can a solution be found.

*What were the outcomes and recommendations of this meeting? What needs to happen to solve this problem and who is responsible for these actions?*

An important outcome was the realization that all agencies must participate for a plan to be successful. In the short term, it was agreed that prior to the Athens Olympic and Paralympic Games, stakeholders would again communicate with athletes and coaches to raise awareness about the dangers of contamination of supplements and the importance of the principle of strict liability. Recommendations in the longer term include the need to have a common definition of nutritional supplements. There was encouragement for coordinated research to compile a more comprehensive database on the patterns of supplement use by athletes and to gain more understanding of the motivations that cause athletes to make particular supplement choices. In a forthcoming issue of *IJSNEM*, we will be calling on the international sports nutrition community to assist with the collection and

collation of this information. It was also agreed that a global database on supplements should be established to ensure that access to all current and reliable information on supplements is made available. There was a general agreement among participants for a product testing and certification program of supplements that could be supported by the industry. Industry representatives agreed that industry must look at self-regulation programs to improve quality, minimize contamination, and provide accurate labeling. Finally, government representatives also recognized that they should be prepared to enact appropriate regulations for the industry because of their responsibilities for public health, for consumer protection, and for education. More information on the recommendations made for action in the short, medium, and longer term can be found in the document "Symposium on nutritional supplements issues recommendations" on the WADA website (<http://www.wada-ama.org/en/t3.asp?p=41275&x=1&a=100887>; accessed July 26, 2004).