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Netherlands Security System Nutritional Supplements Elite Sports (NZVT) - General characteristics of NZVT

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Introduction

In recent years the reasons behind positive doping test results in sport have come under much scrutiny. While some athletes are doubtless guilty of deliberate misuse of banned substances, a growing number have blamed nutritional supplements for their positive doping test results (Catlin et al., 2000; Geyer et al., 2004). The current situation has left many well-intentioned athletes uncertain about the safety of the supplements they are using.

At the same time, many honest producers of nutritional supplements have suffered from the malpractice conducted by some of their colleagues. This has caused a tense and awkward situation in that many Olympic Committees, the IOC, WADA, many National Anti-Doping Agencies (NADOs) as well as governing bodies, have advised athletes to abstain from using any nutritional supplements. This advice has not been well received as many athletes of all levels use nutritional supplements as an integral part of their training and dietary programme. It is very difficult to deny elite athletes the use of legal supplements that have been proven to possess performance enhancing properties, e.g. creatine. The same holds true if a deficiency in one or more vitamins or minerals is established by a nutritional expert.

Pilot project in 2001/2002

In order to accommodate both athletes and sports nutritionists a pilot project was launched that consisted of giving the Dutch athletes that were nominated to go to the Winter Olympics in Salt Lake City 2002 an opportunity to have their supplements tested for doping substances. A total of 69 supplements were submitted, which were tested in a laboratory. Fifteen of these supplements contained unmentioned doping substances above the threshold values of 5 ng/g for steroids and 100 ng/g for stimulants. In two cases, the labels did indicate 'green tea extract', which may explain why caffeine was found in these supplements (at that time, caffeine was still banned by international doping rules). All other supplements should not have contained doping substances according to their respective labels. Most cases showed traces of caffeine and/or ephedrine above the threshold level but not over 1000 ng/g. In addition to these findings, one product contained a small, but above threshold, amount of 3,4-methylenedioxymethamphetamine (better known as MDMA or XTC); four products

contained dehydroepiandrosterone (DHEA); and one product contained several steroids that are known to be a possible cause of nandrolone positives. Combinations of substances were found in the same product (e.g. ephedrine, caffeine, and DHEA within one ginseng product). The results of the analyses conducted during this phase of the project were reported to the relevant public authorities. They concluded that this particular issue is not a concern from a public health perspective, but is first and foremost a sports problem. Nevertheless, a few of the reported cases have been the subject of further investigations and corrective actions. The results and experiences of the pilot project proved that the use of nutritional supplements can be a serious risk for elite athletes. Athletes using nutritional supplements could face severe penalties, up to a lifetime ban from the sport in some cases. Contrary to the severe participatory consequences for athletes, the actual health consequences appear to be minor. A steroid contamination at the level of 15 ng/g, for instance, can cause a positive result on a doping test but will not lead to severe health consequences. These results prompted the formation of a working party to find an appropriate solution for this problem. Experiences from the pilot project also showed that the security that laboratory analyses provide only apply to random samples from individual batches of supplements. These experiences drafted the building blocks of the Netherlands Security System Nutritional Supplements Elite Sports, or NZVT.

A new approach

The NZVT is a non-profit agreement between three partners: the Netherlands Olympic Committee (NOC*NSF), the branch organization for supplements producers in the Netherlands (NPN), and the Netherlands Centre for Doping affairs (NeCeDo). The system is supervised by a working group that also contains representatives from the NOC*NSF Athletes Commission, the National Institute of Public Health and the Environment (RIVM), and the Ministry for Health, Welfare and Sports (VWS). The system rests on four pillars:

1. Criteria enriched HACCP system. The companies and producers joining the NZVT system have to follow special procedures for the purchase of raw materials, production and labelling of nutritional supplements. For quality control, a specific HACCP system has been developed by the branch organisation NPN, in which extra criteria are incorporated into the various stages of the production process to comply with NZVT guidelines. No requirements were set regarding the effectiveness of the supplements that are subjected to the NZVT-protocol. Regarding the ingredients, the only requirement is that no banned substance are included in the supplement.

2. Laboratory analyses. Laboratory analyses are conducted on every batch of nutritional supplements produced within the NZVT system. For this purpose, the NZVT Standard Analytical Procedure has been developed by the participating laboratories and NeCeDo. This procedure consists of sample taking and analysis. The testing includes approximately 15 stimulants at a threshold of 100 ng/g and approximately 15 steroids at a threshold of 10 ng/g. Until January 1st 2004 caffeine was also included at a threshold of 5,000 ng/g. The thresholds were established using the following criteria: a) the amount which causes a positive test at the doping control, b) the daily amount of nutritional supplements an athlete could reasonably consume and c) a safety factor to exclude variations due to individual physiological differences. For steroids, the calculation was made as follows: 10 µg may cause a positive doping result (personal communication with Cologne laboratory) and some athletes take up to 27 different supplements, totalling over 50 tablets (personal communication with Doping Control officials during the Salt Lake City Winter Games in 2002). On an average of 2 grams/tablet (which is high, but not unrealistically high), this means that any laboratory analysis for nutritional supplements should be able to detect 10 µg of a steroid in 100 g of material, or 100 ng/g. A safety factor of 10 is used to cater for individual differences in excretion, which leads to a threshold for steroids of 10 ng/g. This is the same threshold that was used by Geyer et al. (2004).

3. Quality Assurance analysis. The National Institute of Public Health and the Environment (RIVM) randomly conducts extra, double analyses as a security check. This is done by taking the same samples originally selected from the batches of nutritional supplements or by taking consumer units from these batches on the market. The security analyses are also conducted according to the NZVT Standard Analytical Procedure.

4. Communication to athletes in the Netherlands. The supplements that fulfil the NZVT production and analysis criteria are communicated to the athletes through a secured website. On this website athletes are informed, in detail, about the NZVT system and they can order the supplements from the participating companies or from a central distributor. Visitors to the website are informed that all statements regarding security guarantees are only applicable to the specified product/batch combination. They are warned that other products and all other batches of the same product might not fulfil the NZVT requirements. Inside the database, the products can be rearranged on the basis of their main characteristics: product name, producing company, and the category of supplement. Fourteen categories of supplements have been identified: Amino acids, Anti-oxidants, Creatine, Dietary aids, Herbs, Joint health, Mineral complexes, Minerals (single), Multivitamins/minerals, Proteins, Sports drinks, Vitamins

(single), Weight gainers, and Miscellaneous. Each category contains at least five different products.

Over the last few years, different approaches were used in other countries. Initiatives in Australia, Austria and the United States also include lab analyses in order to aid athletes in their decision to choose between the large variety of available supplements. However, these systems do not incorporate all aspects of NZVT. Besides these official initiatives, some nutritional supplement companies conduct their own testing, but these results are not supervised by an independent third party and sometimes have considerable higher limits of detection.

The first experiences

The NZVT started in November 2003 with 85 products in 14 categories ranging from minerals and vitamins to creatine and sports drinks. During the first year a total of 53 product-batch combinations were added to the list. Three products did not pass the lab analyses, even though they fulfilled the administrative requirements. Products are taken off the list when the expiry date is passed. At this time (February 2005), 141 product-batch combinations are listed in the NZVT-database.

After a high peak in the first week of availability, the NZVT-website is visited on a regular basis. The introduction page is viewed daily by, on average, 40 visitors. The database with actual tested products is visited by approximately 20 visitors a day. Given the fact that a) nutritional supplements are purchased at a relatively low frequency; b) the Netherlands is a small country with a relatively small number of elite athletes; and c) the NZVT is still a relatively new system, these figures are deemed satisfactory at the moment.

Dutch elite athletes are satisfied with the NZVT-system. A written questionnaire that evaluated several aspects of the Athens Olympic Games of 2004 revealed that of all Dutch athletes who participated in the Olympic Games in Athens and who used nutritional supplements, 78% chose NZVT-supplements (this amounts to 65% of all Dutch Olympic athletes). Both athletes and support personnel have expressed their support of the NZVT-system and it has claimed international interest (Abbott, 2004).

References

- Abbott A. Dutch set the pace in bid to clean up diet supplements *Nature* 429: 689, 2004.
Catlin DH et al. Trace contamination of over the counter androstenedione and positive urine test results for a nandrolon metabolite. *JAMA* 284(20): 22-29, 2000.
Geyer H et al. Analysis of non-hormonal nutritional supplements for anabolic-androgenic steroids - results of an international study. *Int J Sports Med* 25(2): 124-9, 2004.