

Reprint from

RECENT ADVANCES  
IN DOPING ANALYSIS  
(10)

W. Schänzer  
H. Geyer  
A. Gotzmann  
U. Mareck  
(Editors)

Sport und Buch Strauß, Köln, 2002

---

H. GEYER, M.K. PARR, U. REINHART, Y. SCHRADER, U. MARECK-ENGELKE,  
W. SCHÄNZER:  
Analysis of Non-Hormonal Nutritional Supplements for Anabolic Androgenic Steroids – an  
International Study  
In: W. Schänzer, H. Geyer, A. Gotzmann, U. Mareck (eds.) Recent advances in doping  
analysis (10). Sport und Buch Strauß, Köln, (2002) 83-85

## **Analysis of Non-Hormonal Nutritional Supplements for Anabolic Androgenic Steroids - Results of the International IOC-Study -**

Institute of Biochemistry, German Sport University Cologne, Germany

### **Abstract**

Since 1996 prohormones are available on the US sports nutrition market. According to the doping regulations of the IOC these substances belong to the prohibited class of anabolic agents (1).

Recent studies have shown that “non-hormonal” supplements such as vitamins, minerals, amino acids, etc. contain prohormones not declared on the label [2, 3, 4]. These contents may lead to positive results in doping tests, especially for the nandrolone metabolite norandrosterone [2, 3]. Based on this knowledge, a broad-based investigation of the international nutritional supplement market was conducted.

From October 2000 until November 2001 634 non-hormonal nutritional supplements were obtained in 13 countries from 215 different suppliers. The supplements were bought in shops in the respective countries (578 samples = 91.2 %), on the internet (52 samples = 8.2 %) and by telephone order (2 samples = 0.3 %). Two samples (0.3 %) were sent by the IOC. 289 supplements were from prohormone-selling companies and 345 supplements came from companies which do not offer prohormones. After isolation from the supplement matrix 11 different anabolic androgenic steroids, mainly prohormones of testosterone and nandrolone were analysed with gas chromatography / mass spectrometry.

Out of the 634 samples analysed 94 (14,8 %) contained prohormones not declared on the label (“positive supplements”). We could not obtain reliable data for 66 samples (10.4 %) because of matrix effects. Out of all positive supplements 23 samples (24.5 %) contained prohormones of nandrolone and testosterone, 64 samples (68.1 %) only contained prohormones of testosterone, 7 samples (7.5 %) only contained prohormones of nandrolone. None of the samples contained the prohormone of boldenone.

In relation to the total number of products purchased per country most of the positive supplements were bought in the Netherlands (25.8 %), in Austria (22.7 %) in the UK (18.8 %) and the USA (18.8 %).

country	no. of products	no. of positives	percentage of positives
Netherlands	31	8	25.8 %
Austria	22	5	22.7 %
UK	37	7	18.9 %
USA	240	45	18.8 %
Italy	35	5	14.3 %
Spain	29	4	13.8 %
Germany	129	15	11.6 %
Belgium	30	2	6.7 %
France	30	2	6.7 %
Norway	30	1	3.3 %
Switzerland	13	-	-
Sweden	6	-	-
Hungary	2	-	-
total	634	94	14.8 %

According to the label all positive supplements could be attributed to companies only located in five countries; the USA, the Netherlands, the UK, Italy and Germany.

21.1 % of the nutritional supplements from prohormone selling companies contained anabolic androgenic steroids, whereas 9.6 % of the supplements from companies not selling prohormones were positive.

The positive supplements showed anabolic androgenic steroid concentrations of 0.01 µg/g up to 190 µg/g.

Excretion studies with application of supplements containing nandrolone prohormones corresponding to a total uptake of more than 1 µg resulted in urinary concentrations of the nandrolone metabolite norandrosterone above the cut-off limit of the IOC for several hours (positive doping result).

The results of the present studies show that the sports community should be aware of the danger of nutritional supplements containing prohibited anabolic androgenic steroids not declared on the label. The studies also shows that this is an international problem. The consumption of such nutritional supplements can lead to positive results in doping tests. To minimize the risk of unintentional doping by the consumption of nutritional supplements

athletes should only buy nutritional supplements from companies, which perform a quality check for anabolic androgenic steroids, and/or which can guarantee that they have no contact with anabolic androgenic steroids in the production and transportation processes.

## References

1. International Olympic Committee: List of prohibited classes of substances and methods of doping. International Olympic Committee, Medical Commission, Lausanne 2001
2. Geyer, H., Mareck-Engelke, U., Reinhart, U., Thevis, M., Schänzer, W.: Positive Dopingfälle mit Norandrosteron durch verunreinigte Nahrungsergänzungsmittel. Dtsch. Z. Sportmed. 51, 11 (2000) 378-382
3. Geyer, H., Henze, M.K., Mareck-Engelke, U., Wagner, A., Schänzer, W.: Analysis of "non -hormonal" nutritional supplements for prohormones In: W. Schänzer, H. Geyer, A. Gotzmann, U. Mareck-Engelke (eds.) Recent advances in doping analysis (9). Sport und Buch Strauß, Köln (2001)
4. Ministry for food and rural area, Baden-Württemberg, Germany (Edelhäuser, M): Lecture about results of the analyses of nutritional supplements for anabolic steroids. Press conference BISP, Cologne 08.02.01

**A comprehensive publication of the present paper is in preparation and will be published elsewhere.**