

Reprint from

RECENT ADVANCES
IN DOPING ANALYSIS
(8)

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Statistical Analysis Relating to Detection of 19-Norandrosterone in 17283 Samples analysed
in the Doping Control Laboratory of Madrid during 1998 and 1999
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Statistical analysis relating to detection of 19-norandrosterone in 17283 samples analysed in the Doping Control Laboratory of Madrid during 1998 and 1999.

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1. ABSTRACT.

Nandrolone (19 nortestosterone: 17β -hydroxy-estr-4-en-3-one) is a synthetic anabolic steroid which is used in some sports. The non-conversion into estrogenic compounds and the absence of androgen side effect had made its consumption more common than other anabolic steroids (e.g. testosterone). Till now, the presence of 19-norandrosterone (19-NA: 3α -hydroxy- 5α -estran-17-one) and 19-noretiocholanolone (19-NE: 3α -hydroxy- 3β -estran-17-one) in a doping control test indicates undoubtedly exogenous administration of nandrolone and/or its precursors.

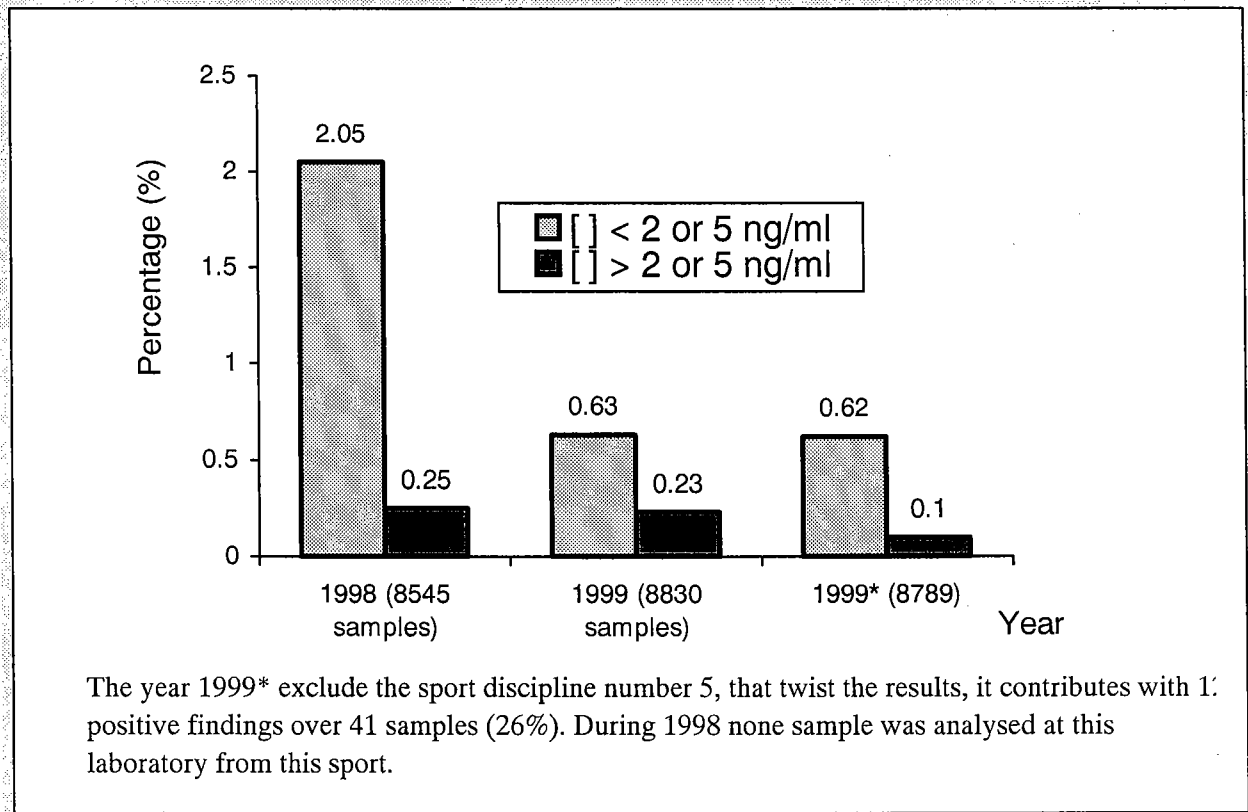
The aim of this study was to summarise the results of the last two years and to relate them with some different parameters such as: athlete sex, sport disciplines, in or out of competition, type of competition. The statistics were applied to more than 17000 samples analysed at the doping control laboratory in Madrid during the year 1998 and 1999.

2.- 19-NORANDROSTERONE IDENTIFICATION.

19 Norandrosterone identification was based on the GC/HRMS analysis of the extracts obtained from the steroid sample preparation procedure (1). At 10000 (5% valley) the 19-norandrosterone diagnostic m/z ions 405.2645 and 420.2879 were monitorized. Relative retention time to the internal standard, methyltestosterone, m/z ion 356.2535, was measured for each suspicious signal. Identification is considered as positive, when in the comparison between the suspicious sample and a 2 ng/ml 19-norandrosterone control, the relative retention time difference is smaller than a 1 % and a 5% for the ionic ratio is achieved. These analytical conditions allow achieving a detection limit of 0.2 ng/ml of 19-norandrosterone.

3.- POSITIVE CASES OF 19-NORANDROSTERONE.

Next graph shows the percentage of samples in which 19-norandrosterone was detected. Anabolic agent concentration under or above the IOC safety threshold is distinguished.



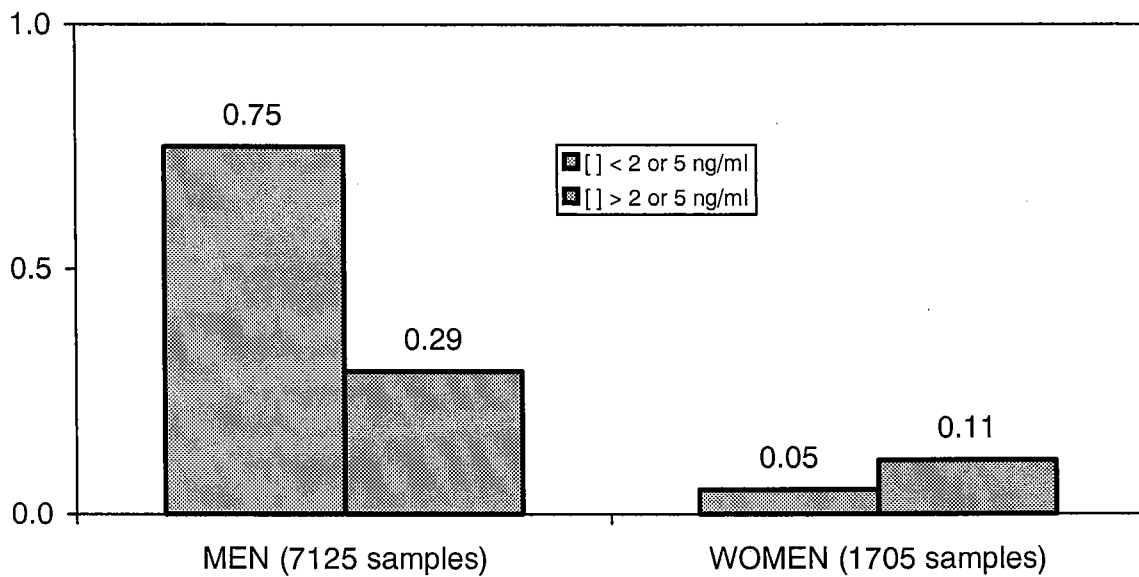
During 1998 a total number of 22 cases were found positive with 19-norandrosterone at a concentration level in urine ranging from 5 to 2290 ng/ml. The number of samples analysed at this Laboratory during this year were 8545, therefore a 0,25% samples were reported as positive with 19-norandrosterone.

During 1999 a total number of 21 cases were found positive with 19-norandrosterone at a concentration level in urine ranging from 8 to 6644 ng/ml. The number of samples analysed at this Lab during this year were 8830, therefore a 0,23% samples were reported as positive with 19-norandrosterone.

4.- DISTRIBUTION OF 19-NORANDROSTERONE FINDINGS BY ATHLETE SEX

The percentage of 19-norandrosterone findings in women at a concentration level below the security cut-off is smaller than in men.

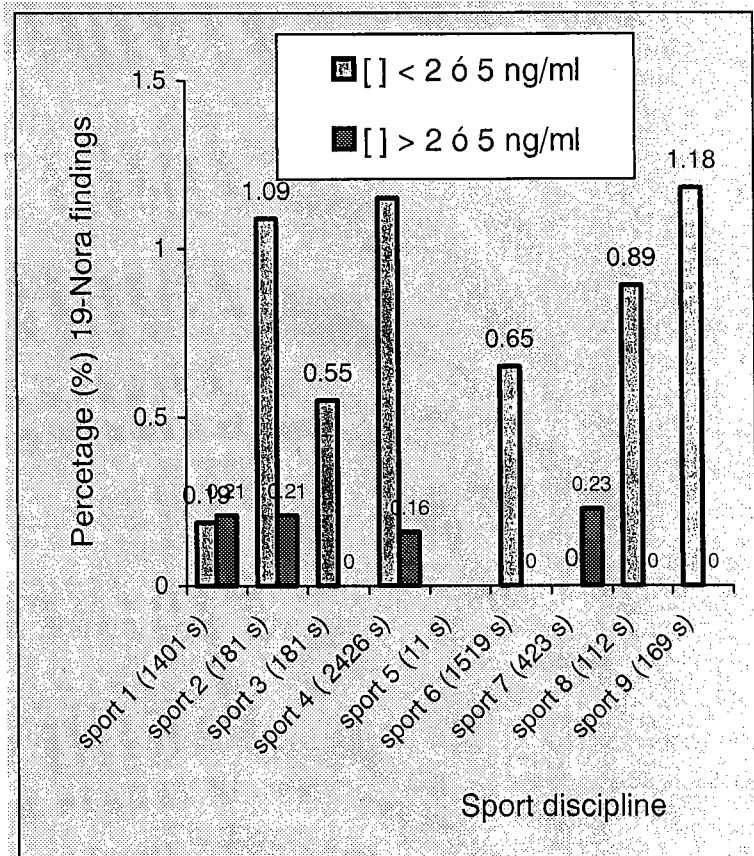
Distribution of 19-norandrosterone findings by Athlete sex. (1999)



5.- DISTRIBUTION OF 19-NORANDROSTERONE FINDINGS BY SPORT DISCIPLINE

In 1999, the laboratory analysed samples from 52 sport disciplines.

- In 43 of them, 2103 samples analysed, no trace of 19-norandrosterone was detected.
- In 4 sport disciplines with 4323 samples analysed, 0,46 % of samples were found to contain 19-norandrosterone above the security cut-off value and a 0.97% below this cut-off (sports 1, 2, 4 and 5).
- In another 4 sport disciplines with 1981 samples analysed, a 0.70% of samples were found 19-norandrosterone below the security cut-off value and none of them above (sports 3, 6, 8 and 9).

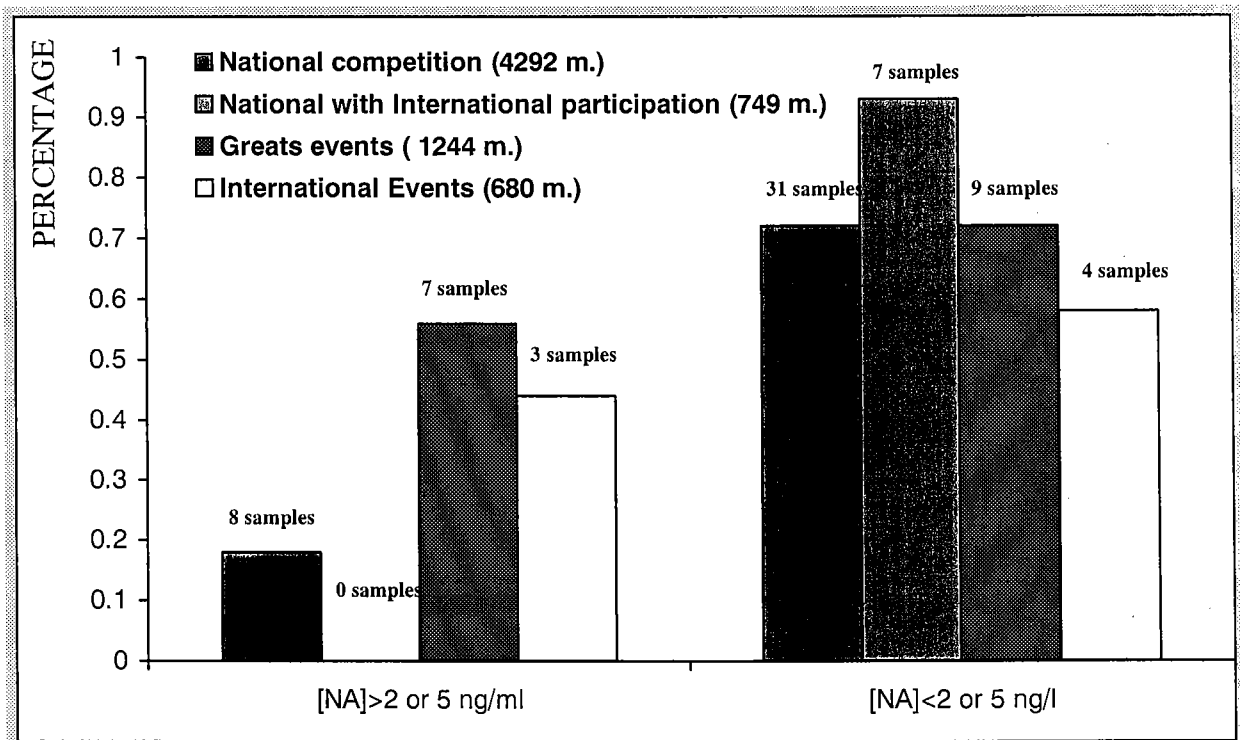


- Only in 1 sport discipline with 423 samples analysed, a 0.23% of samples was found 19-norandrosterone above the threshold limit and none of them below (sport 7).

6.- DISTRIBUTION OF 19-NORANDROSTERONE FINDINGS BY TYPE OF COMPETITION.

In 1999, 6965 in competition samples and 1865 out of competition samples were analysed in this laboratory. According to the next graphic, the number of 19-NA findings in out of competition samples above and below the cut-off level is very similar whereas in competition samples the number of 19-NA findings bellow the cut-off level is greater than the findings above is, also the total number of 19-NA findings in competition samples is greater than the out of competition findings is.

In the graph below it is shown the distribution of “in competition” samples according to the kind of competition: national, national with international participation, great events and international events. It can be observed that in national samples (national and national with international participation) the percentage of 19-NA findings bellow the cut-off level is greater than the above findings is whereas in international events (great events and international events) the percentage bellow and above the cut-off level is very similar.



7. CONCLUSION.

- Relating the positive results from the year 1998 with the year 1999 it was not possible to observe any difference. In both cases when the 19-norandrosterone concentration is above the security cut off the percentage of positive findings is almost the same 0.25% (1998) versus 0.23% (1999). The modal value in both cases is around 70 ng/ml. If we compare the total number of positive findings of 19-norandrosterone at a concentration level under the security cut-off, is clear that the number of these cases during the year 1999* has decreased a lot compared with the year before, 2.05% in 1998 vs 0.62% in 1999*.
- Detection of 19-norandrosterone at concentrations below the security cut-off level is found in only **6** sport disciplines. The total number of sport disciplines tested was **52**. Detection of 19-norandrosterone at concentrations above the security cut-off level is found in 4 sport disciplines.

8.- REFERENCES.

- 1.-J.A.Muñoz-Guerra, D. Carreras, C. Soriano, C. Rodriguez and F. A. Rodriguez, Journal of chromatography B, 704 (1997) 129-141.
- 2.- IOC Medical Commision, list of banned substances and methos of doping-January 2000.