

PROJECT REVIEW

“Detection of Doping with 1-Testosterone”

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1-Testosterone, 17-hydroxy-5 α -androst-1-en-3-one, is a new steroids in the so called sport nutrition market over the world and can be easily and legally purchased in the internet, different from testosterone, boldenone, or dihydrotestosterone (DHT), which are illegal hormones for the nutrition supplements based on the FDA definition.

Since its basically similar to testosterone except instead of a 4,5 double bond, it has a 1,2 double bond, it is something that occurs naturally in the body by way of an enzyme of 5 α -reductase, which is the same enzyme that makes DHT from testosterone. In most cases, it has reduced estrogenic and increased androgenic activity. This allows for increase in strength and aggression, reduction of body fat, and a leaner look to the physique.

It is, of course, a doping substance. But till now there is no validated method to detect doping with it.

This project will firstly study on the main chemical natures with HRMS for element am position, HIR for functional groups in the molecular, LC/MS/MS or GC/MS/MS for chromatographic and mass spectrometric behaviors, GC/C/MS for isotop ratio values...

Secondly two different excretion studies with 5 volunteers will be carried out respectively, one excretion study will be on the oral administration with 300mg/day and the other on the 150mg/day with ethergel. Thirdly, after comparison of analytical results for blank urines and excretion study urines, all the proposed metabolites will be analyzed with the instruments mentioned above. To identify these naturally occurred or endogenously introduced metabolites, GC/C/MS or MS/MS or HRMS should be implemented. Fourthly, the validation of this method proposed by this project shall be checked not only in our lab, but in other IOC labs also. Comparison between Laboratories shall be organized randomly and double-blindly in due time.

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Results and Conclusions

The identity of synthesized 1-testosterone was confirmed with different analytical methods. An excretion study after oral administration was performed in two volunteers. The presence of some exogenous metabolites of 1-testosterone, including 1-testosterone, androst-1-ene-3,17-dione and another unidentified metabolite may be used as evidence for doping with 1-testosterone. The abnormal steroid profile (e.g. T/epiT ratio, 5 α -/5 β -androstanediol ratio, androsterone/etiocholanolone ratio) can be proof of extra evidence of doping with 1-testosterone. Due to the great variation in concentrations of endogenous steroids, androsterone, 5 α -androstanediol etc. are not good markers for the administration of 1-testosterone. . After a single oral dose, some metabolites of 1-testosterone can be detected at least for about 100 hours.

Publications

1- Analytical data of 1-testosterone and the preliminary results of excretion study with 1-testosterone. Zhang Y, Liu X, Wu M, Wang J, Zhang H. Recent Advances in Doping Analysis, 2004: 81-90