

PROJECT REVIEW

“Metabolism and Excretion of 3,6,17 – Androstenetrione”

F. Delbeke, P. Van Eenoo (Doping Control Laboratory, Ghent University (Ugent), Merelbeke, Belgium)

3,6,17-androstenetrione is an anabolic steroid and is also referred to as 6-oxo. This product is sold as an over the counter product in the United States where it is regarded as a nutritional supplement. It is widely available on the internet and it is marketed as an anti-estrogenic agent.

Athletes might be tempted to threat the adverse effects of an extensive abuse of anabolic steroids (e.g. suppression of androgens and gynaecomastia) by using this type of drugs. Although at present no results from clinical studies supporting the claims of the manufacturer are available, it seems likely that athletes will use this product. This is especially true because the manufacturer of this product is the same company that introduced 1 -androstenediol, 4-androstenedione, 4-androstenediol and 1 9-nor-4-androstenediol on the prohormone market. All of these products have rapidly become a commercial succes.

Although the manufacturer claims that 6-oxo is the natural first anti-estrogenic product, it is clear that based upon its structure this product can be regarded as an anabolic steroid as well.

The producer claims that 6-oxo works as an aromatase inhibitor, blocking the aromatisation of endogenous as well as exogenously administered drugs resulting in higher levels of endogenous steroids as well as synthetic co-administered steroids.

Based upon its structure, it is likely that 6-oxo is not metabolised into endogenous steroids commonly screened for during doping control, misuse of this substance remains undetected. It seems therefore necessary to determine whether or not the use of this supplement does indeed result in higher levels of endogenous steroids (testosterone). Moreover elucidation of the metabolism and identification of 6-oxo metabolites is necessary to allow for the detection of this supplement.

This research would therefore investigate the metabolism and

excretion of 6-oxo to allow for its detection in the urine of athletes.

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Results and Conclusions

The analysis of the 6-OXO® supplement resulted in the detection of 6-oxo-androstenedione but also of 6 β -OH-androstenedione. No other contaminants were detected.

Excretion studies resulted in the detection of the parent drug 6-oxo-androstenedione and 6 α -OH-androstenedione and 6 α -OH-testosterone as metabolites.

A GC-MS-SIM method was developed and validated to fulfil the requirements of WADA for doping control laboratories. Using this method, the ingestion of the supplement, according the manufacturers recommendations resulted in the detection of 6 α -OH-androstenedione up to 37 h after the administration, while 6-oxo-androstenedione and 6 α -OH-testosterone could be detected up to 24 h post administration. Because of the longer detection time and its presence in urine after the administration of androstenedione, it is recommended that besides 6-oxo-androstenedione, 6 α -OH-androstenedione is also included in screening methods for doping control purposes. The presence of 6-oxo-androstenedione or 6 α -OH-testosterone can be used to discriminate between the administration of 6-oxo-androstenedione and androstenedione.