T. Piper[*1,2)], G. Fusshöller[2)], C. Emery[1)], W. Schänzer[2)], M. Saugy[1)]

Investigations on carbon isotope ratios and concentrations of urinary formestane.

1) Swiss Laboratory for Doping Analysis, Epalinges, Switzerland
2) Institute of Biochemistry, German Sport University Cologne, Germany

Abstract

The aromatase inhibitor formestane (4-hydroxy-androst-4-ene-3,17-dione, F) is prohibited in sports by the World Anti-Doping Agency (WADA). F possesses only weak androgenic properties and is presumed to be employed in order to suppress estrogen production during the illicit intake of anabolic steroids by athletes.
Former studies additionally showed that F is an endogenous steroid produced in low amounts. According to the regulations of the WADA, urinary concentrations above 100 ng/mL are assumed to be due to ingestion of F. To distinguish between endogenous or exogenous sources of urinary F, isotope ratio mass spectrometry (IRMS) is the method of choice.
Therefore, a method to determine the carbon isotope ratio (CIR) of F in urine samples was developed and validated. Routine samples (n = 42) showing concentrations of F above 5 ng/mL were investigated and enabled elucidation of the CIR of endogenous F and subsequent the calculation of a reference limit. A reference population encompassing n = 90 males and females was investigated regarding endogenous concentrations of F.
An excretion study with one male volunteer was conducted to test and validate the developed method and to identify possible impact of F administration on other endogenous steroids.
By CIR determination of F it is clearly possible to elucidate its endogenous or exogenous source. Taking into account the CIR of other target analytes like testosterone, a differentiation between F and androstenedione intake is possible.
In 2011 the first exogenous F below the WADA threshold could be detected by means of the developed IRMS method.

The complete article can be found at: *Drug Test. Analysis* 2012, DOI 10.1002/dta.386