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Investigations on changes in $^{13}C/^{12}C$ ratios of endogenous urinary steroids after pregnenolone administration.

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Abstract

For the detection of possible misuse of naturally occurring anabolic androgenic steroids like testosterone (T), anti doping laboratories use a combination of two techniques. One is molecular steroid profiling to evaluate urinary steroid concentrations and normal diagnostic ratios. The other is isotope ratio mass spectrometry (IRMS), in which the $^{13}C/^{12}C$ ratios of target analytes like T are compared to the $^{13}C/^{12}C$ ratios of endogenous reference compounds (ERCs). The $^{13}C/^{12}C$ of the most commonly used ERC, pregnanediol (5β-pregnane-3α,20α-diol, PD), can be influenced by administration of pregnenolone (3β-hydroxy-pregn-5-en-20-one, PREG). Therefore PREG administration bears the potential to circumvent IRMS testing for doping control samples.

In order to investigate the influence of PREG on PD and on other urinary excreted steroids administration studies with oral and transdermal application of PREG were carried out. The influence of PREG administration on concentrations and $^{13}C/^{12}C$ ratios of all investigated target analytes was negligible. Only PD and 5β-pregnan-3α-ol-20-one (3aP) showed significant depletion in both their glucuronidated and sulfated steroids. The results suggest that appropriate alternative ERCs are: 11β-hydroxy-androsterone/etiocholanolone, 5β-pregnane-3α,17,20α-triol, pregn-5-ene-3β,17,20α-triol and cholesterol.

Due to its properties to disguise the misuse of anabolic steroids by influencing the $^{13}C/^{12}C$ ratio of PD, PREG should be considered to be added to the World Anti-Doping Agency list of prohibited substances as a masking agent.

The complete article can be found at: *Drug Test. Analysis* 2011, **3**, 283-290.