

One Source Toxicology Laboratory Presents at the International Association of Forensic Toxicologists

Dr. Subbarao V. Kala, Scientific Director, and his colleagues Stan Gerlich, President, and Tom Freijo, Alternate Responsible Person, attended the The International Association of Forensic Toxicologists (TIAFT) meeting held in Seattle, Washington August 26-30, 2007 to present a paper on the analysis of anabolic steroids using LC/MS/MS. This paper addressed the detection and identification of several anabolic steroids: Boldenone, Methenolone, Methandienone, Nandrolone, Stanozolol, Mesterolone, Norethandrolone, Testosterone and Epitestosterone in urine samples using the Applied Biosystems 3200 QTRAP LC/MS/MS system.

The limit of detection and quantitation for most of the steroids using this method is 0.5 ng/ml of urine. The cutoff used by several laboratories for anabolic steroids is 10 ng/mL urine. Using this method, the One Source Toxicology Laboratory staff was able to detect several of the above-mentioned steroids in urine samples of known steroid users.

Several researchers have presented papers on oral fluids and ETG based on the data generated using LC/MS/MS. During this meeting, it was evident that scientists around the world are interested in developing methods for oral fluids for the analysis of abused drugs. Oral fluids testing as an alternative matrix for drug testing grew in popularity among employers because of its simple collection procedure.

Ethylglucuronide was used as an alternative biomarker for alcohol abuse instead of urine alcohol. This is mainly due to the highest level of sensitivity one can obtain in the detection of ETG in urine.

Definition: Anabolic Steroids

- ⊙ Steroids are hormones.
- ⊙ Anabolic steroids, or more precisely, anabolic/androgenic steroids, are also referred to as ergogenic or performance-enhancing drugs.
- ⊙ Steroids are synthetic derivatives of testosterone, a natural male hormone.
- ⊙ The body produces testosterone predominantly in the testes in the male, and adrenal glands in the female.

Most Commonly Used Steroids

- Drug Enforcement Administration
- Deca Durabolin (nandrolone decanoate)
 - Durabolin (nandrolone phenpropionate)
 - Equipoise (boldenone undecylenate)
 - Winstrol (stanozolol),
 - Anadrol (oxymetholone)
 - Oxandrin (oxandralone)
 - Dianabol (methandrostenolone)

Anabolic Steroids/Sports

- ⊙ Anabolic steroids are known to be very potent muscle enhancers and have been used extensively by athletes to enhance body muscle mass to improve their performance.
- ⊙ Several of these anabolic steroids are on the prohibited list of substances by the World Anti-Doping Agency (WADA, 2005).
- ⊙ Recently, several states including Texas, New Jersey and Florida started mandatory testing of Steroids at high school and college levels.
- ⊙ Anabolic steroids are administered several ways including intramuscular, subcutaneous injection, or by mouth.
- ⊙ The length of time that a steroid stays within the body is not clearly established.

Analysis of Anabolic Steroids

- ⊙ Until recently, steroid analysis has been routinely carried out by GC/MS.
- ⊙ These techniques are laborious, time consuming and less sensitive in detecting anabolic steroids.
- ⊙ One Source Toxicology developed a highly sensitive and selective method using LC/MS/MS. Samples from actual steroid users were used to validate the method.

Possible Health Consequences

Disruption of Hormonal System

- ⊙ Infertility, breast development and shrinking of testicles
- ⊙ Excessive growth of body hair

Cardiovascular disease

- ⊙ Increases in LDL, decreases in HDL
- ⊙ High blood pressure and heart attacks

Liver damage

- ⊙ Cancer
- ⊙ Tumors

Psychiatric effects

- ⊙ Rage, aggression, mania and delusions

One Source Will Present at Society of Forensic Toxicologists

Responsible Person Steve Harris and Scientific Director Subbarao V. Kala, Ph.D. are presenting the work on the determination of 6-acetylmorphine (6-MAM) in urine samples by Agilent GC/MS oral fluid analyzer Dean Switch at the Society of Forensic Toxicologists (SOFT) annual meeting to be held in Durham, North Carolina on October 14 - 20, 2007. The method has shown the ability to easily quantitate 6-MAM down to 4 ng/mL in the presence of 10,000 ng/mL codeine, morphine, norcodeine, hydrocodone, hydromorphone, oxycodone and oxymorphone. The LOD/LOQ for the assay is 1 ng/mL.

New Testing Methods Developed

One Source Toxicology Laboratory recently developed a method for the detection and quantification of Ethyl glucuronide, a marker for alcohol abuse, in urine samples. Screening of ETG will be carried out with an Olympus 5400 instrument and the presence of ETG will be confirmed by using Applied Biosystems QTRAP 3200 LC/MS/MS.

The laboratory has also completed the development of methods for the detection and quantification of SAMHSA 5 panel drugs (THC, Amphetamines, Cocaine, Opiates and PCP) in oral fluids. The screening of the drugs in oral fluid will be done by Olympus 5400 and ELISA assays. The drugs' presence in urine will be confirmed by using either Agilent's GC/MS Oral Fluid Analyzer or by AB Systems' LC/MS/MS.