K26 More Bang for Your Buck—An Alternative Approach to Blood and Tissue Screening That Saves Time and Money

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After attending this presentation, attendees will have seen an alternative automated solid phase extraction technique to blood and tissue screening as compared to Liquid-Liquid Extraction (LLE) of basic drugs. Better recovery of designer drugs such as "bath salts" will also be shown.

This presentation will impact the forensic science community by demonstrating how more information can be obtained from the same sample volume, while saving time and money.

The Toxicology Laboratory at the Miami-Dade Medical Examiner Department recently changed the blood and tissue screening methodology from a multi-step LLE of basic drugs to a dual-Elution Solid Phase Extraction (SPE) of acidic/neutral and basic drugs. This was done to achieve a more cost-effective comprehensive blood drug screen, which utilizes smaller solvent volume and reduces sample preparation time.

The objective is to present data comparing the previously utilized LLE procedure to the newly implemented automated SPE method. Examples will include spiked controls, proficiency samples, and postmortem cases.

The LLE procedure (described by Forrester et. al in JAT) applies strictly to the extraction of basic drugs from 1mL of sample. The extract is then analyzed by dual column Gas Chromatography with Thermionic Sensitive Detection (GC/TSD).

The SPE method is a modified version of United Chemical Technologies Procedure Code: DRB200DAUZ120392 using UCT Clean Screen® cartridges and an automated Zymark Rapid Trace® system. The procedure uses 1mL sample volume yet yields two distinct fractions. The acidic/neutral extract is submitted for analysis by dual column Gas Chromatograph-Flame Ionization Detector (GC-FID), and the basic extract is analyzed by GC/TSD. GC-Ion Trap/MS is performed to confirm any positive findings.

The SPE method detected all 113 spiked control drugs and showed improved recovery for certain drugs, particularly the sympathomimetic amines and benzodiazepines. Co-elution of doxylamine and etomidate with caffeine was prevented since caffeine now elutes in the acidic/neutral extract.

The improved detection of ephedrine, in addition to the detection of acetaminophen in the acidic/neutral extract was noted in two separate proficiency samples in which these drugs were missed when screened using the former LLE method.

Screening of postmortem case samples utilizing the SPE method has led to detection of drugs in the acidic/neutral extract such as propofol, topiramate, levetiracetam, acetaminophen, and valproic acid which would have previously been missed. Newer drugs detected in the basic extracts include BZP, TFMPP, 5MeoDIPT, methylone, and MDPV, which could have been missed due to decreased recovery by LLE. In addition heroin, 6-MAM, morphine, and benzoylecgonine were detected in the initial GC/MS screening, as opposed to having to be specifically targeted in other confirmatory assays.

With the constant evolution of designer drugs, it is important for laboratories to respond and adapt accordingly, even though funding for consumables and staff may be limited. By adopting an SPE protocol, the laboratory is now equipped to screen for a variety of tryptamines, as well as the components of the ever-so-popular "bath salts." Additionally, the laboratory has become more efficient due to the reduction in solvent usage and sample preparation time. Other advantages include safety improvements and prevention of errors from multi-step procedures.

More information is obtained from the same sample volume via the dual elution which provides a much more comprehensive screen.

SPE, Comprehensive Screen, Basic Drugs

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