W23 How to Measure and Reduce Drug Background Levels in Forensic Laboratories and Their Implications on Safety and Data Integrity

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Learning Overview: The goal of this workshop is for attendees to understand the significance and benefits of characterizing the composition and amount of drug background present in forensic laboratories. Attendees will learn: (1) about the recent work to establish drug background levels and how the data can be interpreted for the implications on health and safety and for data integrity purposes; (2) what processes contribute to a higher drug background and what controls and cleaning procedures can be implemented to reduce the potential for exposure; (3) what mechanisms laboratories are considering to improve analyst occupational health practices and maintain data integrity through changes to policies and procedures; (4) strategies for addressing drug background in court testimony; and (5) about analytical methods suitable to measure drug background levels and best practices required to collect and analyze the samples.

Impact on the Forensic Science Community: This workshop will impact the forensic science community by providing drug analysts, quality managers, and laboratory directors with valuable information to make informed decisions on a range of topics, including identification of workflow processes that contribute to elevated drug backgrounds, cleaning protocols that reduce drug background, exposure prevention controls such as Personal Protective Equipment (PPE), and occupational health hazards from drug analysis.

Background monitoring is a common practice in many industries, such as pharmaceutical, food manufacturing, and healthcare, designed to address a wide range of challenges, from cross contamination to health and safety concerns to regulatory and data integrity. Although background monitoring has not typically been implemented in forensic laboratories, significant value can be drawn from knowing this data. For instance, the increased potency of drugs (i.e., opioids) has led to the need for more sensitive analytical instruments capable of detecting these drugs in trace amounts; therefore, characterizing the environmental background is critical. The basis for this workshop is a National Institute of Standards and Technology (NIST) -led, multi-agency collaboration focused on establishing drug background levels in forensic laboratories and interpreting the data for implications on health and safety and the data integrity of drug analysis. This workshop will provide foundational data on drug background levels measured in more than 20 forensic laboratories. This study quantified background levels using a targeted Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) drug panel. Samples were collected from a variety of surfaces in drug chemistry units, evidence-receiving units, and other units to establish the surface concentrations throughout each laboratory. These measurements identified workflow processes that most contribute to background, such as taking net weights of bulk powders. This presentation will inform attendees as to how laboratories are considering using this information to enhance their quality assurance programs.

Measuring background levels leads to the question: What do these levels mean for the health of analysts and for the data integrity of drug analysis? The National Institute for Occupational Safety and Health's (NIOSH) Health Hazard Evaluation (HHE) program has begun working with forensic laboratories to answer the first question and will be discussing the results of this work and providing broader suggestions regarding controls to improve analyst occupational health practices. To address the second question, the NIST is working with forensic laboratories to develop methods to quantify the limits of detection and reporting thresholds of their instruments such as Gas Chromatography/Mass Spectrometers (GC/MS). The goal here is to determine whether background levels present concerns for the data integrity of drug analysis. Additionally, efforts to quantify the efficacy of different cleaning agents, such as OxiClean™ and Dahlgren Decon, to reduce background will be discussed.

The final component of this workshop will provide participants with hands-on demonstrations and practice on how to properly sample surfaces within their laboratories to collect background. Following best sampling practices is crucial to the accuracy of measurements and their interpretation. In addition, attendees will be shown how Lateral Flow Immunoassays (LFIs) may be a robust and inexpensive way for laboratories to self-monitor and make nominal background measurements.

Drug Analysis, Background, Occupational Health