



### K41 The Identification of Adulterants in Preliminary Drug Analysis

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After attending this presentation, attendees will understand the implications of drug adulteration for urinalysis and how commercially available and common household adulterants can affect results in preliminary drug screening techniques, such as Enzyme-Linked Immunosorbent Assay (ELISA).

This presentation will impact the forensic science community by demonstrating how these immunoassay-based screening techniques are prone to producing false positive and negative results in the presence of adulterants. Adulteration of urine samples can circumvent current preliminary screening protocols (i.e., ELISA) and even common adulterant test strips. These results may affect criminal proceedings that are reliant on drug tests to determine convictions, compliance in probation, and court-based treatments.<sup>1</sup>

Despite drug abuse being one of the major issues that has plagued society for centuries, the technology to detect drugs and their metabolites in bodily fluids has only been accessible for less than 50 years.<sup>2</sup> Drug testing always begins with a screening technique in the form of immunoassays, such as ELISA, and adulterant testing strips may also be utilized to ensure the sample has not been manipulated.<sup>3</sup> Although response accuracy of immunoassays have increased drastically over the years, they only remain accurate approximately 95% of the time for the detection of drugs of abuse and their corresponding metabolites in urine samples.<sup>4</sup> This value decreases when samples have been adulterated.<sup>2</sup>

Approximately 30 urine samples were collected from anonymous volunteers. Each participant was required to complete surveys detailing the frequency of their drug use in the week prior to providing a sample. Based on this information, samples that may contain significant concentrations of common drugs of abuse and their metabolites were identified (i.e., THC, cocaine, amphetamine, and benzodiazepines). Aliquots of these urine samples were adulterated at different levels (i.e., 5, 10, 25, and 50% volume/volume (v/v)) with common and commercially available adulterants, including bleach, vinegar, eye drops, Drano<sup>®</sup>, nitrite, table salt, hydrogen peroxide, and hand sanitizer. Preliminary research using ELISA revealed that some adulterants (e.g., bleach, eye drops, Drano<sup>®</sup>) drastically reduce the concentrations of detectable drugs/metabolites in comparison to the unadulterated urine samples.

Adulterant test strips were also utilized to determine if, and at what level, they were able to detect when a urine sample had been tainted. Preliminary data revealed that most of the adulterants were not able to be detected at concentrations less than or equal to 10% v/v. Eye drops, specifically those that contain benzalkonium chloride, were not detected in the adulterated urine samples, even at high levels. This is of great concern, considering that eye drops drastically reduced the detection of THC, cocaine, and amphetamine by ELISA. These results suggest that new pre-screening techniques may need to be identified to combat and detect the presence of adulterants in urinalysis.

#### Reference(s):

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#### ELISA, Adulterant Test Strips, Adulterants