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## **E23 Validation of a Paper Analytical Device Through Analysis of Illicit Substances Found at Fatal Overdose Scenes**

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**Learning Overview:** The goal of this presentation is to demonstrate the validation of a paper analytical device designed to identify various illicit substances with street samples collected from the scenes of overdose deaths. Attendees will leave the presentation with knowledge of the fabrication, chemistry, and testing ability of a new Paper-based Analytical Device (idPAD). The collaboration between a chemistry research lab, social scientists, and Coroner's office will also be discussed as a tool strengthen local communities.

**Impact on the Forensic Science Community:** This presentation will impact the forensic community by introducing an idPAD as a presumptive field test that can be used as an alternative or supplement to the current testing methods that can be used by law enforcement and first responders. This idPAD uses less solid than current presumptive tests, costs less than the test pouches, can be used in fewer than five minutes, and generates a complex color matrix to limit single color identifications. This presentation will lay out the different field samples and complex mixtures that were used to validate the device.

A 12-lane idPAD has been developed to detect and classify illicit substances, such as cocaine, heroin, and methamphetamine. The idPAD houses 12 different color tests that each target a different chemical functional group and react with a colored response. By running the tests simultaneously, a complex color "bar-code" is produced unique to each substance that can be read using an image library. The idPAD's ability to produce a unique color bar code for each substance, or mixture, presents a capability not currently seen in modern field presumptive tests. Initial testing of the idPAD with pure drug standards and fabricated mixtures demonstrated a 94% sensitivity and 100% specificity for cocaine, heroin, and methamphetamine in a lactose matrix. The limit of detection is well within the microgram range for all substances, and stability is consistent with current methods.

To validate the idPAD with collected street samples, a collaboration was started with the Marion County Coroner's Office in Indianapolis, IN. Many coroner's offices do not analyze the drugs found at the scene of the overdoses, relying only on toxicology data from the deceased. However, for this study, samples found at overdose scenes were collected and tested on the idPAD, with the results compared to Liquid Chromatography/Mass Spectrometry (LC/MS) of the drug samples and toxicology reports from the decedent. Trends on common drug mixtures as well as the highlights in differences between physical drugs found at scenes compared to in the toxicology report will be discussed.

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### **Microfluidics, Paper Analytical Device, Presumptive Field Test**