A63 The Evaluation of Multiple Commercially Available Extraction Chemistries for Forensic Laboratory Use

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After attending this presentation, attendees will learn more about various extraction chemistries available for forensic labs. The chemistries are compared side by side to assist other forensic scientists to learn about the results that can be produced by using each kit.

This presentation will impact the forensic science community by assisting DNA or forensic biology labs in determining which extraction chemistry may best suit the needs of their lab.

The Palm Beach County Sheriff's Office Forensic Biology Unit has observed a dramatic increase in the number of touch, environmentally challenged, and inhibited evidentiary samples submitted for DNA analysis. This generally means samples with low or degraded DNA template levels resulting in partial, inconclusive, or negative DNA profiles. In order to extract optimum purified DNA concentrations from these types of samples, a matrix analysis of three extraction protocols was conducted. Samples were evaluated using EZ1 DNA Investigator Kit extracted on the EZ1 Advanced XL, DNA IQ Casework Sample Kit extracted on the Maxwell®16 and PrepFiler™ Forensic DNA Extraction Kit extracted manually.

Four comprehensive evaluations were conducted including: (1) a contamination assessment study using liquid blood samples extracted using the EZ1 and Maxwell®16; (2) a template concentration sensitivity study using a female dried blood dilution series comparing all three chemistries; (3) an inhibition study with all three extraction protocols in which saliva samples were spiked with tannic acid, humic acid, or hematin; and, (4) an extraction of mock evidence prepared from "touch" samples. The contamination assessment was conducted with 200 ml of liquid blood and blank samples arranged in a checkerboard fashion. The results indicated no DNA carryover from the samples to the negative controls for the two automated systems. The sensitivity studies were conducted on samples containing 45 ng to 1.0 pg based on quantification results. PrepFiler extractions routinely provided DNA profiles from concentrations down to a 1:512 dilution. DNA IQ provided routine profiles from concentrations down to a 1:32 dilution, with inconsistencies seen at dilutions less than 1:32. Qiagen provided routine profiles to a dilution of 1:128. Samples were spiked with known Taq inhibitors and extracted using PrepFiler, DNA IQ, and EZ1 Investigator. All three chemistries show the ability to remove inhibitors. PrepFiler was successful in this study with removing hematin, but not in removing humic acid or tannic acid. This may be due to improper washing during the manual extraction process. Mock "touch" samples provided a higher yield of profiles using both the PrepFiler and Qiagen extraction chemistries over DNA IQ. Data from all four studies will be presented.

Although each of the chemistries and instruments provide unique advantages, the results obtained from PrepFiler and Qiagen were consistently predictable. The results of this evaluation have been submitted to the Forensic Biology Unit and will be used to determine a chemistry that would provide an optimum extraction method that produces accurate and reliable results. The information presented in this poster may assist other laboratories in choosing an extraction method that is sensitive enough to extract low DNA template concentrations as well as remove inhibitors and avoid contamination.

All extraction protocols and evaluation methodologies will be presented including qPCR and AB3130xl PowerPlex16 data analysis.

Extraction Chemistries, Commercially Available Kits, DNA Analysis

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