

### **B8 The Evaluation and Implementation of the Promega® Casework Direct Kit for Y-Screening on Sexual Assault Samples**

*Carmen Young\*, 1328 Neel Street, Huntington, WV 25701; Amy McGuckian, MSFS, Palm Beach County SO, Crime Laboratory, 3228 Gun Club Road, West Palm Beach, FL 33406-3001; Julie Conover Sikorsky, MS, Palm Beach County SO, Forensic Biology Unit, 3228 Gun Club Road, West Palm Beach, FL 33406; and Kelly Beatty, MSFS, Marshall University Forensic Science Center, 1401 Forensic Science Drive, Huntington, WV 25701*

After attending this presentation, attendees will better understand how to implement the Promega® Casework Direct Kit to screen for the presence of male DNA and the kit's use as an alternative to conducting differential extractions as the primary extraction method on sexual assault samples.

This presentation will impact the forensic science community by informing attendees, especially those in the field of DNA analysis, on the ability to screen for the presence of male DNA using a new extraction method.

Current serological screening of sexual assault samples is time consuming and provides the analyst with little predicative power as to the DNA profile that may be obtained. Recent legislation across the country has increased the number of sexual assault samples that are submitted to forensic laboratories for testing. With this new demand on laboratories, there is a need for the rapid detection of male DNA in a sample and a faster and more efficient DNA process to generate DNA typing results. Prior to the introduction of new robust Short Tandem Repeat (STR) megaplexes and the advent of probabilistic genotyping software, differential extractions and DNA purification methods were developed to separate epithelial and sperm cells in an attempt to produce single-source DNA profiles. With more laboratories turning to probabilistic genotyping software, laboratory personnel may consider using a fast and efficient extraction method that results in DNA mixtures. The Promega® Casework Direct Kit enables the rapid generation of lysates from casework samples and can be used directly in an STR amplification to generate DNA typing results.

Evaluation of the Promega® Casework Direct Kit was conducted by the Palm Beach County Sheriff's Office (PBSO) Forensic Biology Unit. Samples were extracted with the Casework Direct Kit and PBSO's in-house differential extraction method using the QIAGEN® EZ1® XL Advanced® Robot and quantified with the Promega® PowerQuant® System on the Applied Biosystems® 7500 Real-Time Polymerase Chain Reaction System. PCR amplification was achieved using the Promega® PowerPlex® Fusion 5-dye System with 30 PCR cycles and Promega® PowerPlex® Y23 System with 30 PCR cycles on the Applied Biosystems® GeneAmp® 9700 thermal cycler. Capillary electrophoresis was conducted on the Applied Biosystems® 3500xL Genetic Analyzer with a 24-second 15kV injection and data was analyzed using Applied Biosystems® GeneMapper® ID-X v 1.5.

The data generated was evaluated to determine if the Casework Direct Kit could be used to detect the presence of male DNA and as an alternative to differential extraction. Quantification results were evaluated to determine if the autosomal-to-Y ratio could be used as an indicator for downstream process decisions, such as taking the lysate directly to autosomal amplification, Y-chromosomal Short Tandem Repeat (Y-STR) amplification, or for re-extraction of a sample using a differential extraction method to optimize male DNA recovery.

Quantification results obtained for the male target show that the amount of a male DNA recovered from the Casework Direct Kit extraction was comparable to the differential extraction method. Lysates from the Casework Direct Kit with an autosomal to Y ratio of less than 200 were taken direct to STR amplification and produced male DNA profiles in the presence of high female DNA. A full Y-STR haplotype was obtained in a 96-hour post-coital sample. The presence of male DNA was detected and a full Y-STR haplotype was obtained from non-probative samples where sperm cells were not observed during microscopic examination.

The results indicate that the Casework Direct Kit can extract DNA from typical sexual assault evidence and, based on the quantification results, may assist the analyst in making decisions regarding downstream processing or re-extracting with a differential extraction method. Implementation of the Casework Direct Kit would replace conventional serology screening for sexual assault evidence as it would provide a more sensitive method to determine the presence of male DNA.

#### **Y-Screening, Non-Differential Extraction, Sexual Assault Samples**