B9 Y-Screening and Direct Amplification of Casework Samples

Jeanne Bourdeau-Heller, PhD, Promega, 2800 Woods Hollow Road, Madison, WI 53711; Robert McLaren, PhD, Promega, 2800 Woods Hollow Road, Madison, WI 53711; Amy McGuckian, MSFS, Palm Beach County SO, Crime Laboratory, 3228 Gun Club Road, West Palm Beach, FL 33406-3001; Jerome G. Remm, MFS, Palm Beach County Sheriff's Office, 3228 Gun Club Road, West Palm Beach, FL 33406; Julie Conover Sikorsky, MS, Palm Beach County SO, Forensic Biology Unit, 3228 Gun Club Road, West Palm Beach, FL 33406; Anupama Gopalakrishnan, PhD, 2800 Woods Hollow Road, Madison, WI 53711; Lotte Downey, MSc, 2800 Woods Hollow Road, Madison, WI 53711; and Douglas R. Storts, PhD, Promega Corporation, 2800 Woods Hollow Road, Madison, WI 53711*

After attending this presentation, attendees will be able to evaluate and implement both a Y-screening protocol for processing sexual assault samples and a direct amplification process of casework samples in their laboratories.

This presentation will impact the forensic science community by streamlining and simplifying the processing of DNA casework samples.

Current serological screening of sexual assault samples is time consuming and limited in sensitivity, especially when compared to amplification-based methods for the detection of male DNA. Current quantitative Polymerase Chain Reaction (qPCR) and Short Tandem Repeat (STR) amplification chemistries display significant improvements over previous chemistries due to the robust performance in the presence of PCR inhibitors commonly found in casework samples. This makes it possible to perform direct amplification from such samples without the need for a DNA purification step. Elimination of this purification step reduces both cost and the potential for loss of DNA during purification, especially with low-level DNA samples, and it streamlines the laboratory workflow.

The Casework Direct Kit provides a method for the rapid generation of lysates from casework samples, which may be subsequently used in amplification-based assays, such as the PowerQuant® System, to quantify the abundance of human DNA, determine the male/female DNA ratio, predict PCR inhibition, and assess degradation of the DNA. If preferred, the lysate can be used directly in an STR amplification assay to generate an STR profile.

In the case of sexual assault samples, the lysates are used in the PowerQuant® System to screen for the presence of male DNA. Based on this information, the analyst can decide to either perform a differential extraction of the sample, take the lysate directly into an STR amplification reaction, or choose to stop processing the sample.

Unlike direct amplification from a punch, quantification results from the lysate can be used to normalize template DNA in downstream STR amplification reactions. Processing samples with the Casework Direct Kit facilitates the generation of high-quality laboratory results by directing workflow decisions and minimizing repeat assays and/or sampling. The method is fast (less than one hour) and requires minimal hands-on manipulation due to the use of new and improved spin baskets during the incubation step. Data will be presented from Y-screening and mock casework applications, including touch DNA samples, an example of the ability to detect the presence of male DNA, and a full PowerPlex® Y23 System profile in a 96-hour post-coital sample.

Y-Screening, Sexual Assault Samples, Direct Amplification