B32 Improved Methods for the Elution and Extraction of Spermatozoa From Sexual Assault Samples

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After attending this presentation, attendees will be able to understand the importance of physically eluting spermatozoa from sexual assault samples prior to differential extraction and DNA profiling; and to learn how to perform differential extraction of spermatozoa/epithelial cells in less than one hour and still produce high quality, full STR profiles.

Implementation of these new methods for elution and differential extraction of spermatozoa will impact the forensic science community by leading to improvements in the ability and speed of forensic scientists to generate a larger number of successful STR profiles.

Attendees will receive technical information specifically on optimization of sperm elution from cotton swabs. Furthermore, attendees will learn how to perform differential extraction of sexual assault samples in less than one hour and produce high quality, full STR profiles from minimal numbers of spermatozoa.

Methods currently used by forensic laboratories for eluting spermatozoa from cotton applicator swabs collected following sexual assaults typically recover between 5 - 10% of the total spermatozoa present. This report describes a novel elution method developed by selecting and optimizing a combination of physical and chemical conditions designed to release the spermatozoa from the cotton fibers of the swab. The result is a drastic improvement in the number of spermatozoa recovered (85-95%). The use of this procedure produces significantly cleaner slide preparations aiding in the visualization and enumeration of sperm present in the sample.

Once spermatozoa have been eluted from the cotton swab, the sample is then subjected to differential extraction (DE). DE is a procedure commonly used on sexual assault samples for the purpose of separating the male and female DNA fractions. The classic differential extraction method often takes up to two days of processing time and is not very effective on samples with a high epithelial to sperm cell mixture ratio. These samples present a challenge to forensic analysts as they do not produce clean, full profiles when STR typing is performed. To this end, Orchid Cellmark Inc. has developed a new method that shortens the overall DE processing time to less than one hour. Following the use of Orchid Cellmark's new sperm elution procedure, the resulting sperm pellet is treated with an optimized extraction buffer cocktail that enhances the specific lysis of epithelial cells in less than 15 minutes. This treatment allows for a cleaner, more effective isolation of sperm cells which subsequently produce cleaner, full profiles that are easy to analyze. A detailed description of this new method and data obtained from the extraction of samples containing various epithelial to sperm cell mixture ratios will be presented.

Implementation of these methods in forensic laboratories will lead to improvements in the ability and speed of forensic scientists to recover significantly more spermatozoa from sexual assault samples and generate a larger number of successful STR profiles. These methods should lead to the successful resolution of a larger number of forensic cases.

Spermatozoa, Elution, Extraction

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