D29 Development of a Rapid Screening Method for the Processing of Sexual Assault Kits

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After attending this presentation, attendees will understand the potential ability to eliminate presumptive testing in favor of a rapid screening method for sexual assault kits, its ability to be achieved after initiating analysis at Y-quantitation.

This presentation will impact the forensic science community by developing a method of rapid screening that will decrease time taken to process a sexual assault kit, which in turn could increase the percentage of reported sexual assaults, which currently stands at 50 percent.

According to the Criminal Victimization Survey of 2010, conducted by the U.S. Department of Justice, approximately 200,000 sexual assault victimizations occur annually with only a 50.0 percent report rate.[1] When a sexual assault is in fact reported, an official statement is taken followed by a thorough forensic examination. This examination is generally performed with the aid of an evidence collection kit, more commonly referred to as a rape kit. The evidence collection kit for a sexual assault generally includes instructions, bags and sheets, swabs, a comb, envelopes, nail pick, blood collection devices, and documentation forms, although the exact contents of a rape kit varies by jurisdiction.[2] These contents are used to collect victim's clothing, possible physical evidence, blood, urine, hair, and other bodily fluids. Due to the vast amount of evidence collected from the victim, it can take anywhere from six to nine months for a laboratory to begin analyzing a single rape kit.[3] The annual backlog of unprocessed rape kits in the United States is estimated to be around 180,000 with a high of 500,000.[3,4,5] The method in which a rape kit is processed is dependent on the laboratory. Typical processing consists of first preliminary testing which includes reagent and microscopic examination. Reagent testing includes, but is not limited to, prostate specific antigen (PSA) test, acid phosphatase (AP) test, human salivary amylase (HSA) test, and a sperm protein (SP) test. The PSA test confirms the presence of semen by the detection of a glycoprotein produced by the prostate gland and this test is found to be more precise than the AP test which detects the presence of the enzyme acid phosphatase which is found in semen.[6] Microscopic examination includes various staining processes of spermatozoa such as the Kernechtrot Picroindigocarmine staining method. Preliminary testing is preceded by the analysis of DNA from samples and swabs. Analysis includes extraction, quantitation, and amplification of DNA followed by the generation of a DNA profile. The objective of this experiment is to develop a method in which sexual assault kits can be rapidly and efficiently screened. This will be studied through the use of different mixture concentrations of male and female DNA to simulate samples currently encountered in sexual assault kits. Samples will undergo the traditional screening method used in crime laboratories including presumptive testing of swabs, staining and the evaluation of slides, etc. The same samples will undergo a Y-quantitation thus eliminating timely presumptive testing. Profile data from the traditional screening method will be compared to profile data for the rapid screening methods chosen. The two methods will be compared with regards to timeliness, efficiency, and cost.

References:

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