B23 Development of a Speedy Rape Kit Screening Method

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After attending this presentation, attendees will be aware of a method for the rapid screening of rape kit evidence.

This presentation will impact the forensic community and/or humanity by demonstrating information about optimal sampling devices and conditions for the collection of intimate samples from rape victims, and will offer a protocol for the rapid screening of rape kit evidence.

Every two minutes, someone in America is the victim of sexual assault. As recognized by the U.S. Department of Justice, forensic DNA evidence plays a critical role in the resolution of many of these cases. The current backlog of unexamined rape kits is estimated to be 180,000 but the true number may be as high as 500,000. This is a significant public health issue. Women are being raped and much of the evidence is either not examined or not examined in a timely manner. As a result, many rapists who may otherwise be identified by DNA are able to perpetrate additional crimes.

As one approach to reducing the backlog, a speedy rape kit screening method has been developed. Briefly, a minute portion of an intimate swab is cut and subjected to a simplified direct lysis nucleic acid extraction pro- tocol, resulting in an admixed male/female sample. The extract is then ana- lyzed for the presence of Y-chromosome DNA using a real-time PCR assay or Y-STR haplotyping. Post-coital samples ranging from 0 hours to 4.5 days post-coitus have been analyzed using both the direct lysis procedure and a standard differential organic protocol, allowing for an assessment of the accuracy of the former in predicting typing success in the latter. Both a positive real-time result and a Y-STR haplotype were obtained from the direct lysis extracts up to 4 days post-coitus. Analysis with an autosomal multiplex subsequent to an organic extraction proved to be less sensitive, with a male profile obtainable only up to 24 hours, but in each of these cases, a positive direct lysis result was predictive of typing success. Using these procedures, information can be obtained within 6 hours, allowing for a rapid screening of large amounts of evidence.

An additional focus of the project arose during the development of the direct lysis procedure. It was observed that if a cotton swab cutting from which DNA was extracted was subjected to a second direct lysis extraction, a significant quantity of DNA could still be obtained. This indicates that the standard cotton swab used for sampling possesses a high degree of adsorptivity for sperm. A search was commenced for alternative-sampling devices comprised of different swab materials and whose properties included high absorbtivity but low adsorptivity for sperm. Also the efficacy of swabs with different sizes and shapes was evaluated. Initially thirty pseudo-post coital swabs (created by immersing vaginal swabs from a single donor in liquid semen and drying them) were compared. As a result of this initial screen, five swab types were selected for further testing. Using these alternative sampling devices, *bona fide* post-coital swabs were collected in duplicate. The success of a swab was gauged by its perfor- mance in the direct lysis analysis (real-time PCR and Y-chromosome hap- lotyping), as well as in standard organic and differential extractions (auto- somal and Y-chromosomal haplotyping).

This presentation will provide information about optimal sampling devices and conditions for the collection of intimate samples from rape victims, and will offer a protocol for the rapid screening of rape kit evidence, rape kit analysis, Y-chromosome, real-time PCR

Rape Kit Analysis, Y-Chromosome, Real-Time PCR

 ** Presenting Author*