A67 Purification of Sperm DNA From Vaginal Swabs Using DNase I

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After attending this presentation, attendees will understand that sperm DNA can be isolated quickly, easily, and with high purity and yield from vaginal swabs by selectively degrading the victim's DNA using a nuclease, DNase I.

The presentation will impact the forensic science community by allowing crime labs to obtain DNA profiles from suspected rapists more quickly, easily, and in those rape cases where the number of sperm on the vaginal swab is limited.

The profiling of sperm DNA present on vaginal swabs taken from rape victims is a proven tool for identifying and incarcerating rapists. Large amounts of the victim's epithelial cells contaminate the sperm present on swabs, however, and complicate this process. The standard method for obtaining pure sperm DNA from a vaginal swab is to digest the epithelial cells with Proteinase K and to then physically separate the victim's solubilized DNA from the sperm by pelleting the sperm heads and repeatedly washing the sperm pellet, up to five times in some protocols. The sperm pellet washing steps are labor intensive, difficult to automate, and result in sperm loss. An alternative approach that does not require washing steps is to digest with Proteinase K, pellet the sperm, and then destroy the residual victim's DNA with a nuclease. This method is found to be fast, easy, and effective for obtaining abundant and highly pure male DNA from post-coital swabs taken as long as forty four hours after sex. The nuclease degrades the solubilized victim's DNA but does not affect the sperm DNA which is sequestered in the sperm heads and is not in solution.

Results: Fifteen post-coital vaginal swabs taken from up to forty four hours after sex were processed using the nuclease protocol. DNA was quantitated before and after purification for both total and male DNA using Quantifiler Duo from Applied Biosystems. All swabs taken from 10 minutes to 44 hours after sex yield a similar amount of total unpurified DNA (2.2-7.3 ug). The amount of male DNA on each swab dropped by a factor of 25 from 1,573 ng at 10 minutes to 63 ng at 44 hours, while the percentage of male DNA present on the swabs dropped from 33% to 1.5% of total DNA. After nuclease-based sperm DNA purification, the yield of male DNA for each swab was between 19-667 ng, more than enough for STR profiling. Importantly, the purity of the male fractions was exceptional, being greater than 95% male for each male fraction, including that taken from the 44 hour swab. STR profiling of the male fraction taken from the forty four hour swab gave a clear male profile. **Sperm DNA, Vaginal Swab, Nuclease Treatment**

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