B34 A Comparison of DNA Profiles Recovered From Cotton Versus Nylon-Flocked Swabs From Postcoital Cervicovaginal Samples

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Learning Overview: The goal of this presentation is to illustrate the differences observed in DNA recovery efficiencies between traditionally used cotton-tipped swabs and newer nylon-flocked swabs from postcoital cervicovaginal samples.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing information that could potentially improve the standard practices and tools used as part of a sexual assault kit.

Cotton-tipped swabs are routinely used as a method of collecting biological material by medical personnel and forensic investigators. Standard practices include collecting vaginal swab samples from a female victim as part of a sexual assault kit. Swabs used to collect biological material should be able to maximize the cellular material collected, then elute intact cells for DNA extraction and profiling. A swab with a higher extraction and recovery efficiency can lead to more DNA available for genotyping. The differences in swab morphology between cotton-tipped swabs (considered wound swabs) and the hydrophilic open fiber structure of the flocked swabs may account for the higher rates of sample elution from flocked swabs.[1] This study aims to compare male profiles obtained from vaginal samples taken with cotton-tipped swabs and nylon-flocked swabs.

Following Institutional Review Board (IRB) approval, sets of four vaginal swabs were collected from sexually active, heterosexual participant couples. The couples varied in age, menstrual cycle, and birth control methods. Swabs were collected over three distinct postcoital time intervals, with the cotton and the nylon-flocked swabs being inserted concurrently following the National Institutes of Justice (NIJ) recommendations for sample collection.[2] Control swabs of the vaginal cavity were taken after a sexual abstinence period of at least seven days and collected immediately prior to intercourse. Vaginal swabs were collected after 72, 120, and 168 hours postcoitus with ejaculation. Each collection was based on a separate act of intercourse. Cheek swabs of the male and female participants were collected to obtain reference profiles. The reference swabs were extracted using a 5% Chelex® method. The vaginal swabs were extracted using QIAamp® DNA Investigator Kit. Both reference profiles and vaginal swab extractions were amplified using the PowerPlex® Y23 System. For one 72-hour sampling period, the profile obtained from the cotton swab showed 3 of 22 (13.6%) alleles, while the profile obtained from the nylon swab showed 12 of 22 (54.5%) alleles. This same couple also completed the 120-hour sampling period, with the cotton profile returning 2 of 22 (0.9%) alleles and the nylon profile having 13 of 22 (59%) alleles present. For a second 72-hour sampling period by different participants, the cotton profile returned 16 of 22 (72.7%) alleles, while the nylon profile had all 22 alleles present. The 72-hour sampling period by a third couple returned full profiles (22 of 22 alleles, 100%) for both the cotton and the nylon swabs.

These results provide data that could be used to improve the collection methods used in a sexual assault kit. The improvement of the swabs used in postcoital vaginal sampling could have positive downstream implications when attempting to obtain a DNA profile.

Reference(s)**:**

1. Benschop C., Wiebosch D., Kloosterman A., Sijen T. Post-coital vaginal sampling with nylon flocked swabs improves DNA typing. *J Forensic Sci Int:Gen* 2010;4:115-121.
2. National Institute of Justice. *National best practices for sexual assault kits: A multidisciplinary approach.* 2017. NIJ 250384;15-19.

Sexual Assault Collection, Nylon-Flocked Swabs, Cotton Swabs

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