A32 Probative Value of Male DNA on Underwear Collected From Female Children With Adult Male Caretakers

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After attending this presentation, attendees will appreciate the results of autosomal and Y-STR analysis of the interior and exterior aspects of female children's underwear under normal caretaking situations.

This presentation will impact the forensic science community by examining the probative value of the presence of male DNA from a primary caregiver on children's underwear in the absence of semen.

Y-STR technology in public forensic biology laboratories has allowed for male-specific testing on an increased number of evidentiary items across the United States. Cases submitted for biological examination to the Sedgwick County Regional Forensic Science Center (Wichita, Kansas) by the Exploited and Missing Children's Unit often are candidates for Y-STR typing primarily because the nature of the assault involves very low quantities of male DNA. As child crimes typically are not reported immediately to authorities, secondary items such as clothing and bedding often are submitted for examination in lieu of sexual assault examination kits.

In these situations, when the alleged male suspect cohabitates with the complainant, the probative value of secondary items arguably diminishes because it can be reasonable to expect DNA from the male suspect to be present on those items. This can be true for secondary items that are shared (e.g., bed linens) or unshared (e.g., clothing) between the victim and male suspect. Even when examining underwear from the victim – a typical unshared item with high probative value – it can be reasonable to expect DNA from the male suspect to be present due to DNA transfer during caretaking activities. These activities include folding laundry, commingling of garments prior to or after washing, batched washing and drying of clothing, and general assistance with lavatory use or routine dressing.

The purpose of the present study was to investigate the probative value of male DNA on children's underwear in the absence of semen by examining the quantity and quality of male DNA present on underwear from female children that were exposed to normal caretaking activities or commingled laundry situations, or both. Samples were collected from exterior (tapings) and interior (swabbings) aspects of ten pairs of worn underwear from three female children (ages two to six).

Human DNA was detected on the exterior and interior aspects of all ten pairs of underwear, and autosomal STR testing yielded major contributor profiles that were consistent with each underwear donor. Minor contributions to the autosomal STR profiles were detected in five exterior tapings. Foreign contributions in three of these five samples were minimal, whereas the other two produced foreign contributions that were substantial. Notably, Amelogenin Y was observed as a minor allele in just one exterior sample. For the interior swabbings, only one autosomal allele foreign to the underwear donor was observed in one sample.

Male DNA was detected on the exterior aspects of the underwear in all ten cases, whereas it was detected on the interior crotch linings in just four of the ten cases. Y-STR profiles were obtained from all exterior samples, three of which were single source profiles, and seven were mixtures of two or more individuals. For nine of the ten exterior samples, the father could not be excluded as a contributor to the profile. Y-STR profiles were obtained from just eight of the interior samples, four of which were single source profiles, and four were mixtures of two or more individuals. For seven of the interior samples, the father could not be excluded as a contributor to the profile.

Results of this preliminary study confirm that it can be reasonable to expect male DNA to be present on unshared clothing (underwear) from female children due to DNA transfer during caretaking activities. This can be true even for the interior crotch aspect of the underwear and/or DNA samples with undetectable quantities of male DNA. In conclusion, in the absence of confirmed seminal components, the probative value and/or relevance of male contributors on secondary items should be considered carefully prior to subjecting such items to additional timely and costly Y-STR testing.

Y-S R, Clothing, Trace DNA

 ** Presenting Author*