B14 Secondary or Tertiary Transfer Semen DNA Stains?

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After attending this presentation, attendees will better understand: (1) interpreting DNA evidence; (2) the study of transfer and persistence parameters according to a suspect's declarations; and, (3) the evaluation of potential tertiary transfer.

This presentation will impact the forensic science community by the power of accurately interpreting DNA evidence in solving criminal cases.

In sexual assault cases, semen stains can often be found on bodies and/or clothing. The goal of this presentation is to show how an accurate interpretation of DNA profiles can assist investigators in solving a rape case.

The case involved a young victim (V) and two male assailants (A1 and A2). Two men met a drunken woman in a park and engaged in sexual vaginal activity with her. Some hours later, the woman woke up semi-nude in an unknown apartment and called the police. No washing actions (i.e., a shower) were taken between the incident and the collection of the forensic samples from their bodies.

Both men admitted having only one act of sexual intercourse with the woman in the park (first A1 and then A2), but said she consented to the act. Since the woman fell asleep abruptly and they did not know her address, they decided to drive to their apartment. They had no intention of having other sexual activity with the woman; they only wished to help her.

Genetic analysis generated several DNA profiles. By comparison to the reference profiles of A1, A2, and V, the source of the alleles detected in the evidence samples was established. Due to the rough nature of the incident, the victim was bleeding. Several bloodstains mixed with the assailants' semen were found on their clothing and inside the car.

DNA analysis and blood and semen testing indicated the following: (1) vaginal samples contained mixed DNA profiles from V, A1, and A2 (semen and blood positive results); (2) penis and testicle samples from A1 contained mixed DNA profiles from V, A1, and A2 (semen and blood positive results); (3) penis and testicle samples from A2 contained single DNA profiles from A2 (semen positive results).

Given the mixed DNA profiles detected from A1 and considering the suspects' denial of any homosexual relationship between them, the final forensic report discussed the possibility of a secondary transfer of A2 semen following this schema: A2 penis1 victim vagina1 A1 penis. A1 denied having a second act of sexual intercourse with the victim, which would explain the presence of A2's semen on his penis. Rather, A1 described digitally penetrating the victim's vagina inside the car. After doing this, he probably touched his penis, thereby contaminating it with DNA from A2. This kind of scenario involved a tertiary transfer: A2 penis1 victim vagina1 A1 fingers1 A1 penis.

Therefore, A1's fingernail swabs were analyzed and found to have mixed DNA profiles composed of the victim's blood and his own DNA. A2's DNA was not present. When these genetic findings did not support his tertiary transfer hypothesis, A1 tried to justify once again this absence of evidence by a simple hand washing. Consequently, the attention focused on the persistence of semen under the fingernails after an act of digital penetration. It was known that hand washing could have a significant effect on the persistence of trace evidence (trace DNA, fibers, gunshot residues, etc.), but what about the semen? Early forensic papers studied persistence of DNA from laundered semen stains showing the robustness of this kind of biological fluid. Despite this lack of published research in this area, it was possible to assess the evidentiary value of these findings by considering the DNA concentration in spermatic and hematic fluids. In an equal volume, there is more DNA in semen than blood. Therefore, it is very difficult or impossible that a simple hand washing would eliminate the semen while leaving the blood.

Semen DNA Stains, Interpretation, Indirect Transfer