B61 The Visualization of Seminal Stains on Dark Textiles

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Learning Overview: After attending this presentation, attendees will understand the difficulty with traditional screening processes for human seminal stains on dark textiles and potential approaches for a higher success rate of the visualization of stain patterns

Impact on the Forensic Science Community: This presentation will impact the forensic science community by relaying information about the search and visualization of latent seminal stains on dark textiles. Potential techniques for improving the successful visualization of seminal stains on dark materials will be discussed in this presentation.

Searching latent seminal stains during a crime scene investigation can often be achieved using an Ultraviolet (UV) light or an Alternate Light Source (ALS) with a combination of filters. Followed by a chemical test, a crime scene investigator will collect and preserve the evidence for further analysis. However, false-negative outcomes have been found due to the lack of fluorescent emission from the seminal stains on a dark textile. The crime scene investigators must recognize the potential factors associated with false-negative results.

In this project, known human seminal fluids were deposited on different types of dark textiles. Thirty-eight different types of dark textiles were used, consisting of 100% polyester, various polyester blends with spandex, nylon, cotton, acetate, and wool, 100% cotton, various cotton blends with spandex and polyester, nylon with rayon and lycra mixes, and 100% suede. Twenty-seven were laundered before adding the sample, and 11 were unlaundered and sampled as purchased. Controlled samples were prepared by adding 1–2 drops of semen from a pipette to the center of the fabric. All stains were dried for a week. Several commonly used standard visualization methods were used for the visualization of known seminal stains on dark textiles. The visualization methods were: (1) a UV light, (2 and 3) two types of flashlights (455nm) for excitation with an orange filter for fluorescence observation, and (4) a laser (532nm) for excitation with an orange barrier filter for fluorescence observation. Of the total of 38 control samples, it was found 71% of stains were visible to the naked eye, with 53% (20 samples) showing clear deposit patterns. Using traditional UV imaging with no filter, the percentage of visible stains was 58%. Using an ALS at 455nm coupled with an orange filter, successful visualization of seminal stains ranged from 21%–61%, depending on the excitation light sources. The laser at 532nm with an orange filter had a success visualization rate of 34%. Four fabric samples showed false negatives with all visualization techniques, two of 100% polyester blend, one laundered and one not laundered, one not laundered 95% polyester/5% spandex blend, and one laundered 65% polyester/35% cotton blend.

The next step in the lab is to adopt a hyperspectral imager to improve the success rate for the visualization of seminal stains on dark textiles. The goal is to use multiple wavelengths to negate the background quenching effect that the textile has on the stain. The primary focus will be on polyester and polyester blends, as they were the only samples that all methods resulted in a false negative.

Crime Scene Investigation, Alternate Light Source, Seminal Stains

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