



D27 The Persistence of Forensic Soil Evidence on Denim and Car Seat Covers: Getting the Dirt on a Suspect

*Keisha D. Cook, MS**, 2938 NE 64th Ave, Portland, OR 97213; *Ismail M. Sebetan, MD, PhD**, National University, Forensic Sciences Program, 11255 N Torrey Pines Rd, La Jolla, CA 92037-1011; and *Paul Stein, PhD**, 25757 Bellemore Dr, Ramona, CA 92065

After attending this presentation, attendees will better understand the post-transfer behavior of forensic soil evidence. How forensic soil evidence acts during the transition from primary transfer to secondary and higher transfer will be discussed, as well as how the secondary sample of soil compares to the original sample. How various fabrics, specifically car seat covers, play a role in the post-transfer behavior of soil will be explored. Attendees will also have a better understanding of the difference between primary and secondary transfer. An explanation of why this information could be useful to law enforcement and crime scene investigators will be discussed. Finally, recommendations for forensic and crime scene investigators regarding the collection of forensic soil evidence, to include soil-covered clothing, will be suggested and discussed.

This presentation will impact the forensic science community by providing understanding that both fabric weave and fabric type affects the transfer and post-transfer behavior of soil. This information will be useful to forensic and crime scene investigators. When coupled with all other evidence relevant to the case, it can assist investigators in linking persons involved with the scene of a crime.

A study of the persistence of forensic soil evidence was conducted on a variety of garments and fabrics including car seat covers. Car seat covers and denim pants with different types of fiber composition and fabric weave were used. Dry soil was rapidly lost from cotton pants with a stain-resistant backing, and persisted on cotton denim pants—through walking around and then by driving a vehicle. Soil deposited with a wide range of particle sizes initially persisted through primary transfer onto denim fabric throughout secondary transfer to a car seat. Clean denim was then used to determine the post-transfer behavior of the soil.

In some trials, the secondary and higher transfer soil evidence survived motion and activity and could be examined microscopically, whereas in other trials it could not. The smaller fraction of forensic soil evidence deposits can be detected after secondary and higher transfer has occurred, even well after larger particles have been lost from the first transfer surface. This demonstrated the selective loss of larger grain particles that is often suspected in cases submitted to the crime lab.

One immediate observation made was that some soil deposits are extremely difficult to see, especially on darker colored fabrics. The research showed that both fabric weave and fabric type affects the transfer and post-transfer behavior of forensic soil evidence. The size and texture of the material being transferred may affect the persistence of trace materials, which is linked to the type of surface on which the material is being retained. This research showed that a cotton denim weave was a nice retainer for small and very small soil particles. A significant difference between primary, secondary, and higher transfer of soil was found, when compared to the exemplar sample. It was determined this was due to gravity, along with any subsequent movement made by persons involved at a crime scene. This research showed it was apparent that large soil particles were rapidly lost after the initial transfer from ground to denim. Finally, this information is found to be useful to forensic and crime scene investigators, when coupled with all other evidence relevant to the case, as it can assist investigators in linking persons involved with the scene of a crime and/or with a victim.

Forensic Evidence, Soil Evidence, Soil Particles