A155 The Evaluation of Human Hand Odor Volatiles on Various Fiber Chemistries: A Comparison Between Contact and Non-Contact Sampling Methodologies

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After attending this presentation, attendees will learn the basic concepts of the effect of fiber chemistry and collection protocol on collected hand odor volatiles.

This presentation will impact the forensic community by presenting the development of an optimized collection protocol which helps clarify the instrumental definition of an individual odor sample, and also helps develop a more standardized methodology for law enforcement personnel to implement when acquiring scent evidence in the field.

The use of human scent as a type of forensic evidence for legal proceedings lies in the idea that human odor is a unique physical characteristic of every individual and that this odor is left at every location, object, or path which the subject has come in to contact with. Research in the area has focused on an instrumental definition of what constitutes human odor comparing and contrasting target volatiles emanating from humans from different body regions as well as different collection procedures. Furthermore, human scent discriminating canines have offered a practical application of scent evidence by utilizing it as their target source when tracing the location of a person or suspect of a crime thus indicating possible scent matches.

Law enforcement and laboratory personnel have utilized both contact and non-contact approaches for the efficient collection of human scent samples. To date, however, there is no optimized collection protocol for efficient trapping capabilities of chemical profiles. There are two main possibilities for the efficient collection of human scent samples, a contact and non-contact approach. Contact methods include the direct contact with an absorber medium by the suspect or direct swiping of body regions with a sterile gauze pad and transferring scent from the subject to the collection medium. The non-contact methods of human scent collection include a direct absorption of scent by placing a sterile gauze pad near the subject for an unspecified amount of time or utilizing the Scent Transfer Unit (STU-100) as a collection device. As such, collection procedures have not been fully compared for efficient and optimized results. The newly developed Scent Transfer Unit allows for the ability to perform non-contact scent collection using dynamic airflow from objects or suspects without contaminating or altering the object/target of interest, however, chemical profiles obtained from human subjects has not been evaluated with the device. Furthermore, there is a lack of research as to the most efficient absorber medium utilized in laboratory and field work applications.

The focus of the present study is to evaluate and compare both contact and non-contact human scent collection procedures utilizing an array of different absorber mediums to understand the chemical composition of human hand odor volatiles on various fiber chemistries. The materials evaluated in this study were selected to include a range of both natural and synthetic fiber chemistries from which to optimize the best collection medium for odors from forensic specimens. The studies included an instrumental analysis using headspace solid phase micro- extraction in combination with gas chromatography / mass spectrometry (SPME-GC/MS) for the study of hand odor collected utilizing the Scent Transfer Unit over the palms of the hands of both female and male subjects for a period of 1 minute samplings as well as a parallel study with the varying absorbent materials to evaluate the direct collection of human hand odor samples. A comparison of the profiles obtained in the contact method vs. non-contact approach was conducted in order to establish the reproducibility and similarity of both chemical profiles from the individuals evaluated. The contact approach consisted of a hand odor sample procedure in which subjects were asked to hold the materials between the palms of their hands instead of a close proximity. Ongoing research has shown that fiber chemistries such as cotton yield higher mass amounts of collected scent than non-polar fiber backbones such as polyester; thereby showing differences in chemical profiles depending on the collection fiber chemistry.

The development of an optimized collection protocol helps clarify the instrumental definition of an individual odor sample, and also helps develop a more standardized methodology for law enforcement personnel to implement when acquiring scent evidence in the field. Both sampling methods were used on the same individuals thereby providing the scientific community with laboratory data exhibiting the usefulness or disadvantages of implementing each method as well as an informed selection of absorber mediums for enhanced scent profiling.

Scent Transfer Unit (STU-100), Absorber Medium, Contact and Non- Contact Methods

 ** Presenting Author*