## A206 An Evaluation of Volatile Organic Compounds From Biological Specimens Over Time

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After attending this presentation, attendees can expect to have a better understanding of the chemical composition of biological specimens and the persistence of these compounds over time. In turn, the viewer will become better acquainted with human scent and its role in the forensic science arena.

This presentation will impact the forensic science community by providing the essential scientific foundation that is required for the use of human scent evidence in the court of law.

The concept that every individual has an odor that is specific to him/her has lead to the utilization of human scent as a novel method of identification. Human scent is defined as the most abundant, identifiable volatile organic compounds (VOCs) in the headspace of a collected scent sample. Continuous research into human scent identification has explored the various types of VOCs that can be found in collected body odor as well as determine if these chemical profiles will allow for the individualization of people within a population. Recently, human scent has been employed with human scent discriminating canines. In function, this works by presenting a canine with odor that has been collected from a person of interest (traditionally from the palms of the hands) and in turn the canine will begin to trail the odor path if that corresponding odor is in the area.

Using human scent as evidence in criminal investigations has demanded that further research be conducted to ensure that it can hold up to legal scrutiny. Within the United States, a newly developed investigative technique can only be admissible into a court of law if it satisfies the *Frye* or *Daubert* standard (depending upon the state) which is put into place to evaluate the validity of the technique. Thus, for the continued use of human scent in forensic work it is imperative that many crucial concepts are explored and that there is a foundation of scientific research supporting it. Important assessments need to be made regarding human odor, such as the best location/bodily specimen to detect human odor from and is human odor consistent over time. The purpose of this study was to monitor the volatile organic compounds that are detected in the headspace of various biological specimens (such as hand odor, head hair, fingernail clippings, and saliva) for a period of six months and to evaluate the consistency in which these VOCs appear over time.

The importance of this investigation was to gauge whether the primary odor remains consistent over time for hair, fingernails, and saliva in addition to hand odor, in such that the influences from secondary and tertiary odor sources did not significantly alter the chemical profile being detected. For this study, biological specimens were collected from both male and female subjects once a month for six months. The volatile organic compounds found in the headspace of these samples were extracted utilizing the solvent-free technique of solid-phase microextraction (SPME) and VOC detection was performed using gas chromatography-mass spectrometry (GC/MS). The results from the month-to-month collection of biological specimens from each of the subjects will include: intra-subject comparison of chemical profiles collected monthly and inter- & intra-subject trends will also be noted. Briefly, the outcome of these experiments revealed that saliva possessed the most distinguishable chemical composition of all the specimens with a large number of compounds being acidic, which were unlike hand odor, hair and fingernails. The three remaining biological specimen types had many compounds in common with functional groups ranging from alcohols, aldehydes and hydrocarbons. However, when using a multivariate statistical evaluation (i.e., Principal Component Analysis and cluster analysis) it appears that chemical compounds detected in hair and fingernails are the most similar and form very tight groupings.

**Human Scent, Biological Specimens, Solid-Phase Microextraction (SPME)**

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