



A17 Advances in the Forensic Use of Human Scent

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After attending this presentation, attendees will increase their understanding of the sample collection procedures and analytical methods used to evaluate human scent from different biological specimens.

This presentation will impact the forensic science community by providing an overview of several recent research studies that have examined human scent, demonstrating its importance and application for the criminal justice system.

In 2010, Joshua Wade was sentenced to life in prison for the 2007 carjacking and murder of his neighbor Mindy Schloss. Human scent evidence played a crucial role in the resolution of this case after FBI-trained canines were able to identify both the victim's and Wade's scent on different items, as well as follow scent trails linking several locations and pieces of evidence to Wade. In *California vs. Benigo Salcido*, challenges arose regarding canine evaluations of human scent, such as the durability of human scent, the ability of canines to discriminate accurately between scents, and the use of human scent to distinguish different individuals.¹ The courts found that human scent discrimination by a canine can be admitted into court as evidence whenever the training and experience of both the dog and the handler prove to be proficient, the handler's methods prove to be reliable, and the person performing the sample collection technique uses the correct scientific procedures. These court cases have highlighted the significance of human scent within the criminal justice system and in forensic investigations.

This presentation will summarize and discuss human scent research and its ability to be used as a form of associative evidence in forensic investigations. Presently, human scent-discriminating canines are often employed to discriminate individuals, crime scenes, and objects. This practice is based upon the theory that every individual possesses a distinct odor that is generated from a complex combination of the body's metabolism, gland secretions, hormonal control, and interactions with the residing bacterial populations.² Human scent is comprised of secretions and bacterial action that occurs on dead skin cells, commonly referred to as "rafts", which can easily be deposited into the environment allowing canines the opportunity to pick up a person's scent.³ To obtain an understanding of what canines smell, human scent has been studied in the laboratory using a variety of specimens. A large portion of research has been conducted on hand odor since there is a high likelihood that a suspect's hands will come into contact with an object while committing a crime. Hand odor can be collected through two different methods: (1) direct contact of the collection material and the object/person; and, (2) non-contact sampling using a portable vacuum source that is designed to draw in volatile organic compounds (VOCs) from the object/person. Upon collection, scent samples are analyzed using solid-phase microextraction gas chromatography-mass spectrometry (SPME-GC-MS) and statistically evaluated to determine the distinguishability of the scent profiles obtained from different individuals.

Human scent research has advanced over the years to include other biological specimens of forensic interest, such as hair, nails, and saliva. Brown and Furton found that hair, nails, and saliva possessed VOCs that differed between specimens and between people, allowing for the discrimination of individuals. This was further evaluated using human scent-discriminating canines.⁴ Field tests revealed these specially trained canines had the ability to discriminate an individual independent of the specimen being assessed.⁵ In another study conducted by DeGreeff *et al.* in 2011, human scent profiles of living individuals were compared to those that were deceased.⁶ It was found that human scent profiles of living subjects differed from one individual to the next; however, upon death, the scent profiles appeared similar from one person to the next, revealing a more general odor for deceased individuals. This presentation will highlight and explore the advances in human scent research, which demonstrates its significance, versatility, and application in forensic investigations and within the criminal justice system.

References:

1. People of the State of California vs. Benigno Salcido: Hearing on GA052057 Before the Los Angeles Superior Court on 115 Cal. App. 4th 379 (2005).
2. Kusano M, Mendez E, Furton KG. Development of headspace SPME method for analysis of volatile organic compounds present in human biological specimens. *Analytical and Bioanalytical Chemistry* 2011; 400(7): 1817-26.
3. Curran AM, Prada PA, Furton KG. The Differentiation of the Volatile Organic Signatures of Individuals through SPME-GCMS of Characteristic Human Scent Compounds. *Journal of Forensic Sciences* 2010; 55(1): 50-57.
4. Brown JS, Furton KG. Exploring human scent with instruments and canines (Oral Presentation). The 88th Florida Annual Meeting and Exposition; May 2012; Innisbrook, FL.
5. Brown JS. Determination of Signature Volatile Odor Chemicals Emanating from Novel Biological Specimens by Non-invasive Analytical Techniques for the Potential Use in Forensic Identifications. Ph.D. dissertation, Florida International University, 2012.
6. DeGreeff LE, Furton KG. Collection and identification of human remains volatiles by non-contact, dynamic airflow sampling and SPME-GC-MS using various sorbent materials. *Anal Bioanal Chem* 2011; 401: 1295-1307

Human Scent, VOCs, Canines