B112 Variables Influencing the Ease With Which Canines Match Hand Odor Samples From Individuals

Davia T. Hudson, BSc, Florida International University, 11200 South West 8th Street, Department of Chemistry, CP345, Miami, FL 33199; Adee A. Schoon, PhD, University of Leiden, Behavioural Biology Group, PO Box 9516, 2300 RA, AE , NETHERLANDS; and Kenneth G. Furton, PhD, International Forensic Research Institute, Florida International University, University Park, Miami, FL 33199*

After attending this presentation, attendees will better understand the influences of human and non-human components present in hand odor samples on alerts produced by human scent identification canines.

This presentation will impact the forensic community by providing a better understanding of factors that influence alerts produced by human scent identification canines which will aid in increased successful legal challenges for the use of human scent and biological detectors in courts of law.

The human skin which is the body's largest organ is comprised of three layers; the epidermis which is the topmost layer, the dermis which is the middle layer and the subcutaneous layer which is the innermost layer. Dead skin cells known as rafts are constantly shed from the stratum corneum of the skin's epidermis and it is believed that bacterial action on these skin rafts in combination with genetic differences, diet and glandular secretions of the skin greatly influences the odor that is produced by an individual. Upon contact with objects, individuals deposit varying amounts of skin rafts which make it possible for a scent sample to be collected. Collected human scent evidence is of importance to law enforcement as this form of trace evidence can be evaluated through the use of specially trained canines to determine an association between evidence and a suspect.

Canines possess a very sensitive olfactory system and thus are able to detect odors at low concentrations. Even though it has been shown that they have the ability to detect and discriminate persons based on their odor, the basis on which the dogs are producing an alert to human scent is not yet fully understood. Of all five senses, olfaction is the most complex molecular mechanism, as it comprises hundreds of receptor proteins enabling it to detect and discriminate thousands of odorants.

Studies have shown that a single odorant can activate multiple olfactory receptors and multiple odorants can activate a single olfactory receptor. This observation has resulted in olfaction being perceived as a combinatorial effect.

Canine field trials conducted by the Netherlands National Police have shown that specially trained human scent identification canines alert differently to persons. Based on the alerts produced by the canines, the individuals were categorized into two groups; persons easily identified by canines and persons difficult to be identified by canines. This paper will investigate the influences of skin rafts, human skin micro flora and VOCs present in hand odor samples on a canine's ability to differentiate scent samples. Analyses were conducted on hand odor samples collected on pre-cleaned cotton absorbers. The identification and quantification of the VOCs present in the headspace of the collected hand odor samples were obtained using SPME-GC/MS while real time polymerase chain reaction (PCR) was used for the quantitative and qualitative analysis of the human and non-human components of the hand odor samples.

Preliminary results showed no correlation between the amount of human DNA and non-human DNA from hand odor samples deposited on the cotton swabs and the persons who are easy and difficult for the canines to identify. Initial results also demonstrate some variability in the identity of human skin micro flora components which may contribute to the volatile organic compound (VOC) patterns observed. The ratios and combinations of VOCs in hand odor samples of individuals were sufficiently different to enable discrimination of persons statistically using Spearman's Rank Correlation Coefficient and 3-Dimensional Covariance Mapping. It was also determined that recurring VOCs were similar within the easy and the difficult group but different between these groups. Additional analyses are being conducted to better understand the influences of the various parameters being studied on ease of canine alerts.

Human Scent, Volatile Organic Compounds (VOCs), Skin Rafts

 ** Presenting Author*