D62 Differentiation of Human Subjects Based on Scent Profile

Sarah J. Milam, MS, Oak Ridge Institute for Science and Education-Visiting Scientist Program, Federal Bureau of Investigation Laboratory, 2501 Investigation Parkway, Quantico, VA 22135; Douglas Beussman, PhD, St. Olaf College, 1520 St. Olaf Avenue, Northfield, MN 55057; Blake Rushing, Oak Ridge Institute for Science and Education-Visiting Scientist Program, Federal Bureau of Investigation Laboratory, 2501 Investigation Parkway, Quantico, VA 22135; Rex Stockham, MS, Federal Bureau of Investigation Laboratory, Evidence Response Team Unit, Quantico, VA 22135; and Brian Eckenrode, PhD, and Christopher Tipple, PhD, Federal Bureau of Investigation Laboratory, 2501 Investigation Parkway, Quantico, VA 22135*

After attending this presentation, attendees will gain knowledge of the research being performed to provide scientific support to the use of canines in scent discrimination, suspect trailing, and missing person searches. The areas specifically addressed by this research include method development, headspace analysis of human scent samples, and differentiation between individuals based on those scent profiles.

This presentation will impact the forensic science community by educating the public about the current status and challenges of forensic canine use in investigations. This research will provide a scientific foundation for canine validity and unbiased analysis of scent profiles that will bolster the acceptance and legitimacy of canines in both the field and in court.

Canines have been used for decades to identify individuals based upon their unique scent profile. Most commonly this involves either trailing a suspect in a crime or searching for a missing person. Although the exact mechanism by which a canine is able to identify an individual from among a group is not clearly understood, it is clear that canines are able to perform that task. However, such feats are still heavily scrutinized because there is an apparent lack of scientific evidence that supports them. In recent years, there have been several studies published aimed at identifying the essence of human scent in order to provide some of the necessary scientific evidence to support canine responses. These studies have used relatively small subject pools, strict washing procedures, and inherently selective sampling methods such as solid phase micro-extraction (SPME).

In criminal cases where canines may be used, suspects and victims will not undergo procedures to "standardize" their scent profile for the dogs, so the dogs must use these complex scent profiles to identify their target. To mimic these real-life situations, human subjects for this study were not required to perform any specific washing or cleansing procedures, but instead were asked to maintain their normal routines. The lotions, soaps, and other products that each person uses contribute to his or her volatile profile and can be used to help analytically differentiate between individuals.

A large subject group, at least several hundred, will be asked to sample their own forearms by using gauze pads in a procedure similar to those used by law enforcement canine handlers. In this study, a headspace sampling protocol will be used in an effort to eliminate the selectivity of previous methods and provide a more complete picture of human volatile emissions. These gauze pads will be sampled with a cryogenic pre-concentrator and analyzed via gas chromatography with mass spectrometry detection (GC/MS). The resulting scent profiles will be analyzed and compared to one another to determine if they can be used to differentiate between individuals or groups of individuals. Ethnicity, gender, and age will be considered in comparisons, and significant differences between groups will be explored. Ultimately, if analytical differentiation is possible, this research will provide a means for canine handlers to sample scented items given to dogs as well as sample individuals or items located or identified as the result of a canine search. These samples could be sent to a laboratory for analysis and comparison and the data could be used to support canine responses. If "markers" for groups of individuals can be identified, this information could also be used to provide investigative leads by narrowing down a field of suspects or helping to tie an item to a specific victim.

Human Scent, Individualization, Canine

 ** Presenting Author*