B21 The Development of the Human Scent Collection for the Minimization of Environmental Contamination During Non-Contact Human Scent Sampling

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The goal of this presentation is to educate people on possible methods to alleviating conditions leading to environmental contamination during non-contact human scent sampling.

This presentation will impact the forensic community by increasing knowledge on alleviating conditions leading to environmental contamination during non-contact human scent sampling.

The study of human scent has been of interest to the forensic science community due to its application to human scent canines for the use of scent trailing and scent identification line-ups. Human scent is defined as volatile compounds originating from the body and is constant over time and environmental conditions. These compounds make up the "primary odor" of a human, and are of interest to this study. Any volatiles emitted from the body that are not consistent over time and are due to diet or environmental factors make up "secondary odor," also "tertiary odor" is due to compounds applied to the body such as soaps, lotions or perfumes. Improving the scientific understanding of human scent components, as well as, improving the collection and delivery of such components will enhance the admissibility of such evidence in the courts.

Human scent can be collected by direct contact sampling, or by non-contact sampling with devices such as the STU-100. With direct contact sampling the subject holds a piece of material or object in the hands or against the body for a period of time. Odor is collected directly onto such object. The Scent Transfer Unit™ or STU-100 is currently used by law enforcement for the non-contact sampling of human scent volatiles. With this device a scent pad, usually a piece of gauze is placed at the head of the device. The device is placed near the object of interest. Air is pulled through the device, extracting volatiles from the object onto the scent pad to be collected. For the purposes of this study, following collection, the scent pads are placed into vials and allowed to equilibrate. The headspace is analyzed using SPME/GC/MS.

A significant obstacle in the collection of human scent is environmental contamination from people or other sources distinct from the subject. Environmental contaminators hinder the reproducibility of the delivery of human scent compounds. These are particularly substantial problems with non-contact sampling. Studies have shown when blank scent pads devoid of a human scent profile are sampled with the STU-100 and analyzed with SPME/GC/MS, there is high contamination of compounds found in human scent on the pads.

In order to lessen these problems, a human scent collection chamber has been designed, which uses a positive air flow filtration system, filtering particles and reducing odorant compounds. An enclosure large enough to sample a single human was built. A metal cover attached and sealed securely to the top of the chamber, while the other walls of the chamber allow small amounts of air to pass. A section of the metal cover was removed and replaced with a grating. A filter was placed over the grating and a fan over this. When the fan is turned on, air from the surroundings passes through the filter and into the chamber, removing particles greater than one micron in size. As the clean air enters the chamber, the contaminated air is forced out, thus minimizing environmental contaminants and creating an environment for the reproducible delivery of human scent components.

Another obstacle in human scent research studies is the lack of available calibration standards. Experiments were conducted using liquid mixtures of the various human scent chemicals as a calibration sample but using STU-100 and SPME-GC/MS headspace sampling revealed that this approach is not reliable with large variations in the amounts and ratios of components. By optimization of polymer type and thickness we have been able to develop an array of controlled odor mimic permeation systems (COMPs) capable of providing reliable amounts of the calibration compounds.

Human Scent, Scent Transfer Unit, Environmental Contamination

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