A203 Evaluation of the Operational Parameters of a Non-Contact Airflow Dynamic Device for Collection of Scent Trace Evidence

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After attending this presentation, attendees will understand some of the main issues to be considered when using non-contact airflow dynamic systems for collection of scent trace evidence, as well as the scientific validation of the human scent collection system as a tool for non-contact sampling purposes.

This presentation will impact the forensic science community by providing a scientific approach to the instrumental evaluation of a novel non-contact scent collection device such as the Human Scent Collection System (HSCS) for trapping capabilities from target biological specimens.

The use of canines as evidence for judicial procedures in the United States dates back to the 19th century. Canine evidence was traditionally admitted in court as long as there was enough information as to the training, breeding, and handler experience with the case at hand. Toward the end of the 1800s, it was accepted that bloodhound trailing evidence could provide an association between the defendant and the crime of which he was accused. Centuries later the debate toward this type of evidence in court systems in the United States continues and is often challenged due to collection procedures and the scientific validation of

the definition of human scent via instrumental approaches. Field scent collection methodologies have entailed the use of direct and non-direct procedures to obtain scent pads from the scene and/or suspect in a particular criminal investigation. The use of non-direct methods, however, have emerged as the preferred choice for law enforcement personnel as it reduces contamination, eliminates the potential for destruction of other forms of trace evidence, and allows for a larger number of scent samples to be collected from a single target of interest. The already accepted Scent Transfer Unit (STU-100) provided a novel approach in non-contact scent collection procedures. The Scent Transfer Unit is currently the accepted method for the forensic collection of human scent evidence in the United States. It must be noted, however, that due to some drawbacks when operating the STU-100 in an instrumental setting, it has been shown that there is no reproducibility of the collected scent samples when utilizing the STU device. Therefore, in an effort to correct and improve some basic operation settings such as airflow and sampling times, a new non-contact device such as the human scent collection system (HSCS) was developed. This new device could potentially fix encountered instrumental challenges and provide a more efficient field-working device. Thus, the focus of the presented study was geared at a non-contact device performance comparison, evaluating both the STU-100 and the newly developed human scent collection system for the collection of volatiles in an instrumental setting.

The goals and significance of the present study were to validate the use of the Human Scent Collection System (HSCS) as a forensic tool for the collection of volatile organic compounds from various biological specimens. Through this evaluation, the operational conditions were monitored for the sampling of hand odor and buccal swabs as well as a standard mixture containing VOCs present in human scent using solid phase microextraction-gas chromatography/mass spectrometry (SPME- GC/MS) as the instrumental technique. Important operational parameters included airflow speed and collection sampling time with each biological specimen. By using a standard mixture of previously reported human scent compounds as well as actual individuals, the three distinct airflow settings of the device (low, medium, and high) were monitored as well as the duration of sampling by running the device at the two time settings, 30 seconds and 60 seconds, respectively. The collection of hand odor and buccal swab samples was conducted at indoor laboratory conditions from both female and male subjects to compare specimen and gender differences. Factors such as the number and amount of VOCs collected from a sample and reproducibility within consecutive samples taken were closely evaluated to monitor the efficiency of the device for sample collection and consequent instrumental analysis as measured by the obtained chemical profile.

The instrumental validation of the HSCS as a collection tool from possible scent evidence sources such as different biological specimens can improve and further validate the use of this trace evidence collection device and help establish the scientific foundation of canine work within the criminal justice system as it relates to scent evidence as a form of evidentiary tool.

Human Scent Collection System (HSCS), Scent Transfer Unit (STU-100), Non-Contact Methods