



### **B8 Determining Individual Hand Odor Profiles Through Non-Contact Scent Collection Methodologies**

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After attending this presentation, attendees will understand some principles of the collection procedures for human scent sampling as well as some preliminary results of the chemical composition of hand odor samples collected via a non-contact methodology.

This presentation will impact the forensic community by serving as a key aspect for the improvement of human scent identification protocols in the United States and the use of this form of trace evidence in courts of law across the nation.

Body odors are of particular importance and provide information about individual identity in scent evidence collection protocols. Of specific interest to the forensic community is the instrumental determination of hand odor composition which may be present in crime scene areas and objects utilized during the execution of criminal acts. The idea that human odor is an individual characteristic which may be used as evidence in a court of law either incriminating or exonerating a suspect brings a number of aspects and challenges in employing this form of evidence which include not only the effective use of canines in scent identification procedures, but more importantly a scientific validation of the underlying principles of the chemical elucidation of individual odor profiles obtained through instrumental analysis methods.

The collection of human scent evidence plays an important role in the effectiveness of scent discriminating canine teams and the law enforcement community which utilize this form of evidence in criminal investigations. As such, collection procedures in the United States have employed a non-contact collection approach through the use of a device called the Scent Transfer Unit (STU-100). The Scent Transfer Unit allows for the ability to perform non-contact scent collection using dynamic airflow from objects or suspects without contaminating or altering the object/target of interest. This device is a portable vacuum designed to draw air through sterile gauze pads and is currently being used by law enforcement agencies as well as the Federal Bureau of Investigation. To date there has been limited scientific validation on the reliability of this device. The only evaluation to date has determined the ability of the STU-100 to trap and release organic compounds at ambient temperatures in controlled laboratory conditions.

An instrumental analysis using headspace solid phase micro-extraction in combination with gas chromatography / mass spectrometry (SPME-GC/MS) has been evaluated for the study of hand odor collected utilizing the Scent Transfer Unit over the palms of the hands of both female and male subjects for a period of 1 minute samplings with varying collection materials and airflow sampling speeds. The collection process consisted of washing the hands and forearms using a fragrance-free soap, air drying, rubbing the hands over the forearms, and then clasping the palms of the hands together for 10 minutes. Consequently, subjects were asked to open their hands under the Scent Transfer Unit for a period of 1 minute to perform a non-contact sample collection as formulated to mirror the Federal Bureau of Investigation's Standard Operating Procedure for the collection of human scent evidence. These samples were allowed to sit for 24 hours, and then analyzed for a period of 21 hours using a divinylbenzene/carboxen on polydimethylsiloxane SPME fiber prior to GC/MS analysis.

The evaluation of the collected hand odor profiles utilizing the Scent Transfer Unit allows for a scientific approach to analyze and understand the composition of what is being collected in the scent pads which are presented to the canines in practical field work. The understanding of the chemicals present in various fiber chemistry collection mediums as well as varying sampling speeds allows for the interpretation of the individual odor theory and portrays the differences and/or similarities of the volatile organic compound patterns portrayed in each sampling across the individuals tested.

This study demonstrates the usefulness of the Scent Transfer Unit as a scent evidence collection medium which can be used by the forensic community for an optimized collection protocol which may help standardize human scent as a form of trace evidence. Since the actual scent detected by the canine cannot be readily studied, this analysis can provide some indication as to what these biological detectors are finding when brought upon a collected scent sample thus improving the performance and scientific validity of canine teams used across the United States for human scent discrimination purposes.

**Human Scent Evidence, Scent Transfer Unit (STU-100), Individual Odor Profile**