E85   A Non-Contact Passive Approach for the Effective Collection of Target Cadaveric Volatile Organic Compounds (VOCs) for Canine Training Aid Development

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The use of authentic biological material from a human corpse for canine training is illegal in several countries. Moreover, in the countries where the use of human remains is legal, the limited availability of these materials for practice may affect the reliable training of canine teams. After attending this presentation, attendees will better understand of how the development of a training aid suitable for daily operations is useful in providing safe and effective human cadaveric remains detection training for enhanced detection capabilities. This study presents a non-contact passive approach for the collection of target VOCs emanating from human biologic cadaveric materials to be used as useful canine training aids.

This presentation will impact the forensic science community by demonstrating that the creation of training aids using a static non-contact passive collection method could be used to capture all VOCs of biological material from human corpses onto adsorbent material and, in turn, be used for excellent canine detection training in all countries where the use of authentic human cadaveric samples for dog training is prohibited.

In recent years, many studies on the odor signature of canine detection of human remains and blood traces have determined that reliably trained detection dogs do not alert to generic scent; rather, they alert to cadaveric decomposing human tissues traces, maximizing the location of human remains that were deliberately buried to escape detection in an efficient, cost- and time-effective manner.

The investigative, scientific, and medical evaluation of the crime scene requires a relatively short response time to avoid contamination and, therefore, a well-trained dog allows very large areas of research to be covered more quickly, preserving any and all possible evidence, and can assist in locating clandestine burials and human remains deposited or scattered on the surface.

Many studies determined that the compounds of human decomposition are similar to those of pigs; but a dog trained on pigs is simply a dog trained to find dead pigs. Studies also suggest that only a few VOCs, evolved from a biological specimen of human decomposition, can stimulate canine olfactive alerts in every cross-matching condition.

This research was performed based on previously identified human cadaveric VOCs, such as dimethyl disulfide, carbon disulfide, heptanal, nonanal, ethanol, and acetaldehyde. This study was performed using pieces of organs (skin, muscle, fat, brain, heart, lung, spleen, liver, and kidney) from four traffic-accident fatalities (two men and two women, excluding cases of intoxication). The samples were stored in separate 18 ounce glass jars. The glass jars were covered by a film with holes in it, above which were arranged several VOC-free 5″x5″ cotton gauze pads. The jars were then closed by a film cover and maintained at room temperature. The gauze pads were placed approximately ten inches above the samples and later used in part for the chemical analysis and in part for dog training procedures.

Gas Chromatography/Mass Spectrometry (GC/MS) was used to detect the VOCs released from biological specimens of human decomposition and from gauze pads. The headspace extractions were repeated every 15 days in time intervals ranging from 0 to 120 days for each glass jar. The National Institute of Standards and Technology (NIST) mass spectral library and extracted ion chromatograms were used to identify the compounds.

The results demonstrated that collection of human cadaveric VOC's is the same for authentic human cadaveric samples and for "exposed to samples" gauze pads, at each analysis time. At the same time, the gauze pads were used, in many field trials, to test the canine's ability to detect and alert the VOCs released from human cadaveric bodies onto gauze pads via a non-contact passive method. Other field trials were performed to test the canine's ability to detect and alert the VOCs release from authentic human cadaveric samples. For both rows of testing, the dogs demonstrated an excellent sensitivity, with recovery rates ranging between 99.72% and 100%.

K-9 Cadaver Searches, Non-Contact Passive Collection, Volatile Organic Compounds

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