B60 Illicit Substance Volatile Organic Compounds (VOCs) Analysis for Canine Detection

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After attending this presentation, attendees will have a better understanding of an optimized analytical approach for the determination of the Volatile Organic Compounds' (VOCs') profile of a frequently trafficked illicit substance. The development of such a method will aid in improving the quality of information currently being used for canine training purposes.

This presentation will impact the forensic science community by providing a detailed overview of potential compounds that might serve as key constituents in the development of training aids. The development will likely ensure an improvement on the capability of detection of one of the most popular illicit substances by providing a reliable, cost-effective, and non-hazardous system.

Law enforcement agencies have put forth great effort toward stopping drug trafficking. Regardless, the trafficking and use of illicit substances continues to be a national problem. Marijuana is the most widely available and commonly abused illicit drug in the United States. According to the 2013 National Drug Threat Survey (NDTS), 88.2% of responding agencies reported that marijuana availability was high in their jurisdictions.1 Therefore, the detection of this substance, especially during transportation and storage, is of importance. The current state of the art in concealed contraband detection is the use of a canine. To maintain the operational readiness and reliability of these canines, routine training using training aids must be conducted. Though some law enforcement agencies have been able to satisfy the strict guidelines set forth by the Drug Enforcement Administration (DEA), most agencies are unable to satisfy these requirements and therefore have restricted access to narcotic training aids. This has limited the ability of many canine handlers to perform routine training resulting in shortcomings in a canine team's performance. To alleviate this problem, many canine teams have resorted to the use of odor mimics as a substitute for the use of actual narcotics.

Detector canine teams are trained to detect most commonly found illicit substances. The premise for the detection of illicit narcotic substances is based upon the fact that these substances, though hidden, will emit VOCs. These VOCs are not often the parent drug; they are essentially a chemical associated with the source and provide a reliable indication of the illicit substance. Ongoing research has identified dominant active odor signatures of other major drugs such as cocaine, 3,4-Methylenedioxy-Methamphetamine (MDMA), and methamphetamine, to include methyl benzoate, 3 piperonal, and benzaldehyde, respectively, and effective odor mimics have been created using the identified active odor chemicals.[2-4] Currently, limited information about the volatile components for other popular illicit substances can be found.

The purpose of this study is to identify the odor profile of marijuana for canine detection. For this purpose, headspace analysis of the illicit substance from different batches of marijuana was conducted by Solid-Phase Microextraction-Gas Chromatography/Mass Spectrometry (SPME-GC/MS) for the identification and comparison of similarities and dissimilarities of VOCs present in the each sample. The laboratory's current research has revealed terpene compounds such as caryophyllene, pinene, myrcene, and limonene as common VOCs found in the headspace of the illicit marijuana samples tested. Preliminary canine field tests using isolated samples of these VOCs with certified law enforcement canines have resulted in changes in behavior by canines toward some of these VOCs. Upon completion of this field test, the VOCs that were suspected to produce an alert were combined and again presented to certified canine teams to develop reliable odor mimics for field calibration of detection canines to marijuana. The results of the developed canine odor mimics and their efficacy will be presented as this will result in an overall improvement in seizure rates of these substances by canines.

References:

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