A165 MDMA Synthesis Affecting Canine Detection

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The goal of this presentation is to compare samples of 3,4- methylenedioxy-N-methylamphetamine (MDMA) pills to determine what differences exist in the chemical make - up and headspace odor, and if the differences affect detectability by trained law enforcement detector canine teams.

This presentation will impact the forensic community by demonstrating how seemingly unrelated MDMA samples possess similarities that are detectable by biologic and instrumental means.

The use of the illicit drug MDMA (also referred to as Ecstasy and X) has increased in recent years among adolescents and late-night partiers (i.e., "Ravers"). MDMA was first developed in Germany in 1914 as a precursor for other drugs. Abuse in the United States is believed to have begun sometime in the 1960's on the west coast, and while it is traditionally taken in pill form, the drug is also available in powder and liquid form. There are a plethora of published processes for the chemical synthesis for MDMA most of which begin with a methylenedioxy compound. The most common of these compounds include safrole, isosafrole or piperonal, all of which are commercially available. It is widely agreed that MDMA causes a reduction in serotonin levels, but there is not agreement as to the severity of the effect. As a result of increased interest and usage, the distribution of this drug has increased in metropolitan and suburban areas across the country. MDMA is one of the top controlled substances most identified in crime labs, and it is the most recent drug to be added to law enforcement detection canine training regimens.

Despite the increasing number of instrumental methods for detection of characteristic chemical odors, the use of trained canines as biological detectors remains one of the most widely accepted methods to reliably detect drugs. Therefore, detector-dog response is one of the major applications involved with odor detection studies; both for the determination of the chemical signature of individual odors to which these canines are actually alerting, and to whether or not there is a common element within different items to support the use of contraband mimics. Previous studies have shown that law enforcement detection canines which are trained on real, representative samples containing actual parent compounds of drugs and explosives can and will alert to mimics based upon the dominant volatile odor compounds (VOC) found in the headspace of the parent compounds. Previously, piperonal has been shown to be one of the dominant odor compounds in the headspace of samples of MDMA, as well as a key odor to which MDMA trained law enforcement detector canines will alert.

Chemical analysis of MDMA solutions were performed using GC- MS and LC-MS/MS in both negative and positive modes, allowing for a full spectrum of detection. Solutions were prepared by grinding MDMA tablets and dissolving them in solvent. Headspace analysis was performed using SPME-GC-MS to identify the dominant odor compounds that are present in the samples. Upon analysis, a direct comparison was made to show how several compounds [such as 3,4- methylenedioxyphenylacetone and 1-(3,4-methylenedioxyphenyl)-2- propanol] are common among many samples of MDMA regardless of starting compound or synthesis procedure. In addition, differences that were found, such as levels of the various methylenedioxy starting compounds, can be shown to affect the overall outcome of detection alluding to the need of additional training aid odor identification and development.

MDMA, Canine Detection, SPME

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