B20 Canine Detection Using a Calibration Standard and an Optimized Explosive Training Aid System

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The goal of this presentation is to educate on the use of contraband mimics for biological and instrumental detector training and calibration.

This presentation will impact the forensic community by fostering an understanding of how contraband mimics can aid in the training and testing of biological and instrumental detectors.

Odor detection has become a focused area of research over the past number years because of its importance to the forensic, law enforcement, and legal communities. Despite the increasing number of instrumental methods for detection of these characteristic chemical odors, the use of trained canines as biological detectors remains one of the most widely accepted methods to reliably detect explosives, drugs, arson, cadavers, mold, and human scent. 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. A comprehensive review of commercially available explosives has revealed and large redundancy between many different trade names and manufactures and a table of recommended explosives based maximum coverage and highest purity has been constructed.

It has been previously shown that law enforcement detection canines that 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. Laboratory and field studies of explosive canines have shown that the dogs do not alert directly to TNT based explosives (such as military dynamite), smokeless powders (SP), or plasticized explosives (such as C-4) but rather to 2,4-dinitrotoluene (TNT and SP) and 2-ethyl-1-hexanol, respectively. This shows the potential for alternative training methods/aids to be used in place of dangerous and restricted high and low explosives. This study explores the potential for the use of a selection of high and low explosive training aid mimics incorporated into Controlled Odor Mimic Permeation Systems (COMPS) as training aid substitutes for explosives detection. COMPS devices were created with each compound using the optimum odor permeation rate found through careful dissipation rate studies. Evaluation of the dissipation rate of the compounds from the COMPS devices is used as a determining factor for the longevity of the COMPS method. Canine training was performed using a kit of six training aids found to be optimal for a wide variety of explosive compounds (TNT based, plasticized, smokeless powders, etc.).

Double blind field trials were performed with local K-9 trainers and their canines to determine if the canines were able to find the aid to which they had been trained upon as well as the corresponding actual explosive. The canines used in this study were previously unexposed to any form of explosive, explosive pseudo, or explosive mimic. The analysis of field results obtained using these canine teams will be presented to demonstrate the reliability and efficacy of the alternate compounds as training aids. In addition, this study explores the use of non-target volatile chemicals as possible calibration standards for canines that can be used to determine the ability and reliability for detection as well as for field calibration of instruments. The benefit of these non-target chemicals is that they are unlikely to be found in the field during training scenarios as well as in working conditions and can be used to provide a universal comparison of biological and instrumental detectors. Overall, the results demonstrate that canine detection of high and low explosives can be accomplished using non hazardous training aids by the optimal selection of odor compounds combined with selected COMPS. In addition, COMPS for drugs including MDMA have been successfully developed and will be discussed.

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