E30 The Current State of Homemade Explosive Detection by Canines—Research and Knowledge Gaps

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Learning Overview: After attending this presentation, attendees will have learned of the changing trends in explosive threats and how this pertains to canine detection.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing attendees with an understanding of where there are knowledge gaps in regard to canine detection of explosives, why these gaps exist, and how they may be filled.

The gold standard of non-contact explosives detection in real-time is canine detection. Canines are sensitive and selective detectors that can easily be trained to locate novel materials. However, there is often little research to support canine training and deployment. Per this study's research, the most recent review of the scientific foundation for canine research was published in May 2001, prior to the September 11, 2001, attacks and the Boston Marathon bombings of 2013.[1] Both of these events broadly altered law enforcement, affecting every aspect of training and deployment, including the canine sector.[2,3] Compounding the issue, Homemade Explosives (HMEs) have emerged over the last two decades as the predominate weapon used against the United States, but there are still significant gaps in the literature and research on this topic. HMEs are easily constructed or synthesized using commercial ingredients and equipment that are more difficult for traditional methods to detect. Even with the diversity and power of the canine detector, there are minimal resources available for canine research, financial and otherwise. This leads to a dearth of understanding of this detector, which ultimately has a negative impact on canine detection proficiency.

A thorough survey was conducted to assess current and past research in the field of canine detection. This evaluation included research on the detection of explosives, as well as other targets relevant to military and law enforcement. This includes narcotics, human remains, and human tracking, as well as associated research in the fields of veterinary, neuro, and behavioral sciences as they relate to canine detection. Information was collected in the form of surveys provided to researchers in the field of canine detection across many disciplines, as well as to operational users, including canine handlers and trainers. In addition, an extensive review of both peer-reviewed literature and government reports was conducted and a searchable database of canine detection-related literature was compiled. Data from both the surveys and the literature review were used to identify critical knowledge gaps and user needs. Suggestions for appropriate topics for future funding to best serve the canine detection community, with the goal of improving the canine as a versatile field-detector, have been made. Areas of recommended future research include the following: (1) odor delivery, diffusion, and availability; (2) training aids, including storage and shelf life; (3) HMEs; and (4) veterinary health and canine ability/proficiency. It was also suggested that a repository for canine research be created for users and future researchers and maintained on a regular basis. While the body of canine research continues to grow, there remains a need to conduct further research to ensure the ability of these detectors to meet the changing nature of warfare.

Reference(s):

1. K.G. Furton, L.J. Myers. The Scientific Foundation and Efficacy of the Use of Canines as Chemical Detectors for Explosives. *Talanta* 54 (2001) 487-500.
2. K. Hutchinson, Transportation Security Administration [online], 3 March 2016; accessed 15 Dec. 2018; https://www.tsa.gov/news/testimony/2016/03/03/hearing-dogs-dhs-how-canine-programs-contribute-homeland-security.
3. C. Reid. *CBS News* [online], 8 Aug. 2013; accessed 15 Dec. 2018; https://www.cbsnews.com/news/demand-for-bomb-sniffing-dogs-up-after-boston-marathon-attack/.

Canine Detection, Homemade Explosives, Explosives Detection

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