E21 Detecting Human Remains in Fatal Fires Using Cadaver Dogs

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After attending this presentation, attendees will better understand the science behind canines detecting human remains in fatal fires as well as deployment parameters and limitations of canines to fatal fire incidences.

This presentation will impact the forensic science community by providing a critical look at cadaver dogs as a potential resource for search and recovery of fatal fire decedents from case studies and scientific research.

Properly trained cadaver dogs have demonstrated the ability to locate human remains in fatal fires efficiently, safely, and where visible signs of remains were unobserved. They have been deployed to wildland fires, arson, explosions, suicides, and accidental fires resulting in suspected or known fatalities, with successful outcomes. These successful detections and recoveries are reported in popular media and shared as firsthand anecdotes among handlers. While such reports serve as a means to inform general knowledge of the use of cadaver dogs, none can be considered to be rigorous assessment from a scientific view. Controlled experiments using scientific protocols to evaluate the capability of dogs trained to locate human remains has not been reported in the scientific literature, which contributes to the potential for a biased interpretation of accuracy (e.g., unknown false positive rate). Nonetheless, human remains detection dogs are clearly finding human remains in fatal fires.

What dogs use to determine human remains target odor remains unknown, and while focused research has been published on the general topic, none pertains to burned remains specifically. Bones are known to be composed of a mineral phase similar to hydroxyapatite and a collagen matrix. Research has reported on the alteration and decomposition of bones exposed to thermal treatment, focusing on bone mineral modification and ashing, in which the organic component is dehydrated and decomposed, but has not focused on odor signature for olfactory detection. Even with thermal decomposition, properly trained cadaver dogs not only identify ashed bones, but differentiate them from animal remains. The science behind matching targets (burned remains, cremains) versus target generalization (decomposed human remains, bones) will be discussed.

Post-fire repopulation of communities includes great pressure from individuals whose homes and other property were lost. Authorities deem it untenable that families return to their properties where they may find deceased relatives or neighbors. In addition, there is a law enforcement investigation aspect to unwitnessed deaths. In 2015, cadaver dogs were dispatched to and located remains in two different wildfires in California. Less than one year later, cadaver dogs cleared several hundred burned properties in another fatal wildfire. Cadaver dogs dispatched in Los Angeles, CA, also located the remains of multiple individuals in an urban environment in 2016. Cadaver dogs were dispatched to conduct searches in these fatal fires with three different search criteria: (1) subjects possibly missing (homeowners/residents); (2) unknown structure habitation (transient population); and, (3) no subjects reported missing in residential neighborhoods. Where there were decedents, the dogs located those individuals. No instances of dogs missing decedents were reported.

The criteria in place for qualified canines for primary dispatch was certified, single-purpose, passive-alert dogs, with a disaster-experienced handler. Second-tier qualifications included cross-trained dogs that were also trained to locate live people, but still requiring passive alerts for human remains. Dog teams meeting the primary dispatch criteria produced positive outcomes. Not all dog teams are appropriately trained for and meet the criteria to qualify for fatal fire incidents.

Searching for decedents in burned areas poses numerous hazards to the canines and handlers. These include environmental, material, and physical hazards. Unlike searching for live victims, recovery is not a life-threatening emergency, so the acceptable risk to searchers is approached differently. Risk also applies to the dog, which is the sensing device, and must be maintained as any other biosensor or biological detector.

Cadaver Dog, Fatal Fire, Burned Remains