

ClearAlert: Wearable Sensing Badge for Solid Aerosol and Contact Exposure to Fentanils



Homeland Security

Science and Technology

OPIOIDS ARE A GROWING RISK TO FIRST RESPONDERS

In 2017 alone, more than 47,600 people died of opioid overdoses. As the rate of illicit drug use continues to grow, dangerous synthetic opioids such as fentanyl and carfentanil are becoming increasingly common - presenting a unique risk to first responders everywhere.

In humans, carfentanil is estimated to be 10,000 times more potent than morphine. As a result, inhaling just a few grains during an accidental aerosol exposure could result in serious injury or even death for a first responder. As the prevalence of these dangerous opioids increases, so do reports of negative first responder incidence while responding to an emergency scene. As such, there is a serious and immediate need for an on-body warning system to alert first responders to a potential environmental opioid threat.

CLEARALERT PROVIDES RAPID ALERTS

The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) partnered with Clear Scientific (CS) to tackle this issue.

Part of the DHS Small Business Innovation Research (SBIR) program, CS developed a wearable sensor that can quickly provide first responders with critical information related to the toxicity of their environment in the presence of aerosolized fentanils.

With this wearable device, first responders will be able to quickly and accurately determine when they have been exposed to unsafe levels of aerosolized fentanils, allowing them to quickly exit the scene and administer medical countermeasures thus negating the risk of severe injury or death.

CLEARALERT AS A WEARABLE BADGE

Initial Phase I testing confirmed CS's proprietary technology is capable of selectively detecting powdered and aerosolized fentanyl and fentanyl derivatives. Testing

showed the system also prevents responses to common cutting agents and interferents of concern.

A first-generation wearable electronics prototype was developed in conjunction with partners including the U.S. Army Combat Capabilities Development Command Chemical and Biological Center (CCDC CBC), Aberdeen Proving Ground, Maryland. The sensor was evaluated against various opioids, and experimental results indicated successful and rapid detection of sub-microgram quantities of aerosolized carfentanil.

GOAL: COMMERCIALIZE CLEARALERT BY SUMMER 2021

During the ongoing Phase II performance period, the focus on ClearAlert will be to optimize sensor performance to ensure rapid and accurate responses to aerosolized opioids with minimal impact from cutting agents and interferents. Operational life will be optimized, and the wearable electronic badge will undergo a redesign based on feedback from potential users.



The final device will feature inexpensive disposable sensors and an inexpensive, reusable, and rechargeable wearable electronic badge (target of \$20 per badge).

Extensive field testing, including an operational field assessment event, and market research is planned to provide a wearable badge and sensor package that fits the broad needs of the first responder community.

