

## New 'biosensor' screens Air Force personnel and equipment for contamination - within minutes

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Air Force personnel will soon know within minutes if they or their equipment are contaminated with a biological agent, thanks to a new technology developed by the Air Force and a national laboratory. Personnel will use the biosensor system to collect and isolate samples, detect and identify agents, and assess the seriousness of the threat.

Image: The DNA Capture Element instrument was developed at the Pacific Northwest National Laboratory for the Air Force Research Laboratory.



*The "green box" is used to process samples of agents – in a matter of minutes – to determine if they are or aren't harmful.* 

"The system will provide an increased capability for Air Force Special Operations personnel to rapidly determine the presence of biological warfare agents in a combat environment," said Dr. Richard Stotts, counterproliferation branch chief within the Air Force Research Laboratory's Human Effectiveness Directorate. The device is compact, quickly identifies agents, can be used repeatedly and requires very little maintenance to keep it running in the field."

The system consists of a spray, developed at the directorate's Brooks City-Base, Texas, facilities, and a hand-held "green box," which determines if agents are present. The green box, or DNA Capture Element instrument, was developed by researchers at the Department of Energy's Pacific Northwest National Laboratory. The box uses an Air Force-developed biochemical assay based on aptamers, or single chain DNA fragments.

"We've used our lab's expertise to develop an instrument that's complementary to the Air Force's technology and that simultaneously satisfies the speed, specificity, sensitivity, portability, durability, health and safety needs," said Mike Lind, a senior advisor at PNNL. "The rapid detection capability of this instrument will be useful in a variety of applications, even outside of the armed forces."

With the prototype system, the user sprays the suspected contaminated area, creating a sample that can be picked up by a swab. The sample material on the swab is suspended in liquid by rinsing it in a container. Once in a liquid form, the sample is injected into a special flow cell, the place where the assay occurs.

The flow cell is currently designed for one-time use. Since the cell is



sealed, it can be decontaminated by immersion in a bleach solution and then safely transported to a forensic laboratory for further analysis where it can be opened to retrieve the sample material.

A liquid crystal display, or LCD, provides a quantitative readout of the concentration of targeted material present, and a set of red, yellow, and green light emitting diodes provides an easily interpreted reading of the threat level. For instance, "no threat" is green, a barely detectable to medium level of an agent is one or two yellow dots, and a high detection level is red.

The biosensor system is designed to be reliable, disposable and costeffective. The Air Force will continue testing the device over the next several months.

Source: PNNL

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