New tests speed anthrax identification

by MIKE MARTIN, UPI Science Correspondent

GAITHERSBURG, MD. (UPI) -- Two rapid tests for anthrax are promising to speed identification of the deadly bacteria -- now considered a favored weapon of bio-terrorists.

In blood samples, lab technicians can isolate the DNA of Bacillus anthracis -- the bacterium that causes anthrax -- using a sensitive molecular diagnostic technique called polymerase chain reaction, or PCR. In air or dust samples, the rapid field test of choice is so-called "lateral-flow immunochromatography," the same technique used in home pregnancy tests. Both techniques eliminate the long wait time for cultures of anthrax bacteria to grow on petri dishes in laboratories.

Billing its Guardian Bio Threat Alert, or BTA system as "an integrated approach for the rapid collection, detection and identification of biological warfare agents," Gaithersburg, Maryland-based Tetracore Technologies utilizes lateral-flow immunochromatography to quickly identify anthrax and other deadly materials in the field.

"The Guardian system is portable, easy to use and provides a fast, 15-minute screening for harmful biological agents such as anthrax and plague," Tetracore principal scientist Gary Long told United Press International from Gaithersburg.

An aqueous sample containing anthrax will flow down a test strip, reacting with antibodies to create a thin, red line that matches a second "control" line and confirms a positive result. Antibodies are natural proteins produced by the immune system to combat disease-causing organisms. They can also be artificially produced in laboratories. "The antibodies are labeled with colloidal gold, which imparts the characteristic red color," Long told UPI. "These antibodies are so highly specific for anthrax that they won't react with other materials to cause false positive results."

Early tests of the Guardian BTA system convinced emergency management specialist Tom Skowronski to stock the test kits for the City of Phoenix Metropolitan Medical Response System. "We checked out the kits at the Arizona State Health Labs in early trials about a year ago," Skowronski told UPI from Phoenix. "We found them to be very accurate and easy to use."

While field tests are no substitute for laboratory analyses, Skowronski said, confirming the presence or absence of hazardous materials must occur quickly. "We can greatly decrease the panic level and increase the safety level when we know what we are dealing with immediately," Skowronski told UPI.

"All the principals of Tetracore came from federal and law enforcement backgrounds," Gary Long told UPI. "The need for rapid field screening of particulate anthrax became apparent to them when hundreds of threatening letters were showing up at abortion clinics. People would open the envelopes and out would fall piles of dust and notes that read 'You have just been infected with anthrax.'"

Tetracore also produces rapid field tests for the deadly poison Ricin; Yersinia pestis, which causes bubonic plague; and botulinum toxin, from the bacteria that causes botulism, or food poisoning. Better-known for its use in forensic science and the OJ Simpson murder trials, the polymerase chain reaction does for DNA what carefully-tended cultures do for bacteria: it grows large, easily-identifiable strands from minute, sub-microscopic fragments.

First modified in France for the identification of anthrax bacteria in blood, PCR allows researchers to find the bacteria without waiting for cultures to grow -- results from the PCR test are available within six hours instead of two full days using the traditional method. "The ability to detect small amounts of bacterial DNA by PCR generally exceeds the ability to detect the bacteria by culture," David Steffen, director of the University of Nebraska veterinary diagnostic center, told UPI from Lincoln. "The PCR based test provides same day diagnosis so it is much better than traditional techniques in providing information to persons potentially exposed to anthrax, such as farmers and veterinarians," Steffen explained, noting that anthrax is a rare disease, primarily of livestock.

"Time is of the essence with anthrax and toxins like Ricin," Tom Skowronski told UPI. "Faster tests can sometimes mean all the difference between life and death."