# CDC's Laboratory Response to Chemical and Radiologic Terrorism

## Rapid Toxic Screen

- CDC's Environmental Health Laboratory develops and improves the *Rapid Toxic Screen* to analyze people's blood and urine for 150 chemical agents likely to be used by terrorists. These chemical agents include nerve agents, such as sarin, soman, VX, tabun; blistering agents, such as nitrogen and sulfur mustards; cyanide-based compounds; toxic metals; incapacitating agents; and selected other toxic industrial chemicals. The *Rapid Toxic Screen* is currently capable of measuring 150 chemical agents in 30-40 samples within 36 hours of being received in the lab. Once the agent is identified, subsequent measurements for a single chemical agent usually can be made at a rate of more than 300 per day. The analysis involves about 80 people and more than 20 mass spectrometers. Results provide individual exposure information that determines what agent(s) were used, who was exposed, and how much exposure an individual had. This information will help guide treatment decisions and prevent additional exposure.

- CDC's Environmental Health Laboratory maintains a *Laboratory Response Team* that is available 24 hours, 7 days a week to respond to a chemical terrorism event anywhere in the country. This *Team* supports the collection of clinical samples to help ensure that testing is done properly to assess people's exposure to chemical agents.

- CDC also works with public health laboratories in states, territories, cities, and counties (through the Laboratory Response Network) to assist them in expanding their chemical laboratory capacity to prepare and respond to chemical-terrorism incidents using these methods for measuring chemical agents in blood and urine.

## Radionuclide Screen for "Dirty" Bombs

- CDC's Environmental Health Laboratory is currently developing mass spectrometry and gamma spectroscopy methods to rapidly measure in urine the radionuclides that are likely to be used in "dirty bombs." The radionuclides include radioactive forms of uranium, plutonium, strontium, cesium, cobalt, americium, thorium, and technetium.

- This individual exposure information from urine measurements of the radionuclides will provide a unique capability identifying truly exposed individuals— a capability not possible with other available methods. Determining which agent(s) have been used and how much exposure a person has had affects treatment decisions and prevention of additional exposure.

## Mass Spectrometry Toxin Laboratory: Botulinum Toxins, Anthrax Lethal Factor, Ricin, Other Toxins

- CDC's Environmental Health Laboratory is establishing the Mass Spectrometry Toxin Laboratory to build on its early success in measuring botulinum toxins, anthrax lethal factor, and ricin. Using advanced mass spectrometry techniques, CDC has developed a method to measure *all seven* botulinum toxins in milk, food, and feces. The method is much faster than the mouse bioassay, requiring only 4 hours, rather than 2-3 days. Currently, the laboratory can analyze about 80 samples per day. The method is highly sensitive and specific. Improvements are underway and could increase throughput to 1000 samples per day from one mass spectrometer instrument. Some improvements have the potential to measure botulinum toxin in serum *before* symptoms occur, allowing earlier and much more effective treatment. In addition, a separate new mass spectrometry method provides "*toxin fingerprinting*," which is very likely to distinguish subtle changes in toxin structure that should assist forensic and epidemiologic investigations of the source of toxin.

- CDC also has had early success measuring anthrax lethal factor, which is the toxin that accounts for the harmful effects of anthrax. This mass spectrometry measurement may potentially lead to identifying people who are infected with anthrax *before* they have symptoms. This information would allow much earlier, more effective treatment. CDC has also had early success developing a mass spectrometry measurement of ricin which would apply to nasal swab or blood samples. No such high-quality method for ricin is currently available.