

**SUMMARY**  
**Centers for Disease Control and Prevention**  
**Clinician Outreach and Communication Activity**  
**Clinician Briefing**  
**May 31, 2005**

**The Laboratory Response Network (LRN):  
A National Asset in Terrorism Preparedness and Response**

**Julie Fishman, MPH,**

Deputy Branch Chief for the Emergency Response and Air Toxicants Branch in the Division of Laboratory Sciences at CDC's National Center for Environmental Health

**Jasmine Chaitram, MPH, MT (ASCP),** Health Scientist in the Bioterrorism Preparedness and Response Program

**Eric Resultan,** Writer-Editor for CDC's Bioterrorism Preparedness and Response Program

**Susan McClure,** Public Health Advisor for the Division of Laboratory Sciences in CDC's National Center for Environmental Health

***\*\*Please note:** Data and analysis discussed in these presentations were current when presented. Data collection and analysis are ongoing in many cases; therefore updates may be forthcoming elsewhere on this website, through publications such as [CDC's Morbidity and Mortality Weekly Report](#) or other venues. Presentations themselves will not be updated. Please bear this in mind when citing data from these presentations.*

*You can log onto the Web site at [www.bt.cdc.gov/coca](http://www.bt.cdc.gov/coca) to view or download a copy of the full slide set that accompanied this presentation.*

**Part I: The Laboratory Response Network (LRN)**

**What is the LRN?**

The LRN is a national network of local, state and federal public health, hospital-based, food testing, veterinary, and environmental testing laboratories that provide laboratory diagnostics and the capacity to respond to biological and chemical terrorism and other public health emergencies. The LRN was founded in 1999 by CDC, the FBI, and the Association of Public Health Laboratories. It is a multi-agency collaboration. As it has grown, partners like the USDA, EPA, and FDA are fulfilling specific needs.

**The Mission**

Despite the number agencies and organizations – all with their own priorities and missions – the LRN and its partners agree on a single mission: To maintain an

integrated, national, and international network of laboratories that can respond quickly to acts of chemical or biological terrorism, emerging infectious diseases, and other public health threats and emergencies. For example, the LRN laboratory contributed to the detection of *B. anthracis* during the anthrax crisis in 2001. And it was the LRN infrastructure that was used to stand up Biowatch in 2003, just prior to the war in Iraq. (Biowatch is a HHS initiative that calls for the sampling of air in major U.S. cities for pathogens that terrorists might use.)

On the non-terrorism side (in public health emergencies such as SARS), the LRN developed tests for the detection of SARS, and disseminated those tests to LRN laboratories. When monkeypox was first discovered in the U.S., it was an LRN test that was used during the outbreak investigation.

### **The Laboratory Network**

The LRN is a network of labs that are strategically located across the U.S. and abroad. There are more than 140 federal, state, and local labs. These include national labs like those at CDC and reference laboratories that have BSL3 capability; they perform presumptive and confirmatory testing for agent detection. It is these partnerships that shape the scope of the LRN. International LRN partners in the United Kingdom, Australia, and Canada provide reference laboratories abroad. There is also collaborative work with EPA on environmental and water testing, and the FDA and USDA on food and veterinary testing.

### **LRN Structures**

Strategically LRN has two distinct structures:

- For bioterrorism response
- For chemical response

The way BT response is structured is a decentralized approach that promotes a faster public health response to infectious disease outbreaks. There is an emphasis on local laboratory response.

- The first part of the BT structure is the national labs. National laboratories, including those operated by the CDC, are responsible for:
  - specialized strain characterization
  - bioforensics,
  - select agent activity
  - handling high infectious biological agents and toxic chemicals

- Reference labs are the backbone of the LRN. They are responsible for investigation and/or referral of specimens, and they are made up of more than 140 state and local public health, military, federal and international laboratories.

Lab types include:

- veterinary
- agriculture
- food and water testing

These labs perform the presumptive and confirmatory tests that result in BT agent detection.

- Sentinel labs are the thousands of commercial and hospital-based labs that have first contact with patient samples. Sentinel laboratories provide:
  - routine diagnostic services
  - rule-out and referral steps in the identification process

These labs don't have access to the same things that reference and national labs have access to, but they are responsible for referring tests to reference laboratories. Practicing clinicians have direct access to these labs.

### **Sentinel, Reference and National Labs**

What are the differences between sentinel, reference, and national laboratories?

- National and reference labs includes some state and local public health labs that are funded through a BT cooperative agreement through the HHS. These labs:
  - have access to the LRN secure website
  - have the ability to order standardized reagents
  - can perform the presumptive and confirmatory testing using LRN developed tests
  - participate in proficiency testing (required)
- Sentinel labs, on the other hand, aren't funded directly by CDC, although states may choose to fund them. Their status as an LRN sentinel lab is determined by the state public health lab director. They don't perform the standardized LRN tests and they don't use LRN standardized reagents. A flow of samples through BT structure in a covert event moves from sentinel to reference labs. In an overt event, the samples generally will go directly to reference labs where presumptive and confirmatory tests are done. Additional samples may be sent to CDC or other national labs for further testing.

## **Biomonitoring**

The science used to measure chemical agents in people is called biomonitoring. Biomonitoring is a direct measurement of environmental chemicals or their metabolites in blood or urine and gives an actual measurement of what reaches the body (what actually gets into the human body as opposed to estimating it from measurements of air, water, soil, or other environment measurements). Through a program called the Rapid Toxic Screen, it is possible to measure 150 chemical agents like:

- nerve agents,
- cyanide based compounds
- pesticides
- metals
- incapacitating agents
- and other chemicals likely to be used in a chemical terrorism event that could cause significant disease or death

Forty samples come to CDC for analysis along with the assessment of the symptoms being seen at the site of an incident.

## **Chemical Monitoring**

On the chemical side, the LRN has 62 state, territorial, and local public health labs that are included. All 50 states, the District of Columbia, all of the territories, and three localities (Los Angeles, New York, and Chicago) are participants. In the LRN network, there are three levels of laboratories in addition to the CDC laboratory:

- Level 1
- Level 2
- Level 3

Level 3 laboratories work directly with hospitals in collecting and properly shipping samples. They are not conducting laboratory analyses, but are helping to get samples to a laboratory that does conduct testing. Level 3 labs are also involved with preparing coordinated response plans within their states and regions for a chemical terrorism response.

The Level 2 and Level 1 labs, in addition to the CDC lab, conduct analyses of toxic chemicals. The Level 2 labs are involved with a limited number of analyses at this point. They include the detection of cyanide in blood and toxic metals in urine. They will receive additional training over the coming years to add additional analyses.

The Level 1 laboratories, in addition to conducting all of the Level 2 analyses, have

received training in measurement of other chemical agents (such as a marker of ricin exposure, mustard agents and nerve agents.) At CDC, all of these analyses can be done. Some additional assays at the present time are not passed on to other LRN laboratories because the technology for doing them is very expensive and complex. But the CDC is consistently working on making these measurements more rugged and easier to transfer to state and local laboratories. CDC's intention is to be able to move out many of these methods to other LRN member laboratories. In terms of the chemical terrorism program, the CDC provides a number of services to the participating LRN labs, such as:

- helping with purchasing instrumentation
- preparing training courses
- inviting states to come onsite to CDC for trainings

LRN chemical labs have implemented a quality assurance program for testing on a quarterly basis to make sure the analyses that are transferred to state laboratories are being properly conducted.

The chemical terrorism response is more centralized than a biological terrorism response. Initially in an incident, if the state requests the CDC's assistance, a rapid response team will go out and help a state to collect and properly ship samples and ensure the chain of custody. CDC will conduct an assessment of 40 samples using the rapid toxic screen to help determine what agent was used. Results would be sent to the state via the LRN website. The LRN would work with additional LRN members (depending on the size of the incident) to determine additional testing needs. In some cases, if it was a smaller incident, all of the analyses may be performed at CDC or within the state where the incident happened. And depending, again, on the size of the incident and the needs, other LRN member laboratories would be enlisted to participate in the analysis.

### **Toxic Exposure Surveillance System**

The CDC has collaborated with the American Association of Poison Control Centers to set up a surveillance system called the Toxic Exposure Surveillance System.

- This is a real-time database that records all human exposures to potentially toxic substances that are reported to U.S. Poison Control Centers. The reason this is done is to try to determine and elicit any patterns that are ongoing so that illness can be detected early

### **Benefits to the LRN Members**

LRN labs provide their members with:

- standardized reagents and controls
- agent specific protocols
- access to the lab referral directory
- secured communications
- electronic laboratory reporting
- training
- technology transfer and proficiency testing
- appropriate vaccinations for lab workers

### **Information Technology (IT)**

Among the benefits of being an LRN member is information technology support. IT provides an additional level of integration. The secure website allows labs to communicate with CDC, and for CDC to transfer technology, such as access to LRN reagents. More than 1,700 LRN lab workers, secure communications on emerging and emergency issues. They can:

- order reagents
- view protocols for PCR and TRF assays
- report and review proficiency tests
- receive periodic updates regarding reagent availability and other LRN activity information

### **Ready to Respond**

In the event of a terrorist act, or public health emergency, the LRN is poised to:

- test thousands of clinical specimens and environmental samples using its multilevel network of state food testing, clinical, veterinary, military, and federal labs
- coordinate the laboratory response of CDC, law enforcement agencies, public health (and other)

- accept and transfer specimens to appropriate facilities, including the CDC where definitive testing can be done
- assure a rapid laboratory response to a public health emergency

### **LRN Formula for Success**

The LRN has:

- a unified operational plan
- standardized protocols and tests
- pure communications
- molecular diagnostics
- rapid response and reporting
- safe and secure laboratories
- trained laboratorians
- coverage for human, animal, food, environmental specimens
- CDC coordinated support and oversight
- quality laboratory results

The LRN is a network of reference and national labs that are supported by sentinel laboratories. LRN laboratory results play a key role in public health response. Clinical observations and test orders contribute to agent detection.

The BT response is driven by local laboratory results and local clinician observations.

Chemical terrorism or a CT response is driven by first responders and local clinician observations. Lab results for CT are used for confirmation. During a BT response, clinical observations in conjunction with laboratory results are critical in determining individual case classifications such as suspect, probable, and confirm. For more information about sentinel laboratory procedures as well as information for shipping samples there is web a site: [www.bt.cdc.gov/lrn](http://www.bt.cdc.gov/lrn).

Poison control centers are a good source for toxicology expertise and CDC is working closely with them on surveillance.

To access the LRN, clinicians can contact their local health department for assistance. Local health departments will contact the state health departments. Requests must be made to CDC from state and local health departments.

In 2004, the LRN was named as a finalist in the Mitretek Innovations in Homeland Security Award; and in 2005, the LRN was named as a finalist for the Innovations in American Government Awards.

## **Part II: Q & A with speakers**

**Question:** If a physician suspects that his or her patient had an unusual infectious disease such as plague, smallpox or anthrax, which laboratory should he/she send the specimen?

**Answer:** They should go to their local health department first. If their local health department can not handle it, they will send it up to their state health department.

**Question:** Where do the results of tests from the lab network go? Is it only to the public health authorities for the state, or the municipality, or would that also be shared with law enforcement, clinical facilities, etc?

**Answer:** For the "bio" side there is no actual mechanism in place yet for electronic reporting of results. When laboratories do have results, they call CDC with that information. CDC is developing electronic laboratory reporting for LRN members. We are working on a tool for that right now. That information would be shared based on MOAs set up in each state. The state would determine if they want to share that information with law enforcement locally, or with other public health departments. We're not yet at that stage. So at this point, information is shared by phone call and it's up to the state, based on the relationships that they have with the local authorities to share their results.

###