The Integrated Consortium of Laboratory Networks Newsletter

Volume 3, Issue 2, January 2024

The Integrated Consortium of Laboratory Networks (ICLN) is a system of interconnected federal laboratory networks that can quickly respond to high-consequence incidents and give decision makers timely, credible, and interpretable data.

ICLN
Office of Health Security (OHS)

Department of Homeland Security

http://www.icln.org

ICLN@hq.dhs.gov

NETWORK SPOTLIGHT:

LRN-R Pilot: First Steps to Enhancing Clinical Radiobioassay Capacity

Introduction

Over the past several years, the Radiation Laboratory at the Centers for Disease Control and Prevention (CDC) received additional funding to expand capacity for provision of clinical radiobioassay during the response to a radiation emergency. CDC focused on three critical areas beginning with internal capacity through the Urine Radionuclide Screen. The second area was an assessment of the capability of state public health radiation labs to develop, validate, and maintain the CDC clinical radiobioassay methods. The third area was gaining feedback about gaps, challenges, and priorities of potential partner labs to develop clinical radiobioassay capabilities to inform CDC priorities for short and long-term goals.

Rapid Response Clinical Radiobioassay for Radiation Emergencies: The Urine Radionuclide Screen

Developed and maintained by the CDC Radiation Laboratory, the Urine Radionuclide Screen is a set of 13 clinical laboratory methods used to screen, identify, and quantify radioactive material in people. Pending approval for two clinical methods, the complete panel will provide actionable clinical results for contamination in people from all 22 priority threat radionuclides.

The panel comprises two layers of methods. The first layer consists of high throughput screening methods, measuring over 1,000 samples daily and determining if a sample has higher radioactivity levels than a typical population background sample. The second layer of methods can process hundreds of samples daily and provide the specific identification and quantification capability necessary for accurate radioactive dose assessment and determination of overall long-term health risks in people. The CDC Radiation Laboratory proposed the Laboratory Response Network – Radiological (LRN-R) pilot project to enhance laboratory capacity in case of a significant radiation emergency that may exceed its present capacity.

Performance Challenges: Demonstrating the Existing Capabilities of Partner Labs

As part of the pilot project, three state labs and one federal lab volunteered to participate in three performance challenges to test their ability to perform rapid response clinical radiobioassay using modified versions of two CDC screening methods from the Urine

Continued on next page

ICLN Status report, pursuant to the Food Safety Modernization Act (FSMA)

NOW POSTED!

https://www.dhs.gov/publication/status-integrated-consortium-laboratory-networks

Continued from previous page

Radionuclide Screen. These methods included a gross alpha beta method and a gross gamma method. The first challenge was to analyze 50 spot urine samples to determine an average population background level. The second challenge focused on testing laboratory accuracy by demonstrating the capability to identify samples with a Sr-90 beta emitter or Cs-137 gamma emitter from a larger set of samples. Lastly, the labs measured the time it took to analyze data and report results to the CDC for 100 samples, which could be either background samples or samples spiked with a radionuclide.

A fully funded LRN-R program could be successful in expanding testing capacity. The labs involved have the technical expertise to support critical response functions during a radiation emergency. Participants showed great enthusiasm for the project, going above and beyond their routine laboratory functions without outside funding. Participating labs overcame challenges such as incorporating new instrumentation and methods with limited staff for method development, highlighting the need to address this issue. Standardized result reporting across all participating labs is also necessary for efficient data analysis and interpretation. CDC received feedback from participants and will incorporate it into future efforts.

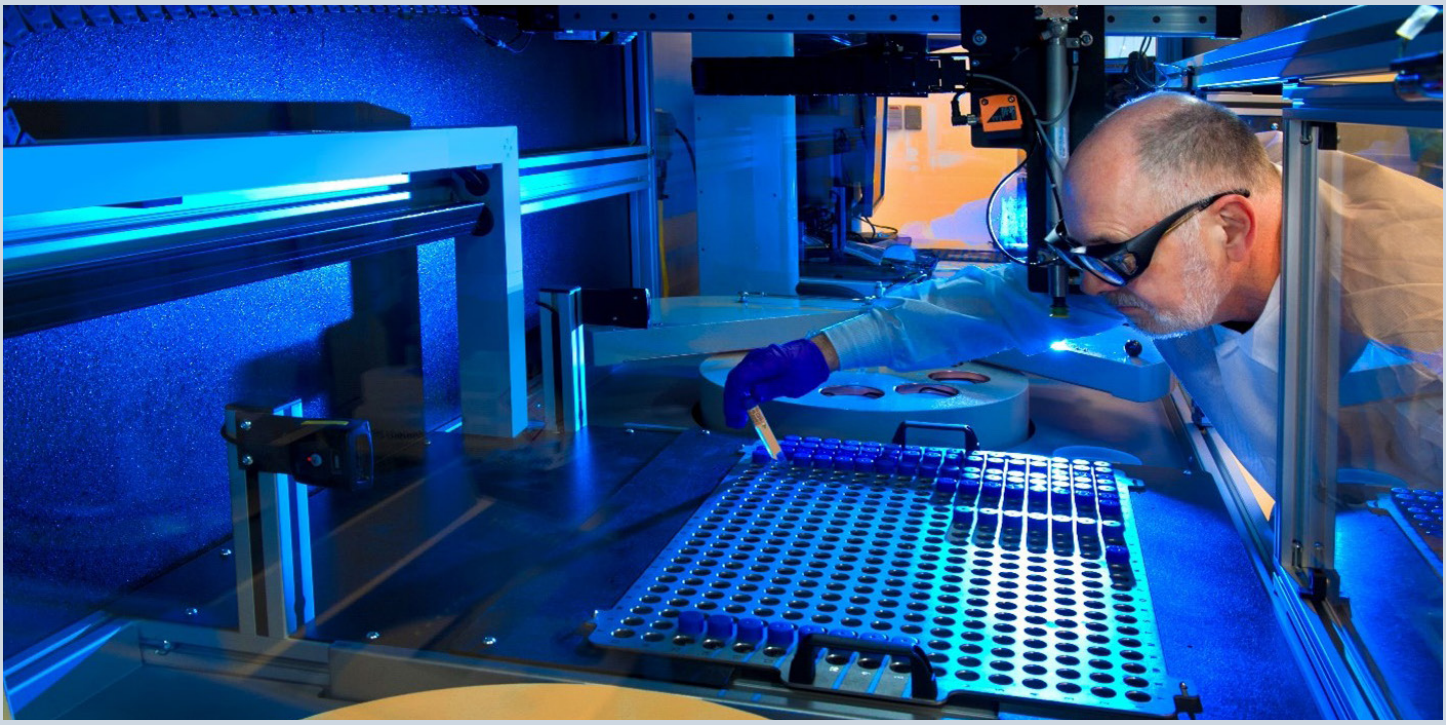
Some remaining tasks include obtaining accuracy challenge results from two labs and sending throughput challenge samples to specific labs. However, now that significant difficulties have been addressed, the project is on track for completion this year.

Next Steps: Achievable Goals to Keep the Momentum Going

Once the challenge activities are completed, the CDC Radiation Laboratory will collect feedback and comments from participants in the pilot program to evaluate the results and experience. This information will be used to make informed decisions for the next phase. The participants have already given some recommendations and deliverables for a future program that will concentrate on maintaining progress and broadening this capability. Based on conversations throughout the pilot program, upcoming short-term projects may involve crafting operational guides, training courses, and exercises for secure collection, packaging, shipping, and receipt of patient urine samples.

Conclusions

Collaboration, organization, and innovation are necessary to meet laboratory analysis needs for a major radiation emergency. According to preliminary assessment, building a laboratory response network may be feasible by investing time, energy, and resources and strategically leveraging our current capabilities.



Centers for Disease Control and Prevention (CDC) scientist sets up a gross gamma screen system.

NETWORK SPOTLIGHT:

Laboratory Response Network for Chemical Threats (LRN-C): Ricinine Capabilities for Castor Bean Exposures

The Laboratory Response Network for Chemical Threats (LRN-C) is a national network of local and state public health laboratories that respond to emergencies involving chemical threats such as toxic industrial chemicals, volatile organic compounds, and warfare agents. CDC's LRN-C Program Office provides quality control materials, proficiency testing, network laboratory referral capabilities, secured data messaging, response readiness drills, hands-on training, and laboratory technical assistance to its LRN-C member laboratories.

In the event of a large-scale chemical emergency involving mass casualties, this national preparedness asset ensures laboratory response readiness in all 50 states, 3 major U.S. cities (Los Angeles County, New York City, and Washington D.C.), and the U.S. territory of Puerto Rico. Local and state health departments also leverage this established CDC testing capacity to support local public health concerns. For instance, LRN-C laboratories have supported both intentional and unintentional exposures to castor beans, containing the potentially lethal substance, ricin.

Rodney Goller, LRN-C scientist from the Utah Public Health Laboratory, preparing urine samples for ricinine analysis. Photo: Jackie Patel

LRN-C Supporting Local Hospitals

In 2016, a patient was admitted to a local Connecticut hospital with profuse internal bleeding. The individual stated that they had ingested 50 castor beans (i.e., a natural source of ricin) blended with frozen strawberries and alcohol. Connecticut's LRN-C laboratory was asked to test patient urine samples for ricinine, an alkaloid found in castor bean plants. Each day, medical providers submitted urine specimens to the Connecticut Department of Health (CDH) to monitor the decrease of urinary ricinine levels over time. Following over 18 days of in-patient care, the CDH laboratory used an LRN-C validated method to test the 19 samples from the patient.

In 2018, a local Utah landscaper accidentally ingested castor beans, after misidentifying them as pine nuts. Following hospital admission, urine samples were collected and submitted to the Utah Public Health Laboratory (UPHL), an LRN-C laboratory partner. The laboratory was able to confirm the presence of ricinine in urine and return these results back to the hospital within the same day.

Similarly in 2022, a patient in Virginia attempted to self-harm by ingesting castor beans. The LRN-C laboratory located at Virginia's Division of Consolidated Laboratory Services (DCLS) was asked to test ricinine levels in urine. To monitor the progress of patient treatment, the hospital collected urine samples every four hours. Ultimately, DCLS tested six patient samples, which exhibited decreased ricinine concentrations over time.

In early 2023, a Utah hospital patient intentionally ingested a homemade paste of castor beans and rosary beads. The Utah Poison Control Center (UPCC) submitted a sample of the patient's urine to the state's LRN-C laboratory for ricinine testing. Again, UPHL was able to return laboratory results, which were positive for ricinine, within a few hours. In both instances, UPHL's rapid laboratory response supported more timely, informed patient care.

National Asset Used in Local Emergencies

Thanks to CDC's established laboratory infrastructure for chemical threats, local and state health departments can leverage their jurisdiction's LRN-C laboratory for everyday public health concerns. A special "thank you" goes out to all of CDC's local and state laboratory partners that maintain testing capabilities for this critical national preparedness asset. For more information about LRN-C testing capabilities please visit: **https://www.cdc.gov/nceh/dls/lrnc.html**.