LANL to certify automated influenza surveillance system

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A compact, self-contained, automated system for surveillance and screening of potential pandemic strains of influenza and other deadly infectious diseases is a step closer to reality, thanks to an agreement between Los Alamos National Laboratory, the University of California Los Angeles School of Public Health, and HighRes Biosolutions of Boston, Massachussets.

Researchers from LANL and the UCLA School of Public Health will test and certify a critical component of the High-Throughput Laboratory Network (HTLN) to be built by HighRes Biosolutions. The company will design the automated high-throughput extraction and screening system for a prototype Global Bio Lab—a compact, modular laboratory that can reliably process thousands of specimens of infectious agents to aid public health officials in responding to a global health crisis.

The extraction and screening system under development by HighRes Biosolutions will enable public health officials to cross reference genetic material from samples collected from infected persons or other sources with reference samples of genetic material from strains of infectious diseases of interest. This will allow public health officials to determine whether an outbreak of an infectious disease comes from a pandemic strain or one less virulent, or whether a strain of pathogen is on the cusp of mutating into a form that can become more transmissible or aggressively virulent. Because testing and verification methods are automated, the technology reduces the potential for errors. Access to fast, reliable data allows health officials to respond more effectively to

potential public health crises.

Each self-contained HTLN unit occupies a small space. A suite of such modular laboratories across the world would comprise a global network. The network could provide consistency and resources to areas otherwise unlikely to have sophisticated pathogen-surveillance technology on hand.

Global surveillance of pathogens such as influenza is a very important approach to combating the pandemic spread of disease. According to the World Health Organization, annual epidemics cause approximately 5 million cases of severe illness, with 250,000 to 500,000 cases leading to death. In the United States alone, the Centers for Disease Control and Prevention reports that the flu causes more than 200,000 hospitalizations and 36,000 deaths each year, with medical costs estimated at $10 billion.

Scientists, programmers, and engineers from LANL and the UCLA School of Public Health have been developing an HTLN to address global influenza surveillance. The initial prototype module underwent testing at Los Alamos in June 2009. Since then, the research team has designed high-speed and high-volume laboratory capabilities for extensive surveillance, and rapid, accurate detection and analysis of pathogens.

The automated workflow consists of field and epidemiological data surveillance, sample transportation, laboratory testing, data management, and analysis. The first node of the HTLN is housed in the Biosafety Level 3-enhanced facility of the Global Bio Lab at UCLA, which is designed to work with highly pathogenic avian influenza viruses and other potential select agents. The HTLN's novel approach to influenza surveillance will enable sequencing of as many as 10,000 full virus genomes per year, more than the total of all full influenza genomes sequenced to date.

"The HTLN project provides an opportunity to deploy high-throughput technology in a way that can protect the health of so many people," said Tracy Erkkila, LANL project manager. "We are looking forward to working with the talented team at HighRes Biosolutions to develop this important component of the HTLN project."

"A project like the HTLN requires innovative approaches to laboratory automation that provides for growth and the flexibility to leverage technological advances and changing throughput requirements," said Lee Borenstein, director of the Global Bio Lab at UCLA.

"We are very excited about the opportunity to work with both LANL and UCLA on this very high profile project" says Chris Pacheco, Director of Life Science Technologies at HighRes Biosolutions. "We believe our modular and flexible system designs will enable UCLA to continue to grow their biosurveillance platform as their needs change."

Provided by Los Alamos National Laboratory

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