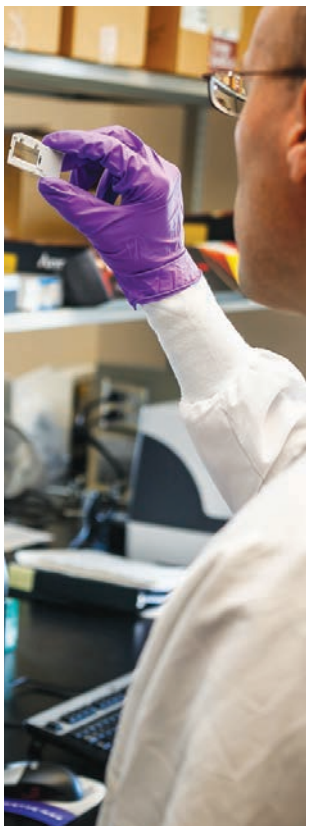
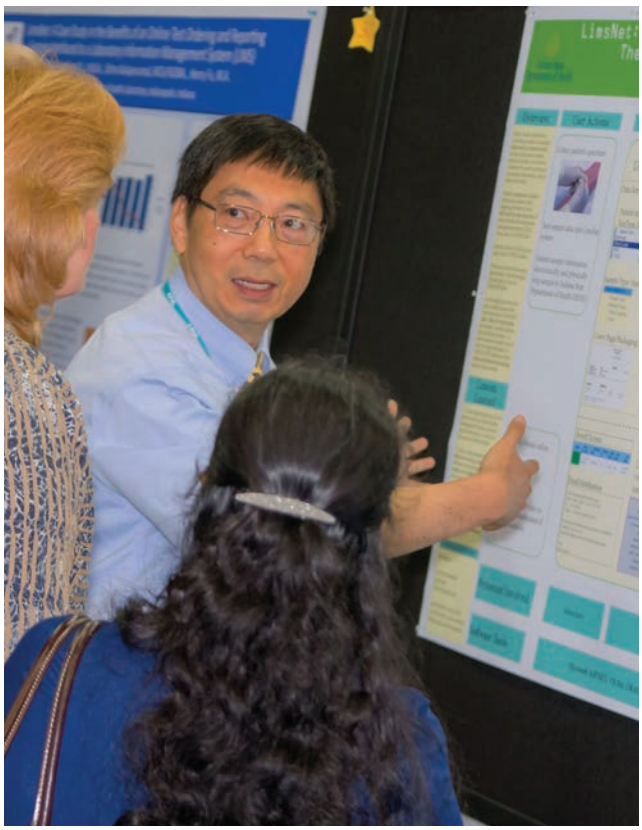
APHL ASSOCIATION OF PUBLIC HEALTH LABORATORIES

Leading the Labs that Protect the Nation's Health

Association of Public Health Laboratories





APHL:
ANALYSIS.
ANSWERS.
ACTION.

MISSION

Shape national and global health outcomes by promoting the value and contributions of public health laboratories and continuously improving the public health laboratory system and practice.

VISION

A healthier world through quality laboratory systems.

The Association of Public Health Laboratories (APHL) protects the public's health by strengthening governmental health laboratory systems in the US and globally. Its member institutions, known as "public health laboratories," detect health hazards and generate scientific data to inform public health action.

A global leader in laboratory science, practice and policy, APHL supports member laboratories and public health partners with laboratory guidance, high-quality training, national policymaking, leadership development, crisis response and development of laboratory information management systems, among other services. Its expert staff represent diverse disciplines, from infectious disease, environmental health and food safety to newborn screening and public health preparedness.

Founded more than 60 years ago, APHL served initially as a forum for directors of state health laboratories to collaborate and exchange information. Over time, the association expanded its membership to include other governmental laboratories working in public health: local health laboratories and state environmental, agricultural and food safety laboratories. APHL membership now exceeds 800 institutions and individuals, including core laboratory members, as well as federal officials, corporate partners, students and other interested parties.

A 501c3 nonprofit organization, APHL is funded through agreements with the Centers for Disease Control and Prevention and other federal agencies, as well as member dues, sponsorships, and revenue from products and services.

Chemist Natalie Grothoff prepares a nutrient analysis using an automated ion analyzer at the Missouri Department of Natural Resources

APHL Expertise

Quality Laboratory Science and Systems: APHL advances the quality of laboratory science and practice through transfer of new diagnostic methods and technologies, training and leadership development, publication of laboratory practice standards, development of management tools, liaison with the corporate community to spur evaluation of new technology and support for a sustainable public health laboratory system.

Emergency Response: APHL serves as a coordinating center for laboratory response to disease outbreaks, natural disasters and other public health threats and emergencies. The association convenes laboratory and health partners to harmonize response activities, disseminates information from national authorities and provides technical assistance to participating institutions. It also supports the Laboratory Response Network with training, quality improvement activities, surge capacity, exercise planning, policy development and outreach to partners.

Global Health: With experience in over 50 countries on five continents, APHL supports the development of laboratory systems worldwide. The association works with ministries of health to create national laboratory strategic plans, manages laboratory renovation projects, implements laboratory management systems, and offers technical and management training workshops. It provides additional training for senior laboratory professionals through its in-country consultants and through the APHL International Institute for Public Health Laboratory Management.

Advanced Chemist Susan Percy pipettes samples for ICP/MS testing in the Wisconsin State Laboratory of Hygiene's Trace Elements Clean Laboratory (Photo credit: Bob Rashid)

Laboratory Informatics: APHL is a leader in laboratory informatics with over ten years' experience designing and implementing laboratory information management system (LIMS) networks in the US and abroad. In addition to governmental laboratories, the association tailors informatics solutions for state and local health agencies, federal agencies and others. APHL's secure, cloud-based messaging services platform supports more than 40 messaging partners.

Training and Leadership Development: APHL offers high quality continuing education programs for public health and clinical laboratory scientists; prepares emerging leaders for senior management positions through its National Center for Public Health Laboratory Leadership; manages fellowship and traineeship programs and promotes careers in public health laboratory science and practice. The association also convenes national conferences and webinars on critical issues in laboratory science.

Policy: APHL informs the development of national health initiatives and public health policy through expert Congressional testimony, comments on proposed regulations and representation on federal advisory committees and other national forums. APHL engages stakeholders in policy discussions by disseminating statements and educational materials on priority issues and serving as a liaison among US public health laboratories, federal agencies, and corporate and other partners.

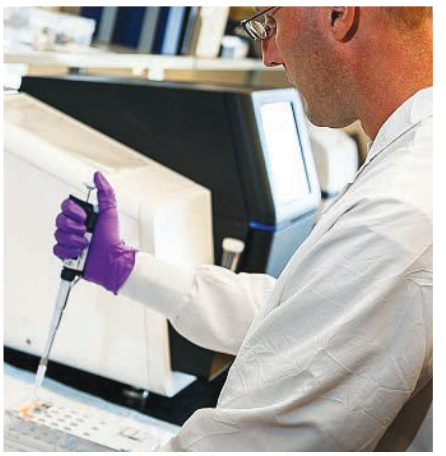
Research and Information: APHL conducts research to document the capacity and capability of US public health laboratories. Via its blog, magazine, website, social media sites and scientific publications, the association shares developments in public health laboratory science, practice and management, and builds a community of informed stakeholders.

Middle school students explore the work of laboratory scientists at an event co-sponsored by APHL and the Indiana State Public Health Laboratory

APHL Global Health staff and consultants discuss laboratory initiatives in Sierra Leone with the Minister of Health and Sanitation, Dr. Abu Bakarr Fofanah, back row, second from right

Molecular testing at the State Hygienic Laboratory at the University of Iowa

Students confer on testing at New York state's Wadsworth Center



Matt Schatt, research scientist at the Wadsworth Center, performs a run through through the NextGen DNA sequencer

Coordinating Laboratory Response to Infectious Disease Threats

APHL functions as a coordinating center for laboratory response to disease outbreaks. For example, during the Ebola crisis of 2014, APHL played a key role in the deployment of the test used for initial detection of the virus and developed a risk assessment template for Ebola-testing laboratories to implement enhanced safety precautions. It also procured laboratory equipment and reagents for use in select US cities, and provided information to prepare public health laboratories to respond to questions from hospital laboratories.

Yet even as the first cases of Ebola riveted the nation, APHL was also responding to other infectious disease threats. The association enlisted subject matter experts to review laboratory testing guidance for Middle East Respiratory Syndrome (MERS), an emerging viral illness with a 35% fatality rate. And it distributed CDC's molecular testing protocol for chikungunya virus, a potentially debilitating mosquito-borne illness that has been detected in Florida, Texas and Puerto Rico.

Meanwhile, the United States' four vaccine preventable disease (VPD) reference centers — all APHL member laboratories recruited and supported by the association through its collaboration with CDC — were busy testing hundreds of specimens linked to the largest domestic outbreaks of measles and mumps in many years.

Emergency Preparedness Supervisor Maureen Sullivan tests for *Bacillus anthracis* at the Minnesota Department of Health, Public Health Laboratory

Strengthening the National All-hazards Laboratory Network

APHL is a founding partner of the Laboratory Response Network (LRN), the national all-hazards network charged with laboratory response to biological, chemical and radiological emergencies. Since its inception in 1999, APHL has been dedicated to making the LRN stronger via preparedness exercises, scientific workshops, support for near real-time electronic threat surveillance and other activities.

Recently APHL identified laboratories to evaluate the biosafety characteristics of technologies under consideration for LRN deployment; recruited APHL member laboratories to conduct a comparative study of two assays used to detect ricin toxin; and, with CDC, developed a tool to help LRN laboratories rapidly identify supplies needed to test for specific biothreat agents and calculate the cost of surge events. Currently the association is expanding training for clinical laboratories to improve biosafety practices.

Laboratory Response Network training on detection of biological threats

Testing hazardous agents at the Public Health Laboratory of East Texas

Promoting Global Health Security

With its commitment to strive for "a healthier world" — the APHL vision — the association works across the globe. It has been a key laboratory partner in the President's Emergency Plan for AIDS Relief (PEPFAR) since this US aid program began in 2003. And it is a supporter of the year-old Global Health Security Agenda — an ambitious, international effort "to accelerate progress toward a world safe...from infectious disease threats."

In addition to addressing discrete problems — such as developing a testing algorithm for HIV rapid test kits in Nigeria or helping to implement molecular test services in Haiti — APHL is focused on the big picture: building sustainable laboratory systems to address national public health priorities.

The association provides technical assistance to help governments develop national strategic plans that outline steps for expanding access to laboratory diagnostic and surveillance testing and provide guidance for effective management of donor funds. With APHL assistance, more than a dozen countries have developed or begun work on such plans, including Botswana, Mozambique, Ukraine and Vietnam.

Another important effort is the development of paper-based and electronic laboratory information management systems (LIMS) and databases to support everyday laboratory operations — such as analyzing test results and tracking supply inventory — and to provide timely, accurate data for national health planning. To date, APHL has implemented a LIMS in more than 30 laboratories worldwide, and its LIMS guidelines have circulated to many more laboratories through CDC and the World Health Organization.

APHL has also been a leader in professional laboratory training — both for laboratory managers and bench staff. The association regularly offers workshops and seminars in international settings and sponsors the APHL International Institute for Public Health Laboratory Management.This unique educational resource has served senior public health leaders from across the world.

Crosscutting all of the association's international work is an emphasis on partnerships. As one example, in 2011, the association played a key role in establishing the African Society for Laboratory Medicine (ASLM), an organization created to strengthen laboratory collaboration across the continent. APHL is now supporting development of the African Public Health Laboratory Network, which is modeled on the US Laboratory Response Network. ASLM serves as the administrator for the new system.

Ghanaian lab technician learns technique for making dried blood spots from umbilical cord blood through the CDC/APHL Newborn Screening Quality Assessment Program

Participants in an APHL leadership training in Ukraine discuss the laboratory system in their country

US Ambassador to Lesotho Matthew Harrington and APHL staff at a ceremony marking the transfer of a national LIMS system to the Lesotho Ministry of Health. APHL led the development of the new system

Participants at the International Institute for Public Health Laboratory Management in Dar es Salaam, Tanzania discuss management strategies

CDC scientist Katie Roache collects *Listeria* from an agar plate to begin DNA extraction for next-generation sequencing

APHL, CDC and NCBI representatives accept the HHS Innovates Award for a proof-of-concept study demonstrating the value of whole genome sequencing as a tool for national real-time surveillance. From left: Peter Gerner-Smidt (CDC), Kristy Kubota (APHL), Cheryl Tarr (CDC) and Bill Klimke (NCBI)

Microbiologist Oliver Beaumont performs bacterial counts on food and dairy samples at the New Hampshire public health laboratory

Advancing Detection of Foodborne Diseases

In 1996, APHL co-founded the United States' first nationwide foodborne disease surveillance network — PulseNet. Today, the association is supporting a proof-of-concept project investigating the use of whole genome sequencing (WGS) in PulseNet laboratories. Compared with the current PulseNet technology (pulsed-field gel electrophoresis), WGS is faster, more efficient, more discriminatory and potentially more useful, as it may reveal pathogens' drug-resistance profiles.

In addition, APHL is supporting an effort to systematically sequence the entire genomes of *Listeria monocytogenes* linked to foodborne illness. In the past five years, the potentially deadly bacterium has been detected in ice cream, prepackaged caramel apples, cheese, sprouts and cantaloupes. A database linking specific *L. monocytogenes* genomes to specific contaminated food products will help public health authorities pinpoint the source of future outbreaks.

To assure state testing data can be confidently used as the basis for regulatory interventions, APHL is collaborating with partners, such as FDA, to assist US food and feed testing laboratories to achieve or to expand their ISO accreditation — a credential signifying the use of rigorous, standardized quality management practices.

Staff accession samples in connection with a foodborne disease outbreak at the Wadsworth Center, New York State Department of Health

Supporting Genetic Screening of Newborns

State public health laboratories screen nearly all (97%) of the over four million babies born in the US each year for genetic and metabolic disorders that can permanently disable or kill an infant. Every year in the US, over 12,000 babies' lives are saved or improved by newborn screening.

APHL supports members' work in national and international laboratory-based newborn screening and genetics population screening. It develops strategies, training, assessments and tools to advance laboratory practice and address changes in the newborn screening field. It publishes position statements, guidelines, survey analysis and white papers, and sponsors the principal conference in the field, the Newborn Screening and Genetic Testing Symposium.

Through a cooperative agreement with the Genetic Services Branch of HRSA, APHL also manages the Newborn Screening Technical assistance and Evaluation Program (NewSTEPs). NewSTEPs provides data, technical assistance and training to newborn screening programs nationwide and assists states with quality improvement initiatives. The program also maintains a comprehensive online resource center to support state newborn screening programs and stakeholders.

Panel from exhibit that traveled nationwide during the 50th anniversary of newborn screening in 2013

NewSTEPS specialists review a newborn screening program in Orlando. The NewSTEPS program is funded under a cooperative agreement to APHL from the Genetic Services Branch at HRSA

Colorado Department of Public Health and Environment's Jean Aldrich collects water samples at a local river

Chemist Susan Percy pipettes samples for ICP/MS testing in the Wisconsin State Laboratory of Hygiene's Trace Elements Clean Laboratory (Photo credit: Bob Rashid)

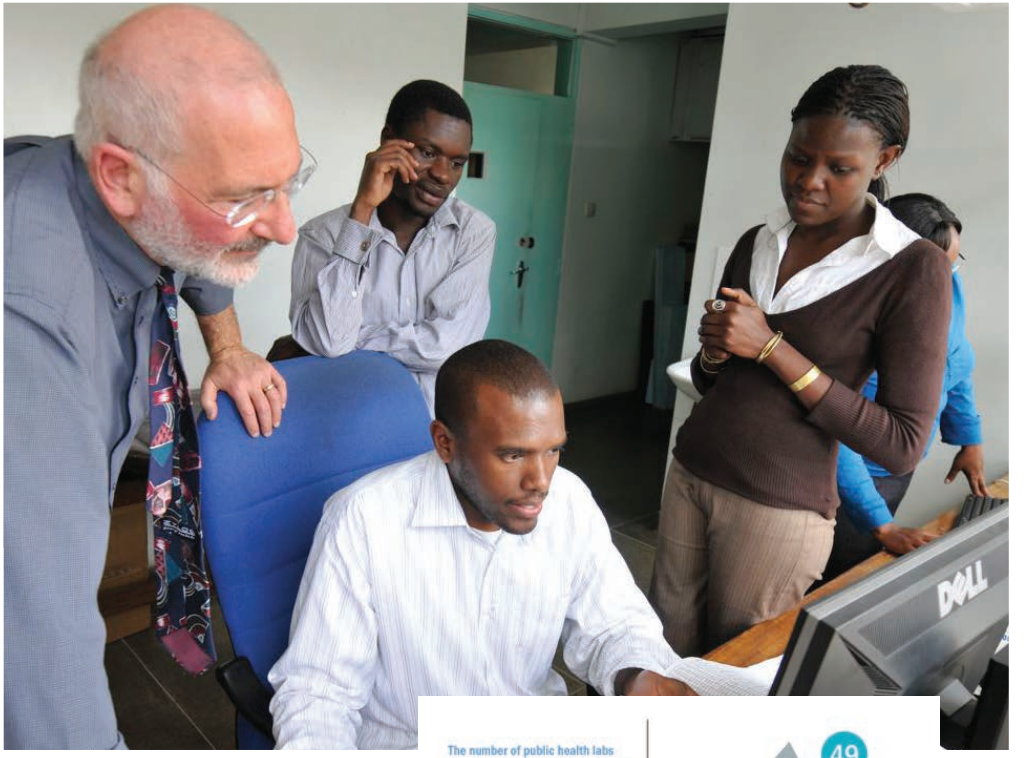
Carmen Gaston, chief of the trace metals section of the Pennsylvania Department of Environmental Protection's laboratory, prepares a drinking water sample for metals testing

Protecting Residents, Resources from Chemicals in the Environment

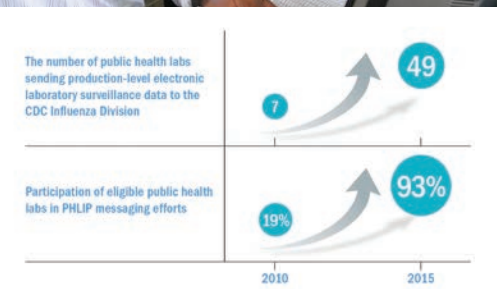
APHL is a leader in the field of biomonitoring, a process that measures levels of environmental chemicals in human tissues and fluids. The association was instrumental in the launch of CDC's first national biomonitoring meeting in 2012 and has since developed a national database of public health laboratory biomonitoring capabilities and a biomonitoring toolkit with information on test methods, strategies for sharing biomonitoring findings and related topics.

A member of the nonprofit US Water Partnership, APHL has worked for years with the US Environmental Protection Agency to assure preparedness for a large-scale water contamination event. The association also sponsors a project that links community members with governmental laboratories that can evaluate suspected environmental threats.

APHL informatics technical assistance team at Washington Public Health Laboratory to implement the electronic laboratory surveillance message for influenza



Kenyan laboratory leaders receive LIMS system training



Members of the USAF School of Aerospace Medicine Epidemiology Laboratory with APHL's PHLIP assistance team on base at Wright Patterson in Ohio

Delivering Lab Data Electronically

Recognizing data's central role in public health practice, APHL has long been a leader in public health informatics. In 2005, the association began the PHLIP Project, a partnership with CDC a partnership with CDC to implement national, electronic influenza reporting for near real-time flu surveillance. Today, 45 states, three local public health laboratories and one military laboratory send influenza data to CDC using the APHL-developed protocols.

APHL's informatics program has expanded dramatically over the past decade. Its collaboration with CDC now involves technical assistance to public health agencies to help them achieve state-of-the-art capabilities for electronic laboratory reporting to a range of partners. APHL also is working with four national vaccine preventable disease reference centers (the state public health laboratories in California, Minnesota, New York and Wisconsin) to assure they can send measles, pertussis and other test data electronically to CDC.

In addition, APHL is working to modernize the National Notifiable Diseases Surveillance System by assisting state public health agencies as they adopt new-generation message mapping guides to send case notification messages to CDC. Eventually, all reporting jurisdictions will use the new message mapping guides for all nationally notifiable conditions. The association's latest contribution to public health informatics is the APHL Informatics Messaging Services (AIMS) Platform — a cloud-based environment that meets HIPAA security requirements and simplifies the validation, translation and routing of electronic public health data. Currently, the platform has more than 50 messaging partners who route an average of more than 20,000 messages/month through the system.

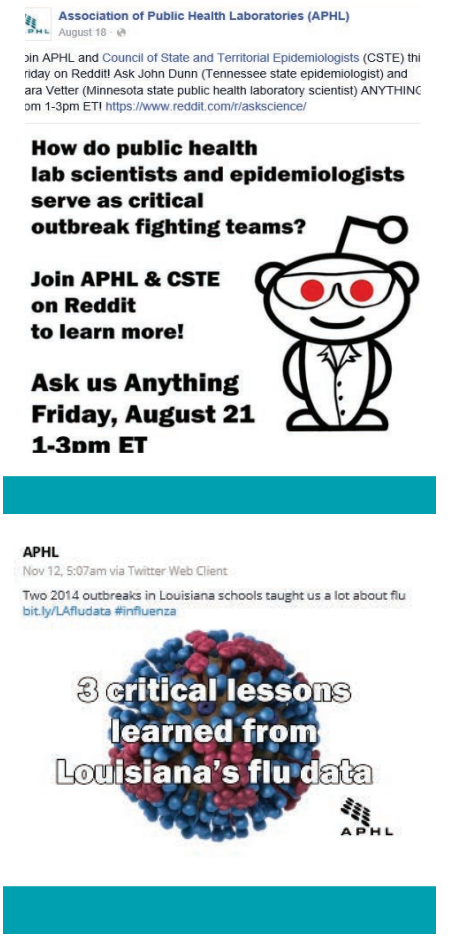
Finally APHL continues to share its informatics expertise through consulting services for public and private customers in the US and internationally. Association experts provide customized informatics solutions at affordable prices, with a focus on efficiency and regulatory compliance. Services include interoperability improvement plans, personalized staff training, billing consulting and technical assistance for adoption of LOINC, SNOMED and HL7 codes and standards.

Educating Policymakers and the Public

APHL is a forceful advocate for public health laboratories. Its goal is to educate policymakers and the broader public about the indispensable — and largely unseen — work of the nation's governmental laboratories, while assuring these laboratories have the resources they need to maintain preparedness for public health emergencies.

Its policy staff arrange for expert Congressional testimony, guidance on legislative proposals and comments on federal regulations impacting public sector laboratories. APHL was, for example, a strong supporter of reauthorization of the Newborn Screening Saves Lives Act. More recently, association experts spoke to US Congressional appropriations staff to explain the urgency behind a presidential request for funding for the Antibiotic Resistance Solutions Initiative.

APHL's communications staff inform and engage the public through the association's blog, social media sites, website and non-technical publications. They collaborate with staff subject matter experts, members and partners to draw attention to critical public health issues. For example, a 2013 campaign, organized in connection with the 50th anniversary of the first mandated state test for newborn screening, publicized the value of newborn screening in protecting an infant's health.



APHL's activity on social media brings public health laboratories to a wide and diverse audience

Joanne Bartkus, director of Minnesota's public health laboratory, briefs Representative Richard Nolan (D-MN) on the contributions of public health laboratories

Microbiologist Bertrand Sandjong, PhD, of the Monterey County Public Health Department Laboratory aspires to become a public health laboratory director

Developing Laboratory Talent

One of APHL's highest priorities is to assure a pool of technically qualified public health scientists and effective laboratory leaders who can respond to homeland security threats.

In the face of a serious workforce shortage, APHL established its National Center for Public Health Laboratory Leadership in 2002. The Center is dedicated to equipping mid-career professionals with the skills needed for senior management positions and has graduated six classes of emerging laboratory leaders, several of whom have advanced to public health laboratory directorships. In 2014, the Center joined with APHL's Global Health group to launch its first international Emerging Leader Program.

Other Center activities include development of leadership assessment tools and an annual orientation program for new public health laboratory directors. The Center, in conjunction with APHL's Quality Systems Program, also has been instrumental in bringing LEAN quality improvement training to public health laboratorians. And it recently completed a 30-month effort to develop the first core competencies for public health laboratory scientists — an achievement that will inform career ladders, training efforts and performance management.

Indiana middle school students explore the work of laboratory scientists at an event in Indianapolis co-sponsored by APHL and the Indiana State Public Health Laboratory

Emerging Infectious Disease fellow Kerri Robinson suits up to work with TB specimens at Washington state's public health laboratory

In addition to leadership development, APHL also offers continuing education for practicing bench scientists. The association manages the APHL/CDC National Laboratory Training Network as well as its own training programs. Together, these two resources serve thousands of scientists in public health and private sector laboratories annually.

Finally, APHL convenes conferences for public health leaders including the:

- Four-day APHL Annual Meeting
- Integrated Foodborne Outbreak Response and Management (InFORM) Conference (co-sponsored by APHL, CDC, USDA, US FDA)
- PulseNet/OutbreakNet meeting (annual, co-sponsored by CDC, US FDA, CSTE)
- Newborn Screening and Genetic Testing Symposium (held every 18 months, co-sponsored by HRSA and the International Society for Neonatal Screening)
- National Conference on Laboratory Aspects of Tuberculosis

APHL Emerging Leaders become members of NOLLA, the Network of Laboratory Leaders Alumni

APHL Emerging Leaders meet to discuss a joint project

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