Anacostia Anthrax Scare Highlights Need to Better Meld Science and Policy

When anthrax was detected at the AMI building in Florida just over two years ago—marking the beginning of the most widespread incident of bioterrorism (BT) in the United States—significant gaps existed in the level of laboratory preparedness for such an event. Of all the BT agents terrorists might have employed, said Rich Meyer, who heads the CDC's Rapid Response and Advanced Technology Laboratory, "We were lucky they chose anthrax. We were most prepared for that."

The nation's public health laboratories quickly refocused their emphasis from testing human specimens, such as blood or mucus, to environmental samples, which the crisis generated by the thousands. State public health laboratories alone ran over 84,000 environmental samples for *Bacillus anthracis* on surface dusts, powders, and other environmental materials. Although challenged by the crisis, public health laboratories played a crucial role in restoring public confidence. And they came away from the incident with valuable lessons about what to expect in a possible future BT event—and, importantly, how to better prepare.

One measure of the current state of preparedness is the federal response to a recent anthrax scare at a mail sorting facility at the Anacostia Naval Station in Washington, D.C. Although officials quickly called off the initial alert, this incident shows that policymakers have not uniformly heeded the lessons of 2001 and that the nation's biodefense procedures do not necessarily capitalize on the best existing science.

"All PCR Tests Are Not Equal"

Experts agree that a serious problem at the Anacostia postal facility was the failure to use standardized testing protocols. The CDC is responsible for developing and validating standardized procedures for select, high-consequence organisms that might be used for bioterrorism. These procedures, considered the gold standard among laboratorians, are disseminated to a nationwide web of laboratories—including all state public health laboratories—that comprise the Laboratory Response Network for Bioterrorism (LRN).

The Navy relied on a private contractor, the Shaw Group, whose biodetection equipment employed a commercially available polymerase chain reaction (PCR) test using a portable PCR system in the field. "We

Science and Policy, continued on page 4...
PRESIDENT’S THOUGHTS

Dear Members,

In September 2003, CDC published a strategic directions initiative entitled A National Strategy to Revitalize Environmental Public Health. Developed by NCEH/ATSDR in partnership with other federal agencies and stakeholders representing the public health practice community, advocacy organizations, the academic community, and communities with special interests related to environmental health, it was designed to complement the CDC Futures Initiative currently under development. Specifically the NCEH/ATSDR initiative aims to build capacity, support research, foster leadership, improve communication and marketing, and develop the workforce in environmental health. Its overarching goal is to develop a comprehensive national system that will revitalize environmental public health.

Achieving this goal will require us to shift our thinking away from environmental protection to the impact of environmental factors on community health. This is important for several reasons. First, many environmentally related conditions affect the health and lives of millions of citizens at significant cost; second, many emerging and re-emerging public health problems require innovative environmental public health service interventions; third, environmental public health is an important part of the public health response to terrorism and other emergencies; and fourth, environmental public health services are becoming more complex.

Environmental public health is not a new focus. From the beginning of public health in the United States in the late 1800’s and continuing until the 1960’s, the connection between the environment, sanitation, and community health was widely recognized. Even before the germ theory of infectious disease was established, the environment was suspected as a likely source of factors causing illness and death in communities. In response, laws were passed to enforce sanitation practices pertaining to clean water, sewage disposal, and food handling. These laws, which reduced or eliminated human exposure to environmental factors, accounted for many of the successes of public health.

As our nation moved into the 1960’s, there was a shift to address “new” environmental issues: air and noise pollution, ionizing radiation, proliferation of solid and liquid waste, disease vectors, wastewater, and others. “Environmental protection” became a watchword. In 1970 the U.S. Environmental Protection Agency (EPA) was formed. It evolved into a regulatory agency with an engineering base, while resources dwindled for environmental health programs based in public health agencies. With limited funding these became fragmented programs.

Under the NCEH/ATSDR initiative, CDC and federal, state and local partners will work together to rebuild the infrastructure necessary to establish the relationship between chemical and biological agents in the environment, public exposure to these agents, and their short- and long-term impact on public health. Public health laboratories will collaborate with environmental laboratories to provide the data necessary to advance terrorism preparedness, effective biomonitoring and environmental tracking. Expect to hear more on this bold initiative.

Sincerely,

Norman A. Crouch
EXECUTIVE DIRECTOR’S NOTE

Dear Members,

How do we know if we’re ready? In public health, this is the question of the moment. A litany of federal agencies from CDC to DHS, the Institute of Medicine, state and local health departments, healthcare providers, academia, hospitals, first responders, health nonprofits and others are grappling with the complex issue of emergency preparedness.

In the aftermath of anthrax, the readiness question resonates with public health laboratories. The logistical snags, long hours and endless stream of samples are still vivid memories, and the situation, as you know, could have been so much worse.

I don’t think any of us would question the value of emergency preparedness indicators specific to public health laboratories. Meaningful indicators will give us benchmarks against which to measure our progress, and standards to support sustained funding of infrastructure and workforce development. Yet indicators are just that — an indication of the status of a program at a given time. As Dr. Georges Benjamin, Executive Director of the American Public Health Association noted in a recent presentation, “Preparedness is a process and not a point in time.” For public health laboratories, there will never be a moment when we can rest from emergency capacity building. Given the boggling number of potential scenarios, the risk to public health and safety is just too great.

As you know, Trust for America’s Health recently released Preparing for Bioterrorism: A Report Card on State Efforts, an assessment of state preparedness following two years of increased federal funding. Though some of you may have found the information presented in the report to be outdated, or the indicators less than satisfactory, the good news is that this initial attempt to evaluate readiness has generated media coverage that is highly favorable to our issues. Workforce shortages, state funding cuts, deteriorating public health infrastructure, challenges with red tape: The word is out. So keep on talking up our issues.

Speaking of which, my sincere thanks for your comments on CDC’s draft indicators for the Public Health Preparedness Project. This information proved extremely helpful at a CDC meeting in Minneapolis on development of an anthrax planning case and related indicators. I have culled several points from your remarks and pass them on as fuel for thought:

- **More Than a Shop for Testing:** A public health laboratory is more than a shop for testing. We must consider all functions – training, reporting, surveillance, communications with clinical laboratories, etc. – in establishing indicators. Similarly, we will do well to develop indicators for laboratories at all levels, sentinel as well as confirmatory.
- **“Watch What You Mix”:** This laboratory axiom also applies to preparedness indicators. Focus areas C and D should be evaluated separately, not together as originally proposed.
- **Look at the System:** A public health laboratory cannot identify a variant subtype if the sample or isolate never arrives from the clinical lab. Indicators need to encompass public health systems as well as the entities directly involved.
- **No Readiness Without Resources:** We can develop the most comprehensive set of emergency preparedness indicators imaginable, but it will have no impact without adequate resources for public health programs and infrastructure. Why is it that this country can sustain funding for roads but not public health? Whatever the answer, moving from roads to health will require a major cultural shift. If it is to occur, those of us in the public health community must grasp every opportunity to explain that readiness means resources.

I wish you all a happy and healthy 2004!

Sincerely,

Scott J. Becker
know very little to nothing about the value of that commercial test,” said Meyer. But he noted that these types of systems have had a history of generating false-positives.

A positive PCR test result generally signifies that a specific genetic sequence was found. Matt Arduino, who oversees environmental microbiology research at CDC’s National Center for Infectious Diseases, explained in an e-mail, however, that “all PCR tests are not created equal.” Some are more likely than others to cross-react with species related to the organism of interest.

According to a report in the Sun newspaper, after the biodetection equipment generated the first positive test result on November 5 last year, Shaw group employees repeated the PCR test and got a second positive result. They then took eight additional samples to a laboratory set up in a trailer at Fort Detrick, in Frederick, Maryland, where the company was performing unrelated work for the military.

Of the eight additional samples, all analyzed on another portable test unit running the same Idaho Technologies assay, seven generated negative results and one tested positive for anthrax. Based on this finding, the U.S. Postal Service closed 11 mail facilities “upstream” from the Navy mail sorting center in case a potentially contaminated mail bundle had passed through en route to the Navy. Final confirmatory testing was performed at the Navy Medical Research Institute laboratory. All samples came up negative.

Confirming Commercial Tests With Standard Procedures

Mike Miller, who heads the Laboratory Management Branch of CDC’s Bioterrorism Preparedness and Response Program (BPRP), said that “what is important is that anyone using these commercial tests ensures that the results be confirmed by standard procedures that we know work.” In this situation, neither the contractors nor government personnel directed any of the samples from the Anacostia facility to an LRN laboratory using CDC test methods. Charles Schable, head of the CDC’s BPR Program, could not be reached for comment for this article, but is cited in the Sun article as saying that test results should have been confirmed by an LRN laboratory.

Michael Volz, who oversees California’s laboratory preparedness and response at the state’s emergency operations center in Richmond, pointed to another flaw in the response to the Anacostia situation: failure to preserve part of the original sample. Although subsequent samples tested negative, laboratorians could not conclusively rule out the presence of anthrax in the original sample because that sample was depleted early on and was therefore unavailable for retesting using more definitive technologies. “It is clear . . . that a variety of costly, far-reaching and perhaps unnecessary public health interventions were taken simply because the science could not define the situation,” Volz wrote in an email. “Yet better science indeed was (and is) available in the same timeframe.”

Nick Cirino, who oversees BT testing for the state of New York, said the New York State Department of Health has tried to limit the use of commercial field tests, such as the one operated by the Navy contractor, because of the increased risk for false-positives. “With any PCR-based test method, field testing is going to be an issue because you can’t control for contamination,” he said.

New Biodetection Systems Make Protocol Critical

Despite general concerns about field tests, two prominent biodetection systems will shortly be in widespread use: the BioWatch system, which is already up and running in several metropolitan areas, and the Biohazard Detection System which will be operational in 282 U.S. Postal Service facilities this spring. The automated, PCR-based screening devices that will be employed in the Biohazard Detection System have been evaluated by the CDC in a pilot program at more than a dozen sites and deemed to be accurate and reliable. Both BioWatch and the Biohazard Detection System rely on LRN laboratories for confirmatory testing.

In New York, a system is in place to promote uniform, triage, collection and transport of environ-
mental samples by first responders. First responders statewide carry a pocket card that outlines a standard environmental sampling protocol for materials suspected of contamination with biological agents. The small trifold also contains contact information for local health departments, LRN testing facilities, and other agencies involved in BT response. State authorities discourage the use of field tests by responders, but if performed, field results must be confirmed by an LRN laboratory prior to public disclosure.

While many samples are directed to the state public health laboratory, any commercial or public health laboratory that performs anthrax tests on environmental samples originating in New York is required to be certified by the state’s environmental laboratory accreditation program. So far, seven laboratories have been certified to test swabs or wipes for anthrax, and only two—the state Department of Health’s Wadsworth Center and the New York City Department of Health and Mental Hygiene—are authorized to test environmental powders for anthrax. Both are LRN reference laboratories.

“This accreditation program,” said Cirino, “is very helpful, because most of the labs that we’ve inspected would have a very difficult time controlling for contamination if they had received the powders from the ‘01 (anthrax) event since they lack high containment facilities and protocols.” Those powders, he said, had been weaponized and were fine enough to pass through paper.

**Environmental Samples, “A Whole New World”**

Even with clear guidelines for environmental sampling and testing, however, researchers readily acknowledge that the state of laboratory science is evolving and that there is limited data available to illuminate the best environmental sampling and testing practices. Before the fall of 2001, the LRN was primarily involved in analyzing clinical specimens taken from people. The switch to environmental samples represents “a whole new world,” according to Meyer.

While the laboratory assays for specific agents, such as B. anthracis, are the same for clinical or environmental materials, the protocols to collect and process the materials are vastly different. In fact, in October 2001 there were no protocols for collecting and processing environmental samples for subsequent anthrax testing. Those procedures were devised only after the anthrax attacks along the Eastern seaboard.

Current environmental protocols, said Meyer, are not as robust as clinical protocols. Part of the problem is the diversity of environmental matrices; food, soil, liquids and any number of other materials could be contaminated with BT agents. Ideally, collection techniques should maximize recovery of BT agents so laboratorians have sufficient material for initial and confirmatory testing, as well as forensic investigations.

[Simply devising the best method to collect anthrax spores from indoor surfaces is complex. CDC’s Arduino, who has been researching environmental sampling protocols, explained that pre-moistened cotton and macro foam swabs appear to perform better than other materials that have been tested to date, but mean recovery efficiencies still do not surpass 43 percent with B. anthracis spores that are alcohol-fixed to surfaces.]

Once samples are collected, genetic material from any biological organisms present must be extracted from the sampling matrix, concentrated, and purified to make it detectable via PCR testing. For example, the humic acids that are naturally present in soils can interfere with some PCR-based methods and so must be removed. “Sample processing for PCR is a huge potential bottleneck,” said New York’s Cirino. “Especially from environmental matrices.”

Another research need is characterization of the environment to ascertain the background levels of naturally-occurring BT agents. Researchers are still investigating a recent Houston-area incident in which multiple environmental sampling filters tested positive for Francisella tularensis, a potentially deadly organism that exists in nature. In this case—stemming
from the national BioWatch program to monitor select metropolitan areas for BT agents—the finding was confirmed by both the Houston public health laboratory and the CDC. Susan Neill, chief of the Texas Bureau of Laboratories, said that it is plausible that naturally-occurring organisms triggered the system.

Many Questions in Environmental Characterization
The research to date on environmental characterization, said Meyer, represents only “the tip of the iceberg.” And there are many other unanswered questions. For example:

- What is the best method for decontaminating indoor environments (that is, maximizing the kill rate of biological organisms without damaging sensitive machinery and office equipment)?
- What is the best method to determine when a building is safe for humans?
- What are the lower limits of detection for various organisms using current technologies?

Meyer said that the CDC is collaborating with a host of federal agencies to study these and other issues. Last year the CDC and Federal Bureau of Investigation conducted a joint review of handheld BT testing devices that determined that the 2002 generation of such devices does not perform reliably. Currently, the CDC, Environmental Protection Agency, National Homeland Security Research Center, and Department of Defense are planning studies to evaluate surface sampling techniques in the hopes of issuing guidelines for the use of various sampling media. And researchers are beginning work on multiplexing techniques that will enable laboratorians to test for a number of BT agents simultaneously.

Advances in Diagnostics v. Cuts in Funding
“As every day goes by (laboratory science) gets better and better,” said Meyer. BT-related research, he said, has “extended the realm of laboratory diagnostics tremendously, not only for BT agents but across the board for public health generally.”

He also pointed out that, from a technical perspective, it’s sometimes difficult to reach consensus on environmental protocols. Moreover, there is no one agency accountable for coordinating and prioritizing BT-related research across all government agencies.

At the state and local levels, public health agencies are grappling with another set of problems: finding the resources to maintain BT preparedness and to educate first responders and the lay public. As a consequence of widespread state budget deficits, most public health laboratories are experiencing significant budget shortfalls. Moreover, state government employment regulations often dictate that employees with the least tenure be the first to be laid off when positions are cut. This practice has meant that many public health laboratories are losing the BT coordinators and scientists that they have only recently hired.

While laboratory science has advanced considerably in the short time since the anthrax attacks, two of the experts interviewed for this article asserted that, without adequate resources and appropriate planning, the nation will not fully benefit from those advances, with possible adverse effects on the public and the field. Wrote Volz, “Demonstrably effective emergency response protocols based upon our best science are essential to maintain the credibility of public health agencies in the eyes of the public.” Referring to the Anacostia anthrax scare, he noted, “We really need to be learning from each discomfitting scenario how better to meld the science of the day with corresponding public health policy.”
Environmental Health Conference Highlights Laboratory Issues

After a break of ten years, the Centers for Disease Control and Prevention (CDC) National Center for Environmental Health (NCEH) and Agency for Toxic Substances and Disease Registry (ATSDR) held its Sixth National Environmental Public Health Conference, “Preparing for the Environmental Public Health Challenges of the 21st Century,” December 3-5, 2003, in Atlanta. Ronald Laessig, PhD, APHL’s Environmental Health Committee Chair, represented APHL on the conference committee.

Plenary sessions challenged participants to look at environmental public health programs and activities in new and inspiring ways. William McDonough called for a new kind of ecological consciousness by describing corporations that are not just doing less harm—they’re actually doing some good for the environment and their neighborhoods, and making money in the process.

Breakout sessions covered a range of issues including global environmental health, terrorism preparedness, lead poisoning, air, water, food, and other technological advancements. CDC supported 66 environmental public health leaders to attend the conference, including Utah public health laboratory director Chuck Brokopp, DrPH.

Biomonitoring, described as a concept whose time has come, was given extensive coverage in both plenary and breakout sessions. APHL members Norman Crouch, PhD, Jim Pearson, DrPH, BCLD, and Richard Harris, PhD, presented “Building State Public Health Laboratories’ Capacity to Respond: Biomonitoring and Chemical Terrorism.” The session showcased the three levels of laboratories funded by Focus Area D as well as biomonitoring programs now underway in New Hampshire and the Rocky Mountain Consortium (presented by New Mexico). Biomonitoring was also discussed at Environmental Public Health Tracking sessions, with development of State Health and Nutrition Examination Surveys (HANES) a popular theme.

APHL director of environmental health programs, Jennifer Liebreich, and a number of APHL members had the opportunity to meet with Henry Falk, MD, MPH, Director of NCEH and Assistant Administrator of ATSDR. At his request, the group spoke about environmental health issues of concern and priority in state laboratories and in the association.

Newborn Screening

Making the Case for Genetics: How Should the Public Health Laboratory Be Involved?

How can public health laboratories be proactive by using advances in human genetics in their efforts to serve their communities? What roles should the public health laboratory play? These issues were discussed at a “brainstorming” meeting held at the APHL headquarters on October 20, 2003. Approximately twenty persons participated; all participants were either active APHL committee members, state and local public health laboratory directors, state chronic disease directors, or academic researchers.

This meeting was sponsored by the Division of Laboratory Systems, Public Health Practice Program Office, CDC.

The intent for this one-day meeting was to foster a dialogue that moved beyond the screening of newborns for heritable metabolic diseases, where current genetic activities primarily reside, toward other promising areas that would advance the services provided by public health laboratories. Short presentations about issues covering chronic disease (cardiac disease and diabetes), infectious disease (meningitis and HIV), and pharmacogenetics were used to facilitate discussion among the participants.

Due to resource limitations and competing priorities, many programs have difficulty changing existing services, unless benefits and cost-savings can be clearly justified; even then, acceptance of changes can be problematic. As the group considered how to
...Genetics, continued from page 7

integrate genetics into current activities, participants began to envision a process adaptable to each program’s environment. The three-step process would include a preliminary assessment to consider priority, practicality, and potential benefits; applied and translational research to test key concepts; and an implementation and evaluation phase. During the course of this discussion, participants interpreted the public health laboratory role to encompass education, advocacy, and partnering. Issues of access, data collection, analysis, and reimbursement would also need to be addressed.

This meeting was designed to begin a dialogue that will expand to allow broader participation. Next steps will include a follow-up meeting where individual state experiences will serve as a primer to identify actions that may be broadly applicable to public health laboratory programs. APHL also intends to further consider the process mentioned above and its applicability in “making the case” for integrating genetics into public health activities. We envision these discussions as invaluable in helping APHL, CDC, and others direct their efforts and resources to those activities that best serve public health laboratories and the health of the community.

CDC is currently developing a more detailed summary of this meeting. For more information, please contact Jelili Ojodu, program manager, newborn screening and genetics, 202.822.5227 x235 or jojodu@aphl.org.

Collaborating for Next Steps on LIMS

Twenty-five state public health laboratories, together with APHL and the Public Health Informatics Institute (PHII), are collaborating to develop a design specifications document for laboratory information management systems (LIMS). Like the earlier joint initiative to develop a LIMS requirements document, this Next Step Project aims to eliminate costly, redundant efforts to specify the informatics needs of public health laboratories. Participating states are Alaska, Arizona, Arkansas, Colorado, Hawaii, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Minnesota, Missouri, Nebraska, Nevada, New York, Oklahoma, Oregon, Vermont, Virginia, Washington, West Virginia and Wyoming. The $150,000 project is supported by the Robert Wood Johnson Foundation.

Already a charter, plan and kickoff meeting have been completed in the first phase of the project. More detailed requirements definitions— including priority business processes, general system requirements and a design methodology—are anticipated by January 2004 and design specifications by May 2004. Post-design analysis will follow with recommendations on subsequent action. Design specifications will become the property of APHL and be made available to all public health laboratories.

An effective LIMS will ensure a high degree of interoperability among PHLs and between PHLs and federal agencies, and improve capacity for mutual assistance in a crisis. It also will facilitate joint proposals to vendors. The design specifications cannot arrive too soon. Many public health laboratories plan to upgrade antiquated information systems or acquire new LIMS software with funds from FY 2004 bioterrorism grants.
EID Fellows in the News

Class VIII Training Fellow Nhi Khuong assisted the NLTN during its molecular diagnostics public health series course in October at the California State Public Health Laboratory in Richmond, CA. Along with NLTN staff, Khuong helped plan the course, including ordering materials, preparing, labeling, and aliquoting reagents for the laboratory portion. She coordinated much of the course equipment, set up the lab benches, proofread laboratory protocols, and served as a lab assistant. NLTN Program Manager Marguerite Oates described Khuong as a valuable member of the planning team. “Her knowledge, skills, and enthusiasm for molecular diagnostics were utilized before the course as well as during the laboratory component. Her contribution made a very positive impact on the course.” Thank you, Nhi!

Khuong also recently co-authored a paper that was accepted for publication in the Journal of Clinical Microbiology, “Real-time Multiplex PCR Assay for the Detection of Brucella spp., B. abortus, and B. melitensis.”

Ayanna Bradshaw-Sydnor presented a poster at the APHA meeting in November in San Francisco. “Trich or Treat: Drug Resistant Trichomononiasis among Adolescents” is based on her research in the CDC’s Division of Parasitic Diseases.

International EID Fellow Abu Tholib Aman presented his fellowship project results at the October 2003 Asian Rotavirus Surveillance Network (ARSN) in Manila, Philippines. Aman recently completed his fellowship in CDC’s Division of Viral and Rickettsial Diseases and returned to his home country of Indonesia.

APHL Launches New Environmental Health Fellowship and Traineeship Program

APHL and DLS/NCEH are pleased to provide an opportunity for state public health laboratories to enhance environmental health laboratory testing capabilities through a new Environmental Health Traineeship and Fellowship Program. The traineeship program provides short-term (2-6 week), specialized training in environmental health technology and testing methods for current laboratory staff. The selected staff will train at another state health department, NCEH/CDC, or other state or federal agencies, such as ATSDR, EPA, NIEHS or NIOSH. The fellowship program provides an opportunity for the recruitment and placement of a pre- or post-doctoral fellow for 1-2 year assignments to address specific environmental health technology needs.

For more information or application materials for these programs, please contact Heather Roney, fellowship program manager, at hroney@aphl.org.

2004 EID Fellowship Deadline

The application deadline for local, state and federal public health laboratories interested in hosting a fellow for the 2004 EID Laboratory Fellowship Program is March 1, 2004. The application deadline for prospective fellows is February 20, 2004. For more information, please contact Heather Roney, fellowship program manager, at hroney@aphl.org.

Did you know?

There have been 229 fellows. One hundred forty-seven have worked in NCID/CDC laboratories; eighty-two have worked in state and local public health laboratories. Twenty-one states have hosted a fellow. During the program, fellows have participated on 330 publications, 86 outbreak investigations and 449 domestic/international meetings. Twenty-eight fellows participated in short-term international assignments in Bangladesh, China, Guatemala, Haiti, India, Kenya, Kyrgyzstan, Mexico, Peru, Singapore, Spain and Uzbekistan.
The National Center Anticipates 2004: What’s on the Horizon?

APHL’s National Center for Public Health Laboratory Leadership finished 2003 with an impressive list of accomplishments and more exciting plans for 2004.

The next Center board meeting is scheduled February 5-6, 2004, in Miami, FL. Board members will discuss future programming and test-pilot the OARS Program’s team-building exercise. OARS builds high-performance leaders and teams by offering a unique, experiential learning program using the Olympic sport of rowing and interactive educational activities. Through a new and rigorous process, program participants gain insight into common factors that affect performance—both positively and negatively.

The board will also discuss how to disseminate key messages from the University of North Carolina’s Grand Rounds broadcast, “Disease, Disaster, and Detection: Partnering with Public Health Laboratories,” which aired September 26, 2003. Approximately 1200 participants, 70% of which were from outside of public health laboratories, registered for the Grand Rounds event. Estimates place the actual number of attendees significantly higher as formal registration was not required to view the broadcast. The program focused on the laboratory network in Minneapolis/St. Paul, MN, and how it protects the health of the community through a strengthened public health infrastructure.

The broadcast aimed to raise awareness of the laboratory system and the respective roles of public health and clinical laboratories in building partnerships, promoting communication networks, and fostering leadership. Also highlighted in the broadcast were APHL’s contributions to improving laboratory systems and practice and the identification of three of the goals of the National Center for Public Health Laboratory Leadership: build alliances, market lab skills and services, and communicate with constituencies. The National Center plans to use this broadcast to expand understanding and awareness of the work of public health laboratories among health organizations and government decision makers.

Disease, Disaster, and Detection: Partnering with Public Health Laboratories

To view the free, archived broadcast online or to order a tape for a fee, visit www.publichealthgrandrounds.unc.edu/labsafety/index.htm.

Faculty speakers:

Robert Martin, Director, Division of Laboratory Systems, Public Health Practice Program, Centers for Disease Control and Prevention
William Roper, Dean of Public Health, University of North Carolina at Chapel Hill
Hugh Tilson, Clinical Professor, Epidemiology and Health Policy, School of Public Health, University of North Carolina at Chapel Hill
Lou Turner, Director, North Carolina State Laboratory of Public Health

A few days after Grand Rounds aired, the National Public Health Leadership Institute accepted four APHL/National Center scholars—Norman Crouch (MN), David Mills (NM), Susan Neill (TX), Lou Turner (NC)—into a one-year, leadership development program funded by the CDC. Established in 1991 in response to the need for enhanced leadership in public health, the Institute works to strengthen the leadership competencies of senior public health officials and to build inter-organizational teams to improve community health status. The program hones scholars’ ability to think from a system’s perspective, interpret and apply data to public health issues, and realize a vision for change.

The new group was dubbed “Team APHL” during its first meeting at the American Public Health Association, November 14-15, 2003. Team APHL will spend the majority of 2004 evaluating the program for its potential to develop leaders in the public health laboratory community. It will also make recommendations, where appropriate, for
revisions that would make the program more inclusive of public health laboratory needs.

In 2004 the Center will continue hosting regional leadership forums on issues critical to laboratory administration, such as implementing public health preparedness measures under CDC’s critical benchmark 10, assuring quality in rapid testing and operating in an environment of draconian cuts. Information from these forums will be compiled into a "best practices" publication.

Forums have been held in the Northeast, Northwest, Midwest and Canada. The next forum, scheduled for January 14-15, 2004, in San Antonio, TX, will focus on risk and crisis communication. The Center will continue working with a dedicated group of retired CDC public health laboratory directors to develop a guidebook for new laboratory directors. The guidebook will be used in a two-day orientation program for public health laboratory directors and shared with other emerging leaders in the field.

To mark the Center’s one-year anniversary in November 2003, it hosted two additional grant-writing workshops in Boston, MA, and Chicago, IL. Forty-three participants, representing 13 state, city, and county public health laboratories, attended the two workshops as well as CDC staff who offered their expertise as grant reviewers. The Chicago workshop was filmed for production of a CD-ROM tutorial that will be distributed free-of-charge in the spring of 2004 to workshop participants and interested public health laboratories. The CD-ROM can be used as a reference or a resource for organizing on-site workshops. More grant-writing workshops may be offered, depending on Center funding.

If you have questions about the National Center for Public Health Laboratory Leadership or would like to obtain copies of the grant-writing CD-ROM, please contact Center Program Manager Rachel Collins at 202.822.5227 ext. 306, rcollins@aphl.org.
The West Nile Virus Epidemic: From 200 to 2000 Diagnostic Tests Per Week

Tony Sambol, Assistant Professor, School of Allied Health Professions, Assistant Director, Nebraska Public Health Laboratory

In 2003 the Nebraska Public Health Laboratory (NPHL) was designated to perform serological testing for West Nile Virus (WNV) IgM antibody in a coordinated effort with the epidemiology department at the Nebraska Health and Human Services System (NHHSS). It was felt that in-state testing by the NPHL, handled through its collaboration with Regional Pathology Associates (RPA—a private reference laboratory service located at the UNMC), and conducted in the serology department of the Nebraska Medical Center Clinical Microbiology Laboratory would allow state epidemiologists to circumvent previous test-result reporting problems by utilizing the web-based Public Health Laboratory Information Program (PHLIP) to track the spread of WNV through real-time electronic reporting. Previously all human serological testing for WNV antibodies of Nebraskans was done by the Centers for Disease Control and Prevention (CDC), other state public health laboratories or private commercial laboratories outside the state.

Methodology
The testing methodology was a solid-phase IgM capture ELISA assay that would allow for 80 specimens to be run in a 96 well microtiter plate. Analyte specific reagents (ASR) from Focus Technologies were used. These reagents were recommended by CDC and used by Mayo Clinic and other reference laboratories in previous years.

Planning
As with any new test, planning for the anticipated volume of testing is critical in outlining the workflow patterns necessary to complete the task in an acceptable length of time. Test turn-around-time (TAT) is an important issue in treating patients or planning public health intervention. Given that there were approximately 174 human cases of WNV in Nebraska last year, including several deaths, and that WNV typically hits an affected state harder during the second and third years, NHHSS personnel predicted that the NPHL might have to test up to 200 specimens per week during the peak of the season. Based on this estimate, the decision was made to set up this test on an automated system used for other serological tests with ELISA-based methodology, to batch specimens, and to perform testing twice per week on Tuesdays and Thursdays. Per CLIA requirements, the test was validated in-house before the testing season began.

Testing
The NPHL began specimen testing in early to mid-June. During the first several weeks the volume was low, less than 200 per week, and tests were performed twice a week in batch as previously established. This strategy worked well until mid- to late July when the WNV epidemic hit Nebraska, and the rest of the Midwest extremely hard. Specimen volume went from less than 200 per week, to four hundred per week, to 600 per week, to a one-day high of nearly 1,000!

Analysis of the Testing Process
As the number of specimens began to increase sharply, weekly and then daily team meetings were held with personnel from the RPA, The Nebraska Medical Center Clinical Microbiology Laboratory, and the NPHL to review and coordinate changes to impact critical workflow issues. The entire “process” related to specimen receiving, test ordering, laboratory testing strategy, and finally reporting of test results to all necessary health officials, including ordering physician, ordering facility, and local and state health officials, was analyzed to understand bottlenecks causing restrictions of the workflow and decreased turnaround time.

Changes to the “process” were incremental at first, but as the season reached its peak, “magnitudinal” changes were necessary to handle the marked increase in the volume of specimens. These changes are listed in the following table:
### Conclusions
A team of staff from RPA, The Nebraska Medical Center Clinical Microbiology Laboratory and the NPHL analyzed the entire “process” of specimen testing in a series of meetings. All processing points were considered to identify bottlenecks impeding the process. Incremental, then magnitudinal changes were made that allowed for successful handling of the marked increase in specimens during the epidemic period. The Nebraska Public Health Laboratory was successful in handling the increased specimen testing volume, and to date has tested over 11,000 serum and CSF specimens from people living throughout the state. Centralized testing allowed for timely release of critical test results to state epidemiologists, the state Chief Medical Officer and health care providers. “Lessons learned” from this naturally occurring epidemic will help the state prepare for another naturally occurring event or one that is man-made.

## Process Task | Incremental Changes | Magnitudinal Changes
--- | --- | ---
Specimen receiving | Longer shifts; working weekends | Addition of temporary staff
Specimen accessioning | Longer shifts; working weekends | Addition of temporary staff
Specimen testing | Daily runs; to longer shifts with 2 to 3 runs per day | Weekend runs added; second machine purchased
Reporting results | Longer shifts; working weekends Hand writing reports to Excel spreadsheets | Addition of temporary staff Automated electronic “mining” and reporting of results to NHHSS

---

### International Conference on Emerging Infectious Diseases (ICEID)
Atlanta Marriott Marquis
February 29, 2004 - March 3, 2004

The International Conference on Emerging Infectious Diseases brings together public health professionals to encourage the exchange of scientific and public health information on global emerging infectious disease issues. Core topics include current work on surveillance, epidemiology, research, communication and training, bioterrorism, and preventions and control of emerging infectious diseases, both in the United States and abroad.

Major subjects covered will include:
- Antimicrobial Resistance
- Bioterrorism and Preparedness
- Foodborne and Waterborne Illnesses
- Global Health
- Molecular Diagnostics and Epidemiology
- Nosocomial Infections
- Socio-economic and Political Factors
- Vectorborne Diseases
- Zoonotic Diseases

Visit www.cdc.gov/iceid.
Chemical Terrorism Satellite Program

It is with great satisfaction that the National Laboratory Training Network (NLTN) office in Chicago looks back at a year of successful planning for the satellite program, “Chemical Terrorism Preparedness: The Basics,” held November 13, 2003. The program included numerous national speakers: the FBI’s Doug Anders, PhD, the CDC’s David Ashley, PhD, the EPA’s Mark Mjoness, the DOD’s Dennis Reutter, PhD, and the University of Arkansas College of Medicine’s Jimmie Valentine, PhD. Topics covered include government departmental roles, chemical agents and modes of transmission, and human medical consequences. This satellite program reached registrants from 48 states, spread between 438 viewing sites. The current tally of viewers is 1200 and climbing.

This program was a collaborative effort of the NLTN Chicago office and three state training coordinators (STCs) – Iowa’s Beth Hochstedler, Minnesota’s Randy Graham and Wisconsin’s Cheryl Matzinger. Each of the three states donated $5,000 toward the cost of the satellite program. Each STC formed a planning team in his/her own state, comprised of laboratory, bioterrorism and environmentalist staff. The NLTN and the STCs participated in monthly planning teleconferences. The NLTN organized the national overview program with input from the states, while the STCs planned independent, local chemical terrorism response programs, designed to follow the national satellite broadcast.

The viewing rates of the local programs varied by site. Minnesota had 336 registrants, spread between ten videoconference sites; Iowa had 150 registrants; Wisconsin had 111. These states hosted the local response programs with panel discussions and tabletop exercises. These programs featured speakers from a variety of local departments such as public health, law enforcement, hazmat, emergency management, homeland security, local EPA and FBI, fire department, other first responders and more. Rhode Island, Delaware, Massachusetts, Oklahoma and California also produced local programs in order to meet their individual needs. Illinois, an additional site, had 199 registrants at 10 videoconference sites.

Evaluations received so far reflect that participants thought the program was worthwhile, taught in an appropriate manner and met the stated objectives. Half of these respondents reported that they would make changes to existing procedures as a result of the program. Ninety to one hundred percent believe they now know the roles of federal agencies such as CDC, FBI, EPA, and DOD and could list agents of chemical terrorism and modes of transmission. Registrants provided with a local program believe that the national satellite program was a good overview, and were grateful for the more specific, local information provided through the state program.

The archived Web cast is available at the Iowa Center for Public Health Preparedness at www.public-health.uiowa.edu/icphp/index.html. All state training coordinators have received a free VHS copy of the program, which can be used for further, state-specific training. Copies of the tape are also available for checkout at the NLTN library, www.nltn.org. Under development is a Workshop-In-a-Box for this program, scheduled to be available in January 2004. This satellite program provided an important first step toward more comprehensive, chemical preparedness training.
**PulseNet**

**MN Hosts First PulseNet Area Meeting**
In the spirit of enhanced collaboration, the Minnesota Public Health Laboratory hosted the first PulseNet Area Meeting on October 28-29, 2003. Representatives from each of the seven states in the Minnesota area were in attendance. In addition to the PulseNet laboratorians, attendees included laboratory supervisors, foodborne epidemiologists, and a few state laboratory directors.

The meeting started with the Minnesota perspective on the PulseNet program, with a welcome by Minnesota's state laboratory director, Dr. Norman Crouch, and speakers from the Minnesota Department of Health, Department of Agriculture, and the University of Minnesota. Six other states were then asked to discuss their own PulseNet activities, highlighting the interactions between laboratorians and epidemiologists.

The highlight of the first day was the brainstorming session and roundtable discussion that followed. Participants were asked to discuss which PulseNet functions need improvement, what changes would increase its functionality, and what barriers impede its progress. The group then proposed creative solutions to these issues, which they can take back and implement in their states. The second day of the meeting focused more on technical laboratory details, and was very helpful to the newer PulseNet laboratorians and to the epidemiologists.

The important outcome of the meeting was the relationship building between laboratory and epidemiology staff. Without these interactions, PulseNet cannot function to its fullest extent. With the assistance of Dave Boxrud and John Besser from the Minnesota laboratory, and the support of CDC's Foodborne and Diarrheal Diseases Branch, APHL hopes to coordinate similar meetings in each of the PulseNet Areas.

**USDA-ARS to Establish Veterinary PulseNet Hub**
For several years, the USDA-FSIS has been a participating member in PulseNet USA, contributing PFGE patterns from food isolates that can be compared to PFGE patterns from human isolates submitted by public health laboratories. Recently, USDA-ARS has allocated funds to establish a separate PulseNet hub for the collection of PFGE patterns from isolates of animal origin, starting with Salmonella. This veterinary database will be a separate entity from PulseNet USA, just as PulseNet International groups maintain their separate hubs. The veterinary database will be operated out of USDA, although CDC will assist with the initial creation and housing of the database. Two USDA staff members will be placed on the PulseNet USA database team at CDC on an interim basis to facilitate the creation of the new network. APHL and CDC welcome this new PulseNet hub as a source of valuable data in investigating foodborne diseases from the perspective of the human-animal interface.

**Second STEC Surveillance Course**
The Georgia Public Health Laboratory was the site for the second STEC Surveillance Course, which was offered by APHL and the Foodborne and Diarrheal Diseases Laboratory at CDC. Twelve students from public health laboratories participated in the five-day course, which included updated lectures and hands-on laboratory sessions. Methods taught include Light Cycler PCR, Smart Cycler PCR, immunomagnetic separation, colony hybridization, specialized media, and serology.

The students returned to their laboratories with complete notebooks covering all lecture and laboratory topics, which should be shared with their co-workers. Additionally, CDC will send sets of reagents to each student's laboratory so that the assays can be set up in the respective states. In order to reach a larger audience than is possible with traditional training courses, CDC opted to have the second STEC Surveillance course videotaped. Footage from this video will be used to create a VHS tape of the course, as well as a DVD-format distant learning module. All public health laboratories will be able to receive copies of both

---

PulseNet, continued on page 16...
the VHS tape and the DVD distant learning module, which should be available in spring 2004.

**2004 PulseNet Update Meeting**

Plans are well underway for the next PulseNet Update Meeting, which will be held in San Diego, CA, the week of April 26, 2004. Five state and county public health laboratorians have joined the agenda committee, and several speakers have also volunteered. The theme for this year’s meeting will be “PulseNet: Getting Connected.” Last year, representatives from every PulseNet participating laboratory attended the Update Meeting, and APHL hopes to meet this milestone in attendance again in San Diego.

Further information on any of the above programs can be obtained by contacting Shari Rolando at srolando@aphl.org.

---

**MEMBER NEWS**

**“Where do my blood samples go?” Kids and Parents Tour Lab**

The full text of this article appeared in the November 2003 employee newsletter of the North Carolina Department of Health and Human Services. Other laboratories may wish to adapt this concept to promote their programs to government and community audiences.

Children with metabolic disorders and their parents got a look at the inside of the North Carolina State Laboratory of Public Health this fall. These happy, active kids and families owe their normal lives to the state’s Newborn Screening Program.

Within two to three days after birth, all infants in North Carolina are tested for conditions that may cause mental retardation or death if untreated. A drop or two of blood is all it takes for the state lab’s tandem mass spectrometer to test for 30 different metabolic disorders. Four other tests, including one for sickle cell trait, are also run in the Newborn Screening Lab. The lab tests as many as 2,000 samples a day for metabolic disorders. The screening program detected PKU in four of these children, and IVA in one of them, within hours of their births. That meant that each child received prompt treatment, including special diets, and avoided the terrible consequences of these disorders. As they grow, the children must be monitored regularly and their treatment modified as needed to keep them healthy, so they send regular blood samples to the lab. On this trip, they saw what happens to those drops of blood, looked at pictures of themselves in the lab scrapbook, and met staff from the lab and Newborn Screening Program.

---

**Iowa Lab Speaks to Thousands**

The University of Iowa Hygienic Laboratory (UHL) actively participates in the University of Iowa Speakers Bureau. This program assists UHL in reaching out across the state to help Iowans better understand emerging infections, environmental issues, and terrorism. Through the speaker’s bureau, Dr. Mary Gilchrist, the UHL director, and many of her staff speak at a wide variety of organizations such as service clubs, community and civic organizations, professional and educational associations, library groups, senior centers, churches, school groups and museums.

One of the most successful, long-term venues for the UHL and the Iowa Speaker’s Bureau occurred through a commitment to the Iowa Public Television’s K-12 Connections program. The lab is able to deliver content to classrooms throughout the state, reaching students in large cities and small rural communities via Iowa’s Communication Network (ICN). The UHL will be reaching out to thousands.
of K-12 students over the next year. As part of its Centennial Celebration, UHL will teach a total of 22 classes, geared for all age levels, covering topics such as "Infections in the School Yard," "Homeland Security," and "Careers in Public Health." To date UHL has taught only four classes but has already reached 865 students across the state. Teachers are enthusiastic: "This was the best ICN class we have participated in. It was well presented and the kids' interaction was valuable. This fits into our science curriculum perfectly."

As University of Iowa Hygienic Laboratory Director Mary Gilchrist says, "We need to learn to communicate about the issues associated with what we do and not about what we do. Just stick to the issues and people will subliminally get the message."

New Public Health Laboratory: State-of-the-Art in Texas

On October 30, 2003, the new Texas public health laboratory was officially dedicated. Eduardo Sanchez, MD, MPH, Commissioner, Texas Department of Health, hailed the state-of-the-art laboratory as a "new beginning in how we serve the people of Texas." The 109,000-square-foot facility, said Sanchez, will improve detection of new public health threats like West Nile virus and bioterrorism, and established ones including rabies, tuberculosis and food-borne illnesses. Speaking on behalf of Governor Rick Perry, George McCleskey, MBA, JD, Chair, TX Board of Health, cut the ribbon to the new building with the assistance of Laboratory Director Dr. Susan Neill. McCleskey extolled the laboratory employees who perform over 6 million tests annually on 1.6 million samples and "build the future in their daily work."

After the dedication, visitors were allowed to tour the state-of-the-art facility. The following sections were of particular interest:

Arboviral Diseases Section: provides testing for surveillance programs and identification of mosquito-borne diseases.

Texas Newborn Screening Program: One of the largest laboratories of its kind in the world, performs more than 600,000 tests per year. Screens every newborn in the state and works with the Texas Health Steps program to perform screening tests on
Laboratory At-A-Glance

Founded: 1896  
Location: Austin, TX  
Labs: 1  
Staff: 314  
Size: 109,000 square feet  
Cost: $45.7 million  
BSL Rating: 3  
Test Volume: 6 million/year

Performs Services in Following:  
Newborn Screening, Clinical Chemistry, Drinking Water Analysis, Parasitology, Microbiology, Environmental Chemistry, Environmental Microbiology, Serology, Immunology, Virology, Molecular Biology, Arthropod Identification, Mycobacteriology, Mycology

...Texas, continued from page 17

samples from children ages’ birth to 21 years for lead intoxication, sickle cell disease, coronary heart disease and syphilis.

Environmental Services Division: Primary drinking water analysis laboratory in the state.

Consumer Microbiology Section: Performs microbiology analyses of food, dairy, shellfish and water samples.

Mycobacteriology/Mycology Branch: Processes about 30,000 patient specimens annually, primary state reference laboratory for mycobacteriology and fungal isolates.

Rabies Laboratory: Notable for its display of bats. Tests 10,000 animals annually and provides results within 24 hours of receipt. Does rabies viral typing.

Training and Outreach

The Texas laboratory also provides training to the healthcare community and participates in diverse outreach activities. Medical technology students from two different academic institutions rotate through several sections of the laboratory as part of their clinical training. Courses for clinical and public health laboratorians are offered routinely around the state on topics ranging from bioterrorism preparedness to specimen collection to molecular epidemiology. A recent success was the bilingual, medical entomology course produced in conjunction with the Pan American Health Organization, which hosted nineteen scientists from Mexico. Outreach activities are not limited to training. Recently the laboratory co-sponsored the University of Texas’s Public Health Career Conference, which was attended by over 500 university and high school students. APHL also supported this initiative.

As C. J. Peters, MD, Director, University of Texas Medical Branch Center for Biodefense so aptly said, “I’ve studied diseases all over the world and a public health department is only as good as the laboratory that backs it up.” Using this measure, Texas stands tall in public health.

FBI Honors New Mexico Laboratory With Community Leadership Award

The FBI awarded the New Mexico State Department of Health’s Scientific Laboratory Division with the Director’s Community Leadership Award at a ceremony held Thursday, December 18, 2003. The award was given for the laboratory’s work in testing for chemical and bioterrorist agents.

With a history of over eighty years, the Scientific Laboratory Division has extensive experience in testing and investigating biological agents of concern as well as West Nile virus, Hantavirus and Severe Acute Respiratory Syndrome (SARS). “Many people do not realize that New Mexico has one of the top public health laboratories in the country,” said Patricia Montoya, Secretary of the New Mexico Department of Health. “It is an honor to have the FBI acknowledge the important work the laboratory does.”

Since 1990, the FBI has presented the Director’s Community Leadership Award to individuals or organizations working to prevent drug, crime or gang violence. The Special Agent in Charge of each of the 56 FBI field divisions selects one winner from that division. As the FBI nomination form stated: “Scientific Laboratory Division personnel have always provided assistance and resources, and, more importantly, extended unparalleled levels of professional courtesy.”
Membership Structure Reviewed, Recommendations Made for Improvement

APHL’s Membership and Recognition Committee met in October to discuss committee business and to focus upon the current status of the membership category structure. One of the priorities of APHL’s Board of Directors and the committee is to ensure that the association is organized in a manner that delivers membership benefits efficiently and encourages ties between similar organizations. An optimal membership structure would also allow for growth of the association and highlight important public health laboratory issues that intersect diverse institutions and laboratories.

In the past year, APHL’s Membership and Recognition Committee reviewed and discussed the results of the 2002 membership satisfaction survey, Governance Task Force recommendations, and the resolutions of the 2003 Leadership meeting. Additionally, the committee considered the directives of APHL’s Strategic Plan, the working definition of a public health laboratory, and the implication of the name, the Association of Public Health Laboratories.

As a result of this work, the committee recommended a new membership structural plan to the Board of Directors. The board reviewed and endorsed the committee’s recommendations, so Chairman Scott Zimmerman will present the plan at the Council of Chairs meeting in January 2004. Resulting guidance will be discussed and incorporated by the committee. Ultimately any new structure would be presented to the voting membership of APHL for approval at the 2004 annual meeting in St. Paul, MN.

Mildred Kerbaugh

Mildred Kerbaugh died on December 30, 2003, in Raleigh, NC, at the age of 75. Kerbaugh served as North Carolina’s state public health laboratory director from 1974 - 1988, giving the state a total of 38 years of service. Memorial services were held January 2, 2004. Lou Turner, NC’s current state public health laboratory director, remembers Mildred Kerbaugh as a great leader—a woman ahead of her time and a wonderful mentor to laboratory employees. Condolences may be shared with the family, directed to Gale Kerbaugh, 2741 Rue Sans Famille, Raleigh, NC, 27607.

APHL Unveils New Booth

In November, APHL staff attended the American Public Health Association’s annual meeting in San Francisco, CA, to participate in sessions and to unveil the association’s new exhibit booth. Designed to catch the eye of meeting participants, a colorful image of Coronavirus forms a vivid background for photographs of laboratorians at work. APHL exhibits at several large meetings each year to bring positive attention to the important work performed daily in public health laboratories across the nation.
**Staff News**

**Duawwonna Bell** joined APHL staff on December 1, 2003, as the Human Resources Assistant. Bell received a bachelor’s degree in Business Administration with a concentration in Human Resources from St. Augustine’s College in 1999. She is currently a member of the Society for Human Resource Management, the National Association for Female Executives, and the International Association of Administrative Professionals. As the HR Assistant at the United States Telecom Association, Bell was responsible for assisting with a variety of human resources duties.

**Shauna Dillavou** joined APHL as the Communications Associate on December 18, 2003. Dillavou brings skills in writing, project management, research and layout to her new position. She has interned at the U.S. Department of State, coordinated programs at a community-based organization serving children with disabilities, and taught English to students in Madrid. She is interested in pursuing a career in public health.

**Lori Uscher,** APHL’s Communications Associate, accepted a position as a senior analyst at the Academies Division of the Advisory Board, a major health-consulting firm in Washington, DC. The Academies Division offers business and managerial training to current and aspiring health care executives. In her new role, Uscher will conduct research, develop curricula and train instructors. Uscher left APHL on November 14, 2003.

**Michele Williams,** APHL’s Infectious Disease Coordinator, left the employment of the association in November 2003. APHL wishes her well in her future endeavors.

---

**The APHL Minute Staff**

Jody DeVoll, Editor  
Emily Mumford, Assistant Editor

**Contributors**

Scott Becker, Executive Director  
Rachel Collins, Program Manager, National Center for Public Health Laboratory Leadership  
Norman Crouch, President  
Shauna Dillavou, Communications Associate  
Pat Dostert, NLTN Manager, Chicago  
Linette Granen, Marketing-Communications Manager  
Terry Hastings, Director of Communications, Public Health Informatics Institute  
Beth Hochstedler, Iowa Training Coordinator  
Jennifer Liebreich, Director of Environmental Health Programs  
Nancy Maddox, Writer  
Jelili Ojodu, Newborn Screening and Genetics Program Manager  
Shari Rolando, PulseNet Manager  
Heather Roney, Fellowship Program Manager  
Tony Sambol, Assistant Director, Nebraska Public Health Laboratory  
Lou Turner, NC State Laboratory Director  
Patina Zarcone, Information Systems Manager

**APHL Board of Directors**

Norman Crouch, President  
Susan Nell, Secretary-Treasurer  
David Mills, Past President  
Paul Kimsey, President-Elect  
William Becker, Member-at-Large  
Katherine Kelley, Member-at-Large  
Ming Chan, Member-at-Large  
Scott Becker, Ex-Officio

The Association of Public Health Laboratories (APHL) is a national, non-profit dedicated to working with its members to strengthen public health laboratories. By promoting effective programs and public policy, APHL strives to provide public health laboratories with the resources and infrastructure needed to protect the health of U.S. residents and to prevent and control disease globally.

This publication was supported by Cooperative Agreement Number 303019 and 319522 from the Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC or imply an endorsement by APHL officers, members, staff or management.

To submit an article for consideration, contact Emily Mumford via email, emumford@aphl.org.