



WSLH Newborn Screening Laboratory staff open packages containing that day's specimen collection cards. (photo courtesy of WSLH)

WISCONSIN STATE LABORATORY OF HYGIENE: MEETING THE NEEDS OF A CHANGING PUBLIC HEALTH SYSTEM

by Emily Mumford, writer

In 1903, state legislature founded the Wisconsin State Laboratory of Hygiene (WSLH) with a \$1,500 operating budget and a mandate to use the scientific, research and teaching capabilities of the University of Wisconsin at Madison to better the public's health. From this simple launch, the modern laboratory took wing: in 2008, the WSLH is a \$38 million operation with nearly 350 employees and encompasses public, environmental and occupational health testing.

Part of the laboratory's identity can be attributed to its unique relationship with the university. Although the growing laboratory has spread into two additional buildings on the east side of Madison, it still occupies a facility in the heart of the university campus. The WSLH is home to an array of faculty and research staff from diverse academic areas, such as engineering, agriculture, life sciences, medicine, public health and medical microbiology. It is able to provide a laboratory training experience to undergraduate, graduate and medical students. The WSLH is also home to a school of cytotechnology.

The laboratory's director, Charles Brokopp, DrPH, said, "The WSLH's emphasis on research and outreach can be attributed, in part, to a concept called the *Wisconsin Idea*." In the early twentieth century, university president Charles Van Hise declared that the resources of the university should benefit every citizen of the state—essentially advocating that the borders of the

university were the borders of the state. Throughout its 105 years, the WSLH has kept the spirit of the *Wisconsin Idea*, developing outreach and educational programs, as well as conducting independent research to benefit public health.

INCORPORATING RESEARCH AND NEW TECHNOLOGY INTO PUBLIC HEALTH TESTING

The WSLH shares a commitment with clinicians and other experts to identify health threats quickly. Among other diseases, the clinical sections of the lab test for tuberculosis, hepatitis, influenza, salmonella, measles, sexually transmitted diseases, legionella, Lyme disease, encephalitis, tularemia, diphtheria, pertussis, HIV, *E. coli*, anthrax, monkey pox, human papillomavirus, cervical cancer and genetic disorders.

The WSLH manages a robust and comprehensive newborn screening program. Each year, 70,000 babies are born—and screened—in Wisconsin. The laboratory

also provides testing for an additional 20,000 babies from other locations, including Montana and Kuwait, and returns results to clinicians in less than 24 hours. Each baby is screened for 48 curable or manageable conditions, more than the nationally recommended core panel of 29 disorders.

A current newborn screening research project is a particular source of pride. The WSLH, in partnership with researchers from Children's Hospital of Wisconsin and the Jeffrey Modell Foundation, is developing and evaluating a newborn screening test for Severe Combined Immunodeficiency Disease (SCID), a defect in the white blood cells that normally help protect against viruses, bacteria and fungi. Children born with this defect are intensely vulnerable to life-threatening infections. Yet if SCID is identified early, a bone marrow transplant may eliminate the disease entirely. "The intent is to determine if it is feasible to include this test in a routine screening panel," said Brokopp.

The WSLH is the first state lab to use molecular testing to detect antiviral resistance in influenza viruses. The lab developed this cutting-edge pyrosequencing technology after data showed that more than 80% of Influenza A (H3N2) viruses are resistant to two of the four antiviral drugs. In the event of a flu epidemic, this test will help determine which drugs would protect the public best.

ENVIRONMENTAL LABORATORY KEY COMPONENT OF PUBLIC HEALTH LABORATORY

The WSLH is the state's primary environmental testing laboratory and serves as a defense against chemical terrorism. It qualifies as one of ten Chemistry Level 1 response laboratories, and can safely handle a wide number of dangerous chemicals, including mustard and nerve agents. Although supported by federal funds from the Wisconsin Division of Public Health and grants from the Wisconsin Office of Justice Assistance, WSLH leadership also chose to invest in-



Occupational Health Laboratory: Keeping Us Safe on the Job

For more than 70 years, the WSLH has conducted industrial hygiene chemical analyses. Since 1977 it has provided a full array of industrial hygiene chemistry and environmental microbiology services to customers nationally and internationally, and serves 40 other states as the central laboratory for the federal Occupational Safety and Health Administration's voluntary consultation program.

WSLH Communicable Disease Division Assistant Director David Warshauer, PhD, dons a mask and gown in the BSL-3 laboratory antechamber. (photo courtesy of Bob Rashid)

ternal resources to earn the top-tier Chemistry Level 1 status. Brokopp and Peggy Hintzman, the lab's deputy director, are well-aware of the importance of this support. "Stable funding for core programs is vital to the lab's health," said Hintzman. "It would be difficult, if not impossible, to support these front-line programs in the long-term without additional state and federal financial assistance."

The state environmental laboratory also routinely does much more than prepare for potential chemical attacks. It is responsible for providing data to assure that public and private water supplies are fit to drink and that air quality is acceptable. The WSLH's ultra-low-level trace element clean lab is one of only a few in the country that can detect trace elements at the parts per trillion. Research studies conducted in this lab include clinical cancer, fine air particulates and diesel emissions.

WSLH is developing a newborn screening test for Severe Combined Immunodeficiency Disease. If the disease is identified early, a bone marrow transplant may eliminate it entirely.

OUTREACH, PARTNERSHIP AND TRAINING: POWER IN NUMBERS

The WSLH takes outreach, partnership and training seriously, and their efforts have assumed many forms throughout the years. The lab has led efforts to build Wisconsin's Laboratory Response Network (WLRN), a voluntary partnership of 135 clinical laboratories. Not only can the network convey information quickly in the event of an emergency, but on a day-to-day basis provides for surveillance, training and consultation. "Other Wisconsin laboratories understand the purpose of the WLRN and the importance of their role. They are eager to share clinical specimens with us that require further

testing or to consult with us regarding unusual situations. The strong relationship between the WSLH and our laboratory partners has enabled Wisconsin to be the first to identify *E. coli* and other public health outbreaks in recent years," explained Brokopp.

WSLH is also part of a newer network, the Food Emergency Response

Network (FERN), established among local, state and federal labs to ensure communication in the event of biological, chemical or radiological contamination of the US food supply. As the recipient of an FDA grant, WSLH continues to expand its analytical capacity: it is now one of two radiation test labs that will handle food samples in the event of a release. Brokopp appreciates the parallels between FERN and the WLRN, saying, "It fits nicely with the concept of the WLRN. The government has shown recognition of the need to develop lab capacity by providing financial support to facilities like this one." The lab's environmental chemistry section also coordinates with other environmental laboratories, local public health laboratories and emergency responders such as HazMat teams.

IN PURSUIT OF A MODERN FACILITY

"Public health functions like those performed by the WSLH need considerable space and technological flexibility," said Brokopp. The WSLH is currently housed in three buildings within Madison. On campus, the 1950s-era Henry Mall building has about 50,000 square feet of space and houses the communicable

diseases, disease prevention, and lab improvement and administration divisions. Off campus, a 46,800 square foot laboratory houses the environmental sciences section (air chemistry, water microbiology and radiochemistry), toxicology and occupational health laboratories. A smaller rental property then provides space for program components of occupational health, safety and surveillance, public health informatics and information technology.

New construction has become a necessity. As a comprehensive public, environmental and occupational health entity, the safety and technology needs of the WSLH have surpassed its facility on Henry Mall. Preliminary plans to construct a new facility near the current environmental health laboratory in east Madison have been developed. The WSLH would likely be co-located with a Department of Agriculture, Trade and Consumer Protection laboratory. But discussion is ongoing among the laboratory, university and state government on funding sources for the project. If the funding and planning discussions stay on track, Brokopp believes it is feasible to be in a new facility by 2012.

NEW DIRECTOR COMMITTED TO STAFF DEVELOPMENT

Brokopp is a relative newcomer to WSLH leadership, becoming director in November 2006. Yet his public health career actually began at the WSLH in 1972 when he served as a laboratory consultant for Wisconsin's Health Division. Brokopp then began a long career in public health and epidemiology, working in and directing laboratories in Idaho, Oregon and Utah. Most recently Brokopp was the director of the Division of Select Agents and Toxins, part of CDC's Coordinating Office for Terrorism Preparedness and Emergency Response. Accepting the offer from WSLH brought Brokopp home to his native Wisconsin, but also "was an amazing opportunity to run one of the country's premier labs," he says.

As state laboratories around the country feel the pinch from a national workforce shortage, the WSLH has made the professional development of its staff a priority. In addition to an attempt to train leaders within the lab, staff are able to volunteer on national projects of public health importance. While true to the spirit of the Wisconsin Idea, it also "makes our job rewarding," says Brokopp. As an employer, "we need to focus on our staff. We need to ensure we hire the right people and then provide opportunities for them to grow." ■

Information in this article has been collected from Charles Brokopp, DrPH, and Peggy Hintzman, MBA; documents provided by WSLH; and various official online sources, including www.CDC.gov, www.slh.wisc.edu/wps/wcm/connect/extranet/home/, www.fernlab.org/ and www.wisc.edu/