

NORTH TEXAS REGIONAL LABORATORY: TARRANT COUNTY'S PUBLIC HEALTH LABORATORY

by Marie France, writer

DIRECTOR

Guy Dixon, PhD, always figured he would end up as an academic, and in some ways he has. Director of the North Texas Regional Laboratory (NTRL) since 1993, he is also an adjunct professor of molecular microbiology in a new program that imparts the latest techniques of public health testing. He loves to teach and wants to promote public health as a profession. The classroom,

he is finding, is a great recruitment ground for future laboratorians.

If the arc of his career includes a few loops, Dixon's interest in biology has remained steady. So has his connection to Texas. He is a native—born, bred and educated in the Lone Star State.

"I thought I'd be pumping out papers in academia," Dixon recalled, thinking back to the 1980s at the University of Texas at Arlington, where he earned a bachelor's degree in microbiology, a master's in biology, and where he conducted microbiological research. From there he went on to do immunological research for six years at the Wadley Institutes of Molecular Medicine in Dallas. Unfortunately, said Dixon, the blood contamination scares that arose with the increased incidence of HIV led to "fallout," and the Institutes closed.

Dixon returned to school in the 1990s to earn a PhD in biology at the University of North Texas. As a postdoctoral fellow there, he taught parasitology and immunology and managed a research program in environmental toxicology. About a year after earning his degree, Dixon accepted the position of lab

director at the NTRL, an opportunity to hone his talents in lab management.

As director, Dixon oversees performance of some 120,000 billable tests per year in clinical laboratory services, water and dairy microbiology, water chemistry and the molecular detection of infectious disease and emerging agents.

LOCATION

Touted by civic leaders as the "perfect mix of cowboys and culture," Tarrant County is "where the West begins," according to Dixon. Perched at the edge of the Great Plains, this part of north Texas provides a first encounter with the wide-open spaces associated with oil rigs and cattle ranches. Today Tarrant is one of the fastest growing urban counties in the country. Cattle, agriculture, aerospace companies and defense contractors form the economic base, along with newer businesses whose reach extends around the globe. Gateways such as the Dallas/Fort Worth International Airport offer access to disease, too. It is no coincidence that the NTRL developed the capacity to test for Severe Acute Respiratory Syndrome and Avian influenza—one of two public health labs in Texas with the capacity to do so—when these diseases emerged several years ago.

Urban planners succeeded in prying apart the Dallas-Fort Worth Metropolitan Statistical Area, Dixon said. Today Fort Worth and Arlington (home of the Texas Rangers, and soon the Dallas Cowboys) are viewed as distinct from "Big D." Arlington has a population approaching 370,000, and Fort Worth is nearly double that size. The two constitute the largest communities among the nearly 40 incorporated municipalities that the Tarrant County laboratory serves. The smaller localities range from bedroom communities to rural towns of a few hundred people.

FACILITY

The current laboratory dates to 2003 and consists of two Biosafety Level 3 facilities to test for biological threat agents of concern on the CDC Category A and B lists. The facility operates within the Laboratory Response Network of Texas, established by CDC in 1999 to test for agents of bioterrorism. Construction was expedited on one building to increase the capacity to respond in a post-9/11 environment. Today this building is used to process environmental samples, such as white powders. The second slightly newer building serves as the main laboratory and testing facility for other types of specimens.



Nancy Turnage, laboratory supervisor, prepares to test milk containers and retail milk products. Photo courtesy of NTRL

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STAFF

Dixon's own tenure reflects the "low turnover" among his "lean" staff of 17. With few vacancies, the leanness is an expression of Tarrant County philosophy, he explained. Salaries are generous compared to most local public health labs and tweaked regularly to remain "competitive with the private sector." Workforce levels are kept stable deliberately. A small but dedicated workforce with extraordinary longevity, each with more than 20 years experience in laboratory testing, explains the success of the laboratory. Extremely competent employees and an effective quality assurance program enabled the laboratory to achieve an overall 99.9% correct proficiency test record in 2007, said Dixon.

REVENUE

The laboratory's total budget for FY 2008 is upwards of \$1.7 million. Tarrant County provides about \$1.1 million. The remainder is supplied through grants.

HIGHEST VOLUME TESTING

In 2007, the lab conducted 47,698 clinical tests, 11,096 HIV-1 tests, 22,090 water tests and 25,834 milk tests. As elsewhere, geography, climate and industry play a role in what needs to be analyzed. The state produces more than 6 billion pounds of milk annually, most of it from dairy farms in north Texas. Laboratory testing ensures regulatory compliance and the safety of raw milk from some 300 dairy farms and retail milk and dairy products from 36 dairy plants.

SUCCESS STORIES

West Nile Virus Surveillance. Launched in 2003, the laboratory's program capitalizes on rapid molecular testing technology to detect virus-infected mosquitoes, using a real-time polymerase chain reaction instrument. The program is highly regarded. The National Association of City and County Health Officials praised it in 2004 as a model public health practice, and the Texas Association of Counties gave it a Best Practice award the same year. Now in its fifth year, the program expects nearly 30 cities to participate during the 2008 mosquito surveillance season, which begins in mid-May and runs through October. Human infections in the county are holding steady at about 24 reported cases of fever or encephalitis each year.

Added testing capabilities. As a member of the CDC National Respiratory and Enteric Virus Surveillance System (NREVSS), the lab has enlarged its capability to test for respiratory viruses, and reports test results online—one of two public health laboratories in Texas to do so.

The lab can now test for the influenza A and B viruses, parainfluenza viruses, respiratory syncytial virus, adenovirus and human metapneumovirus. Detection of Shiga-toxin and Norovirus is possible, and the laboratory is certified to perform Pulsed Field Gel Electrophoresis testing on four organisms to hunt down the causes of food-borne, water-borne and other com-

municable diseases. The lab also added to its ability to detect enteric pathogens such as *Salmonella* spp., *Shigella* spp., *E. coli* O157:H7, *Campylobacter* spp. and *Yersinia* spp.

Enhanced reporting capabilities. Rising concern about pandemics is what spurred the lab to expand its testing capabilities and to join NREVSS, Dixon says. The electronic reporting system communicates valuable information to epidemiologists and health-care providers to understand the trends and the disease burden characteristic of respiratory infections in their communities.

In use for about a year, the additional tests that the public health laboratory perform have led to some surprises. The lab determined that people in Tarrant County suffering from influenza-like illnesses were infected with respiratory syncytial viruses early in the fall, whereas influenza viruses didn't crop up often until after Christmas. Dixon's lab works with departmental epidemiologists to relay such precise detection results to practitioners, so they will know what to look for in their patients and when.

BIGGEST CHALLENGES

- 1. Sustainable funding.** As elsewhere, public health programs are constrained by tight funding, Dixon said. "Our staff has done a great job" with money for bioterrorism preparedness, "but even those funds have begun to shrink."
- 2. Qualified staff.** Finding people to fill future positions is a familiar concern. "One of my goals through teaching is to promote careers in public health, especially ones that focus on infectious diseases," Dixon said. "Training is crucial as we move more and more toward rapid molecular diagnostics and rely more heavily on microbiological testing at the molecular level." By teaching in the new program at Tarelton State University, Dixon said he is "putting his money where his mouth is," and may even spot and hire some local talent.
- 3. Facility space.** Not quite five years old, the lab has outgrown its space. "I had enough space for about a year and a half; the luxury didn't last," Dixon laughed. Now, closets and storage areas are transformed to accommodate new equipment that meets preparedness mandates. Molecular testing occasionally needs a room of its own, for fear of cross-contamination. And, overall, the volume of testing has increased.

GOALS

Dixon would like to see the lab continue to enhance its surveillance of communicable diseases and increase the use of rapid, molecular-based testing. True to his roots as a researcher, he would love to pursue the organism that causes pertussis, which has had a resurgence of late. "I'd like to go after outbreaks of MRSA, too," he added, the Methicillin-resistant *Staphylococcus aureus* bacterium responsible for difficult-to-treat infections in humans, also on the rise. ■