



Lab Career Insider

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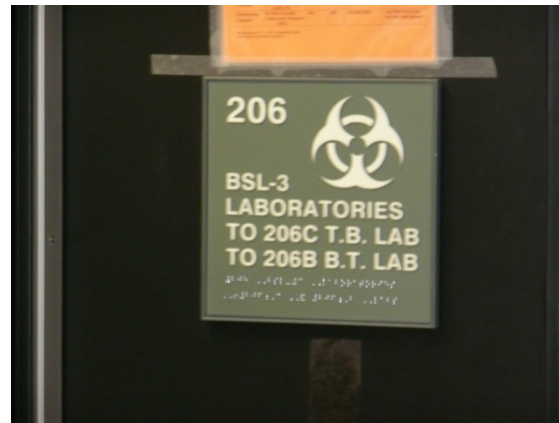
Laboratorian Looks Deeper to ID Multi Drug-Resistant TB

By Patrick Heffernan,
MHDL AHEC intern

Outside of the Bio-Safety Level 3 Lab there is a slight breeze. All the air of the rest of the lab is directed toward the front of the airlock so that nothing has a chance to float away from the BSL-3 doors and into the lab if any particles were to escape. This is because in the level three lab there are some very nasty bugs, most notably TB.

Once inside the air is still, nothing to stir up any of the deadly bacteria. The L-shaped room buzzes with the hum of various incubators and machines and a microscope for florescent microscopy. Working at his desk in the turn of the “L” is John, a lab veteran with over 25 years’ experience. John has seen the technology change from cultures to DNA probing. Yet with all the new technology, John still did some of his best work with cultures; he was old school.

All the specimens come from the Keenan Health Center. When a patient is suspected of having TB, the first thing John does is wash the sample through with special chemicals to kill most of the other weaker bacteria, leaving only the tough mycobacteria. The media that the cultures are grown on also have some other antibiotics, like Peni-



cillin, embedded in the nutrients, leaving only the toughest of the bacteria to survive. TB takes a long time to grow, usually about three weeks. Even then they become overgrown by other faster-growing bacteria that make TB hard to spot.

Using a hand lens John examines like a jeweler all of his specimens by hand. Looking over a bacterial culture from an 18-year-old patient, he thinks to himself, “I’m not going to find anything here,” and puts down the lens and petri dish. All the other tests had come back negative. Both the smear and PCR (polymerase chain reaction) tests and even the “BACTEC” instrument, didn’t pick up any TB.

John started to put into his report that the final test had come back negative, and for most microbiologists it would have ended

there. But John was thorough, always. He would joke about being OCD while taking every measure to make sure he didn’t miss anything. Picking up the dish and lens again John reminded himself: “It’s the tough ones that grow the slowest.”

Peering into the lens, looking over the lawn of bacterial growth, there appeared to be no TB there. Just then he saw it, the familiar cauliflower growth. Twenty-five years of experience told John that there was no doubt, this was TB. Scrupulously John did a DNA probe of the colony. It came out positive.

John immediately reported the finding to the Tuberculosis Control Clinic. The news of the TB spread and soon the CDC was asking for John to send the plate to the CDC so that they could isolate the TB themselves. (See TB on page 2)

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“It’s the tough ones that grow the slowest.”

*John,
MHDL Microbiologist*

TB, *Continued from Page 1*

Before sending the plate John picked a TB colony to do further testing himself, musing over how small they were for having spent six weeks incubating.

A few days later the CDC called. They were unable to get any results because the original plate was so overgrown with other mycobacteria and the TB colonies were too small for them to isolate. They needed John’s isolated sample.

The surprise of finding TB hiding behind other bacteria had worn off and was replaced with curiosity, so John started to test the TB to see if antibiotics, used to treat infected patients, could kill the TB.

Looking over the results of his antibiotic tests John found that the tuberculosis was resistant to all of the first-line drugs. “The tough ones grow the slowest,” John thought to himself again. In the end the CDC was able to find some drugs that were effective against the TB, and a month later the girl was doing much better but would still need treatment for another two years.

“I don’t see too much (multiple-drug-resistant) TB,” John told me as I talked to him about working in the lab. “But I saw three cases last year.” In fact, multiple-drug-resistant TB is on the rise in other countries. The

U.S. itself recently saw its first case of a TB that was completely drug resistant. When presented with an extremely drug-resistant TB, the treatment is reminiscent of chemotherapy where the medicine can make you feel worse than the disease, increasing the need for early detection. The UN estimates that TB is the second leading infectious killer of adults worldwide, taking 1.4 million lives a year. We can all be thankful that there are dedicated microbiologists like John working in Public Health Labs, without whom that number might be higher. ■

STD Testing Results Can Profoundly Impact Lives

By Patrick Heffernan,
MHDL AHEC Intern

A call came in to the Milwaukee Health Department Laboratory one afternoon.

“Normally the Chief of Microbiology would take the call but because he wasn’t here, the person in the front office sent the call to me,” Penelope recalls. A microbiologist with 18 years’ experience working throughout the MHDL, Penelope was responsible for gonorrhea testing at the time she took that particular phone call. “The call was from a doctor who I had never heard of,” she explained. “He had called the lab asking what percentage of preliminary positive tests for GC turned out to be confirmed cases.”

The MHDL does not keep that kind of information on file but Penelope wanted to help. As she hung up the phone, however, she knew that rarely had she seen a presumptive gonococcus culture turn out negative. Gathering all the information from the past eight years and running the numbers

for almost 5,000 samples, Penelope finds the number: 99.75. That’s the percentage of presumptive GC cases that turn out to be confirmed cases.

The number matching her experience and confident in the work she has done, Penelope sends a report to the doctor explaining her results, not expecting to hear anything further on the case.

Four days pass and again the phone rings for Penelope. This time it is the District Attorney from a nearby county, wondering about the statistic she provided to the doctor. The information was being requested for a local court case.

“What have I gotten myself into?” Penelope wondered.

It turned out the details of the case were disturbing. In short, it was a sexual abuse case.

It is not unheard of for laboratory scientists to have to testify in court, especially when STDs show up in underage girls. The MHDL is often used as a reference lab for the area hospitals and clinics for just that reason. Having a second opinion removes some of the pressure

when you receive a sample with such strong implications.

Realizing the volatility of the situation, Penelope turned to the Laboratory Director, who contacted the MHD Communications Officer. They reviewed the information that was sent out and the possibility of being called to testify in court. The report was solid and fortunately Penelope was never asked to testify. No news came back about the case but that was fine by Penelope; she had had enough and was ready to get back to regular lab work.

“I remember driving home after this, feeling ambivalent, because I don’t like that kind of excitement but I also wanted to help and felt like I did a good job,” she said.

Working as a Lab scientist you are in a position of authority. The tests you do and reports you make carry a lot of weight and although lab scientists do not typically meet the people they do testing for, the results they produce have a profound effect on their lives. ■



Interested in getting on the track to a Laboratory Career?

The field of laboratory science offers a variety of career tracks, whether you are interested in pursuing a two-year, four-year or post-graduate degree, or you want to get involved in a clinical or public health capacity. See below for some possibilities!

2-year degree or less

Medical Laboratory Technician (MLT)

Laboratory Assistant

Phlebotomist

4-year degree

Microbiologist, Virologist or Chemist

Molecular Genetic Technologist

Cytogenetic Technologist

Post-graduate degree

Laboratory Director or Manager

Developmental Principal Scientist

Doctorate in Medical Laboratory Science

For more information on these and other lab-related careers, including job duties, education required and an interactive career guide, visit www.labsciencecareers.com.

Virus Testing Plays Key Role in Public Health Surveillance

By Patrick Heffernan,
MHDL AHEC Intern

In the wake of the largest waterborne outbreak in U.S. history that sickened over 400,000 people in Milwaukee in 1993, caused by the parasite *Cryptosporidium*, Dave was hired as a virologist at the MHDL to help out with the environmental testing. “Milwaukee wanted to be more proactive,” he recalls. “The EPA also was beginning a new rule where large municipalities had to test their water if they were using surface water.” The MHDL was one of fourteen labs in the nation doing the testing, with water coming in from all over.

“We needed some sort of control. Something that was loaded with viruses to make sure our procedure was working,” Dave explained. The clear answer was sewage water. “After all,” Dave concluded, “that’s where it all ends up.”

The sewage testing served several purposes: it was the control they needed for their tests; they were able to test the influent (sewage in) and effluent (sewage out) of the sewage processing to verify the plant’s functioning; and lastly, it served

as surveillance – by testing the sewage, Dave was able to see what kinds of viruses were affecting the people in Milwaukee.

Normally the Milwaukee Health Department monitored the viruses by tracking the results they generated from samples from Children’s Hospital. “We did most of the testing for Children’s so we were able to survey the viruses going around that way. But they had just started developing their own testing program so there was this need for a new surveillance model,” Dave recounted.

In fact, the sewage testing showed the same seasonal peaks and troughs as the Children’s data. The number would rise in the summer and drop off the rest of the year but never down to zero. “Often the viruses we saw in spring would be those most prevalent in the summer when the season hit,” Dave noted.

One spring he began seeing a different type of virus – Echovirus 30, most commonly called EV30. “EV30 affects adolescents more often than smaller children,” the MHDL Chief Virologist told Dave. At the time he

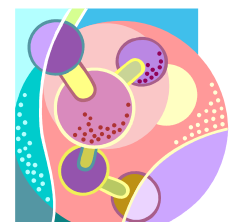
thought little of it. However, a few months later the lab got a call from a Detroit man who used to work in the MHDL. He was calling because a lot of adolescents were getting sick. The connection was made immediately and the children were tested and then treated for EV30.

There is nothing that makes EV30 more dangerous than any other similar virus, Dave said. It just happened to be the one that came up big that year. However, with so many different viruses out there it can be difficult and painstaking for a clinician to find out which one is attacking the patient. That is why it is important for health departments to survey the viruses going around and identify what the likely culprits will be in the next season – and people in the laboratory like Dave can help make that happen by identifying potential pathogenic viruses from environmental samples. ■



About the Author

Patrick Heffernan worked at the MHDL during Summer 2012 as an intern in the Community Health Internship Program (CHIP) through the Milwaukee Area Health Education Center (AHEC). Patrick’s project involved assisting with strategic planning implementation for Milwaukee’s Laboratory System Improvement Program (LSIP), developing a research inventory of key system stakeholders and generating stories for promotion of the laboratory profession. He is currently a senior at the University of Wisconsin-Milwaukee, where he is completing a degree in Biology, PreMed.





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About the MHDL

Mission Statement

"To assist the Department in guarding the public health by providing quality laboratory services for monitoring acute and chronic diseases and the environment through assessment, surveillance, epidemiology and dissemination of information."

Vision Statement

"To continue to provide quality service, to both internal and external customers of our public health laboratory in response to dynamic epidemiological variables and to be responsive to the changing demands of the health community."



MHDL Job and Internship Opportunities

Job opportunities in the MHDL and other areas of the Health Department are posted on the City of Milwaukee's Department of Employee Relations website:

<http://city.milwaukee.gov/jobs>

Internship opportunities are typically arranged through the internship offices of each college or university. If you are interested in and qualified for an internship with the MHD, please inquire with the internship advisor at your school for more information!