TENNESSEE DEPARTMENT OF HEALTH
It's About Time!

# Tennessee Department of Health Public Health Laboratories Newsletter

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**Commissioner of Health**

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## Inside this issue…



## *Tennessee Public Health Microbiologist Wins Advance Magazine's National Laboratorian of the Year!*

Each year *Advance For Medical Laboratory Professionals* honors laboratorians from across the Unites States for excellence in the field of laboratory science. This year the 2012 Award for Laboratorian of the Year goes to Tennessee's own public health microbiologist Jeannette P. Dill. In her nomination, Amy M. Woron, MS, PhD, molecular biologist, Tennessee Department of Health (DOH) Division of Laboratory Services, Nashville, TN, writes, "It is easy to recognize those whose positions keep them in the spotlight. This [contest] is a wonderful opportunity to recognize those who are the reason the spotlight is shining in the first place."

Jeannette P. Dill, our first place Laboratory Professional of the Year, is a shining example of a skilled laboratory professional who goes the extra mile to improve the quality of laboratory medicine and the daily lives of her colleagues. A microbiologist for the Tennessee DOH, Dill is highly involved in the CDC's PulseNet, a national network of public health and food regulatory agency laboratories. From organizing a committee to produce a DVD scrapbook, providing a single source for multi-level partner information, to working closely with members of the CDC, epidemiologists and other state laboratories, she has built invaluable connections in the public health sector.

An active member of the PulseNet planning committee for 4 years, Dill strives to improve the meeting every year. She also serves as primary instructor for pulsed-field gel electrophoresis technology for the medical technologist students rotating through microbiology at the Tennessee DOH and is an active lecturer in the School of Public Health Microbiology.

"Her role as the lead PulseNet microbiologist for Tennessee and passion for salmonella made her the obvious choice for salmonella molecular serotyping training," Dr. Woron reports. Dill embraced the new technology and assay offered by CDC and became the point person for beta testing the assay in the state. Once completed, she jumped into the lead role of validating the assay.

As of January 1st this year, Tennessee is one of the first states to use molecular serotyping as its primary serotyping method. A QA review showed that switching from conventional to molecular serotyping has reduced turnaround times by 1 day. "Her commitment to customer satisfaction, teamwork and advancing technologies is unsurpassed," Dr. Woron notes.

In addition to going above and beyond with her job, Jeannette contributes to a positive organizational culture by arranging for Weight Watchers meeting at work, walk-at-lunch groups and an after work knitting club with coworkers. According to Dr. Woron, Dill brightens the room every time she enters it.

**Congratulations, Jeannette!**

# *PM 2.5 Air Monitoring Program in Tennessee*

PM2.5 refers to tiny particulate matter (PM) in the air that is two and a half micrometers in width or less. Because these particles are so tiny they are able to penetrate into the respiratory system and reach deeply into the lungs. It is suggested, by scientific study, that these particles contribute to asthma, shortness of breath and bronchitis in both children and adults. Comparing this particulate matter to a human hair puts their size in perspective. The average human hair is about 70 micrometers in diameter which makes a human hair about 30 times larger than these "fine" particles.

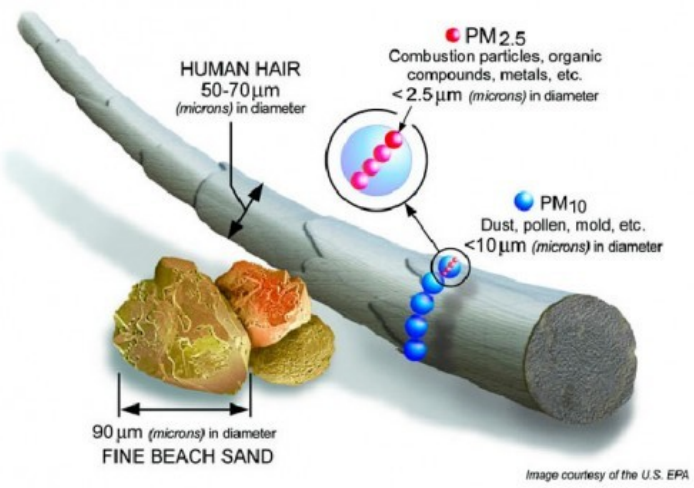
PM2.5 particles are emitted from automobile exhaust and the burning of wood or coal. Fine particulates may be released from forest and grass fires as well as volcanic eruptions. PM2.5 particles also form from the reaction of gases in the atmosphere from power plants. PM2.5 affects the environment as well by contributing to acid rain.

These fine particles are monitored because of their health effects and environmental impact. PM2.5 is regulated under The Clean Air Act. The Clean Air Act is a law that was established about 40 years ago to clean up air pollution. The Clean Air Act mandates that the Environmental Protection Agency set standards on the allowable concentration of these inhalable "fine" particulates and to monitor our air for them.

The PM2.5 monitoring program is divided into two components, a field and data management component and a laboratory component. Field collection, data validation and data reporting are conducted by the Tennessee Department of Environment and Conservation Division of Air Pollution Control as well as by corresponding programs in Nashville, Memphis, Knoxville and Chattanooga. Field collection utilizes 46 mm Teflon filters placed into a sampling device that is computer controlled and automated.

Additionally the Division of Air Pollution Control is involved in enforcement of regulations set forth by The Clean Air Act and the EPA. The PM2.5 weighing program is conducted by the Division of Laboratory Services. The weighing laboratories are located in Knoxville and Nashville.

Before field collection takes place the laboratories




inspect, equilibrate, pre-weigh and distribute the clean filters to the field program. After sampling the laboratories receive, inspect, equilibrate, post-weigh, validate and report the PM2.5 concentrations. While the above steps seem simple enough the full process is detailed and quality control driven. The filters are small and the mass of particles collected usually weigh between 200 to 500 micrograms. Because of the small masses a microbalance is used. The microbalance is housed and the filters are conditioned and weighed in a semi clean room whose temperature and relative humidity conditions are carefully controlled. The clean conditions are necessary to avoid contamination of the filters and reduce air currents. The temperature and relative humidity control is needed to generate stable, reproducible masses and to avoid electrostatic charges. Conditioning the filters in this environment, before weighing, allows any off-gassing to occur and the filters to reach a stable weight. Filters must condition for a minimum of 24 hours prior to weighing.

Pre-weighing sessions include sorting the filters and placing them in numbered petrislides in the clean room for conditioning to occur. After conditioning, the weighing occurs and the masses are captured by computer software. The filters are then placed into cassettes, and the cassette and filter combination is placed into an anti-static bag. At that point the filters are shipped to the respective field programs per their requirements.

After sampling, the filter and cassette combination are returned to the lab in coolers maintained at 4 degrees C. The filters are allowed to warm to room temperature

## *PM 2.5 Air Monitoring Program in Tennessee–* Continued

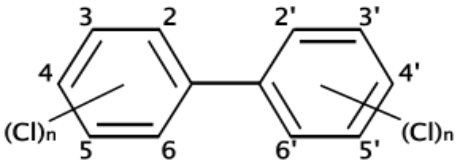
The filters are removed from the cassettes and placed into their respective petrislides for conditioning. The post-weighing takes place after conditioning and the masses are captured by software. After post-weighing, the filters are stored in their petrislides and archived for one year at 4 degrees C. A large amount of data, relating to each filter, is collected from the pre-weighing process through field sampling to the post-weighing process. A database containing the filter number, pre weights, post weights, temperature and humidity conditioning readings, site identification, date sampled, volume of air sampled and calculated concentration are maintained. All of this information is entered at various points during the life cycle of the filter. The database calculates the PM2.5 concentration by calculating the difference between the post-weights and the pre-weights and then divides that weight by the volume of air sampled. The result is reported in micrograms per meter cubed. All of this information in the database is exported to a spreadsheet, reviewed, verified and submitted to the respective monitoring agency for their review and submission to EPA.

For further information regarding PM2.5 filter weighing criteria and methodology, you might consult 40 CFR Part 50, Appendix L, Quality Assurance Document 2.12, or go to http://www.epa.gov/air/particlepollution/index.html

**Submitted by Craig Edwards, Chemist 4, Manager, Inorganic Chemistry**

## *Organic Chemistry Laboratory Assesses Levels of PCBs Across Tennessee*

The Environmental Protection Agency has recently reassessed studies of the health issues caused by polychlorinated biphenyls (PCBs) contamination. Subsequent literature provided by EPA presents overwhelming evidence that PCBs cause cancer in animals. An industry-sponsored peer-reviewed rat study, characterized as the "gold standard study" by one peer reviewer, demonstrated that every commercial PCB mixture that was tested caused cancer. Using evidence from the studies, the reassessment provided EPA with sufficient information to develop a range of potency estimates for different PCB mixtures, based on the incidence of liver cancer. Demonstrated to be carcinogenic, PCBs may also cause a variety of other adverse health effects especially on the immune system, the reproductive system, the nervous system and the endocrine system. Different health effects of PCBs may be interrelated, as alterations in one system may have significant implications for the other systems throughout the body.




**Above is the chemical formula for PCBs**

**Below are electrical parts made of PCBs**

Due to their non-flammability, chemical stability, high boiling point and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications, i.e., electrical devices, adhesives, heat transfer machinery and hydraulic equipment. PCBs are very stable. They do not decompose readily due to their chemical inability to oxidize and reduce in the natural environment. PCBs were manufactured from approximately 1929 to 1979 and sold under many different names. Although they were banned from production in the US in 1979 and by the Stockholm Convention on Persistent Organic Pollutants in 2001, PCBs still remain in products and materials produced prior to the bans. Products that were produced containing PCBs included electrical transformers and capacitors, voltage regulators, switches, bushings and electromagnets. Other products found to contain PCBs are motor and hydraulic system oils, old electrical devices and appliances, fluorescent light ballasts, cable insulation, fiberglass, felt, foam, cork, adhesive tapes, oil-based paint, caulking, plastics and floor finish. The Organic Chemistry Laboratory continually assesses various matrices for unsafe levels of PCBs in an effort to report these levels to the EPA for further action.

**Submitted by Cathie Ayers, Chemist 4, Manager, Organic Chemistry Laboratory**

## *Multistate Outbreak of Salmonella Typhimurium Infections Associated with Exposure to Clinical and Teaching Microbiology Laboratories Spurs Closer Attention to Biosafety Procedures*

CDC is collaborating with public health officials in many states to investigate a multistate outbreak of Salmonella Typhimurium infections associated with exposure to clinical and teaching microbiology laboratories. Investigators are using DNA analysis of Salmonella bacteria obtained through diagnostic testing to identify cases of illness that may be part of this outbreak. As part of this ongoing investigation, CDC is working with state and local health departments, the American Society for Microbiology (ASM), and the Association of Public Health Laboratories (APHL) to conduct a survey of laboratory directors, managers, and faculty involved with clinical and teaching microbiology laboratories to identify areas where improvements in biosafety and laboratory safety training can be made to prevent future illnesses.

In an epidemiologic study conducted by CDC during February and March 2011, ill persons answered questions about exposures during the days before becoming ill. Investigators compared their responses to those of persons of similar age previously reported to state health departments with other illnesses (controls). Preliminary analysis of this study has suggested exposure to clinical and teaching microbiology laboratories is a possible source of illness. Illnesses have been identified among students in microbiology teaching laboratories and employees in clinical microbiology laboratories. IIll persons were significantly more likely than control persons to report exposure to a microbiology laboratory in the week before the illness began. Additionally, multiple ill persons reported working specifically with Salmonella bacteria in microbiology laboratories. The New Mexico Department of Health found that the outbreak strain was indistinguishable from a commercially available Salmonella Typhimurium strain used in laboratory settings. This commercially available strain was known to be present in several teaching or clinical laboratories associated with ill students or employees infected with the outbreak strain. These data suggest this strain is the source of some of these illnesses. Additionally, several children who live in households with a person who works or studies in a microbiology laboratory have become ill with the outbreak strain.

**Article from the Centers for Disease Control and Prevention, MMWR, January 28, 2012**

## *Biosafety Advice to Students and Employees in Clinical and Teaching Microbiology Labs*

Be aware that bacteria used in microbiology laboratories can make you or others who live in your household sick, especially young children, even if they have never visited the laboratory. It is possible for bacteria to be brought into the home through contaminated lab items that are used in the microbiology laboratory.

Persons working with infectious agents, including *Salmonella* bacteria, must be aware of potential hazards, and must be trained and proficient in biosafety practices and techniques required for handling such agents safely, including:

- Wash hands frequently while working in and immediately after leaving the microbiology laboratory and follow proper hand washing practices. This is especially important to do before preparing food or baby bottles, before eating and before contact with young children.
- Do not bring food, drinks or personal items like car keys, cell phones and mp3 players into the laboratory. These items may become contaminated if you touch them while working or if you place them on work surfaces.
- Do not bring pens, notebooks, and other items used inside of the microbiology laboratory into your home.
- Wear a lab coat or other protective uniform over personal clothing when working in a microbiology laboratory; leave it in the laboratory when you are finished. Remove protective clothing before leaving for non-laboratory areas (e.g., cafeteria, library, or administrative offices). Dispose of protective clothing appropriately or deposit it for laundering by the institution.

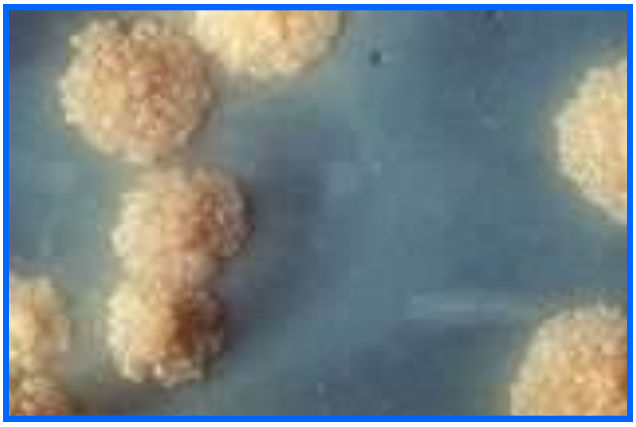
## *Advances in Rapid Detection of Mycobacterium tuberculosis Complex and Rifampin Resistance*

The Special Microbiology Department of the TDH laboratory recently completed a validation study for the molecular detection of *Mycobacterium tuberculosis* complex (Mtbc) and gene mutations associated with rifampin resistance in clinical sputum specimens. The laboratory receives sputum specimens from across the State of Tennessee to test for the presence of acid fast bacilli. These sputum specimens are received from public health departments in the state in an effort to identify tuberculosis patients and monitor their progress. As part of the Healthy People 2020 initiate, state public health laboratories are encouraged to provide a Nucleic Acid Amplification Test (NAAT) result within 48 hours of receipt of the clinical specimen in the laboratory. This early test result contributes to the rapid diagnosis and treatment of those patients infected with Mtbc.

Cepheid's GeneXpert platform offers a MTB/RIF assay. This is a multiplex PCR assay that tests not only for the presence of Mtbc in the specimen, but also for mutations in the rpoB gene of the organism that could be associated with rifampin resistance. The continued emergence of Multi-Drug Resistant (MDR) and Extensively Drug Resistant (XDR) tuberculosis constitutes the need to quickly identify those strains that exhibit the characteristics of drug resistance. Monoresistance to rifampin is uncommon, thus a resistance to rifampin is increasingly becoming an indicator of MDR and/or XDR strains. The use of molecular methods to quickly identify these strains is indicated for rapid and appropriate treatment of the patients. Those patients that are identified through the use of the GeneXpert system as being infected with a potential rifampin resistant strain of Mtbc can begin appropriate therapy immediately instead of having to wait several weeks for traditional drug susceptibility tests to be completed. Expedited initiation of the appropriate drug therapy will render these patients non-infectious much earlier and will decrease the spread of the disease among the citizens of the State of Tennessee. This particular assay supplies results in approximately two hours after testing begins.

Traditional drug susceptibility testing will continue to be performed in the laboratory, but the GeneXpert results will aid clinicians in the early treatment of tuberculosis patients. The implementation of the GeneXpert system to expediently report the presence of Mtbc and potential rifampin resistance will allow Tennessee Tuberculosis Elimination Program personnel (TTBEP) to initiate treatment, improve patient outcomes, interrupt transmission of the disease via respiratory isolation of the patient and begin contact investigations.


**Pictured above, the new GeneXpert test system in use. Below, TB on culture media.**



The rapid diagnosis of these patients using a molecular method can greatly reduce the amount of transmission of the disease. The laboratory continues to look for new and improved ways to contribute to the overall health of the citizens of the State of Tennessee.

**Submitted by Paula Gibbs, Microbiologist 4**
**Manager of the Special Microbiology Laboratory**

## *Tennessee Public Health Laboratory Partners with CDC to Track Nationwide Strains of Hepatitis in the U.S.*

CDC is initiating an acute hepatitis A and hepatitis B surveillance initiative. The goal of the project is to describe the molecular epidemiology of hepatitis virus in the United States and to generate a serum bank for future hepatitis testing.

A sequence database will be established by the molecular epidemiology side of the project to allow for possible tracking of hepatitis strains. Tennessee was one of nine states asked to participate in this project. After acute hepatitis A or hepatitis B is determined, providers are requested to submit a patient information form found at http://health.state.tn.us/lab/Hepatitis_ShippingForm.pdf and greater than 400 µl of serum to the Division of Laboratory Services Immunoserology Laboratory. The Tennessee Division of Laboratory Services will ship all specimens received to CDC.

**For further information contact Dr. Brock Neil, Manager of Immunoserology and Virology, brock.neil@tn.gov, or by calling 615-262-6374.**

## *Tennessee Public Health Laboratories Welcome Newcomers!*

| Name | Job Title | Lab Section | Region | Hire Date |
|---|---|---|---|---|
| Rob Allgood | Biologist 2 | Aquatic Biology | Nashville | 03/26/2012 |
| Vikki Fuller | Office Supervisor I | Reporting/Data Entry | Nashville | 12/19/2012 |
| Justin Geise | Biologist 2 | Aquatic Biology | Nashville | 05/29/2012 |
| Timothy Morris | Chemist 4 | Quality Assurance | Nashville | 02/27/2012 |
| Stephanie Poindexter | Microbiologist 2 | Newborn Screening | Nashville | 01/23/2012 |

## *Unique Job Opening in Molecular Biology Laboratory*

The Nashville Central Laboratory has an opening for a Microbiologist III (Certified), supervisor of the molecular biology department. This position requires a current TN medical laboratory license as a General Supervisor, Supervisor of Microbiology or Supervisor of Molecular Biology. The molecular biology department applies mainly PCR, PFGE and MLST methodologies to surveillance activities within Tennessee and surrounding states. Examples of duties and responsibilities of a Microbiologist III (Cert.) are:

- Supervises and participates in unit laboratory analyses and tests as they relate to molecular biology activities.
- Supervises and participates in the analysis and testing of milk, dairy products, food, water, industrial waste, body fluids, exudes, viruses and other items.
- Supervises and participates in maintenance of work area and equipment; orders supplies and keeps necessary business related records.
- Performs complex analyses and tests calling for advanced knowledge and expertise.
- Assists in the assignment, training, supervision and evaluation of staff and their work.
- Assists in supervising the enforcement of policy and procedure for operations and functions within sphere of authority.
- Keeps records and prepares reports.

This position supervises Microbiologist II (Cert) employees, works closely with the epidemiologists at the Communicable and Environmental Diseases and Emergency Preparedness division and reports to the molecular biologist. The ideal candidate will have supervisory and molecular biology experience as well as excellent communication and computer skills.

This is an exceptional opportunity for a creative leader to become a part of Tennessee's public health laboratory team.

**For more information regarding this opening, please contact Dr. Woron at Amy.Woron@TN.gov.**