TENNESSEE DEPARTMENT OF HEALTH
It's About Time!

Tennessee Department of Health Public Health Laboratories Newsletter

Susan R. Cooper, MSN, RN
Commissioner of Health

David L. Smalley, Ph.D., M.S.S., BCLD
Director, Division of Laboratory Services

Volume 2, Issue 1 Spring 2008

Inside this issue:

It's the Law!

Mandatory Submission of Referral Cultures to the Department of Health

Directors of hospital and private laboratories across Tennessee are required by state law to submit the following cultures to the TDH Division of Laboratory Services. These culture form the basis for surveillance of infectious diseases in Tennessee by the TDH Communicable and Environmental Disease Services Program and play a vital part in determining the accurate state of infectious diseases in Tennessee. Under the Tennessee Medical Laboratory Act (T.C.A. 53-4105) the rules for referral of cultures to the TDH Division of Laboratory Services are as follows:

1200-6-3-.12 REFERRAL OF CULTURES TO THE DEPARTMENT OF HEALTH.

(1) It shall be the responsibility of the director of a medical laboratory to submit cultures of those microorganisms designated by the Board to the Department of Health, Laboratory Services for confirmation, typing and/or antibiotic sensitivity, including, but not limited to:

(a) *Salmonella* species (including *S. typhi*)
(b) *Shigella* species
(c) *Corynebacterium diphtheriae*
(d) *Francisella tularensis*
(e) *Brucella* species
(f) *Mycobacterium* species
(g) *Legionella* species
(h) *Plasmodium* species
(i) *Vibrio* species
(j) *Clostridium tetani*
(k) *Listeria* species
(l) *Listeria monocytogenes*, isolated from sterile sites
(m) *Francisella* species
(n) *Yersinia pestis*
(o) *Escherichia coli* O157
(p) Shiga-like toxin producing *Escherichia Coli* non-O157 (STEC)
(q) Shiga-like toxin positive stools and/or EIA positive broth for shiga-like toxin
(r) *Clostridium botulinum*
(s) *Haemophilus influenzae*, isolated from sterile sites
(t) *Neisseria meningitidis*, isolated from sterile sites
(u) *Streptococcus pneumoniae*, isolated from sterile sites
(v) *Streptococcus*, Group A, isolated from necrotizing fasciitis wound cultures or normally sterile sites *
(w) *Bacillus anthracis*
(x) *Burkholderia mallei*
(y) *Burkholderia pseudomallei*
(z) Vancomycin résistant *Staphylococcus aureus* (VRSA)
(aa) Vancomycin intermediate *Staphylococcus aureus* (VISA)

(2) All cultures shall be accompanied by the following information:
(a) Patient's full name, address (including county), age, and sex.
(b) Physician's (submitters) name and address.
(c) Anatomic source of culture and specimen collection date.

Authority: *T.C.A. §§4-5-202, 4-5-204, 68-29-105, and 68-29-107.* ***Administrative History:*** *Original rule filed October 26, 1979; effective December 10, 1979. Repeal filed May 3, 1995; effective July 17, 1995. New rule filed January 7, 1997; effective March 23, 1997. Repeal and new rule filed June 18, 2002; effective September 1, 2002. Amendment filed September 17, 2003; effective December 1, 2003. Amendment filed February 15, 2006; effective May 1, 2006. Amendment filed July 10, 2006; effective September 23, 2006. *

A normally **"sterile site"** is defined as: Blood, CSF, Pleural fluid (includes chest fluid, thoracentesis fluid), Peritoneal fluid (includes abdominal fluid, ascites), Pericardial fluid, Bone (includes bone marrow), Joint (includes synovial fluid; fluid, needle aspirate or culture of any specific joint: knee, ankle, elbow, hip, wrist), Internal body sites (specimen obtained from surgery or aspirate from one of the following: lymph node, brain, heart, liver, spleen, vitreous fluid, kidney, pancreas, or ovary).

Tennessee Contributes to the Prohibition of Fluoroquinolone Use in Poultry in the United States

Since 1999, Tennessee, a participant in CDC's FoodNet surveillance program, has also been a participant in the CDC National Antimicrobial Resistance Monitoring System (NARMS) for enteric bacteria. NARMS was first initiated in 1997. On a quarterly basis, the ten (10) FoodNet sites (CT, GA, MD, MN, NM, OR, TN and selected counties in CA, CO and NY) submit all of their viable isolates of *Campylobacter jejuni/coli* to NARMS for antimicrobial testing.[1] A trend of Ciprofloxacin and Erythromycin resistance in *Campylobacter jejuni* and *Campylobacter coli* has been observed in the United States since 1997 and continuing through 2004.[2]

FDA Withdraws Approval in 2005

In 1995, ciprofloxacin was approved for use in poultry. Prior to that time, there was no known resistance. In 1997 and continuing, an increase in ciprofloxacin and erythromycin resistance has been observed. Because of these findings, in 2005, the FDA withdrew approval for use of ciprofloxacin in poultry. To determine the impact of the prohibition of fluoroquinolone use in poultry, national monitoring for resistance in Campylobacter will need to be continued.

Continue Submission of *Campylobacter* Isolates

Campylobacter jejuni/coli are not included in the Medical Laboratory regulations' list[3] of organisms required to be submitted to the TDH Laboratory. However, for continued surveillance submission of *Campylobacter jejuni* and *Campylobacter coli* isolates is encouraged. Successful submission includes submitting pure isolates in transport media with transport under cold conditions within two (2) days in transit. Isolates submitted to the TDH Laboratory are confirmed as *Campylobacter jejuni/coli* with oxidase, hippurate, catalase, motility and microscopy. Pure viable isolates are frozen until submission to the NARMS program at CDC. Identification and speciation at NARMS also includes dark field microscopy and polymerase chain reaction (PCR).

Submitted by Henrietta Hardin
Manager, General Bacteriology
And Environmental Microbiology

[1] Centers for Disease Control and Prevention, Atlanta, GA
[2] 1997-2004 NARMS data: Ciprofloxacin resistance among *C. jejuni*
[3] TCA 1200-6-3 General Rules Governing Medical Laboratories, "Referral of Cultures to the Department of Health," http://state.tn.us/sos/rules/1200/1200-06/1200-06-03.pdf, pp.46-47.

Expected Shortfall of Vaccine Highlights Importance of Referral of *Haemophilus influenzae* from Sterile Sites for Serotyping

Voluntary Merck & Co. Recall of Hib Vaccine

On December 13, 2007, Merck & Co., Inc. announced a voluntary recall of certain lots of two *Haemophilus influenzae* type b (Hib) conjugate vaccines, PedvaxHIB® (monovalent Hib vaccine) and Comvax® (Hib/hepatitis B vaccine). Merck does not expect to resume distribution of these vaccines until the fourth quarter of 2008. The recall has resulted in short-term disruption to the Hib vaccine supply in the United States. Two other Hib conjugate vaccines manufactured by Sanofi Pasteur and currently licensed and available for use in the United States; however, Sanofi Pasteur likely is not able to provide adequate Hib vaccine to vaccinate fully all children for whom the vaccine is recommended.

Deferral of Routine Vaccination Recommended

Due to the short-term reduction in available doses of Hib-containing vaccines, CDC, in consultation with the Advisory Committee on Immunization Practices (ACIP), the American Academy of Family Physicians, and the American Academy of Pediatrics, recommends that providers temporarily defer administering the routine Hib vaccine booster dose administered at age 12-15 months, except to children in specific groups at high risk. Limitations of the vaccine supply underscore the importance of surveillance for Hib disease in children and serotyping of *H. influenzae* (Hi) isolates. ACIP recommends that public health practitioners conduct thorough and timely investigations of all cases of Hib disease.

Serotyping Critical to Surveillance of Hib Disease

Serotype information for Hi invasive disease cases is essential to monitor progress toward elimination. This information also is needed to monitor nontypeable Hi invasive disease to determine whether there is an increase in invasive disease with another serotype or with nontypeable strains, and to measure the sensitivity of the surveillance system. Serotyping of *Haemophilus influenzae* isolates from sterile sites is already required in Tennessee. It is an especially critical tool for public health to detect any changes in Hib disease and respond to any cases that occur during this period when immunization of infants and toddlers is less than optimal. For questions on referral of cultures and serotyping, please contact Henrietta Hardin at 615-262-6362.

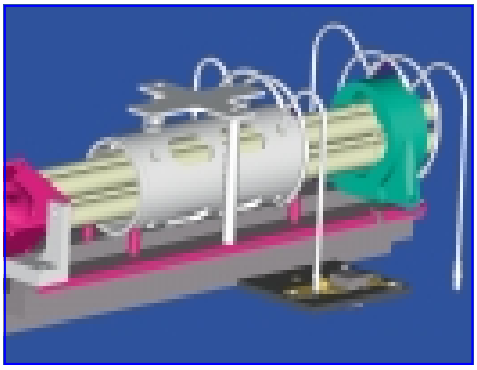
Submitted by James A. Gibson, Director
Clinical Division Laboratory Services

New ICP–Mass Spectrometer for Routine Ultra Trace Element Analysis of Inorganic Metals

Heavy Metals Can Cause Serious Health Effects

As our world becomes more polluted, we find that our environment has a greater impact on our health than ever before. Heavy metals are substances that are frequently ingested, inhaled or absorbed through the skin. Substances such as mercury, lead, thallium, arsenic, cadmium, bismuth, or antimony frequently disrupt immune, neurological, and endocrine functions. The toxicity of these metals has been documented throughout history: Greek and Roman physicians diagnosed symptoms of acute lead poisoning long before toxicology became a science. Today, much more is known about the health effects of heavy metals. Exposure to heavy metals has been linked with developmental retardation, various cancers, kidney damage, and even death in some instances of exposure to very high concentrations. Exposure to high levels of mercury, gold, and lead has also been associated with the development of autoimmunity, in which the immune system starts to attack its own cells, mistaking them for foreign invaders. Autoimmunity can lead to the development of diseases of the joints and kidneys, such as rheumatoid arthritis, or diseases of the circulatory or central nervous systems.

Above is the ELAN 9000 ICP-MS instrument. The device below is the high frequency 2.5 MHz quadrupole magnet for high resolution and abundance sensitivity.

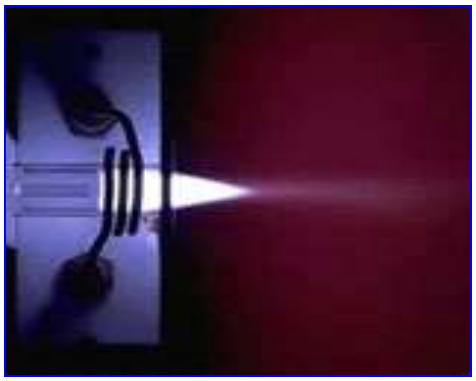


New Analyzer Installed in Inorganic Chemistry Laboratory

The Inorganic Chemistry (Metals) Laboratory in Nashville has added an inductively coupled plasma mass spectrometer (ICP-MS) to its suite of instrumentation. The Perkin Elmer ELAN 9000 ICP-MS was installed in January of this year. Anthony Wilson, the supervisor of the Nashville Metals Lab, is performing initial demonstration of capability of the instrument as well as minimum detection limit studies. Training by a product specialist will take place at the end of February.

Analysis of Wide Range of Metals in Parts Per Trillion

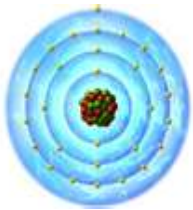
An ICP-MS instrument uses high temperature argon plasma in conjunction with a mass spectrometer for the determination of a wide range of metals at part per trillion levels. An ICP-MS consists of 5 major parts: the plasma, sample introduction system, mass spectrometer interface, ion optics, mass analyzer, the detector, and the vacuum system. In ICP-MS high temperature plasma is formed from argon gas. The plasma dries the sample that is injected by the sample introduction system and the high temperature of the plasma atomizes and ionizes the components of the sample. The ions are then aligned and focused by the interface and the ion optics and presented to the high vacuum mass analyzer. The mass analyzer identifies the isotopes of the metals by their mass-to-charge ratio and the intensity of these peaks is translated by the detector into concentration values.



Samples are decomposed to neutral elements in a high temperature argon plasma (pictured above) and analyzed based on their mass to charge ratios.

Superior Detection Limits

The ICP-MS will add to our analytical capability. In addition to the 26 metals routinely requested by Tennessee's Department of Environment and Conservation we will also be able to determine the isotopes of metals such as uranium and thorium. The ICP-MS will enable us to achieve lower detection levels than currently possible with graphite furnace atomic absorption or with inductively coupled plasma atomic emission (ICP-AES). Because of the ICP-MS instrument's ability to achieve part per trillion detection levels we will not need to rely on our graphite furnace instrument. We will continue to use our graphite furnace instrument for confirmation and as a backup. The ICP-MS joins our ICP-AES as our main analytical tools. An ICP-MS instrument differs from ICP-AES in that ICP-AES technology uses the detection of light emission as opposed to the mass to charge ratio of ICP-MS technology. The ICP-MS complements the ICP-AES with a broad range of detection and analytical speed. The Perkin Elmer ELAN 9000 ICP-MS in conjunction with the Perkin Elmer Optima 3000XL ICP-AES and the Perkin Elmer FIMS 400 mercury analyzer will enable the Nashville Metals Lab to provide greater service in metals determinations.



Submitted by Craig Edwards, Manager

In the Hot Zone: Suspicious Substance Assessment for First Responders

First on the Scene

First responders, including police, fire, or emergency medical services personnel, are the first trained professionals to arrive on the scene of an incident and may be called on to deal with a suspicious substance situation. When a first responder arrives on the scene, the primary concern is to stay safe. Knowledge of how to approach, analyze, and react could have a critical impact on their life and the lives of others.

Cooperative Effort Produces Training Program

In the Hot Zone is a training program developed to help first responders assess the risk of a suspicious substance incident by following the Tennessee *Suspicious Letter and Package Risk Assessment* Guidelines. These guidelines were developed by the Tennessee Department of Health, the Tennessee Department of Emergency Management, and the Tennessee Office of Homeland Security.

Risk Classifications

Suspicious substance incidents can range from the biological agent anthrax to hazardous chemicals to powder from a powdered donut. These incidents in turn can be classified as:

- High risk, requiring a sample be submitted for laboratory testing
- Uncertain risk, requiring further risk assessment
- Low risk, not requiring laboratory testing

First responders must determine if the situation is a risk and the next steps that must be taken. If the situation is determined to be a suspicious substance risk, appropriate law enforcement and emergency management agencies must be notified.

Sample Collection and Transport

Samples must be collected by trained HazMat technicians and delivered by law enforcement to the nearest Tennessee LRN (Laboratory Response Network) laboratory. These Public Health LRN Laboratories are the Laboratory Services in Nashville, the Jackson Regional Laboratory , the Knoxville Regional Laboratory and the Memphis and Shelby County Health Department Laboratory.

DVD or CD Program Formats

In the Hot Zone: Suspicious Substance Assessment for First Responders consists of a DVD or CD, a leader's guide, participant workbook, test, and certificate. The program includes actual footage of different risk levels of suspicious substance incidents that have occurred in Tennessee. The program is designed to help Tennessee's first responders recognize and understand the importance in their role in assessing the situation and taking the appropriate steps to control the incident. The *In the Hot Zone* program is available to all Tennessee's first responders including fire, police, and emergency management agencies.

Funding for the Program

First responders are the country's first and best defense against the war on terrorism and hazardous materials. The Division of Laboratory Services would like to thank the U S Department of Homeland Security and Office for Domestic Preparedness for funding this program.

Submitted by Faye Abdulla, Coordinator, Sentinel Laboratory Emergency Response

Pictured (below left) A HazMat Team in action, (below right) Sampling supplies in a collection kit, (lower left) sampling of a suspicious substance, and colonies of growth of an organism on culture media (lower right).

A recent class of HazMat Teams from the Middle Tennessee area convened at the laboratory in Nashville to learn about the safe collection of laboratory samples. The training program consisted of a series of lectures followed by a demonstration, a hands-on exercise, and concluded with an examination.

Sample Collection Training Offered to HazMat Teams Statewide Hands-On is the Best Way to Learn Safe Handling of Hazardous Materials

Hazardous Materials a Part of Every Day Life

Do you know there are hazardous materials in your community? Every Tennessee county has at least one facility that produces, stores, or uses some form of hazardous material. For example, water treatment plants have chlorine on-site to treat the water for bacterial contaminants. Hazardous materials are used daily in agriculture and industry. Every day trucks and tankers transport hazardous materials through Tennessee on the roads and railways. And the possibility of biological and chemical terrorism are a fact

Suspicious Substance Threats

If an accident involving a hazardous material occurs, a public agency hazardous materials emergency response team (HazMat Team) is called in to control the situation. They survey the situation, respond to the immediate threat, determine the nature of the incident, and, if they determine that there is a suspicious substance, collect samples for testing.

State Public Health Laboratories Test Samples

These suspicious substances are tested at a Tennessee Public Health Laboratory Response Laboratory (LRN) in Jackson, Knoxville, Memphis or Nashville. The Tennessee LRN laboratories provide the HazMat teams with Suspicious Substance Specimen Collection Kits containing the necessary containers and equipment for collecting a variety of samples for testing for suspected biological or chemical terrorism agents.

Partnerships Pay Off

TDH Division of Laboratory Services is partnering with the Tennessee Emergency Management Agency (TEMA) to train HazMat units throughout the state in using the sample collection kits.

Training includes techniques for collecting the sample so that

- Evidence from the scene is collected and preserved properly to be used for law enforcement investigations.
- A representative sample of the suspicious substance is collected using supplies from the TDH Suspicious Substance Sample Collection Kit.
- The sample is not contaminated during the collection. Contaminants may inhibit recovery or mask the presence of terror agents.
- The sampling team and people who deliver and test the sample are protected from exposure to the substance.
- The sample is secured using legal chain of custody requirements so that samples can be use for criminal prosecution of suspected offenders.

Submitted by David Whybrew, Coordinator
Chemical Emergency Response and
Faye Abdulla, Coordinator
Sentinel Laboratory Emergency Response

Division of Laboratory Services Welcomes New Employees

New Hires	Section/Location	Start Date
Anthony Coleman	Microbiologist 3-C, Supervisor, Enteric Bacteriology, Nashville	12/17/2007
Junjun Huang	Microbiologist 2-C, Vector Borne Disease Laboratory, Nashville	03/30/2008
Mary Krueger	Microbiologist 2-C, Tandem Mass Spectroscopy, Nashville	11/19/2007

Biosafety Resource Available to Download

Biosafety in Microbiological and Biomedical Laboratories (BMBL)

New Era Compels Reexamination of and Changes in Safety Practices

We are living in an era of uncertainty and change. New infectious agents and diseases have emerged. Work with infectious agents in public and private research, public health, clinical and diagnostic laboratories, and in animal care facilities has expanded. Recent world events have demonstrated new threats of bioterrorism. For these reasons organizations and laboratory directors are compelled to evaluate and ensure the effectiveness of their biosafety programs, the proficiency of their workers, as well as the capability of equipment, facilities, and management practices to provide containment and security of microbiological agents. Similarly, individual workers who handle pathogenic microorganisms must understand the containment conditions under which infectious agents can be safely manipulated and secured. Application of this knowledge and the use of appropriate techniques and equipment will enable the microbiological and biomedical community to prevent personal, laboratory, and environmental exposure to potentially infectious agents or biohazards

BMBL the Authoritative Resource for Laboratory Safety

Over the past two decades, *Biosafety in Microbiological and Biomedical Laboratories* (BMBL) has become the code of practice for biosafety-the discipline addressing the safe handling and containment of infectious microorganisms and hazardous biological materials. The principles of biosafety introduced in 1984 in the first edition of BMBL and carries through in this fifth edition remains steadfast. These principles are containment and risk assessment. The fundamentals of containment include the microbiological practices, safety equipment, and facility safeguards that protect laboratory workers, the environment, and the public from exposure to infectious microorganisms that are handled and stored in the laboratory. Risk assessment is the process that enables the appropriate selection of microbiological practices, safety equipment, and facility safeguards that can prevent laboratory-associated infections (LAI).

New Technology and Contemporary Issues Require Periodic Updates of BMBL

The purpose of periodic updates of the BMBL is to refine guidance based on new knowledge and experiences and to address contemporary issues that present new risks that confront laboratory workers and the public health. In this way the code of practice will continue to serve the microbiological and biomedical community as a relevant and valuable authoritative reference.

This document is available online at
http://www.cdc.gov/od/ohs/biosfty/bmbl5/bmbltoc.htm
as a downloadable PDF version (3.4 MB).

Reprinted from *Biosafety in Microbiological and Biomedical Laboratories*, U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, and the National Institutes of Health, 5th Edition, February 2007

Pictured above are laboratorians:
plating media under a bio-safety cabinet (top),
measuring reagents (center left),
making serial dilutions (center right),
noting growth patterns (lower left) and
checking specimen identification

Department of Health,
Authorization No.