TENNESSEE DEPARTMENT OF HEALTH
It's About Time!

Tennessee Department of Health Public Health Laboratories Newsletter

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Laboratory Services Molecular Biology Team Earns National Award

Laboratory Services Molecular Biologist Amy Woron and the staff of the Molecular Diagnostics Laboratory in Nashville have been honored with a special recognition at the 2008 PulseStar Awards. The award was announced at the 12th Annual PulseNet Update Meeting in St. Louis, Missouri.

The Molecular Diagnostics laboratory is one of 63 PulseNet laboratories in the United States. The PulseNet award is given for outstanding work with outbreaks of foodborne illness and the rapid identification of infectious agents and recognizes our laboratory for leading the way in investigations of infections.

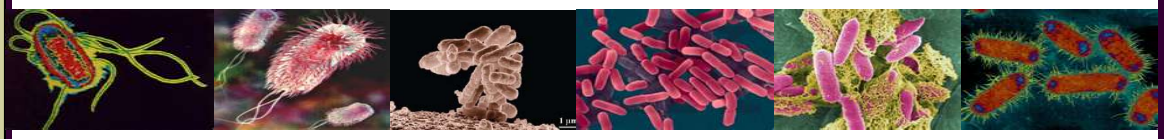
PulseNet operates as a real-time database for the surveillance of foodborne outbreaks. The Molecular Diagnostics Laboratory added nearly 1,700 samples from Tennessee to the national database last year.

Please join us in congratulating our colleagues on this recognition of their hard work!

The Award-Winning PulseNet Team

Shown, left to right, are Michael Lehman, Bill Reimels, Christina Moore, Jeanette Dill, Amy Woron (with plaque) and Sheri Roberts.

Below are various electron micrographs of *Escherichia coli*



Modern DNA Fingerprinting Methods Allow for Rapid Identification and Investigation of Foodborne Outbreaks

To find cases in an outbreak of *E. coli* O157 infections, public health laboratories perform a kind of "DNA fingerprinting" on *E. coli* O157 laboratory samples. Investigators determine whether the "DNA fingerprint" pattern of *E. coli* O157 bacteria from one patient is the same as that from other patients in the outbreak and from the contaminated food. Bacteria with the same "DNA fingerprint" are likely to come from the same source. Public health officials conduct intensive investigations, including interviews with ill people, to determine if people whose infecting bacteria "DNA fingerprinting", match, are part of a common source outbreak.

A series of events occurs between the time a patient is infected and the time public health officials can determine that the patient is part of an outbreak. This period of time means that there can be a delay between the start of illness and confirmation that a patient is part of an outbreak. Public health officials work hard to speed up the process as much as possible.

Refer to the outbreak timeline on page 3

Escherichia coli 101: The Basics You Should Know

What is E. coli? *Escherichia coli* (E. coli) is a common kind of bacteria that lives in the intestines of animals and people. There are many strains of *E. coli.* Most are harmless. However, one dangerous strain is called *E. coli* O157:H7. It produces a powerful poison. You can become very sick if it gets into your food or water. In 1999 it was estimated that about 73,000 people in the U.S. got sick each year from *E. coli*. About 60 died. It's believed that the number of illnesses and deaths has been dropping since then.

How is *E. coli* O157:H7 spread? Outbreaks often are caused by food that has gotten the bacteria, *E coli,* in it. Bacteria can get accidentally mixed into ground beef before packaging. Eating undercooked meat can spread the bacteria, even though the meat looks and smells normal. *E. coli* can also live on cows' udders. It may get into milk that is not pasteurized.

Raw vegetables, sprouts, and fruits that have been grown or washed in dirty water can carry *E. coli* O157:H7.

E. coli can get into drinking water, lakes, or swimming pools that have sewage in them. It is also spread by people who have not washed their hands after going to the toilet.

***E. coli* can be spread to playmates by toddlers** who are not toilet trained or by adults who do not wash their hands carefully after changing diapers. Children can pass the bacteria in their stool to another person for 2 weeks after they have gotten well from an *E. coli* O157:H7 illness. Older children and adults rarely carry the bacteria without symptoms.

What are the signs of *E. coli* O157:H7 sickness? Bloody diarrhea and stomach pain are the most common signs of *E. coli* O157:H7 sickness. People usually do not have a fever, or may have only a slight fever. Some people, especially children under 5 and the elderly, can become very sick from *E. coli* O157:H7. The infection damages their red blood cells and their kidneys. This only happens to about 1 out of 50 people, but it is very serious. Without hospital care, they can die.

How will my doctor know if *E. coli* O157:H7 made me sick? Your doctor will test to see if your sickness was caused by *E. coli* by sending a stool sample to a lab. The laboratory will test for the bacteria. **Anyone who suddenly has diarrhea with blood in it should call or see a doctor.**

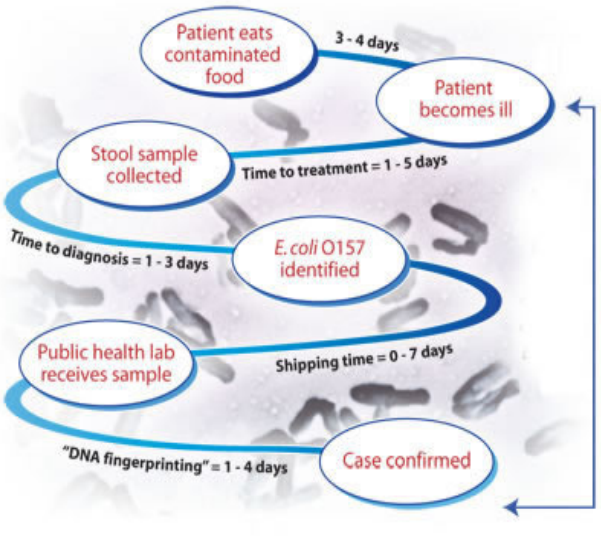
How is it treated? Your doctor will tell you what is best. Taking medicine on your own may not help you get better, and it could make things worse. Do not take antibiotics or diarrhea medicine like Imodium® unless your doctor tells you to.

Will *E. coli* O157:H7 infection cause problems for me later? People who have only diarrhea and stomach ache usually get completely well in 5-10 days. They do not have problems later. For those people who get very sick and have kidney failure, about 1 out of 3 may have kidney problems later. In rare cases, people have other problems like high blood pressure, blindness, or are paralyzed. Talk to your doctor if you have questions about this.

What is the U.S. government doing to keep food safe from *E. coli* O157:H7? New laws have helped keep food from being contaminated with *E. coli* O157:H7. They keep meat safer during slaughter and grinding, and vegetables safer when they are grown, picked, and washed. But there is still a chance that *E. coli* O157:H7 could reach your food, so you should take the precautions listed on the facing page.

E. coli articles are from the CDC Clear and Cultural Communications, CDC web site at http://www.cdc.gov/ecoli/qa_ecoli_sickness.htm

Graphic Representation of Timeline for Reporting of Cases of E. coli



1. **Incubation time:** The time from eating the contaminated food to the beginning of symptoms. For *E. coli* O157, this is typically 3-4 days.

2. **Time to treatment:** The time from the first symptom until the person seeks medical care, when a diarrhea sample is collected for laboratory testing. This time lag may be 1-5 days.

3. **Time to diagnosis:** The time from when a patient sample is collected to when *E. coli* O157 is identified from it in a laboratory. This may be 1-3 days from the time the sample is received in the laboratory.

4. **Sample shipping time:** The time required to ship the *E. coli* O157 bacteria from the laboratory to the state public health authorities that will perform "DNA fingerprinting". This may take 0-7 days depending on transportation arrangements within a state and the distance between the clinical laboratory and public health department.

5. **Time to "DNA fingerprinting":** The time required for the state public health authorities to perform "DNA fingerprinting" on the *E. coli* O157 and compare it with the outbreak pattern. Ideally this can be accomplished in 1 day. However, many public health laboratories have limited staff and space, and experience multiple emergencies at the same time. Thus, the process may take 1-4 days.

How to Stay Safe From E. coli 0157:H7
Here Are a Few Simple Rules to Follow During an Outbreak

- Carefully follow **instructions provided by public health officials on what foods to avoid in order to protect yourself and your family from infection.**
- **Cook all ground beef thoroughly.** During an outbreak of *E. coli* O157:H7. Vegetables should also be boiled for at least 1 minute before serving.
- **Cook ground beef to 160° F** Test the meat by putting a food thermometer in the thickest part of the meat. Do not eat ground beef that is still pink in the middle.
- **If a restaurant serves you an under-cooked hamburger, send it back** for more cooking. Ask for a new bun and a clean plate, too.
- **Don't spread bacteria in your kitchen.** Keep raw meat away from other foods. Wash your hands, cutting board, counter, dishes, and knives and forks with hot soapy water after they touch raw meat, spinach, greens, or sprouts.
- **Never put cooked hamburgers or meat on the plate** they were on before cooking. Wash the meat thermometer after use.
- **Drink only pasteurized milk, juice, or cider.** Frozen juice or juice sold in boxes and glass jars at room temperature has been pasteurized, although it may not say so on the label.
- **Drink water from safe sources** like municipal water that has been treated with chlorine, wells that have been tested or bottled water.
- **Do not swallow lake or pool water while you are swimming**

Tennessee Partners Regionally to Protect the Drinking Water Supply

In 2007, the Environmental Protection Agency (EPA) Water Security Division began working with the ten EPA Regional Offices located across the United States to develop Region-specific drinking water laboratory response plans. EPA has worked with Computer Sciences Corporation (CSC) to prepare a template to use for drinking water utility laboratories, federal and state environmental laboratories and public health laboratories to develop region-specific response plans to contamination.

The region-specific drinking water laboratory response plans are intended to direct a joint laboratory response to an actual or suspected drinking water contamination event. During a natural disaster, terrorist event, or accident affecting drinking water, a large number of environmental samples will be generated, likely overwhelming the capacity and/or capability of any individual laboratory to provide sufficient analytical support. This plan does not obligate a laboratory to provide support in such an event, but rather provides a blueprint for how prepared and willing EPA Regional, State, and drinking water utility laboratories will work together to meet analytical needs.

In the summer of 2007, the Tennessee Department of Health Environmental Laboratories became an active participant in the EPA Region 4 Drinking Water Laboratory Response Plan. The Region 4 States (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina and Tennessee) met at the EPA Region 4 Laboratory in Athens, Georgia to discuss and prepare the Region 4 Laboratory Response Plan (RLRP) for Drinking Water.

By EPA Region 4 definition, *the purpose of the RLRP is to establish a comprehensive, regional approach to drinking water laboratory response across a spectrum of activities including preparedness, response, remediation and recovery. The RLRP provides federal and state environmental and public health laboratories and drinking water utility laboratories with a structure for a systematic and coordinated regional response to a drinking water contamination incident.*

Functional exercises will be conducted in each of the ten EPA Regions during calendar year 2008. The Region 4 Drinking Water Laboratory Response Functional Exercise is scheduled for the week of September 22, 2008, and the Tennessee Department of Health Environmental Laboratories will be an active participant. The exercise will last for one week, include chemical and biological samples and consist of two phases. There will be one primary response laboratory (PRL) and four to six mutual support laboratories (MSLs). Phase I will last for approximately three days, and will be the *identification phase*. Phase II will be the *capacity phase*, and will involve the coordination of a larger number of samples. Each phase will consist of a chemical and a biological scenario. Evaluators will be present at each participating laboratory, and they may be a member of the participating laboratory, from another state laboratory or from the state drinking water program.

The goals of these exercises are to reveal planning weaknesses in the Region-specific drinking water laboratory response plans, to improve the coordination and communication between individual RLRP member laboratories and to identify additional systems and mechanisms that need to be implemented to improve any aspect of response during a contamination incident. The lessons learned from the functional exercises conducted in each of the ten EPA Regions will result in an enhancement of laboratory response on both a regional and national level.

Submitted by Robert Read, Ph. D., Director
Environmental Laboratories
TDH Division of Laboratory Services

Molecular Biology Section Partners with UT School of Veterinary Medicine on MRSA

Methicillin-resistant *Staphylococcus aureus* (MRSA) has a 45 year history in human medicine of increasing resistance to an ever widening range of antibiotics, with the first evidence of an MRSA strain appearing in 1960. While *S. aureus* is the most common human *Staphylococcal* isolate, veterinary patients (particularly dogs) often have skin and surgical infections caused or exacerbated by *S. intermedius* (*pseudintermedius*).

Within the last ten years, methicillin resistance amongst *S. intermedius* isolates submitted to the University of Tennessee College of Veterinary Medicine (UTCVM) Bacteriology Service has progressed from non-existence in the mid-nineties to greater than 30% today. This alarming trend is reported by veterinary diagnostic laboratories in both Europe and Asia and has rendered many commonly used antibiotics ineffective.

In response UTCVM has begun a research initiative to characterize the genetic elements of antibiotic resistance and to develop novel approaches to treat veterinary patients. Part of that characterization will be through a partnership with the Molecular Biology Section at the Tennessee Department of Health Division of Laboratory Services. Pulsed Field Gel Electrophoresis (PFGE) is a standard technique for differentiating MRSA strains in epidemiological studies of hospital and community outbreaks. Utilizing the Molecular Biology staff's technical expertise and streamlined Pulse Net PFGE set-up, the research work began in early June with UTCVM graduate student CPT Chad Black of the U.S. Army Veterinary Corps first learning the procedures and then progressing toward running representative samplings of UTCVM *S. intermedius* isolates. The goal was to detect variation in PFGE type within the sample population. This information can then be used in further epidemiological surveys of patient populations.

Pictured are potential veterinary patients: a bloodhound (known for their sensitive skin) and a close friend.

An east Tennessee native, CPT Black received his DVM from the University of Tennessee College of Veterinary Medicine (UTCVM) in 2004. From 2004 through 2007 he served as a field veterinary officer, overseeing military working dog care and food safety and quality assurance activities at installations in Georgia, Alabama, Mississippi, and the Republic of Korea. As part of the Army Medical Department's Long Term Health Education Training program, he is currently a graduate student pursuing a microbiology Ph.D. through the Department of Comparative Medicine at UTCVM. His research interests include mechanisms of antibiotic resistance in *Staphylococcal* species and canine immune response to microbial challenge.

Submitted by Cpt. Chad Black, DVM, Intern
Army Medical Departments Long Term Health Education Training Program

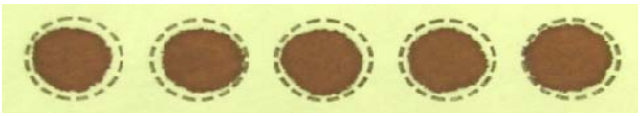
Laboratories Personnel News

New Personnel	Section/Laboratory Location	Hire Date
Karen Hargrove	Micro 2 Cert Bacteriology – Enterics Nashville	May 1
Rose Harts	Microbiologist 4, Jackson Regional Laboratory	April 28
Beth Huddleston	Microbiologist 2, Knoxville Regional Laboratory	March 16
Promotions	**Section/Laboratory Location**	
Kristina Arden	Data Entry Operator/Data Processing Section	
Thomas Childs	Microbiologist 4, Newborn Screening Section	
Retirements	**Section/Laboratory Location**	**Years of Service**
Harvey Tinsley	Microbiologist 2, Bacteriology, Nashville Laboratory	26
Jean Bond	Administrative Assistant, Nashville Laboratory	17
Ann Napier	Administrative Assistant, Nashville Laboratory	33

Changes in Newborn Screening Sample Collection

The Newborn Screening Laboratory added a new test, Immunoreactive Trypsinogen (for Cystic Fibrosis) to the screening protocol on April 1, 2008.

When collecting specimens, we ask that you fill all circles on the filter paper completely with blood. When there are problems filling the circles on the collection forms, please make every effort to completely fill at least 3 circles printed on the end of the form (pictured below). Screening protocols require at least 8, or more, 1/8" spots to complete all tests. An 1/8" spot is smaller than the circles on the form, however if only partially filled circles are sent, there may not be enough specimen to complete the testing, forcing the laboratory to assess the specimen as unsatisfactory.



Babies Are Such a Nice Way to Start People!

For more information on proper blood collection techniques for newborn screening, copies of the training CD, "*Let's Do It Right the First Time: For Newborn Babies and Their Families. A program for the collection of blood spots for newborn screening*" can be obtained by contacting Chris McKeever at 615-262-6352 or e-mail Chris.McKeever@state.tn.us or Thomas Childs at 615-262-6446 or e-mail Thomas.Childs@state.tn.us or Women's Health and Genetics staff at 615-262-6304.

Important Changes in Newborn Screening Forms

The Laboratory Services Newborn Screening Section will shortly begin filling requests for newborn screening forms with our latest edition, forms with the revision date of REV. 08/07. There are several revisions to this form that should be noted:

1. The form is yellow in color with an expiration date of September 30, 2010. The expiration date is found at the bottom right corner of the form and is displayed as 2010-09.
2. If you are submitting a specimen for repeat testing, please place a check mark indicating one of the following **Repeat Reasons**: <24 hr, Unsatisfactory, Abnormal or Transfused.
3. If you checked Abnormal as the repeat reason, please indicate under the section **Abnormal Test(s) to be repeated**: which test was initially abnormal.
4. Please note that the **Previous TDH#** box has moved to the top right of the form. If the patient was screened before, please fill this box with the TDH# from the previous screen.
5. Laboratory policy is to automatically perform a **GAL Enzyme** test on any specimen that exceeds our cutoff. **Do not check the box GAL Enzyme** to order this test unless the newborn is on a non-lactose type formula or you have information regarding family history, etc that the newborn may have galactosemia. See the footnote at the bottom of the form.
6. **Birth weight** has been added to the form to meet FDA requirements of a medical collection device.
7. **Submitter's address** has also been added to the form to meet FDA requirements. Fill out this portion of the form if the submitter address is different from the address of where to send the final report.

If you have any questions, you may contact Christine McKeever 615-262-635 or Chris.McKeever@state.tn.us) or Mitzi Lamberth 615-262-6304 or Mitzi.Lamberth@state.tn.us .