disease prevention news

July 16, 2001

http://www.tdh.state.tx.us/phpep/

Vol. 61 No. 15

TDH Participation in the PulseNet Network for Molecular Typing of Pathogens

The Microbiological Investigation Section (MIS) of the Microbiological Services Division in the Bureau of Laboratories at Texas Department of Health (TDH) is a "charter" member of PulseNet, the public health laboratory network for molecular typing of foodborne bacterial pathogens. This report describes PulseNet and TDH's participation in this cutting-edge laboratory network system.

Texas, Minnesota, Massachusetts, and Washington were the four original public health laboratories selected competitively by the Centers for Disease Control and Prevention (CDC) and the Association of Public Health Laboratory Directors (APHL) in 1995. Since then Canada has also joined PulseNet, and efforts are underway to include other countries as well.

As a PulseNet participant, MIS performs Pulsed-Field Gel Electrophoresis (PFGE), the standardized molecular fingerprinting method, on all isolates of shiga toxin producing *E. coli* (STEC), nontyphoidal *Salmonella, Listeria monocytogenes,* and *Shigella* species. The fingerprints are analyzed with a software package, Molecular Analyst, and those analyses (along with raw images from the gels) are sent to the CDC PulseNet server to be added to the pattern database. MIS is also able to download pattern images from other PulseNet participant laboratories and compare them with the isolates analyzed in Texas.

In year 2000, MIS was designated a PulseNet "Area Laboratory." The area covered includes Texas, Louisiana, Arkansas, Oklahoma, New Mexico, and the city of Houston. Area laboratories are responsible for assisting the other laboratories with PFGE performance and analysis. By 2002 this assistance will include MIS site visits to the other laboratories in the area.

Also in 2000, 118 *E. coli* O157:H7 isolates (the predominant STEC seen in the US) were fingerprinted by PFGE. Thirty were from an Arkansas outbreak, and 18 of the 30 had a PFGE pattern not seen before in Texas. In July and August, the TDH Clinical Bacteriology Section (CBS) received 50 stools from patients in the Dallas-Fort Worth Metroplex who had a history of bloody diarrhea. Initial stool enrichment enzyme immunoassays (EIA) for shiga toxin and PCR for toxin genes were negative, and the organism was not isolated using medium selective and differential for *E. coli* O157:H7. CDC provided immuno-magnetic beads for isolation of cells bearing O157 antigen, and CBS recovered *E. coli* O157:H7 from 8 of the stools. MIS confirmed that 5 of the isolates had the same PFGE profile that matched one seen in Michigan. Although there were several possible food vehicles, none were confirmed in either state despite extensive conventional epidemiological investigations. These findings were presented at the general meeting of the American Society for Microbiology (ASM) in May 2001, in Orlando, Florida. The data from this study contributed to the CDC recommendation, at the same ASM meeting, that Public Health Laboratories use the immuno-magnetic beads on all initially pathogen negative bloody stools or stools from patients with histories of bloody diarrhea.

Also in 2000, 6 nontoxigenic *E. coli* that possessed the gene *eae* (encoding the virulence factor involved with attaching to and effacing enterocytes) were discovered by PCR in the MIS laboratory. PFGE on those that were isolated showed all were distinctly different from one another. Five non-O157:H7 STEC isolates were also fingerprinted by PFGE and found to be distinctly different from one another.

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MIS performed PFGE on 1221 nontyphoidal *Salmonella* species. This effort represented more than 70 serotypes from 10 somatic antigen groups. MIS also analyzed nontyphoidal *Salmonella* isolates from Arkansas and New Mexico. Sixty-three Texas *Shigella sonnei* isolates were analyzed by PFGE, and several pattern clusters were noted by MIS and investigated by the TDH Infectious Disease Epidemiology and Surveillance (IDEAS) Division.

PulseNet meets annually in one of the participant site cities. In May 2003 the meeting will be in Austin, where MIS and TDH will showcase the new laboratory building.

In summary, TDH continues to be an active PulseNet participant, ensuring that foodborne diseases are recognized, analyzed, and controlled via utilization of molecular fingerprinting (PFGE) for bacterial pathogens. This facilitates public health maintenance in Texas by elucidating the sources for foodborne infectious diseases and preventing their further spread.

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Probable Human Anthrax Case in PHR 8

Two probable cases of human cutaneous anthrax have been reported from the Texas Department of Health (TDH) Public Health Region 8. These cases are associated with an ongoing anthrax epizootic in Val Verde, Uvalde, Real, Kinney, Bandera, and Edwards Counties. The epizootic involves livestock and native and exotic hoof stock. Laboratory confirmation is expected to be completed by mid-July.

Human anthrax, which has an incubation period of 2 to 5 days, is classified into three forms—cutaneous, gastrointestinal, and pneumonic—depending on the route the spores enter the body. The cutaneous form is by far the most common.

Cutaneous anthrax results from direct contact with infected tissue or spores, and is commonly found on the hands and arms. Cutaneous anthrax begins as a painless puritic papule that resembles an insect bite. The papule enlarges and within 24 to 48 hours develops into an ulcer surrounded by vesicles. A characteristic black necrotic central eschar appears later with associated edema. The organism can typically be identified as a gram positive rod on a gram stain. Even with early effective therapy, this lesion will finish forming fully. If untreated, 5% to 20% of patients will develop septicemia and a generalized infection resulting in death. Deaths are rare in patients receiving appropriate antimicrobial treatment.

Gastrointestinal anthrax occurs when contaminated meat is consumed. There is no evidence that anthrax can be contracted by consuming milk or milk products from infected animals. Gastrointestinal anthrax is rare and more difficult to recognize, except that it tends to occur in explosive outbreaks. Abdominal distress is followed by fever, signs of bacteremia, and then death.

Pulmonary anthrax results from inhalation of dust particles containing anthrax spores. These spores are released during risky industrial processes such as tanning of hides, or processing of wool or bone from infected animals. Initial symptoms are mild and nonspecific, resembling a

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common upper respiratory infection. A widened mediastinum on chest x-ray should alert one to the diagnosis of anthrax. Acute symptoms of respiratory distress, fever, profuse sweating, cyanosis, and shock follow in 3 to 5 days with death shortly thereafter. The fatality rate approaches 85% even with appropriate treatment.

Cutaneous anthrax may be treated with ciprofloxacin, 750 mg orally, twice a day; or with doxycycline, 100 mg orally, twice a day. Treatment should generally extend for 7 to 10 days, although prolonged treatment may be required. Pulmonary or gastrointestinal anthrax should be treated with penicillin G, 5 million units intravenously every 4 to 6 hours.

Persons infected with anthrax might travel to other parts of the state before they are aware of their infection, so physicians statewide should consider anthrax in their differential diagnoses in patients with compatible symptoms. However before samples are drawn, contact the local health department for instructions and confirmation upon suspicion. Immediately report suspected human cases by calling the local or regional health department or 800/705-8868, 7 days a week, 24 hours a day.

For further information or to report human anthrax cases, contact the TDH Infectious Disease Epidemiology Division at 512/458-7676. For animal anthrax information or reporting, contact the TDH Zoonosis Control Division at 512/458-7255. Both divisions can also be reached at 800/252-8239.

The latest review on medical management is available at http://jama.ama-assn.org/issues/v281n18/ffull/jst80027.html

Prevention of Infections Associated with Water Recreation

Swimmer's ear, or acute diffuse otitis externa, is a mild infection commonly associated with water recreation, especially during hot, humid weather. Another mild infection, swimmer's itch, is a schistosomal dermatitis that occurs when humans swim in water containing snails infected with cercariae. Water related infections that are much less common include *Vibrio vulnificus* skin infections and sepsis, which occur through exposure of a wound to seawater. *V. vulnificus*, which is part of the normal marine flora, reaches infectious thresholds easily during warmer months.

Swallowing water puts swimmers at risk of ingesting enteric pathogens. Numerous outbreaks of enteric diseases associated with swimming have been documented. For instance, giardiasis outbreaks have been associated with infant and toddler swim classes and also with a water slide pool.

The most serious infection associated with water recreation is primary amebic meningoencephalitis (PAM). It is caused by *Naegleria fowleri*, a ubiquitous free-living ameba. While the likelihood of exposure to *Naegleria* is high, the risk of infection is low. However, since PAM is almost always fatal, it is advisable to reduce the risk of infection as much as possible.

Natural bodies of water, especially those that are stagnant or polluted, are the most likely source of infection.

Personal Precautions

The following personal precautions are easy to follow and should substantially reduce the risk of water-related illness. The first 4 preventive actions listed are especially important to protect against PAM. The first 5 are protective against most water-related infections and are recommended for persons of all ages and health conditions. Individuals who tend to get ear or eye infections may benefit from using ear plugs or swim

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Disease Prevention News (ISSN 1068-7920) is a biweekly newsletter published by the Texas Department of Health, Public Health Professional Education, at 1100 West 49th Street, Austin, TX 78756-3199, (512) 458-7677, FAX (512) 458-7340, email: dpn@tdh.state.tx.us. Periodicals Postage Paid at Austin, TX

POSTMASTER: Send address changes to Disease Prevention News, 1100 West 49th Street, Austin, TX 78756-3199.

The electronic version of *Disease Prevention News*, the subscription form, and a searchable index of issues from 1995 are available at the following website: http://www.tdh.state.tx.us/phpep/

TDH Publication #59-10940

Disease Prevention News
Texas Department of Health
1100 West 49th Street
Austin, TX 78756-3199

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goggles. The last 3 recommendations are especially important for keeping potential sources of infection out of recreational water.

- Never swim in stagnant or polluted water.
- Hold your nose or use plugs when jumping into water.
- Swim in properly maintained pools whenever possible.
- Wash open skin cuts and abrasions with clean water and soap.
- Avoid swallowing water when swimming.
- Use ear plugs as needed.
- Use swim goggles or masks as needed.
- Shower before using swimming pools.
- Take young children to the restroom frequently.
- Make sure every child who is not toilet trained is wearing a swim suit (or rubber pants) over diapers designed to prevent leakage. Check diaper at least every 10 minutes.

Although it is impractical to monitor natural bodies of water, all public swimming pools and spas must adhere to established standards of cleanliness and chemical treatment. Stringent pool maintenance does not guarantee total eradication of all potentially harmful organisms, but it does help control many species of infectious organisms.

Information regarding proper maintenance of swimming pools and spas is available from the general sanitation office of your local health department, the National Swimming Pool Foundation at 210/525-1227, the TDH Infectious Disease Epidemiology and Surveillance Division at 512/458-7676, and the TDH General Sanitation Division Central office in Austin at 512/834-6635.

Visit the following CDC website for more information on how to prevent infections associated with water recreation: http://www.cdc.gov/health/spsafety.htm *(click Healthy Swimming).*