# April, 2009: A Drop of News from the Waterborne Disease Surveillance Team at CDC

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# Greetings

***A Drop of News*** *is a forum for highlighting state and local waterborne disease surveillance activities, and giving informal updates from the Centers for Disease Control and Prevention (CDC) about waterborne disease and outbreak surveillance initiatives.*

This issue of A Drop of News covers several topics related to water and health. Read about the EHSNet-Water Vision meeting on page 2 to learn about state projects. Then continue to page 3 to find out more about CDC's Biofilm laboratory, as well as an upcoming Gordon Research Conference about disinfection byproducts (DBPs) that is being sponsored by CDC. Page 4 includes an introduction to the topic of water fluoridation, as well as information about a study evaluating monochloramine disinfection as a Legionella control measure in healthcare facilities. On page 5, read Tennessee's summary of a salmonellosis investigation and a CDC update about waterborne disease outbreak reporting through the National Outbreak Reporting System (NORS).

See page 6 for an article from New York and CDC about guidelines for preventing pool chemical-associated injuries, and a description of an indoor waterpark investigation submitted by the National Institute for Occupational Safety and Health (NIOSH). Lastly, see pages 7 and 8 to read about plans for CryptoNet—a molecular surveillance system for cryptosporidiosis—and a reminder about state submissions of Cryptosporidium-positive stool specimens.

Please share this newsletter with other waterborne disease investigators and send us feedback, suggestions and contributions (see page 10 for contact information)!
We look forward to hearing from you!

# Actions and Alerts

Waterborne disease outbreaks for 2007 and 2008 can still be reported to CDC. Waterborne Disease Coordinators can refer to the email from the Waterborne Disease Surveillance Team (sent 02/12/2009) or contact Jonathan Yoder at jey9@cdc.gov for additional assistance.

Recreational Water Illness (RWI) Prevention week is fast approaching! Waterborne disease coordinators will be receiving additional information and materials for RWI Prevention week via email. If you have not received materials by May 1, please visit the Healthy Swimming Program's RWI Prevention Week webpage at http://www.cdc.gov/healthyswimming/rwi_prevention_week.htm.

The American Public Health Association (APHA) Annual Conference this year has the theme 'Water and Public Health: the 21st Century Challenge. For more information about this year's conference, go to http://www.apha.org/meetings/highlights.

## *Mark your Calendars!*

National Drinking Water Week: May 3-9

RWI Prevention Week: May 18-24

Gordon Research Conference: August 9-14

CSTE Annual Conference: June 7-11

APHA Annual Conference: November 7-11

# EHSNet-Water: 2009 Vision Meeting

*Submitted by Nelle Couret, MEM, EHS-Net Coordinator for the State of Georgia*

EHSNet-Water is a collaborative partnership between the CDC, EPA, and five partnering States (CA, GA, MN, NY and TN). The EHS-Net program aims to identify the environmental antecedents to foodborne and waterborne disease and foster collaboration between environmentalists, epidemiologists, and laboratorians. The EHSNet-Water program has brought much needed attention to the issue of waterborne disease reporting and outbreak investigation at the State level. The flexibility of the program allows each partner State to tackle these issues in a variety of ways, while collaborating to create standard outbreak investigation tools that could be used nationwide.

The Environmental Health Specialists Network-Water (EHSNet-Water) met on January 29th in Atlanta at CDC for its 2009 Annual Vision Meeting. The 2009 Vision meeting featured updates on the special studies conducted at each State. Minnesota and Tennessee presented updates on waterborne disease outbreaks and health education projects. Another common theme was water quality in drinking water wells. New York presented the analysis of a Small Public Water Supplies study, similar to a study that Georgia is working on to examine the relationship between water quality and wellhead protection measures for private drinking water wells. California is also examining well water, focusing on wells servicing labor camps with migratory workers. The studies aim to identify the most significant environmental factors that contribute to water contamination, with an eventual goal of creating risk-based evaluation tools. The EHSNet-Water Working Group is currently beta-testing the Small Water Systems Outbreak Tool, which is available to guide environmental assessments during disease outbreaks associated with wells.

Updates and presentations from Federal partners led to the consideration of new topics and projects. The common current was in understanding the environmental factors at play with waterborne disease through a multidisciplinary approach. One potential study was presented that would examine gastrointestinal illness as it relates to public water distribution systems. Other presentations proposed that the inclusion of land use and septic could be an integral part of the future for the EHSNet-Water program. Mansoor Baloch (CDC/NCEH) highlighted the need to consider a much bigger picture in waterborne illness prevention. Starting from the watershed level, the presentation promoted protection measures at every scale to improve water quality, an approach with which New York State has had experience. In contrast, Max Zarate-Bermudez (CDC/NCEH) examined septic systems on the micro scale, bringing in another essential perspective.

**Figure 1 Rand Carpenter presents Tennessee's EHSNet-Water accomplishments and planned activities for 2009 to EHSNet-Water partners.**

# The Healthy Water Website Goes Live

The CDC Healthy Water website is now live and has an official website address: http://www.cdc.gov/healthywater. The website serves as a clearinghouse on water-related topics, such as drinking water, recreational water, global water, water-related emergencies and outbreaks, and water that is used in agriculture, industry/manufacturing, and medicine. As an ongoing project, the website will add more water-related categories in the future, such as hygiene, conservation, pollution, wastewater, and stormwater.

The Healthy Water team would benefit from your feedback about the website. To provide feedback, please email healthywater@cdc.gov.

# Biofilms—Studying Opportunistic Pathogens in Potable Water

*Submitted by Margaret Williams (CDC) and Rodney Donlan (CDC)*

The Biofilm Laboratory, housed within the Division of Healthcare Quality Promotion, studies the growth of pathogenic bacteria on the interior walls of premise plumbing, and on endoluminal surfaces of medical devices such as bronchoscopes, central venous and urinary catheters. Research activities include assisting in outbreak investigations involving biofilm in water systems or medical devices, studying the survival and disinfection tolerance of opportunistically pathogenic waterborne bacteria in model water distribution systems, and field and intervention studies in healthcare facilities to prevent transmission of opportunistic pathogens to sensitive individuals.

A recent outbreak investigation of catheter-related infections in five oncology patients caused by rapidly growing mycobacteria from the hospital water system, *Mycobacterium mucogenicum* and *M. phocaicum,* highlighted several factors that contributed to their infections.[1] Plumbing on the upper floors of the hospital was stagnant for several months during a construction project. A generator failure caused the stagnant water to siphon into the rest of the plumbing, and finally, the infected patients had been newly catheterized with central venous catheters, and had not known to properly protect their lines from water exposure during showering.

To research the survival and fate of opportunistic pathogens in potable water systems within healthcare facilities, the Biofilm Laboratory is currently studying nontuberculous mycobacteria and amoeba in model systems, such as the CDC Biofilm Reactor (CBR)[2]. In this controlled system, the biofilm is exposed to chlorine-based disinfectants to determine their efficacy on pathogens in potable water biofilms.

Field studies involving point-of-use filtration and point-of-entry disinfection are also underway, to prevent exposure to pathogens in healthcare facilities. For example, membrane filters were installed on sink faucets in a long-term care facility to prevent ventilator patient exposure to rapidly growing mycobacteria. By combining laboratory research and field studies, the Biofilm Laboratory strives to improve infection prevention strategies in healthcare facilities.

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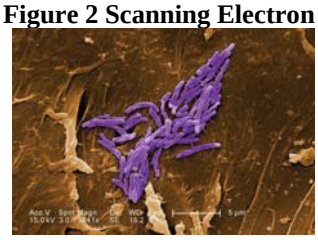
[1] Cooksey, R. C. et al, 2008. Appl Environ Microbiol. **74**:2480-2487

[2] Goeres, D. M. et al, 2005. Microbiol. **151**:757-762.

**Figure 2 Scanning Electron Micrograph (SEM) of *Mycobacterium fortuitum***



# Disinfection By-Products – Upcoming Gordon Research Conference

*Submitted by Ben Blount (CDC)*

The control of waterborne diseases through clean drinking water and improved sanitation is one of the greatest public health achievements in the United States during the last century. Unfortunately, the process of drinking water disinfection can also lead to formation of potentially harmful chemical byproducts such as trihalomethanes and haloacetonitriles. Disinfection byproducts (DBPs) are formed during the disinfection process when organic matter in the water reacts with treatment chemicals to produce new compounds (see the following webpage for additional information about DPBs: http://www.epa.gov/enviro/html/icr/gloss_dbp.html). Epidemiological studies indicate that repeated exposure to elevated levels of some DBPs over decades may increase bladder cancer risk by 20% (see the following webpage for additional information about DPBs and health effects: http://www.epa.gov/enviro/html/icr/dbp_health.html). As water treatment practices change to address emerging challenges (e.g. increased population density, decreased source water quality) water utilities must balance the need to effectively disinfect water without unduly increasing health risks from exposure to DBPs.

CDC is sponsoring a Gordon Research Conference in August, 2009 that will explore emerging DBPs and human health. This conference will feature presentations on the latest research in DBP occurrence and formation, treatment, exposure, toxicity, and epidemiology and will include a session about DBP exposure in recreational water. The Gordon Conference format facilitates dialog between leaders in diverse fields (e.g. chemists, toxicologists, epidemiologists, engineers and public health professionals) that often leads to high impact, interdisciplinary collaborations. For more information please visit the conference website at http://www.grc.org/programs.aspx?year=2009&program=drinkwater. The application deadline for this meeting is July 19, 2009.

**Figure 3 Gordon Research Conference image**

# Water Fluoridation 101

*Submitted by Kip Duchon (CDC)*

Fluoride is present in virtually all waters; however, fluoride in drinking water is predominately below the therapeutic levels for oral health. Water fluoridation is the adjustment of the fluoride content in drinking water to the optimum level, which the United States Public Health Service (USPHS) has recommended is 0.7 to 1.2 mg/L. Fluoridation has promoted good health through a reduction in cavities and tooth loss, and was named by CDC as one of 10 great public health achievements in the 20th Century. The importance of fluoride was identified by an epidemiological study comparing oral health in communities using water with naturally high fluoride levels to communities with deficient fluoride levels (see the following webpage for more information: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4841a1.htm). Fluoride has been shown to benefit all people of all ages, and fluoride use is now standard in dental care. Almost 70% of the population on public water supplies in the United States use fluoridated water.

Water fluoridation was a national program led by the USPHS until drinking water programs were consolidated within EPA. The 1974 Safe Drinking Water Act implicitly established water fluoridation as a state-level effort by requiring EPA to manage water quality from a regulatory compliance perspective. The Surgeon General moved water fluoridation to CDC in 1978 and today, CDC's Division of Oral Health in the National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP) provides national leadership in water fluoridation practice to the state programs. CDC leadership includes training to state officials, assistance in water fluoridation management, technical and engineering support, and information on health effects. In 1998, CDC partnered with the Association of State and Territorial Dental Directors (ASTDD) to develop the Water Fluoridation Reporting System, described online at http://www.cdc.gov/fluoridation/fact_sheets/engineering/wfrs_factsheet.htm. This reporting system supports state program management and is the principal national surveillance tool for water fluoridation. A biannual report provides national statistics on the extent of water fluoridation. More information on water fluoridation is available at CDC's community water fluoridation website, http://www.cdc.gov/fluoridation.

# *Legionella* in Healthcare Facilities—Evaluating the Impact of Monochloramine

*When CDC's Legionella team (http://www.cdc.gov/legionella) provides support to healthcare facilities, a common question the team receives is how to treat the water system for both the short-term and long-term. This article describes a study being led by CDC's Legionella team to evaluate the impact of monochloramine disinfection on Legionella colonization in a hospital water system in order to provide better guidance to healthcare facilities.*

The primary challenges to ongoing water treatment to control *Legionella* in healthcare facility water systems are efficacy, affordability and ease of maintenance. Control measures must take into account the association of *Legionella* spp. with biofilms, which can protect the bacteria from chlorine. Monochloramine (MCL), which is a combination of chlorine and ammonia, is a residual disinfectant that is more stable than chlorine and is used by water systems in approximately 25% of U.S. cities; the evidence to support MCL as a potential measure of control for *Legionella* spp. includes two retrospective studies that showed a reduced risk of sporadic and outbreak-associated cases of hospital-acquired Legionnaire's Disease (LD) in hospitals where MCL was used by municipal water suppliers.[1] [2]

CDC is currently studying a hospital potable water system to determine whether the direct addition of MCL significantly reduces colonization with *Legionella* spp. A secondary aim of the study is to evaluate the impact on colonization of the water system with atypical *Mycobacteria*, which has also been associated with illness in healthcare settings.[3] The study design includes a prospective environmental survey of *Legionella* and *Mycobacteria* colonization in the potable water system of a hospital where *Legionella* colonization was known to be present. Prior to the introduction of MCL to the hospital's potable water system, water and biofilm samples were collected from randomly selected patient care areas on each floor and wing. Monthly sampling began shortly after introduction of MCL in December, 2008 and concluded in March, 2009. Samples are being tested for MCL concentrations, free chlorine, temperature, and pH. Culture for *Legionella* and *Mycobacteria* is being conducted at the *Legionella* and Mycobacterial Laboratories at CDC. Results from the pre-MCL period will be compared to the post-MCL period to assess the impact of MCL on *Legionella* and *Mycobacteria* colonization.

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[1] Heffelfinger, J.D., Kool, J.L., Fridkin, S., Fraser, V.J., Hageman, J., Carpenter, J.; Whitney, C.G. Risk of hospital-acquired legionnaires' disease in cities using monochloramine versus other water disinfectants. Infect Control Hosp Epidemiol 2003. 24(8):

[2] Kool JL, Carpenter JC, Fields BS. Effects of monochloramine disinfection of municipal drinking water on risk of nosocomial legionnaires' disease. Lancet 1999; 353:272-277

[3] Kline S, Cameron S, Streifel A, Yakrus MA, Kairis F, Peacock K, Besser J, Cooksey RC. An outbreak of bacteremias associated with Mycobacterium mucogenicum in a hospital water supply. Infect Control Hosp Epidemiol. 2004;25(12):1042-9.

# *Salmonella* Associated with a Spring-Fed Gravity Flow Water System

*Submitted by Jennifer Kozlica and Rand Carpenter, Tennessee Department of Health*

On August 29, 2008, an infant experiencing bloody diarrhea was examined at an urgent care clinic. A stool specimen was collected and instructions provided regarding hydration. The infant received follow-up care from a pediatrician 4 days later. The hospital Infection Preventionist called to notify the Tennessee Department of Health, Southeast Regional Office (SER) that the stool specimen was positive for *Salmonella*.

The SER learned that both parents and two other young children had also experienced diarrhea. Stool specimen cups were provided for the two children by the pediatrician but no specimens were submitted. Investigation by SER ruled out other potential risk factors and identified tap water as the most likely source of infection.

Water samples collected from the home tested positive for total coliform, *Escherichia coli*, and *Salmonella*. Acceptable levels for total coliform and *E*. *coli* in Tennessee are zero colony forming units (CFU)/100ml. Pulsed-field gel electrophoresis (PFGE) patterns for the *Salmonella* 4,5,12:i:- found in the patient's stool and the tap water were indistinguishable. The family was advised to use bottled or boiled water, and the infant was switched from powdered to premixed formula.

After consultation with the Tennessee Department of Environment and Conservation (TDEC), additional water sampling revealed total coliform=1,986 CFU/100 ml, *E. coli*=20 CFU/100 ml, and positive for *Salmonella.* The source for this family's tap water was a nearby spring that supplied four other homes and a church. After collection in a storage tank, water from the spring is normally distributed via a gravity flow system. Water collected at the church also had positive test results (total coliform=1,414 CFU/100 ml, *E. coli*=6.1 CFU/100 ml and positive for *Salmonella*). Sampling access to the spring was denied by the landowner. PFGE results were indistinguishable between the residence tap water, the church sample, and the patient stool specimen. With these results, notification and educational materials were mailed to the affected residences and church, and signs were posted at the church to advise against drinking the water.

Approximately one month after the initial illness was reported, TDEC returned to discuss the contaminated water with the spring owner and persons at the church and collected multiple water samples from the spring site. These were positive for total coliform and *E. coli*, indicating possible surface influence of this water supply. TDEC, the church, and homeowners are working together to modify this water system to supply clean, safe water for these users; municipal water supply for this area is not currently available. The infant has made a full recovery, and no other illnesses associated with this water supply have been reported.

Information about the safe use of ground water in Tennessee can be found online in the Tennessee Healthy Well Manual (access the PDF online at http://www.state.tn.us/environment/dws/pdf/TnHealthyWell.pdf. Resources are also available on the EPA's safe water website for ground water and drinking water, http://www.epa.gov/safewater/index.html.

# Looking Ahead—The National Outbreak Reporting System

The National Outbreak Reporting System (NORS) completed the final steps in CDC's mandatory clearance and security process and launched in February, 2009. At launch, CDC set up permissions models and user accounts for all reporting sites and requested a signed Rules of Behavior document from any users who did not have one on file (access the PDF at http://www.cdc.gov/foodborneoutbreaks/nors_training/NORS_rulesofbehavior.pdf). Web-based trainings for foodborne, enteric person-to-person and animal contact disease outbreaks occurred in February and March, 2009; training resources for these reporting components are now available online at http://www.cdc.gov/foodborneoutbreaks/nors.html.

All of the reporting components (foodborne, waterborne, enteric person-to-person and animal contact) were available at launch but the training process has been staggered. Reporting sites were asked to wait until spring 2009 to complete the waterborne disease outbreak trainings and begin entering waterborne disease outbreak reports in NORS. The NORS-Water launch date will be May 4, 2009. Reporting Site Administrators (RSAs) will receive an email detailing next steps and will be asked to share the information with other users in their sites. RSAs who want to get started on NORS-Water training should contact NORSadmin@cdc.gov and review the NORS-Water training materials that are currently on the Healthy Water website at http://www.cdc.gov/healthywater/statistics/wbdoss/nors/training.html. Health jurisdictions that will not have access to NORS can also download the NORS CDC 52.12 form and CDC 52.12 'short forms' for treated recreational water, untreated recreational water, drinking water and water not intended for drinking or water of unknown intent by going to http://www.cdc.gov/healthywater/statistics/wbdoss/nors/forms.html.

# Pool Chemicals—Guidelines for Injury Prevention

*Submitted by Michele Hlavsa (CDC), Doug Sackett (NYSDOH), and Michael Beach (CDC)*

In 2007, the New York State Department of Health (NYSDOH) reported more than 30 injury events associated with pool chemicals (1983 -2006) used at public aquatic facilities to CDC's Waterborne Disease and Outbreak Surveillance System (WBDOSS). These events met the definition for an outbreak of recreational water illness (RWI) or aquatic facility–associated health event. RWI outbreaks are defined as 1) 2 or more persons epidemiologically linked by recreational water exposure, time, and illness or injury and 2) evidence implicates the recreational water itself or a water-associated compound entering the surrounding air. An example of such events would be aquatic staff or swimmers developing ocular and respiratory symptoms following exposure to chloramines (editor's note: see the article from NIOSH below). Alternatively, single cases of chemical or toxin poisoning and single cases or outbreaks that are not directly associated with the recreational water itself but are associated with contaminated air at an aquatic facility meet the definition for aquatic facility–associated health events. An example of these would be a pool operator developing difficulty breathing after mixing incompatible pool chemicals, which react and off-gas toxic compounds. Aquatic facility–associated health events can be voluntarily reported to WBDOSS.

Many of these types of injury events had not been previously reported to WBDOSS. To better understand the epidemiology of pool chemical–associated injuries, NYS and CDC worked together to systematically examine data from multiple sources: the U.S. Consumer Product Safety Commission (CPSC), the American Association of Poison Control Centers (AAPCC), and the NYSDOH reports. The CPSC estimates that thousands of people seek care in emergency rooms annually due to injuries associated with pool chemicals. Poisoning, which includes chemical ingestion and inhalation of vapors, was the most frequent injury diagnosis followed by

dermatitis/conjunctivitis and chemical burns. The AAPCC was notified of thousands of exposures to a single pool or aquarium chemical in 2007, most of which were unintentional. Review of the NYS reports revealed common contributing factors to these events such as not using personal protective equipment (PPE) when handling pool chemicals and chemical reactions resulting from poor chemical handling and storage practices. The chemical reactions can produce toxic gas (e.g., chlorine), which often times injures multiple patrons and aquatics staff members to the extent that they require medical attention in the emergency department. Given the high frequency of pool chemical–associated injuries, their preventable nature, and the themes discovered from the NYS events, the Healthy Swimming Program has developed a set of recommendations for preventing these injuries. The target audiences include aquatic facility operators, residential pool owners, and state and local pool program officials. The issues addressed in the recommendations include enhanced pool operator training and improved design of chemical storage areas and pump rooms. These recommendations will be posted on the Design and Operations page of the Healthy Swimming website: http://www.cdc.gov/healthyswimming/design_and_operation.htm.

*AAPCC aggregates data on exposures to pool and aquarium chemicals.

# NIOSH—Investigation of Employee Symptoms at an Indoor Waterpark

*Submitted by Lilia Chen (National Institute for Occupational Safety and Health [NIOSH])*

Employees and patrons at a hotel indoor waterpark began reporting eye and respiratory irritation symptoms to the local health department. Despite tests showing normal water chemistry and air chlorine concentrations, health symptoms continued. The local health department requested NIOSH assistance to determine the cause of these health symptoms. Investigators took a multi-pronged approach by 1) performing environmental sampling for trichloramine, endotoxin, and microbials; 2) administering symptom questionnaires to employees; 3) reviewing the ventilation system; and 4) reviewing water chemistry.

Airborne trichloramine concentrations ranged from below the limit of detection to 1.06 milligrams per cubic meter ($mg/m^3$). These concentrations are similar to those reported in other indoor swimming pool studies. Some trichloramine concentrations were at levels reported to cause irritation symptoms ($\geq 0.5$ $mg/m^3$). Some endotoxin concentrations were found at levels that have been associated with cough and fever.

Exposed individuals (lifeguards) were significantly more likely than unexposed individuals (employees working outside the waterpark) to report work-related respiratory and flu-like symptoms in the month prior to survey completion. Lifeguards reported significantly more work-related symptoms (i.e. cough, wheezing, shortness of breath, chest tightness, and eye irritation) than unexposed hotel employees in the month prior to the questionnaire. Lifeguards also reported significantly more eye irritation and cough on days when hotel occupancy was high versus low. No *Legionella*, fecal contamination, or mycobacteria were detected, and water chemistry met state standards.

The ventilation system may not have provided sufficient air movement and distribution to adequately capture and remove trichloramine at deck level. Based on recommendations to increase air movement and distribution at pool deck level, hotel management modified the ventilation system extensively, and subsequently no new cases were reported to the health department in 2008. The results of this investigation emphasize the importance of appropriate design and monitoring of ventilation and water systems in preventing illness in indoor waterparks.

For more information, you may read the complete report, Investigation of employee symptoms at an indoor waterpark, available online at http://www.cdc.gov/niosh/hhe/reports/pdfs/2007-0163-3062.pdf or the article by Stansbury D, Yeager C, Chen L, et al., Respiratory and Ocular Symptoms Among Employees of an Indoor Waterpark Resort – Ohio 2007. MMWR 58(4):81−85, available online at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5804a3.htm. Questions or comments about this project may be directed to Lilia Chen at lchen4@cdc.gov, Division of Surveillance, Hazard Evaluations, and Field Studies (DSHEFS), Hazard Evaluation and Technical Assistance Branch (HETAB), NIOSH. For more information about the Health Hazard Evaluation (HHE) Program, please visit the HHE website at http://www.cdc.gov/niosh/hhe/.

# CryptoNet—A Molecular Surveillance System for Cryptosporidiosis

*Submitted by Lihua Xiao (CDC)*

*Cryptosporidium* is responsible for a large number of cases and outbreaks of diarrheal illness in the United States. Despite the public health importance of cryptosporidiosis, the United States does not have a national *Cryptosporidium* reference laboratory and an established web-based system for collecting and managing *Cryptosporidium* specimens and subtype data. As a response to the need for such a resource, CDC is developing a molecular subtyping system (CryptoNet) to improve laboratory-based surveillance of cryptosporidiosis. CryptoNet will facilitate data sharing among state and local public health laboratories, promote laboratory-based surveillance of cryptosporidiosis, and improve investigations of foodborne and waterborne outbreaks of cryptosporidiosis in the United States. CryptoNet is modeled after PulseNet, the existing CDC laboratory surveillance system for bacterial diseases (additional information is about PulseNet is available online at http://www.cdc.gov/pulsenet). However, while both systems will use BioNumerics software for storing, sharing, and analyzing subtype data, CryptoNet will use DNA sequence analysis rather than pulse field gel electrophoresis (PFGE) to determine *Cryptosporidium* subtypes in humans, animals, food and water.

CryptoNet is a multi-year project; upcoming activities include the establishment of a preliminary DNA sequence database; acquisition of data on the distribution of *C. hominis* and *C. parvum* subtypes in the United States in both outbreaks and sporadic cases; standardization of DNA extraction, subtyping, and data interpretation procedures; development of standard operating procedures (SOPs); programming of the user interface; training of state users; and the launch of CryptoNet for state use. The first goal is to finalize the DNA sequence library, which will contain nucleotide sequences of the 90 kDa glycoprotein (gp60) gene and other information associated with each sequence/sample/isolate (e.g., host, geographic origin, clinical manifestations, epidemiologic data, and publications). The gp60 gene is the most commonly used target for subtyping *C. parvum*, *C. hominis* and *C. meleagridis*, and has been used widely in CDC's investigation of cryptosporidiosis outbreaks and sporadic cases. Data from multiple sources are being collected systematically so that they can be entered into BioNumerics. When available, the web-accessible CryptoNet database will allow certified users to query DNA sequences or submit data for subtype determination, identify and differentiate outbreaks using data in CryptoNet, identify infection or contamination sources in outbreaks and endemics, track the spread of outbreak subtypes, and investigate the associations between *Cryptosporidium* species/subtypes and geographical locations, hosts, clinical manifestations, or occurrence of outbreaks and cluster cases. Although CryptoNet is currently a CDC initiative, we welcome the collaboration and participation of other federal agencies and state and local public health laboratories. For more information about CryptoNet, please contact Lihua Xiao at lxiao@cdc.gov.

**Figure 4 *Cryptosporidium* oocyst**

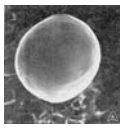
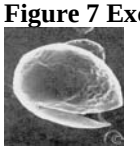


**Figure 5 Excysting *Cryptosporidium* oocyst**

**Figure 6 *Cryptosporidium* sporozoite**

**Figure 7 Excysted *Cryptosporidium* oocyst**



# CryptoNet, continued—Request for Cryptosporidium-Positive Stool

CDC's Division of Parasitic Diseases remains interested in receiving *Cryptosporidium*-positive stool specimens collected both during outbreaks and from sporadic cases (i.e. single case events) to learn more about species/genotype and subtype distribution in the United States. State and local health departments can contact Stephanie Johnston (sjohnston@cdc.gov) to submit specimens from outbreaks and contact Lihua Xiao (lxiao@cdc.gov) to submit specimens from sporadic cases. General guidelines are included below. Step-by-step instructions are also available in the June 2008 issue of *A Drop of News*.

- Specimens may be submitted year-round.
- The stool specimens should be **fresh or frozen** (e.g., formalin-preserved stools cannot be used for molecular analysis). **Zn-PVA-, EcoFix-, UNIFIX no PVA, or ethanol-preserved or Carey-Blair specimens** can be accepted if fresh or frozen stool is unavailable. *Stool specimens stored in LV-PVA for >4 weeks or formalin for >2 weeks are not usable.*
- If possible, put stool in 50 ml centrifuge tubes before shipping. Send fresh or Carey-Blair specimens on cold packs and frozen or other samples on dry ice by overnight shipment.
- Please call the lab at 770-488-4088 or 770-488-4840 to alert them about a shipment so they can ensure that it arrives safely.
- Please send specimens Monday-Thursday. Please do not have specimens arrive on Saturday, Sunday, or a holiday, because no laboratory staff will be available to accept and begin processing them.

# Publications and Presentations

If you have recently completed a waterborne disease investigation or surveillance project that was published in a peer-reviewed journal or presented at a conference, remember that you can share your accomplishment by listing a citation for your work in the next newsletter under "Publications and Presentations." We also encourage you to send in other examples from waterborne disease outbreak and surveillance projects that we can highlight in this or other sections of the newsletter (e.g. new and improved web sites, links to recently-developed educational materials).

# Contacts

CDC is available to provide assistance regarding waterborne outbreaks and illnesses. Pleasecontact us to report an outbreak or to request information about waterborne illnesses related to drinking water, recreational water and other water uses. State Health Departments can also contact CDC to obtain epidemic and laboratory assistance for waterborne outbreak investigations. Additional resources are available for recreational water inquiries and outbreaks involving *Legionella*.


| | |
|---|---|
| **Telephone** | 770.488.7775 (staffed Monday-Friday) |
| **Fax** | 770.488.7761 |
| **Email** | parasites@cdc.gov |
| **Mail** | Waterborne Disease and Outbreak Surveillance Coordinator,<br>Division of Parasitic Diseases, NCZVED, CDC, MS F-22<br>4770 Buford Highway, NE, Atlanta, GA, 30341-3724 |


**Training and resources for reporting waterborne disease outbreaks to CDC via the electronic National Outbreak Reporting System (NORS):**
http://www.cdc.gov/healthywater/statistics/wbdoss/nors/index.html
**Recreational Water- Online Resources:**
http://www.cdc.gov/healthyswimming
**Outbreak Response Toolkits:**
http://www.cdc.gov/healthywater/emergency/toolkit/index.html

***Legionella:***

*[Editor's note: contact info edited, 06/2009]*

**All travel-associated Legionnaires' disease cases** should be reported directly to the *Legionella* team by emailing travellegionella@cdc.gov or by sending a completed Legionellosis case report form within the seven days following state notification to CDC 1600 Clifton Road MS C-23 Atlanta, GA 30333, Attn: *Legionella* Team. **All legionellosis cases and outbreaks that are not associated with travel** may be reported by sending completed case report forms to the above address within one month of state notification or as soon as possible thereafter. Case report forms and *Legionella* information can be found at http://www.cdc.gov/legionella. **Contact for additional questions, including assistance with outbreak investigations**: travellegionella@cdc.gov, 1-800-CDC-INFO (1-800-232-4636).

*Please also report outbreaks of legionellosis in NORS when the outbreak investigation has been completed (see links to training and other resources for NORS at left).*

Please contact Virginia Roberts at evl1@cdc.gov to submit content or suggestions for *A Drop of News*