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The National Molecular Subtyping Network for Foodborne Disease Surveillance

PulseNet™ News

State & Local Public Health Laboratories in the United States and PulseNet Canada

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Northeast Area PulseNet Meeting

Lee Wotherspoon, MPH, PFGE Laboratory, Massachusetts State Laboratory Institute, Jamaica Plain, MA

The first Northeast Area PulseNet Meeting was held June 22–23, 2004, in Boston, MA. Hosted by the Massachusetts Pulsed-Field Gel Electrophoresis (PFGE) Lab and the National Laboratory Training Network (NLTN), the meeting was attended by lab directors, epidemiologists, and laboratorians from Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, the Centers for Disease Control and Prevention (CDC), and the Association of Public Health Laboratories (APHL). The meeting was closely modeled after the Midwest Area Meeting hosted by Minnesota in October of 2003. Many of the ideas generated by that meeting were used to develop an agenda that would allow for multidisciplinary discussions of improving foodborne disease surveillance in the Northeast and nationwide.

The goals of the meeting were to (1) openly discuss issues affecting identification and response to foodborne illness within PulseNet programs, (2) increase understanding of epidemiology and laboratory roles and activities within their public health system, (3) develop strategies to increase PulseNet effectiveness in identification and response to foodborne illness within PulseNet programs, and (4) develop recommendations for implementing these strategies.

The meeting was comprised of presentations and breakout sessions. It was structured to permit the greatest amount of time for breakout discussions in small groups. Participants from each state were randomly grouped to allow for more open discussion and greater exposure to new ideas.

At the start of the conference, each state presented an overview of the foodborne illness surveillance and response systems in place within their state. The laboratorians, epidemiologists, and directors from each state jointly created these presentations to provide the perspectives of the various parties involved in foodborne illness surveillance and response. The state presentations were an opportunity for all states within the region to hear the challenges faced by their colleagues, as well as to learn about the successful components of the many different systems presented. The presentations shed light on the enormous diversity in the activities surrounding PulseNet in each state. The Northeast states vary greatly in areas such as funding, dedicated personnel, laboratory resources, and working relationships between laboratory and epidemiology staff.

The breakout sessions following the state presentations challenged participants to

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LABORATORY PROFILE: FDA/CVM

Food and Drug Administration/Center for Veterinary Medicine *(FDA/CVM)*

Shaohua Zhao, DVM, MPVM, Ph.D., Office of Research, Food and Drug Administration/Center for Veterinary Medicine, Laurel, MD

The Food and Drug Administration (FDA) Center for Veterinary Medicine (CVM) joined PulseNet in 1998. The PulseNet laboratory is located within the Division of Animal and Food Microbiology (DAFM), Office of Research in Laurel, MD. The overall mission of the division is to conduct basic and applied research on zoonotic pathogens to support regulatory decision-making by the CVM. Currently, the division is involved in three major programs: the National Antimicrobial Resistance Monitoring System (NARMS); the National Committee for Clinical Laboratory Standards (NCCLS), focusing on the standardization of antimicrobial susceptibility testing; and PulseNet. There are five microbiologists on the CVM PulseNet team: Dr. Shaohua Zhao, who oversees the program; Sharon Friedman, who conducts PFGE analysis and is responsible for monitoring laboratory QA/QC; Sadaf Qaiyumi, who performs PFGE and also works on PCR and DNA sequence analysis in investigating the mechanisms of antimicrobial resistance; David Melka, who is responsible for PFGE analysis of all *Campylobacter* isolated from NARMS; and Jason Abbott, who

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PulseNet Meeting (Continued from page 1)

identify the strengths and weaknesses within their state PulseNet programs. Participants were encouraged to discuss what some states were doing well that could be used to address problems within other states. The issues raised and solutions offered covered a wide spectrum of topics. Among the key findings from this conference were:

(1) There is a need for improved Epi-Lab integration. Most participants described frustration with Epi-Lab relations at the state or national level. Some of the Epi-Lab issues mentioned were lack of integrated data or ability to share data efficiently, one-way communication with no reports coming back to the lab, and lack of understanding or appreciation of roles and responsibilities for both laboratorians and epidemiologists. Collaborative solutions recommended for improving Epi-Lab functioning at the state level were: create a shared, cluster database available to lab and epi staff; use existing tools such as weekly reports; seek IT support; develop communication strategies at the state level; send reports to the lab once epi investigations are closed; develop Epi-Lab working groups; and provide Lab 101 and Epi 101 trainings, orientations, and shadowing. To improve PulseNet functioning at the regional and national levels, the following actions were recommended: designate PulseNet epidemiologist(s) in each state, combine Epi-X listings with corresponding WebBoard postings, provide and define epi privileges and responsibilities for PFGE data, have epis participate in PulseNet-Area conference calls, and have CDC provide a template for how to share data between epi and lab programs (states that have successful programs for sharing lab and epi data could provide CDC and other states with a template).

(2) Laboratorians and epidemiologists are still searching for the best algorithm to define a cluster. While most participants expressed a desire for CDC to make clear determinations, some steps were recommended to improve the process. First, test all available isolates if possible to increase the library of patterns. Also, communicate with epidemiologists before posting to the WebBoard, and involve epis in data analysis; i.e. in determining the significance of a pattern at the state, regional, or national level.

(3) WebBoard: We need to improve the postings and decrease the burden. While the WebBoard is recognized as a great tool, many lab staff want better training on use of the WebBoard. Better monitoring of the WebBoard is also recommended at the state labs. In order to decrease the burden of the many postings, ideas generated at the conference such as simpler response fields, tallies, and checkboxes have been recommended to CDC.

(4) There is a need for improved isolate and case report submission. Both the lab and epi staffs are limited in what they can do for foodborne disease surveillance and response by the submission of isolates and case reports. To improve submission, the following ideas were recommended: mandate isolate submission by updating requirements, and include a PulseNet and Epi overview on bioterrorism education/training offered to hospitals and Local Boards of Health to encourage compliance with unfunded mandates.

(5) There is need for improved standardization. Standardized protocols are credited with the great success of the laboratory end of the PulseNet program. Extending this standardization is recommended to improve the overall program. The participants would like CDC to recommend that state epis use standardized tools and share field-tested questionnaires. We would also like for CDC to improve the standardization of the PFGE proficiency test.

(6) There is a lack of public awareness and political clout. With resources being a No. 1 issue in most states, participants express a concern that the public and the decision makers are not well enough aware of the important work done by the PulseNet programs in our states. To help insure the future of PulseNet, it is recommended that APHL assist public health laboratories in developing and carrying out a PulseNet Public Relations Campaign by sending executive summaries to commissioners, governors, and legislators and using presentations or mailings to increase knowledge and presence of PulseNet as an essential component of implementing the mission of public health departments.

Based on the key findings from the discussion sessions, the participants from each state devised an action plan specifically tailored to address the most important issues in their state. The action plans were presented by each state (laboratorians, epidemiologists, and directors) at the close of the meeting to offer a public

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PulseNet BioNumerics Server Setup Workshop

Susan Hunter, M.S., Foodborne and Diarrheal Diseases Laboratory Section, Centers for Disease Control and Prevention, Atlanta, GA

Workshop participants gathered at a local restaurant

The first PulseNet BioNumerics Server Setup Workshop was held on October 7–8, 2004, in Atlanta, GA. The workshop was sponsored by the CDC FDDB PulseNet Team and APHL; faculty included Dr. Paul Vauterin from Applied Maths, Brenda Brown, Robert Long, Paola Bordoni, and Susan Hunter from CDC. The workshop consisted of formal classroom-style presentations and exercises for a day and a half, followed by a half day of independent practice and an additional question-and-answer session for specific concerns of the participants.

The workshop began with a welcome and introductions by Dr. Bala Swaminathan from the CDC. PulseNet International representatives from Hong Kong, the United Kingdom, New Zealand, and Argentina attended, as well as CDC Division of Healthcare Quality Promotion (DHQP) staff and USDA-ARS (VetNet) staff. Participants learned to set up and maintain a PulseNet BioNumerics server database. For this workshop, each participant had both a client and a server computer. This made it possible for the students to actually create a server database during the workshop and log on to it from their client database during the exercises. Topics covered and exercises performed included: an overview of PulseNet server setup including server scripts; setting up an on-line PulseNet server database; a practice session on setting up a PulseNet BioNumerics server database; database security-related topics; use of the client, server, and administrator scripts; overview of tables used by BioNumerics in the context of PulseNet; and recommendations for successful management of a PulseNet BioNumerics online database. According to the workshop evaluations, all participants mentioned that the workshop would "positively or very positively influence their ability to set up a PulseNet BioNumerics server database." They were pleased with the content and focus of the workshop, and suggested that the "workshop should definitely be offered again in the future." CDC

Frequently Ask Questions

1. What are the sizes of the combs recommended by PulseNet? PulseNet recommends the 10-well Adjustable-Height Comb (170-4326) and/or the 15-Well Comb (170-3627), both of which have 10-mm-wide teeth for gel images sent to the National Database. Lanes from combs with wider teeth are easier and more accurately analyzed than those from combs with smaller teeth (5-mm), especially if the lane is distorted. The 10-well comb fits the Standard Casting Stand (170-3689), and the 15-well comb fits the Wide/Long Combination Casting Stand (170-3704). The Combination Comb Holder (170-3699) can be used with either of these combs and casting stands. When a new instrument is purchased, a 15-Well Adjustable-Height Comb with 5-mm teeth (170-4324), which fits the smaller (standard) casting stand, is included; additional combs and casting stands must be purchased. The prices in the 2004-2005 Bio-Rad catalog are $41.00 for the 10-well comb and $70.00 for the 15-well comb (without the PulseNet discount).

2. How do I troubleshoot a poor quality gel? For example, the lanes do not run straight, the lower bands are not straight across the lower part of the gel, there is more background than usual, etc.

First, note if there were any changes in procedure or reagents when making the plugs, gel, or running buffer (e.g., a new lot of the 10X TBE or agarose), or if anything changed in the lab since last "good" gel was run. If nothing obvious has changed, run another gel (this is a good opportunity to check pattern and appearance of "new and untested" H9812 standards) to see if the problem persists on another gel, or if it was a one-time occurrence. Following are some reminders for setting up and running PFGE gels:

- **Have dedicated electrical lines for the PFGE equipment.**
- **Level the assembled casting stand before the gel is poured.**
- **Equilibrate temperature of melted agarose to 54°C–56°C for 15 minutes before pouring gel.**
- **Examine comb for distortion, and make sure it is in correct position in casting stand.**
- **Level electrophoresis chamber before adding the buffer. (If the leveling bubble indicates the chamber is level, but the chamber rock-from side to side, one of the adjustable feet**

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PulseNet BioNumerics Training Workshops

BioNumerics Training at CDC: L-R (back row): Brenda Brown, Desmond Jennings, Nehal Patel, Alpha Diallo, Diana Armstrong, Precilia Calimlim, Sherricka Simington, Jeffrey Antig, Melissa Butler, Merritt Adams, Molly Joyner, Melba Torres, and Kristy Kubota. L-R (front row): Kimberely Myrick, Dominic Vacca, Paola Bordoni, Ewelina Lyszkowicz, Susan Van Duyne, Jennifer Kincaid, and Jana Lockett

Paola Bordoni, B.A., Foodborne and Diarrheal Diseases Laboratory Section, Centers for Disease Control and Prevention, Atlanta, GA

On September 15–17, 2004, PulseNet held Beginning and Intermediate BioNumerics Training Sessions at the CDC's Koger Center campus in Atlanta, GA. At the same time, Hurricane Ivan was making its way through the southeastern United States. Still, participants from as near as Tennessee to as far as Hawaii braved the storm to attend the training.

The storm did not dampen our spirits in the least. Beginning BioNumerics began early Wednesday morning with introductions and an overview of BioNumerics. The class was then led into topics including PulseNet Masterscripts, BioNumerics installation, and processing a PFGE TIFF image. After lunch, the class dove into connecting to the national database, uploading, and accessing data using the national database. After several exercises, the class was dismissed to rest in preparation for another busy day of training on Thursday.

On Thursday morning, the class learned to create and use comparisons. Using the national *Salmonella* database during exercises, participants performed a "hotlist" search on the national server and created clustering dendrograms. Once comparisons were mastered, students were briefed on the PulseNet WebBoard, and pulled their newly learned abilities together in an exercise where they were able to create and submit a WebBoard posting. The day came to a close as the storm's winds pushed through Atlanta.

The start of day three marked the beginning of the Intermediate BioNumerics Workshop, an all-day affair. A review of the previous day's work got everyone up to speed, and the more advanced tools of BioNumerics were presented. Some of the features of BioNumerics that were shown were importing external databases, creating PulseNet bundles for WebBoard, introducing database management, creating a unique pattern list, querying databases, clustering techniques, creating graphs and charts, and working with subsets. The informative course offered numerous exercises, and although exhausted, the students were pleased with their newfound abilities in BioNumerics.

At the close of the Beginning and Intermediate Workshops, students were given certificates of completion. Congratulations to all the participants!

Publications and Abstracts

- Foley S L, Simjee S, Meng J, White D G, McDermott P F, and Zhao S. **Evaluation of Molecular Typing Methods for *Escherichia coli* O157:H7 isolates from Cattle, Food, and Human.** Journal of Food Protection. 2004. 67:651-57.
- Mazurek J, Salehi E, Propes D, Holt J, Bannerman T, Nicholson L, Bundesen M, Duffy R, Moolenaar R. **A Multistate Outbreak of *Salmonella enterica* Serotype Typhimurium Infection Linked to Raw Milk Consumption - Ohio, 2003.** Journal of Food Protection. 2004. 67: 2165-2170.
- Varma J, Greene K, Reller M, DeLong S, Trottier J, Nowicki S, DiOrio M, Koch E, Bannerman T, York S, Lambert-Fair M, Wells J, and Mead P. **An Outbreak of *Escherichia coli* O157 Infection Following Exposure to a Contaminated Building.** Journal of the American Medical Association. 2003. 290(20):2790-12.
- Zhao S, Qaiyumi, S, Friedman S, Singh R, Foley S L, White D G, McDermott P F, Donkar T, Bolin C, Bolin S, Munro S, Baron E J, and Walker R D. **Characterization of *Salmonella* enterica Serotype Newport Isolated from Humans and Food Animals.** Journal of Clinical Microbiology. 2003. 41: 5366-5371.

PulseNet Meeting (Continued from page 2)

commitment to take the momentum of the conference home and improve the program in each state. Some of the action plan items included establishing weekly Epi-Lab meetings, allowing epis have access to the WebBoard, setting up lab and epi trainings, offering college-level Epi courses for lab staff, setting up shared drives and cluster databases, sending reports to the state public health commissioner, and arranging site visits to hospitals.

Evaluation data from the conference indicated it was a constructive event for all participants. Participants appreciated the opportunity to network with their regional colleagues and take part in in-depth discussions. A general consensus among the participants was that future regional meetings should include additional lectures on the basics of PFGE/PulseNet for epidemiologists and Epidemiologic Investigations for laboratorians. A follow-up to the action plans will be held during the next Northeast Area conference call. Progress on each state's action plan will be discussed, and further recommendations may develop out of the lessons learned in the time since the conference.

The evolution of this conference from the meeting first held in Minnesota was an invaluable learning experience. The Massachusetts Department of Health would like to especially thank John Besser and Dave Boxrud for helping to make this meeting a success. The meeting's materials are available to all others interested in hosting similar meetings. CDC

SPECIAL ANNOUNCEMENT

APHL's *On the Front Line* award honors an individual or organization outside of the association's membership who makes significant contributions to APHL, its membership, and its mission. In recognition of his innovative leadership, APHL has selected Bala Swaminathan, Ph.D., to receive the first *On the Front Line* award. Dr. Swaminathan, chief of CDC's Foodborne and Diarrheal Diseases Laboratory Units, spearheaded the enormous success of PulseNet. This unique surveillance system is widely recognized for its ability to assist in the early detection, rapid investigation, and effective intervention in the control of local, state, national, and even international outbreaks of foodborne disease. Under Dr. Swaminathan's guidance, the PulseNet network has expanded to include all state public health laboratories, some local and county public health laboratories, and an increasing number of international laboratories. Because of his dedication, many outbreaks have been detected, countless cases of foodborne illness have been averted, lives have been saved, and high costs of medical care have been avoided.

Dr. Swaminathan has been an innovator, a motivator, a teacher, and a determined advocate. He has made a major contribution to APHL, its membership, and the mission of our public health laboratories.

LABORATORY PROFILE: *FDA/CVM*

(Continued from page 1)

joined our team in 2003 from the Maryland State Department of Public Health PulseNet Laboratory. Jason is our image analyst and is also responsible for database maintenance and communication with PulseNet WebBoard. Our laboratories are well equipped as we have four CHEF Mappers, a RiboPrinter®, an ABI 3700 automatic DNA sequencer, two Sensititre automated ARIS antimicrobial susceptibility systems, and five thermocyclers, including a Roche LightCycler®.

CVM PulseNet has been actively engaged with the CVM NARMS/FoodNet program. CVM continues to strive to provide for the safe use of antimicrobials in food animals, while ensuring that human antimicrobial therapies are not compromised. The main safety concern is that the use of antimicrobial drugs in food-producing animals may lead to the emergence of bacterial pathogens that are resistant to drugs used to treat human illness. To address these concerns, CVM, in conjunction with CDC and 10 FoodNet sites (California, Colorado, Connecticut, Georgia, Maryland, Minnesota, New Mexico, New York, Oregon, and Tennessee), expanded the NARMS program in 2002 to include surveillance of retail meats for both antimicrobial-resistant commensal and foodborne bacterial pathogens. *Salmonella* and *Campylobacter* isolated from FoodNet sites are subtyped by PFGE and tested for antimicrobial susceptibility in accordance with NCCLS methods. This surveillance allows CDC and CVM to monitor the antimicrobial susceptibility profiles of these bacteria at the point of purchase by the consumer, and to monitor prevalence, persistence, and distribution of particular serotypes or clones of foodborne bacteria in retail meats. This surveillance program serves as an early warning system by providing information on susceptibility, serotype and, clonality trends among bacteria present in the meat supply. The data from this program will provide additional information to assist CVM in making regulatory decisions and formulating guidance documents to protect public and animal health.

CVM PulseNet also has a collaborative project with five state veterinary diagnostic laboratories, including Arizona, Michigan, Missouri, North Carolina, and Tennessee. This project focuses on subtyping and antimicrobial susceptibility testing of *Salmonella* strains isolated from the four major food animals: chickens, turkeys, swine, and cattle. Antimicrobial susceptibility, molecular typing, and serotype data from this surveillance study is compared to NARMS/FoodNet data to help understand the extent to which foodborne bacteria, including resistant strains, are being transmitted from food animals to humans via the meat supply. This data will help to define the primary animal sources of antimicrobial-resistant foodborne bacteria.

Our CVM PulseNet team also subtypes select isolates of *Salmonella* and *E. coli* obtained from the ResistVet surveillance program in Mexico, as well as the USDA-Agricultural Marketing Services (USDA-AMS) produce survey program. In addition, we support all research activities at CVM related to the molecular epidemiology of foodborne diseases. Our division conducts research on other typing methods, including ribotyping, Rep-PCR, MLST, and protein profiling, to identify host-specific biomarkers for *Salmonella* and *Campylobacter*. Our team provides full support to these research activities. We have also been working closely with the FDA's Center for Food Safety and Applied Nutrition (CFSAN) PulseNet team in offering training courses and technical support to the field laboratories of FDA's Office of Regulatory Affairs.

To date, the CVM PulseNet database has generated over 3,200 PFGE data entries: 71% *Salmonella*, 19% *Campylobacter*, 9% *E. coli*, and 1% *Vibrio*. The antimicrobial resistance profiles and PFGE patterns from both the NARMS/FoodNet and veterinary diagnostic projects have been submitted to the CDC National PulseNet database. We share this information with PulseNet participants through the WebBoard whenever we have PFGE patterns indistinguishable with potential cluster patterns. Our database continues to expand as our PulseNet program strives to meet new challenges in supporting surveillance and research activities at CVM. CDC

Frequently Asked (Continued from page 3)

is probably not touching the lab bench. When this happens, screw all four feet in most of the way and then make any needed adjustments so all four feet are on the lab bench and chamber is level).

- **Remove small pieces of agarose that may be on the sides of gel and bottom of black platform with a tissue so they will not float in the buffer and clog the lines.**
- **Be sure most of the posts on bottom of agarose trap are intact and firmly pushed into holes at front of electrophoresis chamber.**
- **Confirm the gel is flat against the black platform and the platform and gel frame are flat against the bottom of the chamber.**
- **Verify that the pump setting is correct (usually ~70) for a buffer flow of ~0.75–1.0 liter/minute.**
- **Verify that the buffer is flowing freely through the tubing and there are no large bubbles in buffer stream.**
- **Be sure tubing is not kinked or caught in corner of lid; move tubing around to eliminate any bubbles or gaps in buffer stream.**
- **Verify that the buffer temperature is 14°C ± 2°C during most of the run.**
- **Monitor the initial milliampere (ma) value, which should be 115 – 140 ma. (This value will depend on formula of TBE buffer and the water quality and will increase during the run to ≤170).**
- **Start the electrophoresis at least an hour before leaving for the day so you can monitor the temperature, flow, and ma value for major fluctuations, which could indicate problems.**

If problem with gel appearance persists, refer to the troubleshooting section in the instrument manual and/or the "General Maintenance Guide for PulseNet" that was distributed at the 2003 PulseNet Update Meeting in San Antonio, TX, for additional solutions/suggestions. You might also post a message describing the problem, along with a gel image, to the PulseNet WebBoard "Troubleshooting" Conference to see if others have had the same problem and how/if it was solved. You can also contact Bio-Rad through their Website (discover.bio-rad.com or consult.bio-rad.com) or by calling 1-800-424-6723 and pressing "2." CDC

North Carolina State Laboratory of Public Health

Leslie Wolf, Ph.D., Microbiology Branch, North Carolina State Laboratory of Public Health, Raleigh, NC

Denise Griffin and Shadia Barghothi

The mission of the North Carolina State Laboratory of Public Health (NCSLPH) is to provide certain medical and environmental laboratory services such as testing, consultation, and training for public and private health provider organizations responsible for the promotion, protection, and assurance of the health of North Carolina citizens.

PulseNet is one of the important surveillance programs in the Special Microbiology Laboratory within the Microbiology Unit. The NCSLPH began participating in PulseNet in 1999 when Dr. Leslie Wolf, an Emerging Infectious Disease Research Fellow at the time, set up the laboratory after being trained by Dr. Denise Toney and Judith Carroll at the Department of Consolidated Laboratory Services in Richmond, VA. After subsequent training at the CDC, NCSLPH began to officially participate in PulseNet by attending annual update meetings and submitting certification gels for important pathogens.

In July 2001, Ms. Denise Griffin joined the PulseNet laboratory as a Laboratory Medical Specialist and began the training process in the middle of a statewide *Salmonella* Enteritidis outbreak, which involved an EpiAid team from CDC. The addition of Denise to the PulseNet lab, as well as the addition of a second CHEF Mapper, allowed the surveillance and outbreak investigation activities to increase dramatically.

Following CDC recommendations, all *E. coli* O157:H7 and *Listeria monocytogenes* isolates take priority for PFGE analysis. North Carolina has high numbers of *Salmonella* isolates each year, thus prioritization of PFGE analyses is based on serotype prevalence, unusual local increases and multistate outbreak investigations. Surveillance on common *Salmonella* serotypes such as Newport, Enteritidis, Typhimurium, Javiana, Heidelberg, and Muenchen is carried out as personnel and other resources allow.

After Dr. Wolf moved into an administrative position as the Assistant Laboratory Director in November 2002, Denise became the lead laboratorian with all PulseNet responsibilities. In addition, she was trained to perform Norovirus RT-PCR for outbreak situations, which occur throughout the year. Since then, Denise has received certification from PulseNet for subtyping by PFGE of *E. coli* O157, *Listeria monocytogenes,* and *Salmonella* serotypes. She has cross-trained one of our Bioterrorism Team members, Ms. Shadia Barghothi, in PulseNet standardized PFGE protocols and procedures. Shadia has already contributed significantly to PulseNet activities in North Carolina and quickly received *Salmonella* certification.

Denise and Shadia had the misfortune of beginning PFGE work at a time when "clean," dedicated power lines were difficult to come by in our 30-year-old laboratory building. After troubleshooting for well over a year and repeating too many gels to count due to electrical disturbances, Denise and Shadia were able to set up the CHEF Mappers in a new, modular BSL-3 laboratory adjacent to the main laboratory building. With stable power, they are able to submit timely, and now routinely, high-quality PFGE patterns to the national database. Despite the heroic efforts they have employed to produce high- quality gels (photo: Notice the red wagon used to transfer gel supplies and reagent grade water), Denise and Shadia enjoy participating in PulseNet and communicating with our state epidemiologists, other PulseNet labs, and CDC. CDC

DON'T MISS THIS! With live music, food, and drinks, "**PulseNet:** *The Exhibit*" opened in the Global Health Odyssey of the CDC on October 5, 2004. Among many things, the exhibit displays PulseNet's "Innovations in American Government" award from the Ford Foundation and Harvard University, the "Least Wanted List," PulseNet lab equipment, a video that shows laboratory procedures, and games that teach visitors how to match DNA fingerprints. Many people attended this unforgettable event and enjoyed learning about PulseNet's past, present, and future.

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c/o PulseNet Database Administration team, *(PFGE@cdc.gov)*
1600 Clifton Road, NE
Mailstop CO3 Atlanta, GA 30333
Tel: 404-639-4558 • Fax: 404-639-3333

The PulseNet News editorial committee:
Bala Swaminathan, Shari Rolando, Mary Ann Lambert-Fair, Susan Hunter, Efrain Ribot, Susan Van Duyne, Jennifer Kincaid, Kelley Hise, and Nehal Patel.

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Welcomes

- **Rebekah Berry** is a Clinical Laboratory Scientist in the Microbiology department at the Oklahoma State Department of Health. Rebekah splits her time between Enterics and PFGE.
- **Kara Cooper, Ph.D.** is the newest member of the CDC PulseNet Methods Development and Validation Laboratory. Kara comes to us from Creighton University in Omaha, NE, where she worked on the development of sequence-based approaches to studying the molecular epidemiology of methicillin-resistant *Staphylococcus aureus*. Kara's experience with PFGE, sequencing, and microarrays will play an important role in our efforts to improve existing protocols and assist in the development of novel ways to subtype foodborne bacterial pathogens.
- **Nancy Garrett** joined the PulseNet team at CDC in September 2004. She graduated from North Georgia College and State University in May 2003, with a B.S. in Biology. Nancy will be helping with the unique PFGE pattern project, routine PFGE, and general lab support for the CDC PulseNet Methods and Validation Laboratory.
- **Peter Gerner-Smidt, MD, DMSc** has returned to CDC as Chief of the Epidemiology Investigations and PulseNet USA Unit. We are very fortunate to have Dr. Gerner-Smidt return to CDC and we look forward to working with him again.
- **Indiana State Department of Health** welcomes microbiologists Keith Obye and Veronica Erwin to the PulseNet team. Keith works in the Hepatitis lab and Veronica works in the Food/Dairy Lab.
- **Lea Kelso** joined the California Department of Health's PFGE section in February 2004. Lea is a recent graduate of Cal State University in Hayward, CA, with a B.S. in Biology.
- **Annette Malan**, a Microbiologist Principal, joined the Idaho Bureau of Laboratories. She recently completed a week-long training in PFGE at the Washington State Laboratory with Ravi Pallipamu.
- **Rachel Nieda**, a Public Health Microbiologist, joined the California Department of Health's PFGE section in the Enterics unit in February 2004.
- **NY State Lab** welcomes Yvette Khachadourian and Cathleen Fisher to their PFGE lab.
- **Wei Zhang, Ph.D.** is an American Society for Microbiology (ASM) fellow working in the CDC PulseNet Methods Development and Validation Laboratory. He obtained his doctorate degree in food microbiology from Penn State University. His dissertation work focused on the development of novel DNA sequence-based methods for the molecular subtyping of *Listeria monocytogenes*. Wei will be working on the evaluation and development of DNA sequencing-based methods for subtyping *E. coli* O157 and other STEC.

Farewells

- **Grace Lin**, who has been with California Department of Health's PFGE section in the Enterics unit since June 2003, has left to join the Mycobacteriology section.
- **NY State Lab's** Felicia Gomez and Alicia (Ebeling) Bebout left the lab to return to graduate school in August 2004. We wish them well in all their future endeavors.
- **Christine Steward** has ended her role as QA/QC Contractor for PulseNet. Chris made a significant contribution to PulseNet in the two years that she has worked for APHL — far exceeding expectations in the amount of work she completed and in the range of improvements she suggested for the QA/QC program. Please join us in wishing all the best to Chris with her future endeavors.

HOW WOULD YOU LIKE TO RECEIVE THE PULSENET NEWSLETTER? Currently, subscribers to the PulseNet quarterly newsletter receive a hard copy in the mail. The newsletter is also available electronically on the WebBoard and on the PulseNet website (www.cdc.gov/pulsenet/news.htm). If you would like to stop receiving the hard-copy version and either receive the electronic version via e-mail or access it via the website or WebBoard, please send your request to the PFGE inbox at pfge@cdc.gov with the subject line: PulseNet Newsletter.