

TB laboratory conference builds bridges to the future

by Louise Kubista

History took place on Oct. 29, 1998, as tuberculosis laboratories from across Wisconsin met together for the first time at a WSLH-convened conference. Twenty-three laboratories (77 percent of all TB testing laboratories in Wisconsin) had representatives at the meeting—"Tuberculosis in Wisconsin:

Building an Effective Laboratory Network"—held in Madison.

The conference objectives were to provide laboratorians with an understanding of the recommendations for optimizing TB laboratory services and to lay the foundation for developing a lab network whose goals are consistent with the recommendations of the TB White Paper (see "TB white paper released", page 5). Several local public health agency representatives also attended. They offered a very helpful end-user perspective.

Jeff Davis, M.D., state epidemiologist and chief medical officer, Communicable Disease Section of the Division of Public Health, was the special guest speaker. The other presenters were the members of the team that created the TB White Paper. The following is a conference summary.

WSLH Director Ronald Laessig, Ph.D., and Pete Shult, Ph.D., director of the WSLH Communicable Disease Division, opened the

meeting by welcoming the participants as partners in the fight against communicable diseases.

Davis began the meeting's technical portion by defining how the services of laboratories, both private and public, are critical to control tuberculosis. While Wisconsin as a whole meets the national target of less than 3.5 cases/100,000, certain groups are of particular concern. For example the case rate for those 65 years of age and older is 6.8/100,000 and the number of cases in the foreign born continues to rise, representing 41 percent of Wisconsin's tuberculosis cases in 1997.

Wisconsin also has had a number of cases of multiple drug resistant tuberculosis. It is important to note that our neighboring state of Illinois has greater than 7.4 cases/100,000. Since disease does not stop at the border, Wisconsin must continue to improve its infrastructure and capacity to manage and control TB in the state. A network of quality laboratories is an integral part of this infrastructure.

Following Davis' presentation, the critical role of laboratory testing in the state's control and prevention program was reviewed by Tanya Beyer, director of the TB Program, Wisconsin Division of Public Health. Beyer first clarified the legal reporting requirements for laboratories, physicians, infection control officers and local health departments.

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Louise Kubista has worked in the WSLH Tuberculosis Unit for 30 years. She retired as TB supervisor in January 1999.

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Ronald H. Laessig, Ph.D., became WSLH director in 1980 after 10 years as assistant director. He earned his bachelor's degree in chemistry at UW-Stevens Point and his doctorate from UW-Madison. He completed post-doctoral work at Princeton University. A UW Medical School professor of preventive medicine and pathology and laboratory medicine, he is an active speaker on the topic of clinical laboratory regulations.

WSLH Partnerships add up for Wisconsin's Benefit

Partnerships—an idea we take seriously at the State Laboratory of Hygiene. The concept is so important that we have made it one of our primary strategic goals. This issue of *Results* features several great examples of partnership that demonstrate the best that Wisconsin laboratories have to offer.

The “TB White Paper,” growing out of a WSLH-organized statewide conference, showcases the efforts of Wisconsin's public and private sector TB laboratories. The partners, 30 TB testing laboratories, along with their primary customers, the state and local public health agencies, surveyed practices and developed recommendations which will serve Wisconsin's TB programs well in the future. Currently, the partnership is developing a statewide TB information sharing network to expand the benefits to date.

We know from reader responses that “Virus Views” is one of the most popular features of *Results*. When you read about the latest virus activity in Wisconsin, you are seeing the benefits of another great partnership—one which begins with the WSLH and other virus

laboratories in the state. Working also with UW Family Medicine Clinics scattered throughout the state, this partnership of public and private laboratories and providers shares information to create an accurate, statewide picture of current virus activity. This not only reduces individual laboratories' and agencies' costs, it also provides an accurate picture of virus activity which benefits laboratories, clinicians, health agencies and, most of all, every citizen.

These two examples stress partnerships between laboratories and agencies. Partnership has another essential meaning to the WSLH—the partnership between people and technology. The article on pulsed-field gel electrophoresis as a state-of-the-art tool to investigate foodborne outbreaks is a prime example. By combining public health training, scientific knowledge and emerging technology, we are supporting our public health partners in fulfilling their mission of protecting Wisconsin's health.

How do laboratory based partnerships fit into Wisconsin's “public health equation?” It looks something like this:

[Wisconsin's Best Laboratories* + State of the art technology + Public Health Theory + Public Health Practice] • [Working in Partnership] = The best health care for Wisconsin.

* Wisconsin's Best Laboratories = Those in the Private and Public Sector

The WSLH team is proud to be a part of this equation.

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The statutes require immediate reporting of both confirmed and suspected cases. A "suspected" case is defined as: (a) a physician's observation of clinical signs and symptoms which strongly suggest TB or, (b) an AFB positive smear with no previous identification of non-tuberculosis mycobacteria or, (c) a physician orders treatment with at least two anti-tuberculosis medications.

Beyer next provided detailed information about how laboratory results relate to specific actions by the physician and local public health agencies. For example, if TB is suspected, patients must be isolated until the laboratory culture is grown and reported as "no TB". Therefore, delays in getting patient samples to the laboratory, in setting up the samples, or in reporting the results may result in unnecessary and expensive treatment, as well as isolation of the patient from the normal life routine, including loss of income. This information was greatly appreciated by the laboratorians present.

Judy Friederichs, director of Brown County Health Department, was the next speaker. She described her experience in a recent TB outbreak in her county, emphasizing the important role played by laboratories throughout this experience. Friederichs brought the whole problem of tuberculosis to a very personal level by describing the effect on the patients and their families. She recounted how the investigations took agency staff into businesses within the community to track contacts that were not necessarily known to each other by names, but only by shared activities. The investigation took a different direction than that evident by contact investigation when laboratory testing revealed involvement of more than one strain of tuberculosis. This broadened the investigation, providing the health department with a more complete understanding of the extent of the outbreak. Friederichs explained how incentives, such as meals and transportation etc., helped in their investigation and, in one instance, improved the living conditions for a homeless patient. This report gave the laboratory personnel insight into the importance of testing and its timeliness as it directly impacts upon the activities of the local public health officers and the lives of the patients.

Other members of the TB White Paper team joined Davis, Shult, Beyer and Friederichs in a panel discussion on how the laboratory recommendations outlined in the TB White Paper impact their laboratories and local public health agencies.

- Karl Schmitt, M.D., Aurora Clinical Laboratories, discussed the efforts by their TB lab team to design a facility that meets the recommended Biosafety Level 3 standards, emphasizing the need for the bench level technical people to be involved in designing an efficient safe facility.
- Ajaib Singh, Ph.D., Milwaukee Bureau of Labs, reported on their TB testing program.
- In an entertaining presentation, Kurt Reed, M.D., Marshfield Laboratories, described a scenario in which the difficulty of reporting results to the correct people in a timely manner was revealed. Reed also shared his laboratory's willingness to adopt the national recommendations.
- Delores Harder, Washington County Health Department, described the challenge faced by local public health agencies that see few if any cases of tuberculosis, but yet must be prepared in the event of an outbreak.
- Louise Kubista, WSLH, told of the problems involved with receiving isolates from specimens that are sent to out-of-state laboratories and of the difficulties in verifying new tests when laboratories receive few specimens.

The remainder of the presentations focused on the TB White Paper recommendations and discussions of possible strategies for building a laboratory network.

Specifically, Reed gave a brief history on the activities of the White Paper team in their efforts to produce the document. He was followed by Kubista who explained the origins of the recommendations adopted by the white paper team.

Shult then described the Wisconsin Influenza and Respiratory Virus Surveillance Network as an example of how a laboratory network

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was developed and is maintained. He then led a discussion on the next steps needed to move forward with the TB Laboratory Network. Several points were agreed on by the participants: (i.) to be effective, a laboratory network must include participation of the public health agencies; (ii.) the WSLH should organize a workshop around the topic of new and rapid methods; (iii.) the WSLH will work with some of the larger labs to develop a plan for routine sharing of laboratory testing information.

Ideas for methods of communication, such as the Internet and fax reports, and the logistics of future meetings will be gathered from the

laboratories. The WSLH will use that data to develop a plan that permits all the state's 30 TB labs to be active contributing members.

The day came to an end all too quickly. Wisconsin is fortunate to have public and private laboratories that are already doing a good job at meeting most of the national recommendations and are committed to continuous improvement. They and the public health agency representatives demonstrated an eagerness to work together to provide the citizens of Wisconsin the best TB laboratory services possible.

Kubista retires on high note

by Anne Rodgers, WSLH Public Affairs

On October 29, 1998, the State Laboratory of Hygiene hosted a tuberculosis conference in Madison and the TB White Paper was unveiled. The success of both were a fitting ending to the almost 30 years that Louise Kubista, a primary architect of both activities, has given to the State Lab.

Kubista began working in the WSLH TB lab in June 1969 and admits that the early years of working as a lab technician were uncertain. She became supervisor of the TB lab in 1973, but had not yet placed her role in the lab into the greater picture of tuberculosis testing in Wisconsin.

In the early 1990s, however, in the midst of a national movement to incorporate public health issues into public and private labs nationwide, the State Lab began thinking more about its appropriate role. Over time, public health became a focal point of Kubista's work. Her career would take a new direction toward building partnerships among the WSLH and public and private labs across the state.

Tuberculosis and TB testing became a hot topic within the public health field in the early 1990s when the



Louise Kubista

number of cases began to increase after many years of low levels. As the new leader of statewide lab testing, Kubista began building upon existing relationships with labs that shared the common goal of providing appropriate TB testing.

In 1997, a satellite conference on the role of public health labs was held from which idea of the White Paper was conceived. The paper would both define the current activities of public and private laboratories, as well as

offer recommendations for all Wisconsin laboratories to improve their role in TB control and prevention.

Kubista says she is very pleased with the outcome of the TB White Paper.

"The information in the paper comes from working with people at all levels," she says. Most important, she adds, were the people who work at the benches testing for TB every day.

The TB conference in October marked the first time the WSLH and the state's other public and private TB laboratories came together to form a single network to provide the type of quality testing Kubista and others have worked so hard to achieve. The presentation of the TB White Paper punctuated the event perfectly.

On January 19, 1999, Louise Kubista retired from the State Laboratory of Hygiene.

"Having seen the beginning of the formation of a TB network was the highlight of my career," says Kubista. "I feel that I am leaving on a high note-an up beat."

NOTE: Phil Wand is the new WSLH TB Program Coordinator. You can reach him at (608) 263-5364.

TB white paper released

by Peggy Hintzman

In May 1997, professionals from the laboratory and public health communities met as part of two national satellite conferences to identify the role laboratories should play in public health issues. As an outcome of those conferences, a team was appointed by Ronald H. Laessig, Ph.D., WSLH director, to study the role of laboratories in the prevention and control of tuberculosis. The work of this study committee was released in the form of a White Paper presented at a meeting held October 29, 1998, in Madison.

TB was selected as a topic because it remains an important public health concern despite the advances made to reduce its spread. Increased immigration of TB-infected individuals, decreased funding for public health, the AIDS epidemic, emergence of multi-drug resistant TB, and changes in health care financing all have contributed to recent increases in TB cases nationwide.

In preparation for their study, the TB White Paper Team identified four underlying principles for their work. All laboratory testing for tuberculosis :

- must be of the highest quality available;
- must be consistent regardless of the laboratory facility;
- must include a rapid reporting system to facilitate patient follow-up; and
- must include cooperation and collaboration with all members of the health care team.

To better understand the current situation with respect to TB in Wisconsin, the White Paper Team undertook two important surveys. The first was sent to local public health agencies to ascertain their current concerns about the role laboratories played in the public health community's TB control and prevention programs. In general, local public health agencies were pleased with the quality and level of cooperation they received from their local and state laboratories; however they expressed concern about specimens sent to out-of-state laboratories and delays in receiving reports of possible new cases.

A second survey was sent to the 30 laboratories in Wisconsin which were licensed to perform some level of TB testing. This survey compared individual laboratory performance with the recommendations of the First, Second and Third National Conferences on Laboratory Aspects of Tuberculosis on major indicators such as: safety, adherence to recommended methods, compliance with minimum workloads, use of appropriate media, isolation rates, identifications, turnaround times and reporting processes. The results show that overall Wisconsin laboratories perform well in comparison with national recommendations, though there are some areas for improvement. (A summary of the results is printed on page 6.)

After careful study and analysis of these surveys and other data, the TB White Paper Team developed the following recommendations:

- All laboratories in Wisconsin which choose to perform TB testing should be in compliance with the recommendations of the first, second, third and future "National Conferences on Laboratory Aspects of Tuberculosis".
- All laboratories in Wisconsin should be strongly encouraged to provide aliquots of all TB isolates to the WSLH. The WSLH, in turn, should be required to maintain a well-organized and documented repository of these isolates.
- All tests for suspected TB should be performed by in-state laboratories. Alternatively, provisions should be made to assure the timely reporting of test results on Wisconsin residents obtained by out-of-state laboratories to Wisconsin public health agencies and the forwarding of isolates to the WSLH.
- A conference of state TB laboratories, which focuses on a discussion of these recommendations and strategies for their implementation, should be held as soon as possible. Furthermore, a mechanism for on-going assessment and improvement of the quality of TB laboratory testing statewide should be created. The WSLH should assume a leadership role in accomplishing this recommendation.

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Peggy Hintzman, M.B.A., currently holds joint duties as WSLH assistant director and as a team member of the Wisconsin Division of Public Health's Turning Point initiative.

Members of the TB White Paper Team were:

Tanya Beyer, Director, Tuberculosis Program, Wisconsin Division of Health

Larry Donahue, Microbiologist, formerly with Aurora Health Care

Judy Friederichs, Director, Brown County Health Department

Delores Harder, Director, Washington County Public Health Department

Kurt Reed, M.D., Associate Director, Marshfield Laboratories

Ajaib Singh, Ph.D. Chief Microbiologist, Milwaukee Health Department Laboratories

Louise Kubista, Supervisor, Tuberculosis Unit, Wisconsin State Laboratory of Hygiene

Peter Shult, Ph.D., Director, Communicable Disease Division, Wisconsin State Laboratory of Hygiene

Peggy Hintzman, Assistant Director, Wisconsin State Laboratory of Hygiene

TB white paper... from page 5

Implementation of these recommendations began as part of the October 29, 1998 conference at which time participants agreed to establish a TB Laboratory Network.

If you would like to receive a copy of the White Paper, "Laboratory Testing for Tuberculosis in Wisconsin: Current Status and

Recommendations for Improvement", or become a member of the TB Laboratory Network, please write Phil Wand, TB Program Coordinator, at: Wisconsin State Laboratory of Hygiene, 465 Henry Mall, Madison, WI 53706-1578 or call him at **(608) 263-5364**.

Laboratory Survey Summary

The recommendations from the "National Conferences on Laboratory Aspects of Tuberculosis" are for all labs to provide or use the items listed. The responses indicate a wide range of practices. The right hand column lists the percentage of laboratories in compliance with the recommendations. Thirty laboratories in Wisconsin provide some level of mycobacteriology; they all participated in the survey.

The Laboratory Survey Summary (right) is Appendix 14 in the White Paper, "Laboratory Testing for Tuberculosis in Wisconsin: Current Status and Recommendations for Improvement". The Question column in the summary at right refers to the question number in the survey sent to Wisconsin Tuberculosis laboratories.

SAFETY

| Question | Item | % of labs |
|----------|---|-----------|
| | Secondary Barriers-Facility | |
| 3 | Unidirectional airflow into the mycobacteriology laboratory | 77 |
| 4 | Exhaust air to the outside | 100 |
| 2 | Two sets of doors to access mycobacteriology laboratory | 50 |
| 1 | Formaldehyde gas decontamination of lab in case of accident | 23 |
| 9 | Access to autoclave | 73 |
| 10 | Autoclave in mycobacteriology laboratory | 37 |
| 5 | At least 10 to 12 air exchanges per hour | 17 |
| | Primary Barriers-Equipment | |
| 6 | Class II Biological Safety Cabinet | 100 |
| 7 | BSC certified annually | 100 |
| 8 | Aerosol free centrifuge equipped with O-rings | 93 |
| 13 | Use of respirators | 23 |
| | Practices | |
| 12 | Annual Skin Test | 100 |
| 11 | Written Spill Control Plan | 86 |

ACID FAST SMEARS

| Question | Item | % in compliance |
|----------|--|-----------------|
| | Workload | |
| 14 | Twenty or greater specimens processed for AFB Stain per week | 30 |
| | Acid Fast Stain Technology | |
| 15 | Fluorochrome Stain | 97 |
| 16 | Do not use staining jars | 100 |
| | Reporting | |
| 17 | Report the number of organisms observed on the smear | 97 |
| 18 | Report smear results in 24 hours or less | 93 |
| 19 | Phone or Fax positive smear results, follow with hard copy | 100 |
| 20 | Laboratory Based Reporting | 9 |

CULTURE FOR ISOLATION

| Question | Item | % in compliance |
|---|---|-----------------|
| Workload | | |
| 21 | Twenty five or greater specimens for AFB culture per week | 27 |
| Isolation Method | | |
| 22 | NaOH NALC method for decontamination | 83 |
| 23 | Centrifugation for 15 minutes | 60 |
| 24 | Centrifugation at 3,000G or greater | 70 |
| Media | | |
| 25 | Use of both broth and solid media for isolation | 83 |
| 28 | Use Bactec 460 Tuberculosis System | 43 |
| Growth Index for smear and culture identification GI <= 100 | | |
| 28a | Smear | 77 |
| 28b | Identification | 38 |
| Reading Schedule | | |
| 27 | Solid Media to be read 2x/week for the first 4 weeks | 33 |
| | Broth Media to be read 2-3x/week for the first 3 weeks | 63 |

CROSS CONTAMINATION

The responses for monitoring for cross contamination indicate that some labs are aware of the problem and have safeguards in place to prevent it. Others are aware of the problem, but process so few specimens it is not a problem for their lab. Others are unsure as to what cross contamination refers. No percentages were figured for this item, question 26.

ISOLATION RATES (There are no recommended rates)

| Question | Cultures showing growth of Mycobacteria | Unknown | 5 % or less | 6-10% | 20% |
|----------|--|-----------|-------------|-----------|-----|
| 29 | % Laboratories Reporting | 3% | 70% | 23% | 3% |
| 30 | Isolates recovered from broth | 40% | 89% | 95% | 97% |
| | % Laboratories Reporting | 8% | 8% | 15% | 8% |
| 31 | Isolates recovered from solid media | 50% | 52% | 60% | 63% |
| | % Laboratories Reporting | 23% | 8% | 8% | 8% |
| 36 | Cultures positive for <i>M. tuberculosis</i> | 0 to < 1% | 1% to 25% | 60% - 100 | |
| | % Laboratories Reporting | 45% | 48% | 7% | |

TURNAROUND TIMES

| Question | Item | Percent in compliance |
|----------|---|-----------------------|
| 32 | Growth detected in 8-12 days (broth systems) | 13 |
| 37 | <i>M. tuberculosis</i> isolates identified in 14 to 21 days | 77 |
| 38 | Cultures Negative Report 6-8 weeks | 100 |
| 42 | <i>M. tuberculosis</i> Susceptibility Testing 15-30 days | 100 |

IDENTIFICATION

| Question | Item | Percent in compliance |
|----------|--|-----------------------|
| 33 | Rapid Methods for Identification | 100 |
| 34 | Perform identification as soon as growth is sufficient | 75 |
| 35 | Submitting to referral as soon as growth is detected * | 100 |

* The recommendation is that labs that culture also should do identification.

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Laboratory survey summary... From page 7

SUSCEPTIBILITY TESTING

Four laboratories perform susceptibility testing, all use the Bactec 460 TB system as recommended. One laboratory tests for Streptomycin, Isoniazid, Rifampin, Ethambutol and Pyrazinamide. The other three test Streptomycin, Isoniazid, Rifampin and Ethambutol. The time interval between the initial susceptibility testing and follow-up testing is three months. Those labs that track this information comply, the others either didn't have enough isolates to be concerned with this, rely upon the physician to request the testing or didn't know. (Questions: 39, 40, 41, 43)

ROLE OF THE STATE LABORATORY FOR MYCOBACTERIOLOGY

The following responses by the participants are in line with the recommendations. The recommendations are not included here as they are quite extensive and are available through CDC and ASTPHLD.

1. Share information (Monitor incidence of AFB isolation/TB isolation, monitor resistance, compile statistics, e.g. Virology Reporting Network)
2. Act as a reference laboratory
3. Teaching and Training (Update information on mycobacteriology testing, offer guidelines for procedures, reporting and safety, and provide educational opportunities.)
4. Isolate repository
5. Leadership
6. Proficiency Testing
7. °RFLP testing
8. Screen for local public health agencies, hospitals, clinics, and physicians without in-state mycobacteriology laboratory.
9. Epidemiology
10. Amplification technology

International EID Fellow gains knowledge to help back home

by Anne Rodgers, WSLH Public Affairs



Dovile Vaisviliene

The Emerging Infectious Disease (EID) International Fellowship Program has brought Dovile Vaisviliene, M.D., to the Wisconsin State Laboratory of Hygiene.

Vaisviliene comes to the WSLH from Vilnius, Lithuania, and is here for a year-long fellowship during which she will be trained not only to perform updated clinical testing techniques and to apply these to community infectious disease surveillance, but also to understand and participate in strategic leadership and other administrative functions of a public health laboratory.

Vaisviliene earned her M.D. degree from the University of Vilnius and works at the Centre for Communicable Disease Prevention and Control ("The Centre") in Vilnius, Lithuania's public health laboratory. Madison was a perfect place in which to complete her fellowship work. It is smaller than the city of Vilnius, but both cities have a top-notch university and are home to a large public health laboratory. Since one of the WSLH's strong points has always been its relationship with the UW-Madison, it serves

as a perfect model for creation of a similar partnership in Vilnius.

Pete Shult, Ph.D., director of the WSLH Communicable Disease Division, is Vaisviliene's mentor and has enjoyed a very productive relationship with scientists in the city of Vilnius for more than seven years. He hopes that by training Vaisviliene in all aspects of the WSLH's operations, she will in turn help Lithuania develop a comprehensive public health laboratory with a university affiliation that focuses on three components: public health surveillance, patient diagnosis and research.

Shult says that both laboratory and university administrators in Vilnius have embraced this idea. He hopes that by the time Vaisviliene returns, it will be well on its way to becoming a reality.

The EID Fellowship program is sponsored by the Centers for Disease Control and Prevention and the Association of Public Health Laboratories. The WSLH has trained EID fellows in each of the program's three years of existence.

Unpredictable influenza season

Last fall, we compared the predictability of influenza activity with the predictability of the weather. These last few months have affirmed that comparison. There is probably no need to review the remarkably warm December or the snowfall of early January.

Even as this newsletter goes to print, however, we are still wondering what level of influenza activity will occur and which type of influenza will predominate this season. Laboratory-confirmed cases of both influenza A (H3N2) and influenza B have been detected throughout this season. Also, a recent isolate was confirmed as influenza A (H1N1).

Although the first influenza isolate in Wisconsin was detected in early November by Marshfield Laboratories, laboratory detections continued at sporadic levels in Wisconsin through mid-January. Since mid-January, the number of influenza B detections appear to be increasing more rapidly than influenza A, although both have been increasing.

In comparison, during the 1995-96 and the 1996-97 influenza seasons, laboratory detections of influenza reached peak levels in late December and early January, four to six weeks after the first influenza isolate was detected in the state. Last season, laboratory-confirmed influenza peaked in mid-February, 11 to 12 weeks after the first detection.

In further comparison, the last three seasons produced a major peak of influenza A activity, followed by smaller late season peaks of influenza B (1995-96 and 1996-97) or late season sporadic detections of influenza B (1997-98).

Of the influenza A isolates which have been subtyped thus far by the WSLH and the Milwaukee Health Department laboratory, all but one have been influenza A (H3N2). Although only the CDC can completely characterize influenza strains, these isolates are related to the A/Sydney strain of influenza A which circulated widely last year and is included in this year's vaccine. The influenza B isolates appear to be related to the strain of influenza B which has circulated for several years and also is included in this year's vaccine.

As the season develops, we will continue to monitor influenza activity in Wisconsin

through the Wisconsin Laboratory Information Network of virology laboratories.

Other virus activity

Laboratory detections of respiratory syncytial virus (RSV) are increasing, as expected. RSV activity can be expected to reach peak levels in February and March, according to patterns of previous years. Each winter, this virus causes significant illness, including bronchiolitis and pneumonia, among infants and young children. This virus also re-infects older children and adults, usually causing upper respiratory infections.

To complete the picture, the rhinoviruses and parainfluenza viruses—the most common causes of the “common cold” and childhood croup, respectively—continue to circulate in Wisconsin. Adenoviruses, which can cause a range of illnesses both respiratory and gastrointestinal, are detected year-round in the state.

Still to come?

Rotavirus activity appears to be slowly increasing. Rotaviruses are the leading cause of gastroenteritis in infants and young children, with peak activity occurring during late winter-early spring. The availability of the rotavirus vaccine, however, could impact the activity seen this winter.

Weather's effect

We've heard a number of questions about whether the late influenza season may be related to the warm weather we had in December. Although the weather does not cause influenza, the impact of the weather and the season on our activities may allow easier transmission of influenza. However, the exact mechanisms by which this might occur have not been documented.

Transmission of influenza occurs predominantly by the airborne route, so indoor contact of large numbers of people (for example, schools, nursing homes, shopping, holiday gatherings, etc.) increases the likelihood of transmission to susceptible people.



Carol Kirk is a microbiologist supervisor in the WSLH Virology Laboratory. She has 25 years of professional laboratory experience at the WSLH.



Peter Shult, Ph.D., is director of the WSLH Communicable Disease Division and is WSLH chief virologist. He received his doctorate from UW-Madison.

COMMUNICABLE DISEASE DIVISION

WSLH takes the “pulse” of foodborne outbreaks

by Jan Schneider, WSLH Public Affairs

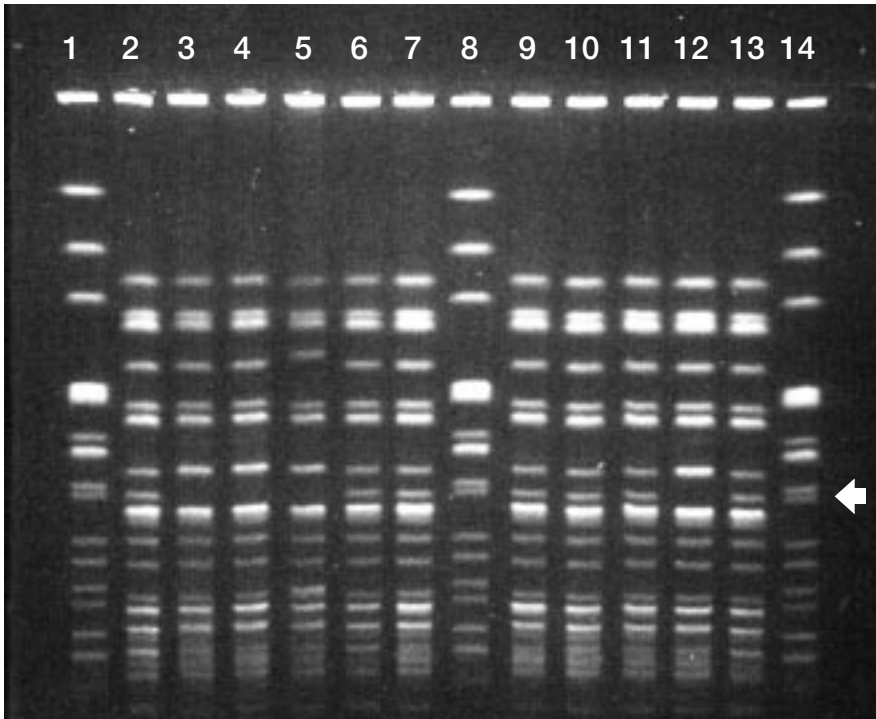


atching what you eat has taken on a whole new meaning the past few years as newspaper headlines and TV news broadcasts relay the latest stories of foodborne outbreaks. Everything from fast-food hamburgers to fruit juice to boiled ham at a church dinner have been linked to the illness, and sometimes death, of thousands. The WSLH Bacteriology Section is

participating in a national program—PulseNet—to identify and track the causes of foodborne disease.

Created by the Centers for Disease Control and Prevention (CDC) and the Association of Public Health Laboratories (APHL) in 1998, PulseNet is a national network of public health laboratories that use pulsed-field gel electrophoresis (PFGE) to obtain DNA “fingerprints” of bacteria that may be involved in foodborne disease. These “fingerprints” are stored in a database at CDC so public health epidemiologists and laboratorians nationwide can determine if bacteria isolated from various individuals in an outbreak(s) are similar, thus implying a common source of infection.

Because PulseNet is national in scope, it makes it easier for epidemiologists to track multi-state outbreaks. Within Wisconsin, PFGE provides epidemiologists at the Division of Public Health (DPH) and at local public health agencies with data to determine if ill persons were sickened by the same



This thermal print is of a *Shigella sonnei* gel. Numbering from left to right, lanes #1, 8 and 14 contain a standard control which is always run on each gel. In the remaining lanes are 11 patient isolates. Isolates in lanes 3, 4, 5 and 12 are indistinguishable from one another and comprise one outbreak. Isolates in lanes 2, 6, 7, 9, 10, 11 and 13 are indistinguishable from one another; but they differ by one DNA band from the first group. These results indicate that strains in these two groups are closely related, but likely to be from different outbreaks. The final determination would have to be made on the basis of epidemiological data.

How does DNA ‘fingerprinting’ by PFGE work?

Excerpted from PulseNet fact sheet distributed by the CDC

When a bacterium divides, the two daughter bacteria have the same genetic makeup as the parent bacterium, like identical twins. Even after many generations, bacteria descended from the same original parent will have virtually identical genetic material, or DNA. DNA “fingerprinting” by PFGE is a simple way of comparing genetic material that involves cutting up the DNA into pieces, then measuring the number and size of those pieces. The pieces are separated by a kind of a sieve, made of a jelly-like substance (gel). The DNA that has been cut in pieces is placed at one end of the gel. A pulsing electric field applied across the gel drives the DNA pieces across the gel over a period of hours. The smallest pieces slip through the sieve more quickly, so the pieces are separated as distinct bands on the gel. This pattern of bands, which resembles a bar code, is the “fingerprint.”

strain of bacteria and, if a food sample is available for testing, to determine if there is a link between the bacteria and a common food source. The WSLH keeps a database of bacteria “fingerprints” from DPH investigations, as well as transfers that information to the CDC database for use in PulseNet.

The WSLH has had PFGE capabilities for approximately four years. In early 1998, the WSLH received funding from CDC to upgrade our PFGE equipment so that it would be in line with the standardized PFGE methods developed for the PulseNet program. WSLH staff also received training from CDC in those methods.

Approximately 95 percent of the PFGE work performed at the WSLH is in support of DPH’s foodborne outbreak investigations. The WSLH also does a small number of analyses for nosocomial infection outbreak

investigations in hospitals. The WSLH currently performs between 10-40 PFGE analyses a week.

Salmonella serotype Typhimurium and *Shigella sonnei* comprised the bulk (about 80 percent) of the WSLH’s PFGE analyses this past year. Since March 1998 when the WSLH came on-line with PulseNet, PFGE has been used to investigate outbreaks of *Salmonella*, *Shigella*, *E. Coli* O157:H7 and *Neisseria meningitidis* in Wisconsin. Most of those outbreaks had a minimum of 10 people. Ironically, although large-scale outbreaks may get more media coverage, the majority of outbreaks are much smaller in scale.

By participating in PulseNet the WSLH assures our national, state and local agency partners that if a foodborne outbreak does make news, they have the data to make the story accurate.

Evans studies evolution of pathogens

by Anne Rodgers, WSLH Public Affairs

There is a new fellow in town—literally. Peter Evans came to the University of Wisconsin several years ago to obtain a Ph.D. in cellular and molecular biology. Last summer, Evans was awarded an Emerging Infectious Disease (EID) fellowship following postdoctoral work on human immunodeficiency viruses.

He is working at the WSLH, in cooperation with scientists at the UW Laboratory of Genetics under the direction of Fred Blattner, Ph.D., studying bacteria that lurk in the food we eat. This work involves comparing the genetic makeup of two related strains of *E. coli*; K-12 and O157: H7. While the K-12 strain is a normal and beneficial inhabitant of human intestines, the O157:H7 strain causes serious illness. Foodborne outbreaks of *E. coli* O157:H7 were first observed in the early 1980s, and are becoming increasingly common. Infection leads to bouts of bloody diarrhea, and, in some cases, kidney failure and death.

The genome (total DNA) of each strain of *E. coli* has already been deciphered, or “sequenced”, by the Blattner group in the UW Laboratory of Genetics. The genomic sequences are highly related, but there are regions of the O157:H7 sequence absent in

K-12. It is these regions—called “non-homologous, pathogenicity-related islands”—that most interest Evans. He will take *E. coli* O157:H7 samples from different foodborne outbreaks and survey for changes in the non-homologous islands in order to identify disease-causing genes. To find O157:H7 isolates suitable for observation, Evans will use pulsed-field gel electrophoresis (PFGE) to produce a genetic fingerprint of the entire bacterial genome.

Evans has always found the evolution of pathogens to be very interesting.

“This study in particular,” Evans said referring to the O157:H7 survey, “asks how this genome evolved the ability to cause disease.”

He believes that enteric bacteria could be trading genes based on what they need to survive in the environment, much like two children trade baseball cards to complete their collection.

“If we can identify the types of pathogenicity genes that are being traded, we can predict and prepare for the emergence of new combinations of these genes in the future,” Evans says.

The EID Fellowship program is sponsored by the Centers for Disease Control and Prevention and the Association of Public Health Laboratories. The WSLH has trained EID fellows in each of the program’s three years of existence.



Peter Evans

Results

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Attention WSLH Toxicology customers

The WSLH Toxicology Unit has moved to the State Lab's new Environmental Health Division facility. Their new address is:

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