

Michigan Department of Community Health Bureau of Laboratories

“Quality Laboratory Science for Healthier People and Communities”

Bangladesh Ministry of Health Delegation Visits

MDCH Laboratory

In November, 2012, the Bangladesh’s Secretary of the Ministry of Health and Family Welfare (MOHFW), Mr. M. Humayun Kabir, and his accompanying delegation visited Michigan for a first-hand experience on the United States public health laboratory system. The MOHFW is working to establish a national public health laboratory system for Bangladesh. This visit provided insights into the function, structure, operation and management of state and local public health laboratories and their roles within the Michigan Laboratory Network and the national laboratory system. Calling upon their Michigan experience, the MOHFW will be developing their own public health system and initiating a laboratory improvement strategic plan.

This visit was a follow-up to a 2009 trip to Bangladesh organized by the Association of Public Health Laboratories that included the MDCH BOL Laboratory Director, Dr. Frances Pouch Downes. This initial visit assessed the Bangladesh public health laboratory infrastructure, capability, and capacity.

LabLink



Notice: MDCH BOL Now Using Microsoft Outlook for E-mail

On February 3, 2012, the MDCH Bureau of Laboratories began using Microsoft Outlook for e-mail. It is possible that some e-mail sent to BOL employees will bounce back as undeliverable. Should you get a bounce back undeliverable e-mail message:

- Delete the individual's name from your frequent contact list
- Re-select that person's name from your address book
- Re-send your e-mail

Your e-mail message should now go through to the intended recipient. A few individual email addresses changed with the migration to Outlook. Watch for emails informing you of changed addresses.

New *Chlamydia trachomatis/Neisseria gonorrhoeae* Non-Culture Test Request Form

The MDCH Bureau of Laboratories (BOL) has updated the *Chlamydia trachomatis/Neisseria gonorrhoeae* (CT/GC) Non-Culture test request form (DCH-1248) for use in the Lansing and Regional Laboratories. Changes to this form include a new billing information section (which now includes insurance providers other than Medicaid) plus an expanded specimen information section on the **reverse side** of the form. Please be sure to complete this section as it is important for testing. The Definitions/Explanations section of the form has also been updated to reflect current practice. This new form merges the previous non-culture for CT only and CT combo forms. When filling out the new form, you now must indicate in item 21 on the **back** of the form which test you are requesting. Please check your stock and recycle forms dated prior to January 13, 2012. New forms can be downloaded and printed off the BOL web page. http://www.michigan.gov/documents/mdch/DCH-1248.12.11_372085_7.pdf

LabLink

Bureau Vision

The Bureau of Laboratories is a stronger, more diverse team within an integrated public health system. We utilize advanced technology and innovative leadership to provide comprehensive public health services in our dynamic global community.

Bureau Mission

We are dedicated to continuing leadership in providing quality laboratory science for healthier people and communities through partnerships, communication and technical innovation.

<i>Chlamydia trachomatis/Neisseria gonorrhoeae</i> (Non-Culture) State of Michigan - Regional Laboratory Test Requisition	
Date Received by Laboratory: _____ Laboratory ID# _____	
Michigan Department of Community Health-Bureau of Laboratories 3350 N. Martin Luther King Jr. Blvd. Lansing, Michigan 48909 Laboratory Requisition # 17130-0000 Telephone Requisition # 17130-0007 Fax: 517-336-9871 http://www.michigan.gov/mdchlab http://www.saginawpublichealth.org	
Saginaw County Health Department 1620 North Michigan Saginaw, Michigan 48602 Telephone: 989-758-3825 Fax: 989-758-3795	
1 SUBMITTER INFORMATION	
Return Results to:	ENTER AGENCY CODE (IF KNOWN)
FP <input type="checkbox"/> Phone _____	
STD <input type="checkbox"/> Fax _____	
CONTACT PERSON/ORDERING PHYSICIAN/PROVIDER NAME _____ NATIONAL PROVIDER IDENTIFIER # _____	
PATIENT INFORMATION	
NAME (Last, First, Middle Initial) _____	
DATE OF BIRTH (MM/DD/YYYY) _____	SEX <input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/>
PATIENT'S CITY OF RESIDENCE _____ ZIP CODE _____	
RACE (check all that apply)	
<input type="checkbox"/> Black <input type="checkbox"/> Native American or Alaskan <input type="checkbox"/> White <input type="checkbox"/> Hawaiian/Pi <input type="checkbox"/> Asian <input type="checkbox"/> Unknown	
ETHNICITY (check one response) SUBMITTER'S PATIENT # (if applicable)	
<input type="checkbox"/> Hispanic <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> 11 _____	
<input type="checkbox"/> Other <input type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/> 12 _____	
BILLING INFORMATION	
MEDICAID/PLAN FIRST # _____	
complete all areas that apply	
<input type="checkbox"/> CONFIDENTIAL TESTING (insurance other than MEDICAID will not be billed; patient/submitter is responsible for test cost)	
<input type="checkbox"/> BILL THE SUBMITTER	
<input type="checkbox"/> INSURANCE PROVIDER OTHER THAN MEDICAID	
SUBSCRIBER'S NAME (Last, First, Middle Initial) _____	
RELATIONSHIP TO SUBSCRIBER _____ GROUP # _____	
<input type="checkbox"/> Self <input type="checkbox"/> Spouse <input type="checkbox"/> Dependent <input type="checkbox"/> 16 _____	
POLICY/CONTRACT # _____	
17 _____	
▶▶▶▶▶FOR ENTRY OF SPECIMEN INFORMATION PLEASE USE REVERSE SIDE▶▶▶▶▶	

<i>Chlamydia trachomatis/Neisseria gonorrhoeae</i> (Non-Culture) State of Michigan - Regional Laboratory Test Requisition									
SPECIMEN INFORMATION									
DATE COLLECTED (MM/DD/YYYY) _____	TIME COLLECTED _____								
18 _____	19 _____ <input type="checkbox"/> AM <input type="checkbox"/> PM								
SUBMITTER'S SPECIMEN # _____									
TEST REQUESTED									
<input type="checkbox"/> 21 <input type="checkbox"/> C. trachomatis only (non-culture) <input type="checkbox"/> C. trachomatis and N. gonorrhoeae combo (non-culture)									
SPECIMEN SOURCE									
<input type="checkbox"/> 22 <input type="checkbox"/> Urethra <input type="checkbox"/> Vagina <input type="checkbox"/> Urine <input type="checkbox"/> Urethra <input type="checkbox"/> Rectum (Lansing only) <input type="checkbox"/> Pharynx (Lansing only)									
REASON FOR TESTING - Check all areas that apply (refer to definitions/explanations)									
<input type="checkbox"/> 23 <input type="checkbox"/> Symptoms <input type="checkbox"/> History of STD (<3 years) <input type="checkbox"/> Age Recommended For Testing									
<input type="checkbox"/> Infected Partner <input type="checkbox"/> Partner Risk <input type="checkbox"/> Prenatal Visit <input type="checkbox"/> Retest									
Definitions/Explanations									
Symptoms:	Patient requiring examination due to symptoms, or, symptoms discovered upon examination.								
Infected Partner:	Patient has known exposure to STD (self-reported or documented).								
Partner Risk:	Patient has multiple sex partners.								
History of STD:	Patient has been diagnosed with a sexually transmitted disease within the last 3 years.								
Prenatal Visit:	Patient examination is part of prenatal visit.								
Age Recommended:	CDC recommends annual screening of females < 24.								
Retest:	Patients diagnosed with chlamydia and gonorrhea should be retested approximately three (3) months after treatment, regardless of whether they believe that their sex partners were treated. If retesting at three months is not possible, clinicians should retest whenever their person next presents for medical care in the twelve months following initial treatment.								
FP STD:	This field is to be completed by sites supported by the Michigan Department of Community Health to provide STD and/or Family Planning services. Completion of this field will assist us in linking tests with the correct submitter site.								
Zip Code:	Patient zip code data is used to calculate screening rates in local jurisdictions and compare them to infection. The resulting information can be used to better target resources and testing.								
Specimen Collection:	Specimens must be collected using the appropriate collection kit as shown below. Specimens received in the wrong collection kit will not be tested and reported as "Unsatisfactory."								
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Specimen Source</th> <th>Collection Kit</th> </tr> </thead> <tbody> <tr> <td>Urethra, Vagina, Rectum, Pharynx</td> <td>Optima Urine Swab</td> </tr> <tr> <td>Urine</td> <td>Optima Urine Collection Kit</td> </tr> <tr> <td>Vagina</td> <td>Optima Vaginal Swab</td> </tr> </tbody> </table>	Specimen Source	Collection Kit	Urethra, Vagina, Rectum, Pharynx	Optima Urine Swab	Urine	Optima Urine Collection Kit	Vagina	Optima Vaginal Swab
Specimen Source	Collection Kit								
Urethra, Vagina, Rectum, Pharynx	Optima Urine Swab								
Urine	Optima Urine Collection Kit								
Vagina	Optima Vaginal Swab								
Rectal or Pharyngeal Swabs:	Limited testing of rectal and/or pharyngeal specimens is available only in the Lansing laboratory. This is not intended for population based screening. MDCH recommends the								

New Pertussis Multiplex Assay Barb Jacobson, Microbiology Section

The Microbiology Section at MDCH will introduce a new multiplex assay for pertussis testing on March 6, 2012. The current method is performed on the LightCycler® (Roche Applied Science, Indianapolis, IN) platform and is a real-time PCR assay that detects a section of the genome (*IS481*). This portion of the genome is a repeated insertion sequence that is found in multiple copies in *B. pertussis*. However, this sequence can also be found in *B. holmesii* which means the current assay cannot differentiate between the two. *B. holmesii* can cause respiratory illness although *B. pertussis* is responsible for most cases in humans and causes a more severe form of respiratory illness than the other *Bordetella* species. The new multiplex assay will be performed on the ABI 7500 Fast Dx (Applied Biosystems, Foster City, CA) platform which uses a 96-well plate format. This will increase testing capacity as well as improve specificity.

The multiplex also adds a second target (*ptx1*) and will be more specific for *B. pertussis* detection. This second target is specific for the *S1* subunit of the pertussis toxin gene, which is present in only a single copy in both *B. pertussis* and *B. parapertussis*. Therefore, determining the presence or absence of both sequences allows discrimination between *B. pertussis* and some of the other human pathogenic *Bordetella* species. A target for human DNA, RNaseP, is also incorporated into the multiplex assay and its absence indicates either the presence of an inhibitory substance or a poorly collected specimen.

Interpretation for the multiplex will be based on the following algorithm:

	<i>IS481</i> Detected (Strong Positive)	<i>IS481</i> Detected (Weak Positive)	<i>IS481</i> Not Detected
<i>ptxS1</i> Detected	<i>B. pertussis</i> DNA Detected	<i>B. pertussis</i> DNA Detected	<i>B. parapertussis</i> DNA Detected
<i>ptxS1</i> Not Detected	<i>Bordetella</i> spp. DNA Detected	Indeterminate	<i>Bordetella</i> DNA Not Detected

Reports will now reflect testing that detects the presence of *B. pertussis* DNA as well as *B. parapertussis* DNA. *B. parapertussis* can cause a milder pertussis-like respiratory infection which often goes undiagnosed. DNA detected in low amounts will result in reports of either “*Bordetella* spp. DNA detected” or “Indeterminate.” This multiplex method does not differentiate between other *Bordetella* species such as *B. holmesii* and *B. bronchiseptica*. Throat and nasal swabs and lower respiratory tract specimens will be reported as “Unsatisfactory.” A test that is negative does not exclude the possibility of *Bordetella pertussis* or other *Bordetella* spp. infection. The validation of the multiplex assay indicated the lower limit of detection was 1 CFU/mL for *IS481* and 100 CFU/mL for *ptxS1*.

Specimens for pertussis PCR are to be collected using a flocced nylon nasopharyngeal swab. The swabs are transported in a dry sterile tube or submersed into Regan Lowe agar. The appropriate nasopharyngeal swab and transport tube can be ordered from MDCH by completing a Clinical Specimen Shipping Units Requisition (DCH-0568) found at http://www.michigan.gov/documents/dch-0568_7396_7.pdf or by calling 517-335-9040 and requesting Unit #15. Specimens collected using other swabs or transports systems can decrease testing accuracy and may be rejected by the laboratory.

To the majority of health professionals the accurate detection of *B. pertussis* is most significant while the need to identify other *Bordetella* species on a routine basis is less critical. The addition of the second target, *ptxS1*, in this multiplex assay would eliminate the misidentification of pertussis, and rule-out an outbreak caused by another organism. This new multiplex method is an efficient, cost-effective and practical means for achieving greater accuracy.

Newborn Screening Unit, Laboratory Information Systems Staff, and the Michigan Regional Laboratory System Nominated for Director's Choice Award

**Martha Boehme, Laboratory Systems Section
Patty Clark, Laboratory Systems Section**

Keri Fisher and Heather Wood, two laboratory scientists in the Newborn Screening Laboratories Section, the entire Newborn Screening Section Staff, the Laboratory Information System Team, and the Michigan Regional Laboratory System were among those nominated by coworkers for a prestigious MDCH Director's Choice Award, which recognizes outstanding individual achievement in six categories. This year, four individual winners chosen by Director Olga Dazzo in three of the six categories were announced January 23. (Photos on page 5.)

The six categories include Leader Within, Outstanding Customer Service, Innovative Solution, Passion for Your Career, Streamlined Process, and Team Accomplishment.

Although not among the final winners, our efforts were applauded by Director Dazzo and other DCH staff at the special ceremony.

Keri Fisher was nominated by Marty Boehme for both the Innovative Solution and Streamlined Process categories, in recognition of her work developing a method for standardized documentation, categorization and monitoring of non-conforming events (NCE) in the laboratory that will simplify NCE tracking and follow-up. Keri was inspired by reading the CLSI document GP32-A to create a tool to classify, analyze and present data on the many nonconforming events that occur throughout the year. In the previous paper reporting system, differentiating major NCEs from minor events was difficult and time-consuming. Keri's method will help managers identify major issues more rapidly.

Heather Wood was nominated by Anu Patel in the category The Leader Within for her leading a team that implemented the TREC screening assay for detecting Severe Combined Immunodeficiency (SCID). Heather's communication and problem-solving skills were instrumental in the team's success. See the Fall 2011 LabLink (http://www.michigan.gov/documents/mdch/LabLink_fall_2011_368110_7.pdf) for more details on the project.

The entire Newborn Screening Laboratory staff received nomination certificates for Team Accomplishment for successfully taking on many major challenges in the same year. Lori Foster submitted the nomination recognizing everyone for the validation and start-up of new instruments for amino acid disorders, fatty acid oxidation disorders, and organic acid disorders. Preparation for addition of the SCID assay in October involved not only the implementation of a new test technology by Heather Wood and her great team but also co-operation from the rest of the staff as adjustments were made to work flow in all areas of the laboratory. The procedure for biotinidase deficiency testing was changed in August and testing for Bart's hemoglobin was started in September. All of this could not have been accomplished without careful planning and dedicated employees.

The Laboratory Information System (LIS) Team consisting of Julie Kusey, Paul Wolanski, Tim Zwolak, and Roy Buzdor, were also nominated for the Team Accomplishment Award because of the outstanding accomplishments they achieved in 2011. The team successfully transitioned all testing done in the Division of Infectious Diseases from the legacy EPIC system to the new StarLIMS system; successfully completed the Association of Public Health Laboratories' Public Health Laboratory Interoperability Project (PHLIP); and converted the LIS HL7 messaging from 2.3.z to the new HIE standard of 2.5.1. A successful PHLIP project allows the BOL to electronically transmit respiratory viral test results to the Influenza Branch of the Centers of Disease Control and Prevention (CDC) saving personnel time and decreasing reporting time. By upgrading our HL7 messaging to 2.5.1, the BOL LIS meets new HIE guidelines for HL7 messaging including a standardized vocabulary and message format. The implementation will also allow for future enhancements in test ordering and result delivery to BOL clients.

Nominations Continued on Page 11

Syphilis Antibody Stability in Human Serum
William Crafts, B.S.MT(ASCP)
Carlton Evans, B.S.
Jamie Kestila, NMU Intern
Bacterial Parasitic and Viral Serology Unit

Treponema pallidum subsp. pallidum, the causative agent of syphilis, continues to pose a major public health threat around the globe. In Michigan, the rate of syphilis among males in 2010 was 2.1 cases per 100,000 population compared to the U.S. rate of 7.8 cases per 100,000 population. Michigan ranks 31 among the 50 states for syphilis case rates per 100,000 population. Serologic analysis remains the “gold standard” for the diagnosis of syphilis. At the Bureau of Laboratories (BOL) specimens are screened with a nontreponemal Unheated Serum Reagin (USR) assay (VDRL antigen Becton & Dickson Co., Sparks, MD). Reactive specimens are titered to endpoint as previously described (1), then confirmed using the *Treponema pallidum* particle agglutination (TP-PA) assay (Fujirebio, Tokyo, Japan).

Serum remains the specimen of choice for the serologic diagnosis of non-neural syphilis. Serum specimens are often shipped to laboratories via private courier or through the U.S. Postal Service. Effects of shipping delays and storage temperature on nontreponemal and treponemal test results are largely unknown. No recommendations or guidelines establishing acceptable time frames between date of collection and date of testing currently exist. The deleterious effects on antibody stability over time at varying temperatures have not been previously studied. At BOL, greater than 90% of serum specimens submitted for syphilis testing are received within 3-4 days of collection, however, 10% take greater than 5 days.

In 2010, the BOL conducted a study to determine nontreponemal and treponemal syphilis antibody stability in human serum at varying temperatures over a thirty day period. Archived serum specimens (stored at -20°C) tested for syphilis within the previous six months, thawed, specimens with similar USR titer and TP-PA reactivity were pooled, retested by both USR and TP-PA assays to establish post-thaw baseline reactivity, then

Syphilis Continued on Page 6

**Photos of Director’s Choice
Award Ceremony**



**Heather Wood with
Director Dazzo**



**Keri Fisher with
Director Dazzo**

Syphilis Continued

aliquoted. Four aliquots from each of the 30 pools were stored at 23-26°C, 2-8°C, and -20°C. Weekly, one tube of each pool was retrieved from the three storage conditions and tested by USR and TP-PA. Aliquots were stored in the same 12 x 55 mm plastic tubes as those routinely received at BOL for syphilis testing. To minimize error and inconsistent interpretation, USR testing was performed in duplicate and both USR and TP-PA were performed by the same scientist(s) on the same day each week for a total of four weeks. Baseline TP-PA testing revealed 12 nonreactive and 18 reactive (all 4+ reactions) specimens; USR titers ranged from nonreactive (N=6), weakly reactive to 1:4 titer (N=14) and 1:8 to 1:128 titer (N=10).

At week three, USR results from all three storage temperatures were within one dilution above or below baseline titers. At week four, no decline in USR titer was noted at 2-8°C or -20°C; however, three room temperature specimens decreased in titer greater than one dilution (one from 1:4 to 1:1 and two from 1:32 to 1:4).

Although within the acceptable one dilution, four of five (80%) weakly reactive USR pooled specimens reverted to nonreactive at various weeks and storage temperatures. Specimen #16 was nonreactive in ten of twelve results (83%) at all three temperatures indicating a possible incorrect baseline result. At room temperature storage, specimen #1 was nonreactive at weeks 1, 2 and 4; specimen #2 was nonreactive at all four weeks; and specimen #19 was nonreactive at week 4 only. Refer to Table 1.

100% agreement was noted in three of five weakly reactive specimens (# 1, 2, 19) stored at 2-8° and -20°C. There were no discrepant TP-PA results at any temperature over the four week period.

Weakly Reactive USR Specimens Stored at Room Temperature
Table 1

Serum Pool #	Baseline	Week 1	Week 2	Week 3	Week 4
*1	WR	NR	NR	WR	NR
^2	WR	NR	NR	NR	NR
^4	WR	WR	WR	WR	WR
^16	WR	NR	NR	NR	NR
*19	WR	WR	WR	WR	NR

WR = weakly reactive NR = nonreactive *TP-PA pool initially reactive ^TP-PA pool initially nonreactive

This study suggests treponemal antibodies are stable at most shipping temperatures for a minimum of four weeks and nontreponemal antibodies for a minimum of three weeks. However, weakly reactive USR specimens may be more susceptible to decline in titer when shipped or stored at room temperature.

There were several limitations to this study. A comprehensive analysis of antibody stability was limited due to the small number of specimens evaluated (30). Archived specimens were not characterized according to stage of infection, therefore, low titer USR specimens may represent biological false positives. Antibody stability in whole blood was not evaluated. All reactive TP-PA specimens chosen for the study were strongly reactive (4+ out of a range from 1-4+) hence, weaker reactive specimens were not evaluated for degradation.

Reference

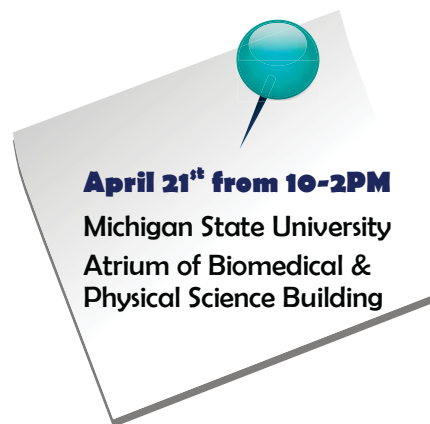
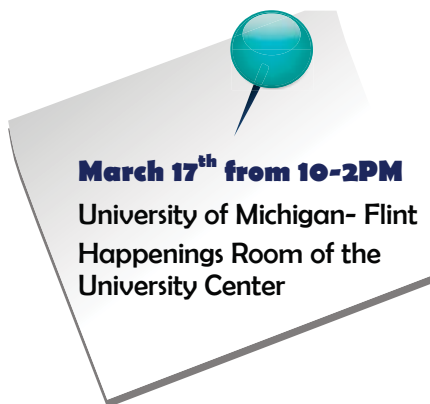
1. Larsen S., et. al., A Manual of Tests for Syphilis, American Public Health Association, 9th ed., Washington D.C.

Explore Laboratory Science Ninah Sasy, M.S.A., Laboratory Systems Section

The Bureau of Laboratories is proud to announce the launch of our new K-12 Laboratory Outreach web site titled Explore Laboratory Science.

Our laboratory was recently awarded a grant from the Association of Public Health Laboratories (APHL) to fund our K-12 Laboratory Outreach Program. We will promote the program at local science fairs, provide hands-on science demonstrations at local schools and host two events at local universities. Our goal is to increase interest in science, in general, and, specifically, public health laboratory careers while promoting the value of public health laboratories to the general public. This program will help address the national laboratory workforce shortage by promoting the laboratory science profession. Day-to-day operations (developing educational activities for web site, etc.) will be performed by college student interns with supervision. This will allow college students to gain experience in a public health laboratory environment while increasing younger students' exposure to science and scientific principles.

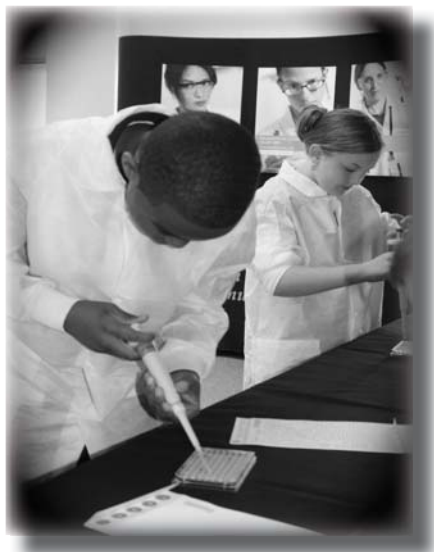
Kick-off Events:



These kick-off events will showcase our program by having hands-on demonstrations for children. These hands-on activities will be age-appropriate and include activities like starch-iodine reactions, DNA extraction, pH determination, and streaking of agar plates. In addition, digital microscopes will be used to view previously prepared specimen slides of yeasts and moulds, cultures, fibers, bacteria, and/or insects.

Please RSVP @ <http://ExploreLabScience.questionpro.com>

Registration is not mandatory. However, it will guarantee that your child receives a give-away/ activity packet.



Bureau of Laboratories Latest Work in Method Development for Trace Organics Analysis is Timely in Light of the 2011 Call to Action Paper by The Endocrine Society

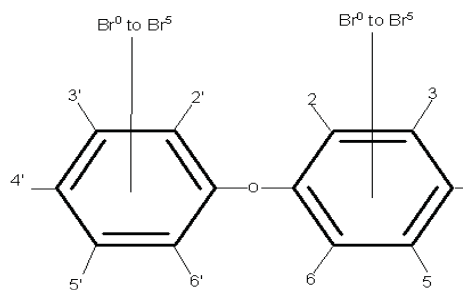
Paul Loconto, PhD, Analytical Chemistry

A recent Consensus Statement for a Call to Action from The Endocrine Society proposes that a multidisciplinary effort among epidemiologists, basic scientists, public health officials, endocrinologists, chemical companies and regulatory agencies be established to achieve the shared goal of public safety and quality of life (1). Large studies by U.S. and European authorities have shown that human fluids and tissues contain low concentrations of a large number of endocrine-disruptive chemicals (EDCs) especially in fetuses and children (2, 3). EDCs cited in the Call to Action paper include many of the persistent organic pollutants (POPs) quantitatively determined in the Michigan Department of Community Health Bureau of Laboratories (MDCH BOL) Division of Chemistry and Toxicology's Analytical Chemistry Section's fish monitoring and biomonitoring laboratory programs. The Call to Action paper addresses the central question as to whether the concentrations of EDCs present in humans contribute to disease. The Call to Action paper states that a growing body of evidence from human epidemiological and animal studies suggest that even low concentrations of EDCs at levels currently present in humans cause endocrine disruption. However, other epidemiological and animal studies do not demonstrate endocrine disruption at the low concentrations with single compound exposures.

Cohort studies in the U.K. and Nordic countries have shown that from 2% to 9% of newborns have cryptorchidism, or non-descended testes, and this trend is increasingly mimicking well-established data on increases in testicular cancer (1). It is believed that testicular cancer is of fetal origin (4). Other common endocrine problems include widespread infertility, early onset of puberty, childhood obesity, increased cases of Type 1 diabetes mellitus, thyroid disease and neuroendocrine problems (1).

The MDCH experience in human biomonitoring extends back over 30 years and is unique among other state public health laboratories due to the PBB crisis of 1973 in Michigan (5). Studies designed to isolate, recover, and quantitate trace levels of POPs from human serum require large sample volumes, tedious and labor intensive sample preparation techniques, combined with highly skilled scientists and expensive analytical instrumentation. Quality assurance for hundreds of congeners adds to the complexity and costs to conduct human biomonitoring studies.

PBBs were banned from use, but belong to the class of emergent EDCs, brominated flame retardants (FBRs). The FBRs that replaced PBBs are polybrominated-diphenylethers (PBDEs). These compounds have a generalized molecular structure for PBDEs as shown below:



**Polybrominated Diphenyl Ethers
PBDEs**

These compounds have appeared in the environment, are persistent and can be measured in the human population. The BOL has been very active over the past five years in developing a more cost effective experimental approach to isolate and recover PBDEs from human serum. The lab moved from conventional

Trace Organics Continued on Page 9

Trace Organics Continued

liquid-liquid extraction to reversed-phase solid-phase extraction and then to stir bar sorptive extraction (SBSE) in an effort to better utilize automation technology with the goal of increased sample throughput with lower turnaround times. The SBSE sample preparation method combined with increased chromatographic and mass spectral selectivity and sensitivity resulted in improved efficiency (6, 7).

This work has been extended to the development of screening methods with smaller sample size requirements that may make testing more feasible especially in children, who face the highest body burden to EDCs. The Association of Public Health Laboratories (APHL) recently awarded a fellowship in environmental biomonitoring to the Analytical Chemistry Section and the recipient of this award, Colin Johnson (a recent chemistry graduate), is developing this screening method. This support has enabled the development of a SBSE technique to extract more environmentally persistent PBDE congeners using only 250 μ L of human serum, instead of the usual 4 mL that is required by most methods. This work was presented recently at the annual conference of the Association of Mass Spectrometry Applications for the Clinical Laboratory (MSACL) in San Diego, CA in January, 2012 (8).

In 2012, BOL expects to receive 200 human serum specimens from MDCH Bureau of Epidemiology (supported by the Agency for Toxic Substances Registry (ATSDR)) to quantitatively determine PCBs, Toxaphene, and Pesticides. In collaboration with the Minnesota Public Health Laboratory funded by ATSDR, 500 additional human specimens from will be sent to our lab to quantitatively measure Toxaphene and PCBs.

The Bureau of Laboratories is very excited to make significant contributions to support this Call to Action described above.

The BOL acknowledges funding from the CDC Public Health Emergency Preparedness (PHEP) Cooperative Agreement # 2U90TP517018-11. An appointment to the Environmental Public Health (EPH) Fellowship Program administered by APHL and funded by the Centers for Disease Control and Prevention (CDC) is greatly appreciated. GERSTEL Global Analytical Solutions assisted with Colin's training and provided continuous instrument support and technical expertise during this project.

References

- 1) Sakkebaek, N., J. Toppari, O. Söder, C. Gordon, S. Divall, and M. Draznin, *J Clin Endocrinol Metab*, October 2011, 96 (10); 3056-3058.
- 2) Woodruff, T., A. Zota, and J. Schwartz, *Environ Health Perspect*, 2011, 119:878-885.
- 3) Centers for Disease Control and Prevention 2009, Fourth national report on human exposure to environmental chemicals. <http://www.cdc.gov/exposurereport>.
- 4) Skakkebaek, N., E. Rajpert-De Meyts, and K. Main, *Hum Reprod*, 2001, 16:972-978.
- 5) P.R. Loconto and M. O'Keefe, "Report: A Scientific and Historical perspective on the Quantitative Analysis of Human Serum Specimens to Determine Polybrominated Biphenyls", 2007, in-house publication.
- 6) Loconto, P.R., "Evaluation of automated stir bar sorptive extraction-thermal desorption-gas chromatography electron capture negative ion mass spectrometry for the analysis of PBDEs and PBBs in sheep and human serum" *Journal of Chromatographic Science*, 47 (2009) 656-669.
- 7) Loconto, P.R. "Selectivity and sensitivity improvements for selected polybrominated diphenyl ethers and polybrominated biphenyls using capillary gas chromatography/electron capture negative ion mass selective detection: a cost effective approach to biomonitoring" *LC-GC North America* 26(11) (2008) 1118-1130.
- 8) Colin Johnson, Paul R. Loconto, Michael O'Keefe, and Bonita Taffe, "PBDE Analysis in Human Blood Serum by Gerstel Twister SBSE Technique and GC/MS-ECNI-SIM", *MSACL*, January 14-18, 2012.

2011 BioWatch Award of Excellence

Dr. Jim Rudrik was awarded the BioWatch Award of Excellence for Laboratory Operations for the year 2011. Dr. Rudrik has been an active participant in the Michigan BioWatch Program since 2003. He is the Microbiology Section Manager at the Division of Infectious Diseases, managing the BioWatch laboratory personnel and overseeing the BioWatch /LRN procedures. Dr. Rudrik participated in the workgroup that developed the initial BioWatch Plan for the State of Michigan and was a member of the inaugural BioWatch Advisory Committee. He developed the Phase I Sampling Plan to be used by the Michigan Department of Environmental Quality, FBI and EPA in a response to a local BioWatch Actionable Result. Dr. Rudrik developed and maintains the environmental sampling kits to be used in the field and participates in yearly sampling exercises to ensure appropriate sample collection. At the federal level, Dr. Rudrik has been involved with numerous workgroups and studies including the Quality Assurance Sample Pilot Study, the Critical Reagents Program Validation Study and the Quality Assurance Proficiency Plan. The BioWatch Laboratory Program in Michigan continues to flourish under his leadership.

Dr. Rudrik was nominated by Mary Macqueen, CDC Public Health Emergency Preparedness Coordinator, and supported by Susan Shiflett, Planning and Competency Evaluation Unit Manager, both of MDCH Office of Public Health Preparedness. The nominees were evaluated on the following criteria:

- Noteworthy technical, operational and/or scientific achievement on, or contributions to, the BioWatch Program.
- Identified issues and developed successful solutions to solve them.
- Cultivated long-term and collegial relationships within his/her jurisdiction.
- Demonstrates self-motivation and determination to successfully contribute to the BioWatch mission.
- Has been in the position for one year.
- Other attributes and/or accomplishments that contributed to the jurisdiction's BioWatch mission.

Congratulations to Dr. Rudrik!



Nominations Continued

The Michigan Regional Laboratory System (MRLS) is a collaboration of state and county public health laboratories that are committed to ensuring quality of laboratory testing activities at local public health jurisdictions in Michigan. The MRLS was nominated in the Team Accomplishment category for undergoing an extensive reorganization process that resulted in each participating agency transitioning to their own laboratory certification, laboratory director, and ensuring the quality of their laboratory testing services.

Congratulations to all for your nominations!

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Past Issues

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