MDHHS
Michigan Department of Health & Human Services

Bureau of Laboratories

ANNUAL REPORT

2023

Fiscal Year

October 1, 2022 –

September 30, 2023

www.Michigan.gov/MDHHSLab

Laboratory Director

Dr. Sandip Shah, PhD., HCLD (ABB)

Mission

The Bureau of Laboratories is dedicated to continuing leadership in providing quality laboratory science for healthier people and communities through partnerships, communication, and technical innovation.

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.

Values

Professionalism and Integrity
Teamwork
Excellence
Communication

The Bureau of Laboratories was established under provisions of the revised Public Health Code – Act 368 of 1978, Part 96 (333.9601).

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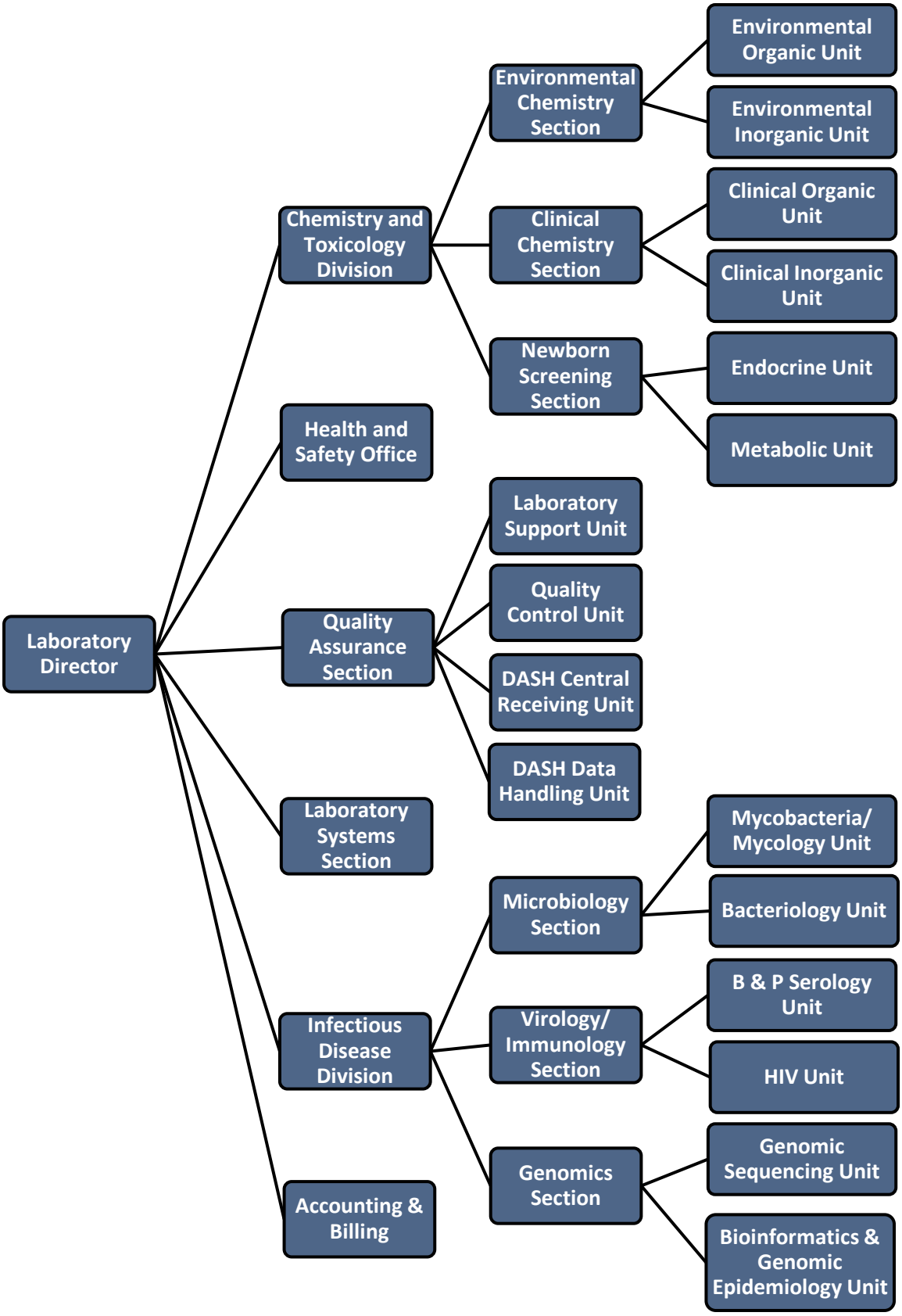
Organizational Chart



Testing By The Numbers

About 7 Million Total Tests Performed in FY 2023



Newborn Screening

6,156,446 tests for **109,454** newborns

Infectious Disease

133,839
Microbiology tests

154,044
Virology tests

Chemistry

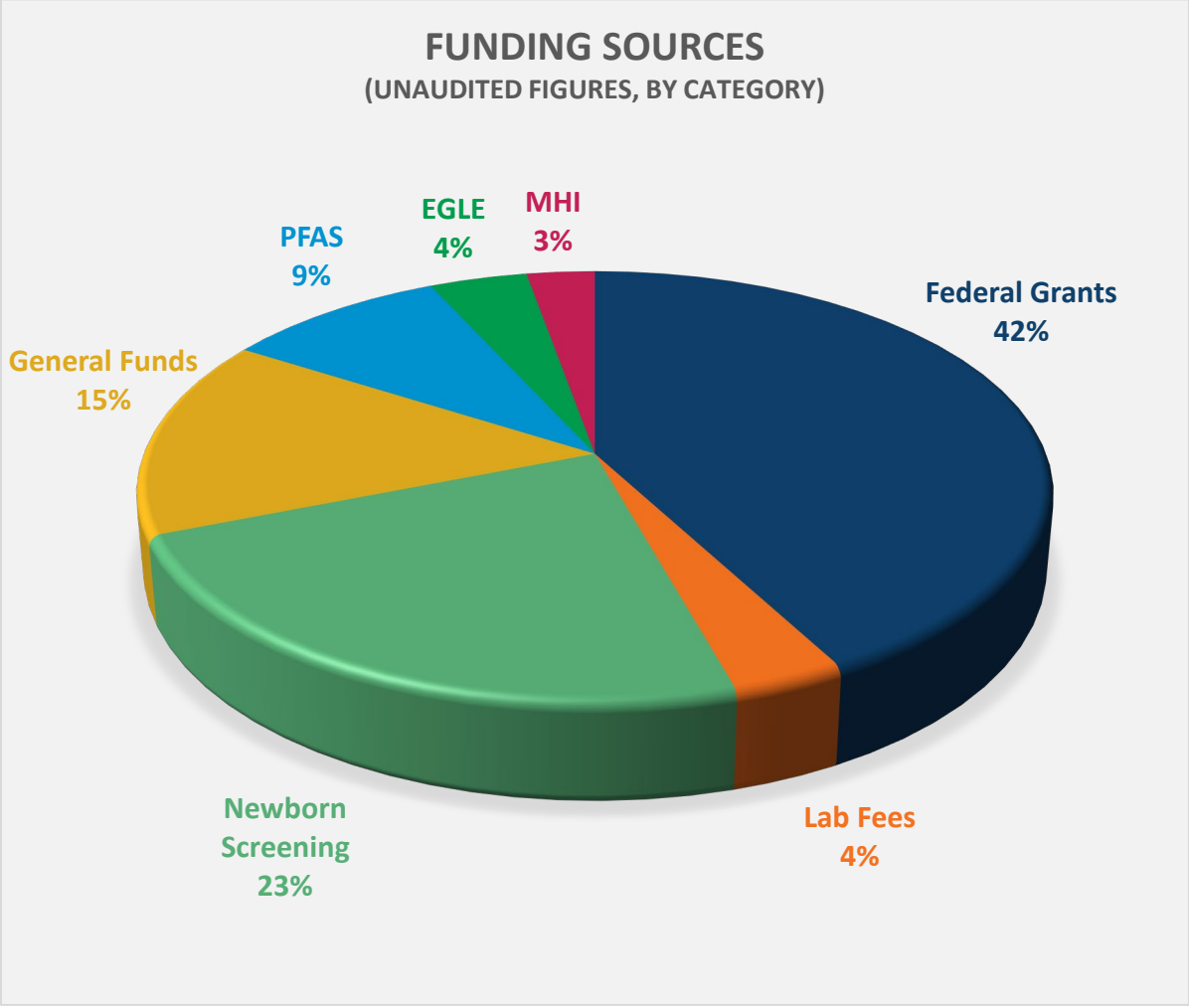
374,587
Clinical Chemistry tests

168,838
Environmental Chemistry tests

Funding

Federal grants comprise the largest amount of funding for the Bureau of Laboratories (BOL). BOL federal partners include the Centers for Disease Control and Prevention (CDC), Federal Drug Administration (FDA), Department of Agriculture (USDA), Department of Homeland Security (DHS), and Department of Health and Human Services (HHS).

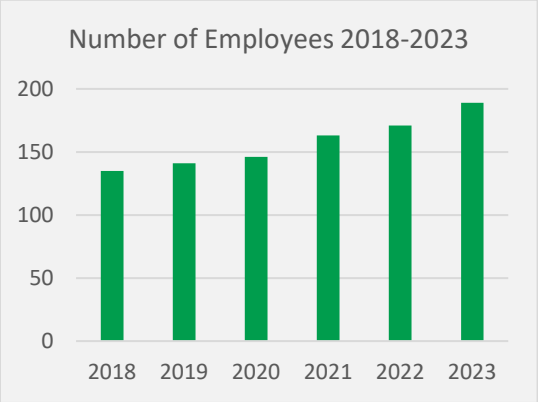
The remaining funding derives from BOL newborn screening (NBS), lead testing and sexually transmitted infections (STI) laboratory fees, State of Michigan general funds, State of Michigan PFAS response funding, Michigan Department of Environment, Great Lakes, and Energy (EGLE), and Michigan Health Initiative (MHI).



Year in Review

The Bureau of Laboratories (BOL) completed its building expansion project this year. The new space, which included a training laboratory, classroom, meeting rooms, and office space, provides increased opportunities for education and training for employees and partners. Renovations continued in the original portion of the laboratory and included transitioning a meeting room and offices into additional laboratory space for testing and support activities. Modifications to the Data and Specimen Handling (DASH) Units expanded space for specimen acquisition and data entry. Additional quality improvements included the implementation of a new laboratory-wide computerized supply inventory system as well as a new water purification system.

While renovations and improvements continued at the current building, planning and design for a multi-agency laboratory facility at a new site began, with the groundbreaking in 2024 and expected completion by late 2026. The new facility will be shared with the Michigan Departments of Environment, Great Lakes, and Energy (EGLE) and Labor and Economic Opportunity (LEO) and will provide a more collaborative and unified response to public health laboratory testing.



Along with physical changes, the Bureau of Laboratories underwent some organizational changes as well. Many new employees were hired, almost doubling the staff in some units. Due to an increase in testing and in support of biomonitoring activities, the Analytical Chemistry Section was reorganized into two sections: Clinical Chemistry and Environmental Chemistry, each with an Organic and Inorganic Unit (see featured article on page 23). The BOL also hosted its first two interns from the "Public Health Laboratory Internship Program: an APHL-CDC Initiative." These paid internships, administered through the Association of Public Health Laboratories (APHL) and Centers for Disease Control and Prevention (CDC), are part of a nationwide effort to create pathways to public health laboratory careers.

Staff engaged in many presentations, trainings, and tours, including a visit from the Michigan National Guard's 51st Civil Support Team in February 2023. Several employees served on subject matter committees, such as Biosafety and Biosecurity, Environmental Health, Infectious Diseases, and Laboratory Systems and Standards through external partners such as APHL and CDC. Internally, the BOL monitored and improved laboratory core functions through committees such as Safety, Biosafety, Quality Steering, and the Process Improvement Team.

BOL staff continued to make a commitment to serve the community and began hosting regular American Red Cross blood drives onsite for employees. The initial blood drive included twenty first time blood donors, with subsequent drives encouraging even more to give. A variety of locally owned food trucks were also invited to park near the laboratory throughout the year to provide an option for employee lunches and support local businesses.

Most importantly, the BOL saw continued excellence in testing and surveillance. The laboratory performed well with proficiency testing as well as with internal and external regulatory and accreditation audits that ensures the highest standards in testing. The end of the Michigan Mpox Outbreak Public Health Emergency in February 2023 and the end of the Federal COVID-19 Public Health Emergency in May 2023 did not slow testing. Several areas, including *Candida auris* and per- and polyfluoroalkyl substances (PFAS) testing, even saw an increase in specimens collected. The BOL continues to remain ready and is committed to tackling all public health challenges now and in the future.

Chemistry And Toxicology Division

Clinical Chemistry, Environmental Chemistry, and Newborn Screening Sections

The Chemistry and Toxicology Division is designated as a CDC Laboratory Response Network-Chemical (LRN-C) Level 1 laboratory that tests clinical samples in the event of a regional chemical exposure. The Clinical Chemistry Section provides testing for clinical specimens in cases of human exposures and for biomonitoring projects and the Environmental Chemistry Section is responsible for environmental sample testing, including drinking and recreational water, soil, food for the Food Emergency Response Network (FERN), and some species of wildlife including fish for the Eat Safe Fish program. Both sections test for contamination from chemical agents, toxins, and metals, including lead. These results are used to determine the course of action for environmental mitigation through the MDHHS Mi Lead Safe Program and the treatment of individuals who have a confirmed elevated blood lead concentration. The Newborn Screening (NBS) Section tests for 57 congenital metabolic and endocrinologic disorders such as cystic fibrosis and sickle cell anemia for every infant born in Michigan. This laboratory testing program is part of a comprehensive state program for newborns including referral to specialty clinics and follow-up care to prevent and treat serious health problems.

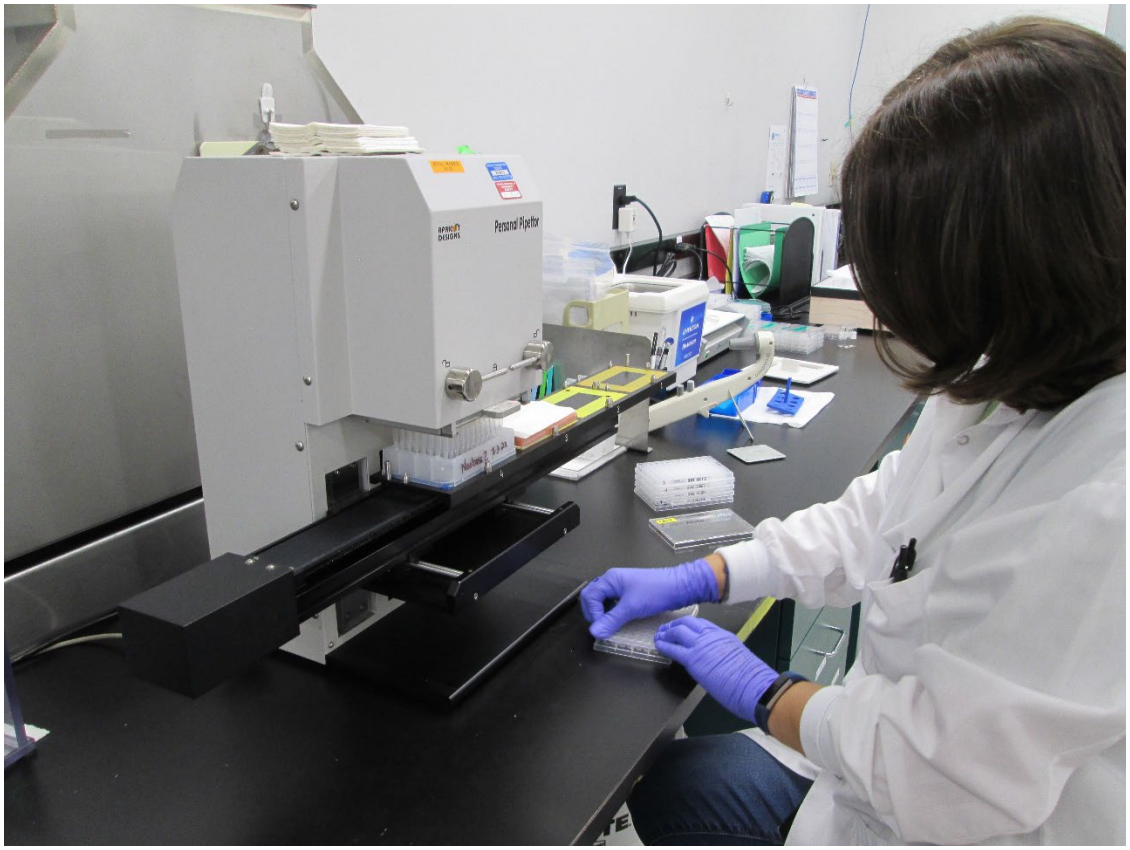
Key events and activities in FY 2023 include:

- After the creation of the Clinical and Environmental Sections and subsequent units, the hiring of new employees in both sections nearly doubled the workforce. The Michigan Department of Environment, Great Lakes, and Energy (EGLE) provided funding for two scientists in the Environmental Organic Unit.
- Keri Fisher filled the role of the Environmental Chemistry Section Manager, Kelley Freed became the Environmental Inorganic Unit Manager, Adam Bush was hired for the Environmental Organic Unit manager role, and Char Mackie was hired for the Environmental Technical Supervisor role.
- Jessica Pruett was hired for the Clinical Chemistry Section Manager, Dr. Sarah Lockwood-O'Brien became the Clinical Inorganic Unit Manager, and Timothy Karrer became the Clinical Organic Unit Manager.
- Ron Kulwicki and Janette Moore retired.
- Matthew Geiger, Mike Stagliano, and Jessica Morrison attended the LRN-C spring meeting. Topics included emergency response, lab relocation/renovations, methods troubleshooting, and presentations from the FBI on weapons of mass destruction and USPS on dangerous mail investigations.
- Clinical Chemistry Section staff successfully completed a CDC LRN-C Surge Capacity exercise in May. This was the first exercise that involved samples for two different methods. Staff worked 24/7 and were able to report 200 samples for CVAA, and 250 samples for a nitrogen mustard metabolite, EDEA, in less than 24 hours from receipt of samples.
- Three Newborn Screening staff, Erika Jackson, Scott Larabell, and Laurie Fletcher attended an APHL-funded trip to the Wisconsin Newborn Screening laboratory to receive training on the Cystic Fibrosis next generation sequencing assay.
- Michigan's PFOMS project was spotlighted in a CDC article: Firefighters Need Protection Too | NBP | CDC.
- The Environmental Chemistry Section is now testing harmful algal blooms in drinking water year-round and is also looking into and developing a PFAS biosolids method on a LC-MSMS with an analyte panel to 45 analytes.

- The Environmental Chemistry Section is working on expansion of future testing capabilities to perform organics in drinking water in support of surveillance testing throughout the state.

Test Validations and Verifications:

- Biomonitoring Aluminum and Chromium in Whole Blood by ICP-MS/MS.
- Developing matrix extension for the analysis of waterfowl tissue and liver method for the analysis of PFAS compounds with a sample clean-up step on the LC-MSMS and expanded the analyte panel to 45 analytes.
- Improved the tissue method (fish, beef, and deer) for the analysis of PFAS compounds by changing the analytical column and mobile phase gradients on the LC-MSMS and expanded the analyte panel to 45 analytes.
- Developing a direct inject, filtered, and digested methods for metals in drinking water on both the ICP-OES and ICP-MSMS to perform drinking water surveillance testing in our state.



Infectious Disease Division

Microbiology, Virology, and Genomics Sections

The Infectious Disease Division is designated as a CDC Laboratory Response Network Biological (LRN-B) Advanced Tier laboratory that tests biological samples for the CDC, the Federal Select Agent program, and the Food Emergency Response Network (FERN). It also provides quality reference and specialized testing services for rapid and effective detection and surveillance of emerging and existing communicable diseases. The Microbiology Section performs testing for a variety of threats such as foodborne illness, sexually transmitted infections (STI), fungal disease, as well as respiratory diseases like tuberculosis (TB) and pertussis. The Virology Section handles viral public health threats such as SARS CoV-19, Jamestown Canyon virus, rabies, and Eastern Equine Encephalitis (EEE) virus. The Genomics Section assists epidemiologic efforts to trace and monitor emerging infectious diseases and their variants via genetic sequencing and data analytics. The laboratory also functions as the National Tuberculosis Molecular Surveillance Center and the National Hepatitis C (HCV) Nucleic Acid Test (NAT) Reference Center.

Key events and activities in FY 2023 include:

- Arianna Miles-Jay was selected to co-chair a new Advanced Molecular Detection (AMD) workgroup hosted out of Council of State and Territorial Epidemiologists (CSTE) in collaboration with CDC's Office of Advanced Molecular Detection.
- Heather Blankenship was selected to be the infectious disease subdivision representative for the Association of Molecular Pathology professional relations committee. She also accepted an APHL consulting opportunity to teach and mentor Pan American Health Organization (PAHO) countries over the next year for the implementation and utilization of genomic data.
- Barb Goodson from the Western Upper Peninsula Health Department (WUPHD) lab was in house for a training session on the King Fisher Extraction and Respiratory Pathogen Identification (RPIP) sequencing panel to implement at the WUPHD lab.
- Genomics staff traveled to the WUPHD to aid in a whole genome sequencing of respiratory viruses training with a local health department partner.
- Many new staff added to the Genomics Section.
- CDC Laboratory Leadership Fellow, Casey Vantucci, visited to experience how a state public health laboratory operates.
- Kevin Rodeman attended the CaliciNet national norovirus outbreak surveillance network meeting.
- Diana Riner earned her CLIA laboratory director certificate and was also presented a digital certificate of appreciation for the continued support of testing and providing valuable subtyping data on Influenza Hospitalization Surveillance Project (IHSP) specimens to the IHSP, RSV-NET, and COVID-NET programs on behalf of CDC, MDHHS & the Michigan RESP-NET team.

- Kim McCullor was invited to co-chair the Council for Outbreak Response's Healthcare-Associated Infections (HAIs) and Antimicrobial-Resistant Pathogens (AR) Laboratory Workgroup and will serve as a voting member.
- Chong Vue, Sheri Robeson, and Kim McCullor attended the Laboratory Flexible Funding Model (LFFM) annual meeting, which provided opportunities to network, learn about new and cutting-edge methodologies for food testing, and was instrumental in learning what the future goals of FDA and LFFM are for future planning purposes.
- The Biowatch program underwent a successful multi-agency phase I exercise in May.
- Steve Church, Jolene Vanneste, Elyse Eldridge, and Kirk Annis from the Mycobacteria/Mycology Unit provided Mycobacteria MALDI-TOF training to three staff members from Henry Ford Hospital, a staff member from Corewell Health - Royal Oak, a staff member from Corewell Health – Spectrum, and the Alabama Public Health Laboratory.
- Tonya Heyer and Brandon Hirt from the Mycobacteria/Mycology Unit provided fungal training to a staff member from Corewell Health - Spectrum.
- The Mycobacteria/Mycology Unit hosted a new manager from the South Carolina Public Health Laboratory to learn about the different methods utilized for Mycobacterium isolation and identification.
- Angie Schooley, Jolene Vanneste and Laurel Vibber attended the 13th National Conference on Laboratory Aspects of Tuberculosis in conjunction with the 2023 National TB Controllers Conference.
- The Mycobacteria/Mycology Unit supported Texas Public Health Laboratory's testing needs while their BSL-3 testing space was renovated.
- Matthew Dover attended the Central Region Influenza Surveillance Meeting.
- Discontinued testing for COVID-19 (SARS-CoV-2) antibodies due to low demand for testing and the inability to obtain testing reagents. Continued to offer molecular testing and sequencing for COVID-19 virus.
- Hosted the quarterly HAI Prevention and Advisory Committee in mid-August.
- Participated in a special project with FDA for Legionella water testing.
- Submitted GC isolates to Microbiologics to aid in resistance monitoring.
- Completed material transfer agreement with University of California, San Francisco to ensure procurement of antibody reagents for *Clostridium botulinum* testing.
- Successful Select Agent inspection.
- Hosted two high school students.
- Mitch Kogut, Sheri Robeson, and Bruce Robeson retired.

Test Validations and Verifications:

- BioWatch multi-lab validation of new FT PCR assay.
- MALDI-ToF identification of dimorphic fungi approved and on-boarded for testing.
- Switched methods for the hepatitis B surface antibody (HBsAb) test followed by the hepatitis B surface antigen (HBsAg) test. Testing was moved from the enzyme immunoassay (EIA) on Bio-Rad's EVOLIS instrument to the chemiluminescent immunoassay (CLIA) on Siemen's Centaur XPT instrument. This technology provides higher throughput for faster turn-around-times with reporting.
- PCR for Cyclospora from stool validation.
- Panther instrument verification for updated GC/CT panel.
- Panther instrument validation for updated GC/CT panel for non-FDA approved under 14 age groups from urine (in collaboration with Oakland County).
- Verification of two additional MGIT 960 Instruments.
- PCR and culture validation for *Candida auris* colonization.
- PCR for staphylococcal enterotoxin food testing validation.

Quality Assurance

The Quality Assurance (QA) Section supports all laboratory quality system essentials and external proficiency testing with the Laboratory Support (LS) Unit and Quality Control (QC) Unit. The QA Section also includes the DASH Central Receiving and the DASH Data Handling Units, as well as a Warehouse Unit. The DASH Central Receiving Unit receives specimens and samples for laboratory testing, resolves specimen errors, and handles all packing and shipping for sendouts. The DASH Data Coding Unit is responsible for demographic data entry, data resolutions, and all legal requests.

Key events and activities in FY 2023 include:

- The AIHA LAP accreditation external audit went very well with only a small number of minor nonconformances noted. This success is due to the dedication of the testing staff, managers, and the BOL internal audit team.
- Implemented a new laboratory-wide electronic inventory management system.
- Installed a new water purification system for the building. This system is utilized by both MDHHS and EGLE. The project required the extensive coordination of BOL Accounting, QC Unit staff, the QA section, DTMB Facilities, DTMB Electricians, DTMB Controls staff, and the vendor.
- Sixteen employees completed Lean Six Sigma Green Belt training.
- The two DASH Units moved to their newly renovated space. This was no small feat including moving nine data coders, eight laboratory staff, and two managers. The new space will assist with streamlining specimen accession and data entry operations.
- Renovations were completed in the QC office space. This improved the working environment and included adding space for a future employee.
- Completed contract negotiations for the preventive maintenance and emergency repair of autoclaves.
- Worked with the LSS Section to amend the LKOTS contract to include the ability to move forward with application enhancements. The DASH specimen receiving area and the QA Section finished the testing of 14 enhancements to the Laboratory Kit Order Tracking System (LKOTS) application. This is the culmination of 1 ½ years of work with DTMB and the LKOTS application developer.
- Matt Bashore attended the 2023 APHL Annual Conference.
- Kirsten Gallagher and Ann Godines celebrated 20 years of service.
- The BOL internal audit team, additional staff audit volunteers, and BOL managers worked together to complete the 2023 CAP interim inspection. This involved the efforts of 33 staff. Sixteen separate internal audits were completed from May 15 – June 9, 31 follow-up records were completed by June 16, and Dr. Shah completed his final review on June 20.
- The BOL warehouse successfully sent out supplies to kick off a new HABs season.

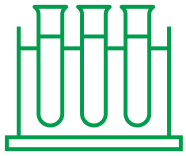
Laboratory Support Unit:

- Ran 63 oven sterilizations, with 452 hours of run time and an additional 189 hours of preparation.
- Ran 344 loads of glassware, with 516 hours of runtime and at least 1,376 hours of preparation.
- Filled countless glassware orders from all testing areas.

Quality Control Unit:

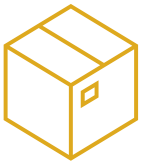
- Processed and routed 220 PT events.
- Handled the logistics of coordinating and closing out 48 vendor visits.
- Processed 759 competencies.
- Ran quality control on 751 media receipts.
- Processed and tracked 122 corrective action reports.

DASH Data Handling Unit and the DASH Central Receiving Unit:



- Completed data entry and double data entry 595,806 times.
- Accessioned 297,903 specimens.
- Supported the resulting of 7,006,882 tests.
- Shipped out 405 infectious packages.
- Completed countless FOIA requests.

Warehouse Unit:



- Compiled and shipped 1,987 orders containing a total of 322,323 components through LKOTS.
- Shipped out 862 orders of medications to support the STI program.
- Shipped out 3,051 newborn screening cards.
- Received and delivered countless UPS and FedEx shipments.

Laboratory Systems and Safety Office

The Laboratory Systems Section (LSS) administers two laboratory information management systems (LIMS) ensuring real-time reporting of laboratory results to hospital laboratories, veterinary clinics, physician offices, clinical laboratories, environmental agencies, as well as local, state, and federal health officials to track outbreaks and prevent illness, disease, and deaths. LSS outreach staff provides training in package and shipping for biological and chemical threat agents and laboratory biosafety, represents the BOL in public health emergency preparedness activities, and manages a laboratory science education program for K-12 students.

Key events and activities in FY 2023 include:

- The Community Health Emergency Coordination Center (CHECC) closed response to the COVID-19 outbreak in February 2023 after being in operation for 160 weeks (not including de-mobilization time).
- The Bioterrorism Training Coordinator, Jason Wholehan, participated in a twinning project sponsored by APHL that involved time spent at the Alaska State Public Health Laboratory and a reciprocal visit to Michigan by Alaska's Bioterrorism Coordinator.
- Jason Wholehan and Julie Kusey attended the Great Lakes Homeland Security Conference.
- The BOLB (BOL Business) monthly internal newsletter was created to communicate events, relevant information, announcements, and celebrations to BOL employees.
- Carrie Anglewicz, Biosafety Officer, participated in an APHL Lab Culture podcast for biosafety month, featuring past winners of the Leadership in Biosafety and Biosecurity Award: Lab Culture ep. 31: Past, Present and Future of Biosafety - APHL Blog.
- Three sessions of the A2LA Quality Fundamentals, Method Validation, and ISO17025 course were offered with 82 BOL employees and managers completing the course.
- The Biosafety Subcommittee, led by Carrie Anglewicz, coordinated biosafety month learning activities for laboratory staff and completed an internal autoclave training video in conjunction with MDHHS Communications.
- MDHHS Communications representatives were invited to the laboratory to share how they support the BOL.
- Heather Seymour, Explore Lab Science (ELS) program coordinator, joined the APHL Public Health Laboratory Ambassador program.
- The ELS program provided activities for 12 events reaching around 1600 students across the state.
- Throughout the year, eight college interns from various schools and science-based majors assisted with the ELS program.
- LIMS staff handled 158 requests for changes (RFCs) for STARLIMS.
- Social media content was created by Teresa Miller and the APHL Midwest Consortium to highlight laboratory jobs and by Heather Seymour to highlight different areas of the laboratory during lab week.

- Teresa Miller, Chemical Threat Response Training Coordinator, completed six years as a member of APHL Environmental Health Committee and received praise for her “hard work, effort, and valuable perspective.”
- Jenny Campbell and Heather Seymour celebrated 20 years of service.
- LSS hosted BOL’s first APHL intern through “Public Health Laboratory Internship Program: an APHL-CDC Initiative.”
- Teresa Miller and Jason Wholehan delivered 14 Category A and five Category B Packing and Shipping Dangerous Goods courses to more than 258 clinical and public health laboratory professionals.
- Safety and Biosafety Officers performed initial and annual trainings for employees including, but not limited to, respirator fit tests, chemical safety, bloodborne pathogens, and PPE.
- Teresa Miller attended the LRN-C spring meeting.

Publications And Presentations

Publications:

- Martin ET, Lauring AS, Montgomery JP, Valesano AL, Eisenberg MC, Sheen D, Nord J, Ernst RD, Mortenson LY, Valdez R, Niknafs Y, Conway D, Rifat SF, Bagdasarian N, Lyon-Callo S, Collins J, **Blankenship HM, Soehnlen M**, Marquez J. Containment of a multi-index B.1.1.7 outbreak on a university campus through a genomically-informed public health response. *medRxiv*. (2022). https://doi.org/10.1101/2022.01.04.22268758
- Mukherjee S, **Blankenship HM**, Rodrigues JA, Mosci RE, Rudrik JT, Manning SD. Antibiotic susceptibility profiles and frequency of resistance genes in clinical Shiga toxin-producing Escherichia coli isolates from Michigan over a 14-year period. *Antimicrobial Agents and Chemotherapy*, Vol. 65, No. 11. (2021). https://doi.org/10.1128/aac.01189-21
- **Nindo FN** co-author on: Delgado KN, Montezuma-Rusca JM, Orbe IC, *et al.* Extracellular Loops of the Treponema pallidum FadL Orthologs TP0856 and TP0858 Elicit IgG Antibodies and IgG+-Specific B-Cells in the Rabbit Model of Experimental Syphilis. *mBio,* Vol. 13, No. 4. (2022). https://doi.org/10.1128/mbio.01639-22
- **Blankenship HM** co-author on: Brito AF, Semenova E, Dudas G, *et al.* Global disparities in SARS-CoV-2 genomic surveillance. *Nat Commun* 13, 7003 (2022). https://doi.org/10.1038/s41467-022-33713-y
- Shibabaw A, Gelaw B, Ghanem M, Legall N, **Schooley AM, Soehnlen MK**, Salvador LCM, Gebreyes W, Wang S, Tessema B. Molecular epidemiology and transmission dynamics of multi-drug resistant tuberculosis strains using whole genome sequencing in the Amhara region, Ethiopia. *BMC Genomics* 24, 400 (2023). https://doi.org/10.1186/s12864-023-09502-2
- Rodrigues JA, **Blankenship HM**, Cha W, Mukherjee S, Sloup R, Rudrik JT, **Soehnlen M**, Manning S. Pangenomic analyses of antibiotic-resistant *Campylobacter jejuni* reveal unique lineage distributions and epidemiological associations. *Microbial Genomics*, Vol. 9, No. 8. (2023). https://doi.org/10.1099/mgen.0.001073
- **Blankenship HM, Dietrich SE, Burgess E, Wholehan J, Soehnlen M**, Manning S. Whole-genome Sequencing of Shiga Toxin-Producing *Escherichia coli* for Characterization and Outbreak Investigation. *Microorganisms*, Vol. 11, No. 5. (2023). https://doi.org/10.3390/microorganisms11051298
- **Johnson J, Soehnlen M, Blankenship HM**. Long read genome assemblers struggle with small plasmids. *Microbial Genomics,* Vol. 9, No. 5. (2023). https://doi.org/10.1099/mgen.0.001024
- "*Staphylococcus aureus* – Michigan, 2021" accepted for publication to the CDC Morbidity and Mortality Weekly Report with **Kim McCullor and Marty Soehnlen** as co-authors.
- "Considerations for SARS-CoV-2 Genomic Surveillance: A Report of the Association for Molecular Pathology" has been submitted to JMP with **Heather Blankenship** as a co-author.

Presentations:

Association of Public Health Laboratories (APHL) Annual Meeting

- Dr. Marty Soehnlen co-presented "Laboratory Leadership and Management: Laboratory Systems Perspective."
- Carrie Anglewicz co-presented "Forming Partnerships with Non-Traditional Testing Sites.
- Heather Seymour spoke on the panel chat "Pathways to Public Health Laboratory Careers: Help Us Help You."
- Nicole Braun, Dr. Katie Margulieux, Bruce Robeson, and Dr. Diana Riner presented the poster "Validation of Roche COBAS 800 for Detection of Hepatitis C Virus (HCV)."

Laboratory Response Network - Chemical (LRN-C) Fall Technical Meeting

- Andrew Garofalo co-presented "Lead Isotope Testing to Support Public Health Mitigation of Lead Exposure."
- Timothy Karrer co-presented "Logistics of Biomonitoring Specimen Handling and Results Reporting."
- Dr. Jessica Morrison presented "MDHHS Bureau of Laboratories, Clinical PFAS Methods."
- Dr. Michael Stagliano presented "LRN-C Methods Troubleshooting Panel GC/MS."

South Central Association of Clinical Microbiologists (SCACM) Spring Meeting

- Ashley Rogers presented the poster "Validation of Applied Biosystems SeqStudio Genetic Analyzer."
- Kaycee Hine presented the poster "Validation of the Detection of *Cyclospora cayatanensis* from Fecal Specimens using Real-Time Polymerase Chain Reaction."
- Brandon Hirt presented the poster "Clinical Identification of Dimorphic Molds Using the Bruker MALDI-TOF."

APHL/International Society for Neonatal Screening (ISNS) Newborn Screening Symposium

- Mark Lemos presented the poster "Hindsight is 2022: Michigan's experience implementing an MS/MS based method for GAMT deficiency screening in newborns."

APHL ID Con

- Jason Wholehan presented “You want me to ship what!? Radioactive and Select Agents; Unusual Shipping Requests”
- Dr. Jared Johnson presented “Shotgun Metagenomics: A Success Story of the Rapid Development and Implementation of a Genomic Surveillance Method During the 2022 Human MPox Outbreak.”
- Tonya Heyer presented the poster “Clinical Identification of Dimorphic Molds Using the Bruker MALDI-TOF.”
- Stephen Dietrich received a travel award and presented the poster “Genomic Surveillance of Antimicrobial Resistant Pathogens in a Non-regional ARLN Laboratory.”

APHL AMD Days

- Ellen Ewald presented a talk and poster “Investigation of a Multi-Drug Resistant Human *Enterobacter mori* Isolate from Michigan.”
- Dr. Heather Blankenship spoke on a panel discussion “Strategies for Collaborations Between Laboratory Scientists and Epidemiologists.”
- Dr. Kristin Jacob, Rebecca Kramer, and Dr. Heather Blankenship authored the poster “Strategy, Design and Challenges of Implementing Whole-Genome Sequencing Validations in Public Health Laboratories for Routine Bacterial Surveillance and Outbreak Detection.”

American Society for Microbiology (ASM) NGS Conference

- Dr. Jared Johnson presented a poster regarding his fellowship work on nanopore sequencing of pathogens.
- Dr. Heather Blankenship presented a talk on making use of pathogen genomic data for epidemiological insights.

Additional presentations

- Jason Wholehan presented “Bio - What!? Crime, Terrorism, Weapons, and War” at the American Society for Clinical Laboratory Science (ASCLS) – Michigan annual meeting.
- Chong Vue presented a talk on the Staphylococcus Enterotoxin Project at the Food Emergency Response Network (FERN) Annual Meeting.
- Sheri Robeson presented “Laboratory Aspects for the Outbreak Ready Training.”
- Dr. Heather Blankenship presented “The Future of Genomics for Informing Rapid Response” at the Rapid Response Team Annual Meeting.

- Dr. Heather Blankenship provided a 90-minute ASM webinar live and recorded as part of ASM/CDC development of Next Generation Sequencing Training.
- Jolene Vanneste taught a MALDI-ToF in-person training for APHL/CDC.
- Dr. Arianna Miles-Jay guest lectured about public health pathogen genomics for a University of Michigan School of Public Health course.
- Dr. Heather Blankenship provided genomic epidemiology career presentations to Michigan State University and University of Michigan students.
- Elizabeth Burgess presented "Lessons Learned at MDHHS: Implementing the Tecan Fluent for SARS-CoV-w WGS" at the Integrated Foodborne Outbreak Response and Management (InFORM) Regional Meeting.
- Dr. Heather Blankenship presented a talk on developing a genomics quality management system in Michigan at the Next Generation Sequencing Quality Initiative Technical Coordinating Committee meeting.
- Jolene Vanneste presented a talk on targeted sequencing for tuberculosis at the TB Nurse Network meeting.
- Jason Wholehan co-presented a microbiology quiz session at the SCACM fall meeting.

Featured Articles

New Identification Assay for Dimorphic Fungi

Dimorphic molds are fungi that can exist as both a mold and yeast depending on the temperature and conditions they are exposed to. Dimorphic fungi take on a mold phase at 30˚C, but at 36˚C, on rich media, the fungi exist as yeast. Dimorphic fungi are found as mold spores in the environment. When the spores enter the human body, they convert to a yeast phase causing systemic infections. There are several important pathogens noted to cause diseases in human and other animals including *Coccidioides immitis*, *Paracoccidioides brasilienseis*, *Blastomyces dermatitidis*, *Histoplasma capsulatum*, and *Sporothirix schenckii*. Dimorphic fungal infections remain a major public health concern due to multiple issues including climate change and an increased prevalence of immunocompromised individuals.

Although these types of infections are significant and of growing public health concern, FDA approved diagnostic clinical assays for the identification of dimorphic fungi are extremely limited. Hologic announced the discontinuation of their Accuprobe line for the identification of dimorphic fungi including *Histoplasma capsulatum*, *Blastomyces* spp., and *Coccidiodes* spp. To ensure testing capability, the MDHHS BOL Microbiology Section validated and onboarded testing from clinical isolates for the identification of *Blastomyces* spp., *Coccidiodies* spp., and *Histoplasma capsulatum*. The validated assay uses matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF) technology. This mass spectrometry technology utilizes a laser that atomizes inactivated organisms from a target plate. The spectral profile generated from the sample is compared to a library of known profiles. Statistical analysis is run and a confidence score with an organism identification is generated. Currently, BOL is validated to run MALDI from Sabourard Dextrose Agar (SDA), Kelly's agar, and Cysteine agar from either the mold and yeast phases. For more information regarding fungal testing at BOL, please visit our website or contact Angie Schooley, TB/Mycology Unit Manager, schooleya@michigan.gov, (517) 335-9637 or Dr. Kimberly McCullor, Microbiology Section Manager, mccullork@michigan.gov, (517) 335-9641.

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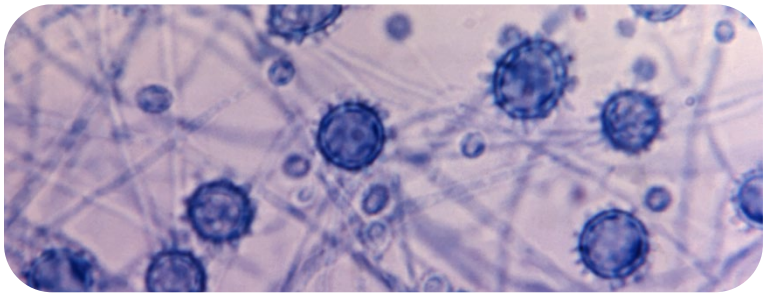

Organizational Changes at the Bureau of Laboratories

Environmental health focuses on human illness and disabilities caused by non-infectious, non-occupational factors encompassing the natural and built environment (American Public Health Association, 2022). Environmental health includes programs such as biomonitoring, childhood lead poisoning prevention, food safety, and safe water to name a few (Center for Disease Control and Prevention, 2023). In Michigan, environmental health concerns are statewide and as of 2019 the following environmental sites and hazards were identified: 59 PFAS sites; 652 public water supplies reported lead and copper data above the action level exceedance; 284 vapor intrusion sites; and 66 superfund sites. These numbers continue to grow as additional sites triggering regulatory responses are identified.

Most of the testing for Michigan's environmental health programs such as MI Lead Safe Program; Eat Safe Fish Program; PFAS in deer, fish, serum, and drinking water; harmful algal blooms in recreational and public water supplies; biomonitoring and human health studies are performed at the Bureau of Laboratories (BOL), Division of Chemistry and Toxicology (DCT), Clinical and Environmental Chemistry Sections, formally known as the Analytical Chemistry Section (ACS).

Prior to 2017, DCT was made up of two sections, Analytical Chemistry and Newborn Screening, with two testing units in each section and divisional staff of 40 employees. To better serve Michigan residents as identification of environmental contamination and hazard sites increased, the Analytical Chemistry Section was expanded from two to three units: Trace Metals, Environmental Organic Response and Clinical Organic Response units.

In 2022, the ACS received funding to expand testing capabilities and perform drinking water surveillance testing to support necessary public health responses. This expansion allowed ACS to separate into the Clinical and Environmental Chemistry Sections, with each section comprised of an Inorganic and Organic Unit.

Currently, the DCT has approximately 72 staff within three sections: Clinical Chemistry, Environmental Chemistry, and Newborn Screening that support the testing expansion capacity. Each section's capabilities are outlined in ***Table 1***.

Table 1: Clinical and Environmental Chemistry Section Testing Capabilities

Environmental Chemistry Section	
Environmental Inorganic Unit	Environmental Organic Unit
Mercury in fish	Harmful algal blooms in recreational and drinking water
FERN* panel	Persistent organic pollutants in fish
Spices, teas, and supplements panel	FERN* panel
Lead isotope	PFAS* – tissue and agriculture
Clinical Chemistry Section	
Clinical Inorganic Unit	Clinical Organic Unit
LRN-C* whole blood and urine panel	LRN-C* serum panel and urine panel
Whole blood lead screening and confirmatory tests	PFAS* – serum, plasma, dried blood spots, and water
Biomonitoring whole blood and urine panel	Persistent organic pollutants in serum
Arsenic and mercury speciation	Biomarkers in serum and whole blood

*LRN-C, Laboratory Response Network-Chemical
*FERN, Food Emergency Response Network
*PFAS, Per- and Polyfluoroalkyl Substances

Article from BOL LabLink Summer 2023, Volume 30, Number 2

MDHHS BOL proudly maintains internationally recognized accreditation status

The Michigan Department of Health and Human Services Bureau of Laboratories (MDHHS BOL) continues to maintain both American Industrial Hygiene Association (AIHA-LAP, LLC) and College of American Pathologists accreditations and certifications from the Centers for Medicare & Medicaid Services (CMS), Clinical Laboratory Improvement Amendments (CLIA), and the National Lead Laboratory Accreditation Program (NLLAP).

MDHHS BOL takes extraordinary steps in providing accurate and reliable test results to Michiganders for all the completed testing. In the mid-1980s, MDHHS BOL obtained accreditation through the AIHA LAP, LLC, using their accreditation policy modules. AIHA is an International Organization for Standardization and uses the International Electrotechnical Commission standards (ISO/IEC 17025:2017). This approach forms the specialized system for worldwide standardization for environmental lead testing through the Environmental Lead Laboratory Accreditation Program (ELLAP).

With this accreditation, the MDHHS BOL is an approved lead laboratory program under the Environmental Protection Agency's (EPA) NLLAP. In 2017, MDHHS BOL expanded the field of testing to include food analyses and obtained accreditation through the Food Laboratory Accreditation Program (FoodLAP).

This accreditation demonstrates MDHHS BOL's commitment to excellence in public health laboratory testing program. These programs were established as a way to formally recognize laboratories capable of maintaining and operating a quality management system, they are technically competent, and can generate technically valid and reliable test results. These programs also require following several essential good laboratory practices – adequate testing capacity, enforcing exercise of overall responsibility, following strict scientific protocols, maintaining objectivity of results, impartiality in conduct, traceability of measurement, accuracy and precision of tests, and transparency of analytical processes.

Article from The Guardian of Public Health e-newsletter, March 2023

MDHHS Bureau of Laboratories supports STEM education

What do you want to be when you grow up? This common question is frequently presented to children, and their responses are influenced by the occupations to which they have been exposed. Many children have limited knowledge of or contact with someone in the field of laboratory diagnostics, but the Michigan Department of Health and Human Services (MDHHS) Bureau of Laboratories (BOL) aims to change that.

To address the laboratory workforce shortage and raise awareness of laboratory diagnostics as a career, the MDHHS BOL established the "Explore Lab Science" K-12 outreach program a little over a decade ago. Because students are unable to visit the laboratory to observe what we do, this program allows us to send a scientist from the laboratory to visit students and share the Science, Technology, Engineering, and Mathematics (STEM) principles underlying our work through hands-on activities and demonstrations.

The "Explore Lab Science" program is divided into three tiers:

- Tier 1: K-3rd grade students are introduced to science in general terms.
- Tier 2: 4th-8th grade students are presented with laboratory terminology and learn basic experiments.
- Tier 3: High school students are presented with more complex laboratory experiments and demonstrations.

The "Explore Lab Science" program supplements classroom curricula with a wide variety of STEM concepts. For younger students, we might explain surface tension using bubbles, demonstrate catalysts with elephant toothpaste, and introduce germs and proper handwashing with fluorescent powder. For older students, we include activities that replicate laboratory tests such as DNA extraction, chromatography, and microscopy. In addition to on-site visits, a wide variety of educational information and STEM activities are available for students on the "Explore Lab Science" website.

The program also employs and mentors college interns majoring in STEM-based fields of study. They play an active role in the development of program material and the determination of program goals, all while learning about public health laboratory testing and increasing skills such as leadership, photo and video editing, and preparing and delivering presentations.

For more information about the "Explore Lab Science" program or to schedule a visit, contact Heather Seymour at SeymourH@michigan.gov.

Article from The Guardian of Public Health e-newsletter, May 2023

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