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TN Department of Health

Public Health Laboratory Newsletter

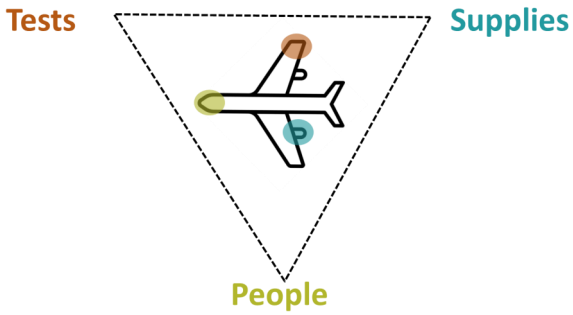
Lisa Piercey, MD, MBA, FAAP
Commissioner of Health

Richard Steece, PhD, DABMM)
Director, Laboratory Services

Inside This Issue:

Building the Plane While Flying It: Diagnostic Testing in the COVID-19 Pandemic Response

The Coronavirus Disease (COVID-19) pandemic response efforts have relied heavily on laboratory testing for decision making at the local, state and national levels. While the challenges associated with testing have dominated the news, what the TN Public Health Laboratory has accomplished in the last ten months in terms of massively scaling up diagnostic testing for a novel virus is truly remarkable.



So how did we build this COVID-19 airplane as we flew it? Well for successful testing, three main components are needed: you need a **test** platform in place (the wings of the airplane), you need sufficient **supplies** and supply chain to provide ongoing testing (fuel for the plane), and finally you need enough **people** trained to perform the novel test, for multiple shifts, every day, for going on 10 months (those are the pilots guiding the plane). If you don't have enough tests, supplies or people, COVID-19 test can come to a screeching halt, putting the health and safety of Tennesseans at risk.

(Continued on page 2)

Tennessee Awarded Grant to Fund Lead Testing in Drinking Water in Schools and Child Care Facilities

In April, the U.S. Environmental Protection Agency awarded $697,000 in grant funding to assist Tennessee with identifying sources of lead in drinking water in schools and childcare facilities. The principal objective of the Water Infrastructure Improvement for the Nation Act., or WINN, is to provide grants to states and territories to help assist schools and child care programs to test for lead in drinking water, utilizing EPA's 3Ts for Reducing Lead in Drinking Water in Schools and Child Care Facilities guidance or applicable state regulations or guidance regarding reducing lead in drinking water in schools and child care programs that are not less stringent. [1]

The Tennessee Department of Environment and Conservation, in partnership with the Tennessee Department of Health, Tennessee Department of Human Services and the Tennessee Department of Education plan to address lead exposure from drinking water by testing drinking water in Head Start/Early Head Start facilities and TDHS-licensed child care centers. TDEC, TDH, TDHS and TDOE, will utilize EPA's 3Ts for Reducing Lead in Drinking

(Continued on page 3)

Building the Plane While Flying It *(Continued from page 1)*

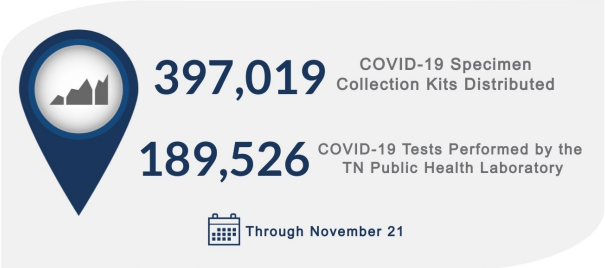
Tests

Currently, there are three main types of tests for COVID-19, but it didn't start out that way. The first tests developed to detect the virus were molecular (PCR). Antibody tests became more widely available in early spring, and by July, the first antigen tests were authorized and available. There are also sub-categories of COVID-19 tests that have developed, ranging from home collection, pooled testing, point-of-care testing and multi-plex testing.

It is important to highlight the tremendous efforts of our PHL staff and just how many COVID-19 tests we've performed at the PHL. In mid-February, the TN PHL was one of the first five labs in the country to have the CDC COVID-19 test verified and ready for use. This was well-timed because less than two weeks later, we identified the first case in TN. From that point on, we've added multiple test platforms to massively scale up our testing capabilities and the entire laboratory has been involved in the testing efforts. We completed 100,000 tests at the end of July and as of mid-November we've done approximately 180,000 COVID-19 tests. We've also coordinated and/or performed approximately 12,000 COVID-19 antibody tests of frontline healthcare workers.

Supplies

From the very beginning of the pandemic, all laboratories struggled to find sufficient and steady supply chains of test reagents and consumables. Early on, it was the components of the specimen collection kits like swabs and transport media that became scarce. The TN PHL media preparation team found creative ways to solve this problem. They packaged and sterilized swabs, made transport media and packaged and distributed specimen collection kits to all the health departments across the state.



People

Finally, and most importantly, we must acknowledge all the laboratory staff that have contributed to the COVID-19 pandemic response. These are the folks piloting this COVID-19 airplane and it truly wouldn't fly without them. It's not just people at the lab bench running the instruments, it has been an all hands-on deck endeavor. Lab staff from other sections like environmental and newborn screening stepped in to help with the pre- and post-analytical steps of testing. From sample receiving, aliquoting and coordinating the distribution of samples to the different sections for testing, our accessioning staff have truly been on the frontlines of COVID-19 testing. The post-analytical steps are equally important, such as confirming quality controls worked, second checks of results and approvals, must be completed before results are reported out to providers and ultimately, patients. All this is done for every sample we test, so to have done approximately 180,000 COVID-19 tests over the last ten months is truly a herculean effort by our laboratory staff.

Taken together, this is how we built our COVID-19 plane -- by implementing multiple test platforms for COVID-19 as fast as possible, by sourcing from multiple supply chains and making what we couldn't buy, and finally by using the full power of all our laboratory staff to get testing done, quickly and accurately. We could not be more proud of our lab and what we've accomplished as we continue to test and play a vital role in the pandemic response.

Submitted by

Kara Levinson, PhD, MPH, D(ABMM) | Deputy Director

Lead Testing in Drinking Water *(Continued from page 1)*

Water in Schools and Child Care Facilities guidance as a model to:

1) Communicate the results and important lead information to the public, parents, teachers and larger community throughout the implementation of the program;
2) Train on the risks of lead in drinking water and testing for lead, as well as developing key partnerships to support the program;
3) Test using appropriate testing protocols and a certified laboratory; and
4) Take Action, including the development of a plan for responding to results of testing conducted and addressing potential elevated lead where necessary.

All water lead testing will be conducted at the Tennessee State Public Health Laboratory. As a result of the global SARS-CoV2 pandemic, the program, originally scheduled to begin in April, instead kicked off in November. A public announcement in October generated substantial interest. The laboratory staff began testing on November 18, 2020.

About Lead Exposure

Lead can enter drinking water when plumbing materials that contain lead corrode, especially where the water has high acidity or low mineral content that corrodes pipes and fixtures. The most common sources of lead in drinking water are lead pipes, faucets and fixtures. In homes with lead pipes that connect the home to the water main, also known as lead service lines, these pipes are typically the most significant source of lead in the water. Lead pipes are more likely to be found in older cities and homes built before 1986. Among homes without lead service lines, the most common problem is with brass or chrome-plated brass faucets and plumbing with lead solder.

EPA has set the maximum contaminant level goal for lead in drinking water at zero because lead is a toxic metal that can be harmful to human health even at low exposure levels. Lead is persistent, and it can bioaccumulate in the body over time.

Young children, infants and fetuses are particularly vulnerable to lead because the physical and behavioral effects of lead occur at lower exposure levels in children than in adults. A dose of lead that would have little effect on an adult can have a significant effect on a child. In children, low levels of exposure have been linked to damage to the central and peripheral nervous system, learning disabilities, shorter stature, impaired hearing and impaired formation and function of blood cells.

Submitted by

Marc J Rumpler, MS, PhD, DABCC, NRCC, DLM (ASCP)SC^{cm} | Environmental Division Director

[1] *https://www.epa.gov/dwcapacity/wiin-grant-lead-testing-school-and-child-care-program-drinking-water*

TDH ARLN-CRO Section Update

The Tennessee Antibiotic Resistance Laboratory Team will be assisting APHL with the facilitation of the AR LAB Network Annual Meeting. The virtual meeting will include public health stakeholders from across the country. Tennessee will be presenting on *Aspergillus* and facilitating a round robin exercise.

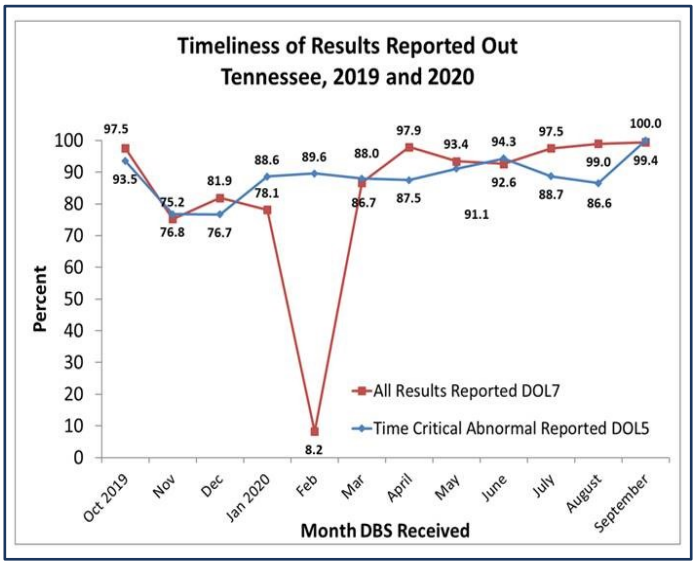
The Tennessee Antibiotic Resistance Laboratory team has helped support the western regional lab with CPO screening in California. The CDC and Western Regional Lab reached out to Tennessee in July to provide surge capacity for CPO screening in California. The state lab team was able to provide screening for 290 specimens to support the investigation since July 29, 2020.

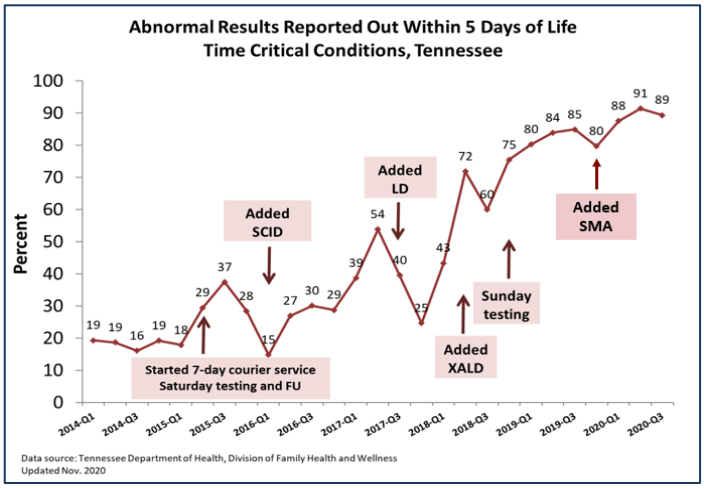
Submitted by

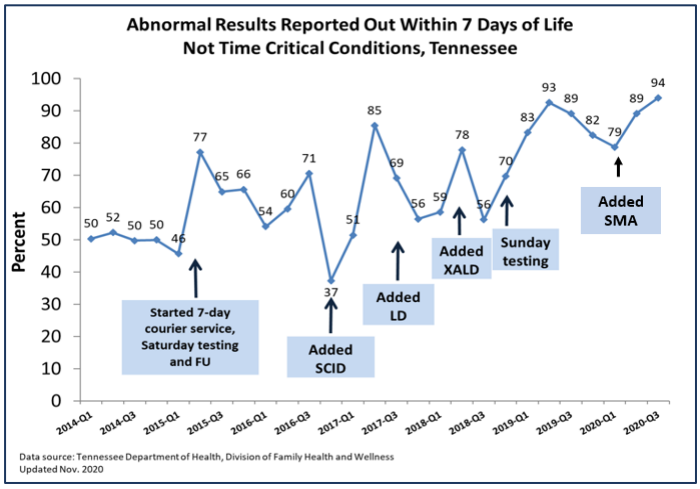
James Albert Burks IV, MLS (ASCP)^{CM}, RN | ARLN—CRO Supervisor

Newborn Screening Continuous Quality Improvement Contributes to Meeting National Turnaround Time Recommendations

The Advisory Committee on Heritable Diseases on Children and Newborns of the Health Resources and Services Administration of the Federal Government in 2015 recommended that all time critical abnormal results from newborn screening be reported by the infant's fifth day of life, or DOL5. Time critical results are those that need immediate medical intervention before the onset of symptoms to prevent death and disability. Time critical disorders include Galactosemia and Citrullinemia. The ACHDNC also recommended that all time sensitive abnormal results and all within normal results be reported by the infant's seventh day of life, or DOL7. Time sensitive disorders are those disorders that will need medical intervention, but there is some time before the onset of symptoms. Examples of time sensitive disorders are Biotinidase Deficiency and Sickle Cell Disease.







To meet these recommendations, the Newborn Screening Program implemented several initiatives including contracting with a courier service for delivery of specimens seven days a week to the State laboratory, adopting Saturday testing in 2015, adding Sunday testing in late 2018, rearranging the laboratory workflow to maximize efficiency and improving education for our birthing facilities on decreasing unsatisfactory collections and improving the timing of collection after birth. Our baseline in 2014 from the accompanying graph indicates we were reporting less than 20% of time critical specimens by DOL5 and less than 50% by DOL7 each quarter. With the gradual changes, we were able to attain reporting 99.4% of time critical abnormal specimens by DOL5 and 100% of all specimens by DOL7 for the month of September 2020. The credit for achieving these percentages belongs to the hardworking Newborn Screening laboratory and follow-up staff who are dedicated to improving the health outcomes for Tennessee infants. There is no doubt that their continuous efforts will enable the program to sustain reporting according to the ACHDNC recommendations.

Submitted by
M.Christine Dorley, PhD, MT(ASCP) | Assistant Director
Newborn Screening Laboratory

Spotlight on Safety

Safety should be everyone's priority at ALL times. Each and every individual is a safety officer. Each and every individual is the laboratory's most important asset. Safety should be foremost in our minds in all things that we do. Without our most important asset, turnaround times and accomplishment of our mission is compromised. When things are compromised and things are overlooked, the risk of an accident increases.

There are many steps we can take daily to ensure we mitigate hazards that could result in an accident. It may be waking up a little early to ensure we don't speed to work or slowing down a bit in our daily workflow. We need to take these steps to ensure we do our best to stay safe at home or at work.

In summary, no task or mission is more important than the safety of our employees, for without them we would have no task or mission. So please, in everything that you do, take time to think safety, know safety and do safety.

Submitted by Tracy Minster, MLS(ASCP)^{cm} | Assistant Safety Officer

Tracy Minster selected as Assistant Safety Officer

Tracy Minster has been selected as Assistant Safety Officer for the Public Health Laboratory. He earned his Bachelor of Science in Medical Laboratory Technology from Austin Peay State University in 2013. Tracy has worked in the Virology Section of the Public Health Laboratory for the past seven years. Prior to working at the Pubic Health Laboratory, he worked at LabCorp performing Flow Cytometry.

New Laboratory Biosafety Guidance Available to All

Biosafety in Microbiology and Biomedical Laboratories, 6th edition was recently published. The BMBL is a tool for assessing and mitigating risk in clinical and research laboratories. The BMBL continues to be a guide to best biosafety practices for safe work in clinical and research laboratories. Although it is not a regulatory document, it is the most revered guide for laboratory safety in the United States. Please note the new addition of an appendix devoted to clinical laboratories!

The entire publication may be downloaded free of charge at:

https://www.cdc.gov/labs/pdf/CDC-BiosafetyMicrobiologicalBiomedicalLaboratories-2020-P.pdf

Submitted by
Rolinda Eddings, MT(ASCP) | Safety Officer

Importance of Early Genetic Testing and its Role in Treating MCADD

The purpose of Newborn Screening is to identify harmful, inherited genetic diseases within the first days of life to allow healthcare providers to advise interventions that will allow the infant to thrive later in life. One such disease is Medium-Chain Acyl-CoA Dehydrogenase Deficiency, or MCADD. MCADD is a condition which disrupts fatty acid oxidation of medium chain fatty acids.[1] While the overall prevalence of MCADD is 5.3 per 100,000 births, this disease occurs at a high rate in those of Northern European Caucasian descent, with the carrier frequency between 1:40 and 1:100.

Tennessee began screening for this disease in 2004. In the 16 years since, there have been 100 confirmed cases out of 1,391,616 newborns screened, or an incidence of 7.19 per 100,000 births. The preferred biochemical marker that the screening picks up is C8, or octanoylcarnitine, a medium length fatty acid chain of 8 carbons that is bound to an ammonium molecule, so that it may be used in metabolism.[2] This compound is detected from a dried blood sample preferably collected within the first 9 days of birth through tandem mass spectrometry. A specimen is deemed abnormal when the concentration of C8 is elevated past a certain threshold. The gene, *ACADM*, which encodes the protein responsible for converting the medium-chain fatty acids into acylcarnitines, often carries a specific point mutation in the case of MCADD. A point mutation is a mistake that the cell makes when copying its DNA at a single place along the DNA code. In this case, this mistake is a substitution of one nucleotide base for another, which in approximately 80% of cases occurs specifically at nucleotide position 985 in the gene, wherein a guanine base is substituted for an adenine base. This one change results in 'misfolding', meaning the protein's structure is altered from that of the normal version found in the general population, impacting its ability to function which is derived from its structure.[3] The consequences of carrying two copies of this mutated gene that are inherited from both parents are realized in times of fasting and sickness involving vomiting, and symptoms manifest as lethargy, seizures, coma and low blood sugar. If not diagnosed early in life, sudden death is known to occur. The intervention for this disease includes a diet high in carbohydrates and low in fat and to simply avoid a fasted state by taking high sugar foods or drinks intermittently. During infancy, supplementation with L-carnitine has been shown to beneficially impact clinical presentation of disease, however studies have not shown a significant impact of carnitine supplementation in adults.[4]

Submitted by
Fredrick McCorkle | PH Laboratory Scientist I
Newborn Screening

References:

- https://ghr.nlm.nih.gov/condition/medium-chain-acyl-coa-dehydrogenase-deficiency#
- https://academic.oup.com/clinchem/article/43/11/2106/5640638
- https://www.ncbi.nlm.nih.gov/books/NBK1424/
- https://adc.bmj.com/content/103/2/e2.41

Molecular / Sequencing Section Update

The TN Public Health Laboratory verified testing methods for SARS-CoV-2 in February 2020, awaiting the many specimens that would eventually arrive for testing. The Centers for Disease Control and Prevention has requested SARS-CoV-2 positive specimens to be submitted for whole genome sequencing. The goal of sequencing positive specimens is to establish a set of viral sequences to be made available in the public space. The Molecular/Sequencing section oversees sending positive specimens biweekly to the CDC. This activity began on November 9, 2020 and will continue to the end of the year.

Submitted by:
Linda S. Thomas, MAFM, BSMT (ASCP) | Molecular and Sequencing Manager

ANNOUNCEMENTS

⇒ **DISCONTINUATION OF VIRAL CULTURES**—*Effective November 2, 2020*—MEMO

⇒ **DISCONTINUATION OF *BORDETELLA* TESTING**—*Effective October 22, 2020*—MEMO

Please visit the Laboratory Services Webpage to view all announcements:
https://www.tn.gov/health/health-program-areas/lab.html

TRAINING NEWS

Virtual Packing and Shipping Training

The Association of Public Health Laboratories has partnered with Saf-T-Pak to offer virtual Infectious Substance Packaging and Shipping training classes. The TN Public Health Laboratory has secured a limited number of seats for sentinel laboratory personnel in Tennessee who are required to package and ship infectious substances.

For more information about this workshop opportunity,
please visit the TDH Laboratory Services Training and Workshop webpage:

https://www.tn.gov/health/health-program-areas/lab/lab-education.html

TRAINING PARTNER OPPORTUNITIES

APHL/CDC Training: Biothreat Rule Out or Refer

CDC, in collaboration with APHL and the State Hygienic Laboratory at the University of Iowa, has developed a set of virtual knowledge exercises (VKEs) on Biothreat Rule Out or Refer. The VKEs are interactive web-based exercises designed for clinical and veterinary diagnostic laboratorians performing microbiology testing to build and enhance skills in biothreat agent recognition. VKEs do not replace proficiency testing, but serve as a supportive exercise. For more information, Visit:

https://www.cdc.gov/labtraining/training-courses/biothreat-rule-out-refer-virtual-knowledge-exercise/index.html

Fundamentals of Personal Protective Equipment (PPE) in Clinical Laboratories

On-Demand Training—CDC Laboratory Training

Safety is imperative when working with potentially harmful materials and other hazards in the laboratory. This course is designed to assist clinical and public health laboratory professionals with applying risk management strategies to identify hazards, assess risks and select appropriate personal protective equipment (PPE) options. PACE CE credit available.

Download the course brochure for more information:

https://www.cdc.gov/labtraining/docs/training/PACE_Brochure_PPE_04_07_20.pdf

For more CDC Laboratory Training Opportunities, please visit: https://www.cdc.gov/labtraining

Employee News

Welcome New Employees!

July 2020

Joseph Schmitt
PH Laboratory Tech 2
Media Prep

October 2020

Taylor Neal
PH Laboratory Tech 1
COVID Support

November 2020

Tamikka Coleman
PH Laboratory Scientist 1
COVID Support

Trey Leeper
PH Laboratory Scientist 1
COVID Support

Bel Giraud
Administrative Assistant 3
HR/Admin

Retirements

Ron Trubilowicz
PH Laboratory Manager 1
5 Years of Service

Henrietta Hardin
PH Laboratory Manager 3
45 Years of Service

Promotions

June 2020

Courtney Fisher
PH Laboratory Scientist 2
Special Micro

Lawrence Pastor
PH Laboratory Scientist 2
Newborn Screening

Bethany Wheeler
PH Laboratory Scientist 2
Newborn Screening

Nicholas Vincent
PH Laboratory Scientist 2
Newborn Screening

November 2020

Nathan Hayford
PH Laboratory Scientist 1
Aquatic Biology

Shelby Lowrie
PH Laboratory Scientist 2
Serology

Liz Kassens
PH Laboratory Scientist 2
Serology

Zach Perry
PH Laboratory Scientist 3
Molecular Biology

Valerie Ragland
PH Laboratory Manager 2
Newborn Screening

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Division of Laboratory Services

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TN Department of Health

The Mission of Laboratory Services is to provide quality testing services through innovation, collaboration, and education that protects and improves the health of all.

https://www.tn.gov/health/health-program-areas/lab.html

Department of Health, Authorization No. 343472, December 2020. This public document was promulgated at a cost of $0.00 per copy.