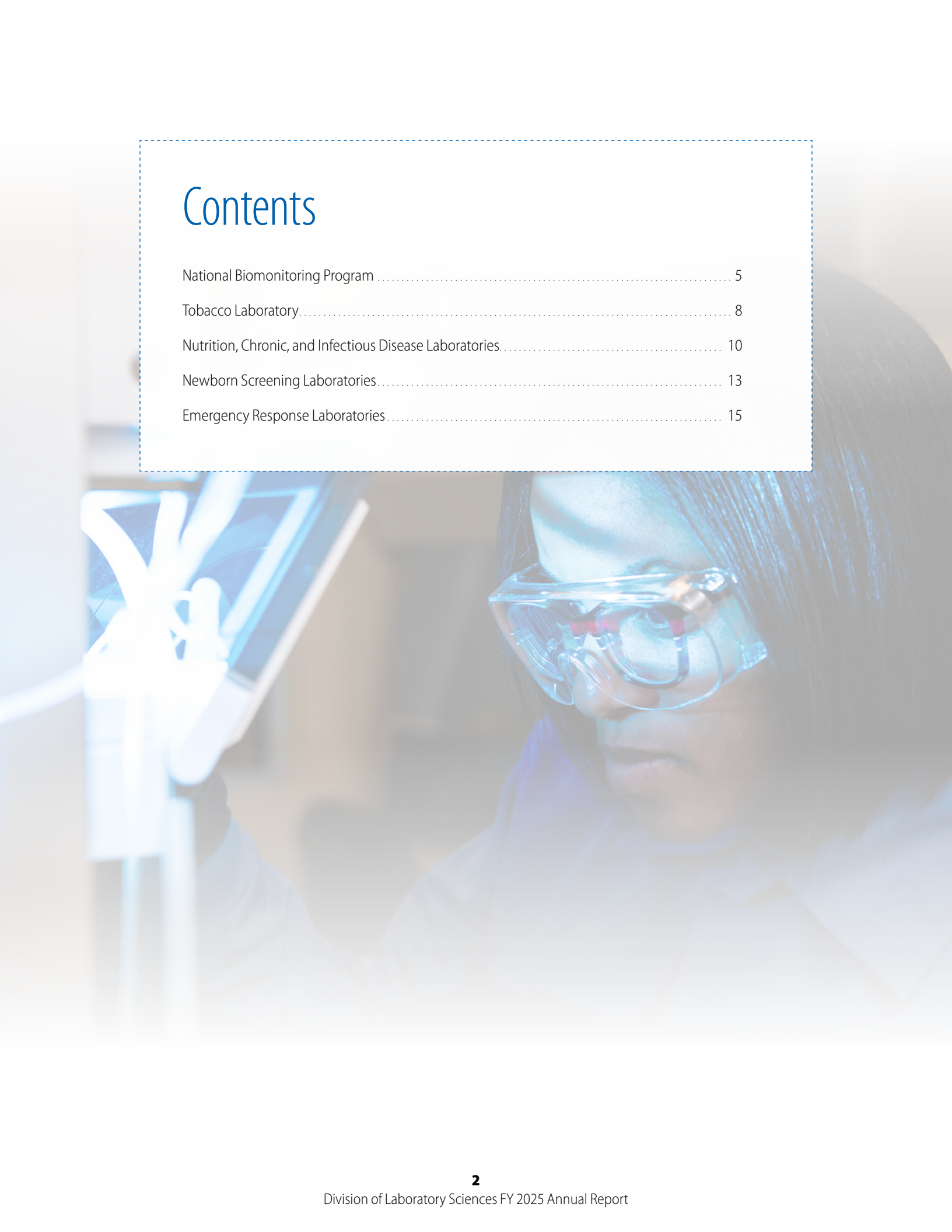


Division of Laboratory Sciences

FY 2025 Annual Report



A person with dark hair, wearing a white lab coat and clear safety glasses, is looking down at a piece of equipment. The equipment has a screen and some cables. The background is blurred, suggesting a laboratory setting. The entire image has a light blue tint.

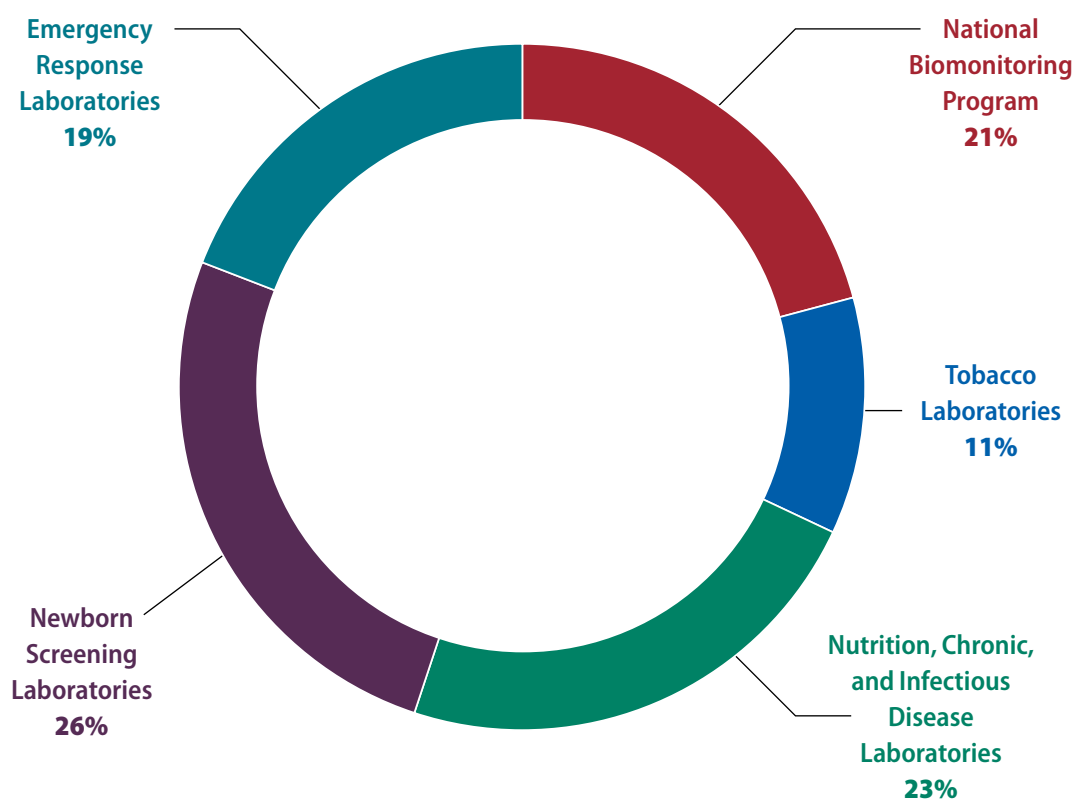
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Funding Overview—FY 2025

Funding Source	Amount
Direct Appropriated Funding—Environmental Health Laboratory	\$49,060,613
Financial support from other CDC programs	\$25,280,068
Financial support from other U.S. government agencies	\$6,688,616
Financial support from other sources (including user fees and gifts)	\$1,812,743
Total Dollars IN	\$83,274,978

Spending Overview—FY 2025





The Division of Laboratory Sciences (DLS) improves Americans' health

by developing laboratory methods to diagnose or assess risk of disease, testing for exposure to harmful chemicals, helping other labs improve the quality of their tests, and responding to public health emergencies.

DLS strategically partners with U.S. government agencies, state and local health departments, academic institutions, community groups, philanthropy foundations, and global organizations to achieve its mission. In FY 2025,



Quality Improvement

DLS quality assurance and standardization programs worked with **nearly 1,700 laboratories worldwide** to improve the quality of their laboratory measurements.



Formal Agreements

DLS maintained formal research agreements with **46 partner organizations**, including **10 global organizations**.



Funding Support

DLS provided funding support to **seven public health laboratory programs** and **two professional organizations** to strengthen national laboratory capability.

National Biomonitoring Program

Helping Lower People's Exposure to Harmful Chemicals

The National Biomonitoring Program provides laboratory science that improves the detection, diagnosis, treatment, and prevention of disease from exposure to environmental chemicals.



Biomonitoring combines **biology** and **monitoring**. DLS scientists **monitor** markers of environmental chemicals in **biological samples**. For example, DLS develops special laboratory methods and uses them to measure environmental chemicals in blood and urine from participants in the National Health and Nutrition Examination Survey (NHANES). NHANES is an ongoing survey that tracks the health and nutritional status of adults and children in the United States.

Scientists in the National Biomonitoring Program analyze and summarize these data in the [National Report on Human Exposure to Environmental Chemicals and Updated Tables](#). The report provides the most thorough and up-to-date information on Americans' exposure since 1999 to over 400 environmental chemicals. State and local public health researchers rely on the report to assess, track, and reduce exposure to environmental chemicals that may be harmful to people.

Every year, DLS biomonitoring activities support more than 75 studies of people whose health is at greater risk from exposure to harmful chemicals. The results of these studies can influence regulations and other actions to reduce exposures.

Benefits of Biomonitoring

In short, biomonitoring improves health and well-being. Scientists improve Americans' health by testing for exposure to harmful chemicals, helping other labs with the quality of their tests, and responding to public health emergencies. DLS biomonitoring measurements, for instance, showed widespread exposure among Americans to per- and polyfluoroalkyl substances (PFAS). This group of chemicals has been widely used in industry and consumer products since the 1940s and remains in the environment for a long time. These data, along with concerns about the health effects of some PFAS, prompted the Environmental Protection Agency (EPA) to issue updated drinking water health advisories for two PFAS, perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS).

Supporting State Labs across the United States

DLS provides funding for high-quality biomonitoring programs that help state laboratories detect harmful chemicals. DLS also offers training and performance evaluation to improve state laboratories' techniques.

FY 2025 Accomplishments

Studied health effects of PFAS exposure

DLS collaborated on nine studies aimed at better understanding possible health risks from exposure to PFAS. These studies follow up on possible links between PFAS exposure and liver cancer, breast cancer, cardiovascular disease (heart and blood vessel disease), and other health outcomes. Results will provide critical data to guide public health policies and preventive strategies to improve Americans' health.

Investigated chemical exposures in firefighters

Structural firefighters—who fight fires in homes and buildings—face an increased cancer risk, but we don't fully understand the links between this risk and their exposure to fire smoke. To find answers, DLS investigators are studying exposures to harmful pollutants that are released during structural fires, such as polybrominated diphenyl ethers (PBDEs) and dioxins. By connecting these exposures to fire call frequency and the length of a firefighter's career, the study aims to guide effective strategies that will limit risks and improve the health and safety of firefighters.

Developed new methods to accurately characterize inhalation exposures to carcinogens

DLS developed advanced laboratory methods to measure long-term, chronic exposure to ethylene oxide and acrylonitrile. These methods enable better assessment of human exposures from e-cigarettes, tobacco smoke, and other combustion sources. The new methods generate critical data to assess health risks from these chemicals and help distinguish between exposures from different sources.

Studied pesticide exposures in farmworkers

Farmworkers face high pesticide exposure risks, showing the need for effective prevention methods, especially during pregnancy and breastfeeding. Early-life exposure to pesticides can lead to health problems, including developmental delays and increased respiratory issues. DLS investigators worked with collaborators to fill critical data gaps by studying biological markers of glyphosate and other pesticides in farm workers. Then they developed educational materials to help improve protection against pesticide exposure in this at-risk population.

Supported public health response to lead crisis in Milwaukee

The Milwaukee public school district identified an issue with widespread lead exposure in public schools after some parents reported high blood lead levels in their children. Working with the CDC Division of Environmental Health Science and Practice, DLS provided technical support to the Milwaukee Health Department to update laboratory testing methods and conduct lead testing. Rapid and accurate testing is critical for early actions that can reduce long-term health issues.

Developed a new method to measure people's exposure to a chemical of concern found in tires

DLS developed a new method for measuring some phenylenediamines. These organic compounds, widely used in vehicle tires, can be harmful to humans and deadly to salmon populations, even at low concentrations. The new DLS method can improve our understanding of how this common environmental contaminant affects people.



Tobacco Laboratory

Smoking Out What Keeps People Hooked

The Tobacco Laboratory aims to reduce people's contact with addictive and toxic substances in tobacco products—from cigarettes to cigars to e-cigarettes. The laboratory develops special, high-quality lab tests that analyze addictive and toxic substances from tobacco products.



Tracking Trends in Tobacco Use

DLS measures harmful and addictive tobacco ingredients in NHANES participants.

Measurements of cotinine and 3-hydroxycotinine—markers of nicotine—in the national survey show that harmful exposures occur in both smokers and nonsmokers. For example, in the early 1990s the data revealed that 88% of nonsmoking Americans were exposed to tobacco smoke. This led to protective measures like smoking restrictions in public buildings.

DLS continues to support public health efforts by identifying groups who are at risk from secondhand smoke exposure, including children.

Offering Data Solutions

DLS shares baseline lab data that are important for science-based tobacco regulation by the U.S. Food and Drug Administration (FDA). The data include measurements of addictive and toxic substances in tobacco products, smoke, and in the urine and blood of tobacco users or persons in contact with secondhand smoke.

Every year DLS provides 700,000 analytical results for a population study on the behavioral and health effects of the 2009 Family Smoking Prevention and Tobacco Control Act. The law discourages minors and young adults from smoking.

FY 2025 Accomplishments

CDC Provided data on cannabis exposures in children

DLS completed measurements of cannabis biological markers in urine to study the connection of in-home cannabis smoking with exposures in children. Results showed that in-home cannabis smoking greatly increased children's exposure to toxic and possibly cancer-causing components in the smoke.

Studied smoking exposures in pregnant women

DLS provided laboratory measurements for a study of the potential risks of vaping during pregnancy. Results showed that former smokers who exclusively vaped had significantly lower levels of selected volatile organic compounds than those who exclusively smoked. Former vapers had levels that were comparable to those in people who never used nicotine or tobacco products.

Studied chemical exposures from little cigars

Little cigars are like cigarettes in terms of dimensions, filters, and overall appearance; however, flavored little cigars tend to be more appealing to new users. Collaborating with FDA, DLS measured levels of benzo[a]pyrene (BaP) in mainstream smoke of little cigars. BaP is a highly toxic and cancer-causing compound associated with a range of adverse reproductive, developmental, and cardiovascular health effects. Results showed that although little cigars are physically similar to cigarettes, their smoke chemistry differs, producing higher BaP levels and posing greater health risks.

Improved measurements for tracking Americans' exposure to secondhand smoke

DLS enhanced two tobacco-specific biomarker methods used to monitor secondhand smoke (SHS) exposure among Americans. By increasing the sensitivity of serum cotinine measurements and expanding the capacity for urinary 4-(Methylnitrosamino)-1-(3-pyridyl)-1 butanol (NNAL) analysis, DLS can more accurately track trends in SHS exposure. These improvements also enable more timely documentation of harm from the tobacco-specific carcinogen NNAL.

Found metals in the fillers of commercial hemp cigarettes

Hemp and cannabidiol (CBD) products are growing in popularity and are sometimes marketed as being safer than tobacco products. Hemp cigarettes are designed similarly to traditional tobacco cigarettes, with a filter and plant-based filler wrapped in paper. DLS measured nine metals across 14 commercial hemp cigarette brands. Results showed that, apart from cadmium, metal concentrations in hemp cigarette fillers were generally comparable to those found in tobacco cigarettes and little cigars, indicating similar exposure risks.



Nutrition, Chronic, and Infectious Disease Laboratories

Measuring Important Markers of Nutrition and Diseases

The Nutrition, Chronic, and Infectious Disease Laboratories improve the laboratory detection and diagnosis of nutrition-related disease, heart disease, and other chronic diseases. The labs also support influenza and selected infectious disease projects.



Improving Nutritional Health and Well-Being

DLS provides a broad look at Americans' nutrition status—from salt intake to trans-fatty acid levels. DLS develops special lab tests and uses them to measure nutrition markers found in blood and urine samples from NHANES participants.

The Second National Report on Biochemical Indicators of Diet and Nutrition in the U.S. Population sums up information on 58 nutrition biomarkers that are important to human health. The report helps physicians, scientists, and public health officials improve Americans' health and well-being.

Improving Laboratory Methods and Health

Health professionals need accurate and precise laboratory measurements to correctly diagnose and treat disease. DLS develops and improves laboratory methods to measure biomarkers, or signs, for risk of heart disease, cancer, thyroid disease, diabetes, and other conditions. DLS also offers programs that help public health, patient care, and research labs, test developers, and manufacturers achieve accurate, consistent, and comparable test results.

Improving Flu Vaccines

DLS methods to measure flu proteins have helped improve the accuracy and quality of flu vaccines. This has reduced the time it takes for the vaccines to become available. DLS recently built on its success in this area with new ways to measure viral proteins, allowing for rapid characterization of emerging virus variants and development of new and improved vaccines, diagnostics, and treatments.

FY 2025 Accomplishments

Improved measurements for diagnosing and treating chronic diseases

As the only U.S. laboratory of its kind, DLS safeguards the quality of chronic disease tests that are essential to patient care. DLS detected concerning trends in the accuracy of tests used in cardiovascular and thyroid disease management, helping to prevent incorrect interpretation of patient test results. These efforts not only improve the reliability of clinical decision-making and patient health outcomes, but they also reduce unnecessary costs for patients and the healthcare system.

Developed new laboratory methods to advance chronic disease management

DLS developed unique, highly accurate, and sensitive laboratory methods for assessing hypertension, advancing our understanding of the causes of high blood pressure, and enabling earlier detection of kidney disease. The critical information and data generated by these new methods allow for better diagnosis and treatment of conditions affecting most Americans. They also help reduce the substantial burden that chronic diseases place on the U.S. healthcare system.



Demonstrated a decline in Americans' trans fatty acid levels

DLS laboratory measurements in NHANES highlighted a significant decline in Americans' trans fatty acids levels in recent decades. These findings show the effectiveness of the public health actions to help lower Americans' intake of trans fatty acids from partially hydrogenated vegetable oils.

Improved measurements of aflatoxin

DLS enhanced its laboratory method for determining human exposure to aflatoxins—harmful compounds produced by *Aspergillus* mold species that contaminate crops and feeds such as corn, peanuts, cottonseed, and tree nuts. An advanced automated workflow will improve the speed and reliability of public health response to emergency investigations of suspected aflatoxin exposure and the analysis of samples in large-scale studies.

Demonstrated effectiveness of a new intervention to improve folate status in women

DLS completed folate measurements as part of a first-time study of Ethiopian women who consumed a newly formulated salt fortified with both iodine and folic acid. The results showed dose-dependent improvements in folate status and only minor accumulation of unmetabolized folic acid. These data will provide invaluable insights to policymakers about folic acid fortification strategies in a population with an unusually high number of neural tube defects, many of which are expected to be responsive to improvements in folate status.

Newborn Screening Laboratories

Making Big Footprints in Babies' Health

The Newborn Screening Laboratories help assure the early and accurate detection of treatable newborn diseases.



CDC's Newborn Screening and Molecular Biology Branch has the only laboratory in the world devoted to ensuring accurate newborn screening tests. The laboratory strengthens newborn screening test results for certain genetic, metabolic, and endocrine diseases in every state and more than 80 countries.

Every state in the United States screens newborns for many serious but treatable congenital diseases. These include spinal muscular atrophy, cystic fibrosis, sickle cell disease, endocrine diseases, multiple inborn errors of metabolism, lysosomal storage diseases, and severe combined immunodeficiencies. Early, accurate testing helps babies get diagnosed and receive appropriate and timely treatment.

Early Diagnosis Is Key

DLS helps state newborn screening programs achieve accurate test results by supporting them with training, technical help, test development, and quality assurance materials. For example, DLS's Newborn Screening Quality Assurance Program creates about 1 million dried blood spots to simulate the sample types that newborn screening laboratories test. Laboratories use these sample spots to make sure their tests are accurate. Each year, the process helps ensure the early, correct identification and treatment of congenital disease in more than 6,000 American babies who otherwise may have died or had severe developmental disabilities.

DLS, the Association of Public Health Laboratories, and other partners develop and host yearly training on newborn screening methods for state public health laboratories. DLS also gives funding to help state laboratories test for new diseases, including those recently added to the Recommended Uniform Screening Panel, a national list of 37 disorders for newborn screening at birth.

Improving Tests for Newborn Screening

DLS develops and improves newborn screening tests and provides technical assistance for both biochemical and molecular laboratory testing to detect newborn disease. Since 2011, the Newborn Screening Molecular Assessment Program has provided 29 on-site assessment visits to state newborn screening laboratories.

FY 2025 Accomplishments

Accelerated screening for lysosomal storage disorders

DLS developed a method that dramatically speeds up newborn screening for lysosomal disorders. Because it now takes only three hours instead of 18 hours to perform a required analytical step, same-day analysis and reporting of critical newborn screening results are now possible for the first time.

Developed and piloted new materials to help states accurately screen for Duchenne Muscular Dystrophy

DLS developed new dried blood spot quality assurance materials for Duchenne Muscular Dystrophy and worked with five U.S. newborn screening laboratories to assess the materials' fitness for new proficiency testing and quality control programs. Successful production of these materials shows CDC's readiness to support states as they adopt testing for this condition, which was recently added to the Recommended Uniform Screening Panel.

Improved screening for Metachromatic Leukodystrophy (MLD)

DLS produced prototype quality assurance materials for detecting newborns with MLD and distributed them to five newborn screening programs for evaluation. In parallel, DLS developed and validated a new test that incorporates MLD analytes into an existing newborn screening method, simplifying adoption by state programs.

Preparing for future newborn sequencing programs

In preparation for the expected expansion of newborn screening to include genome based platforms, DLS is developing fully characterized proficiency testing and quality control materials for whole genome and gene panel sequencing. These materials will be essential for newborn screening programs planning implementation of sequencing based screening in 2027.



Emergency Response Laboratories

Preparing for and Responding to Emergencies

The Emergency Response Laboratories support the nation in public health responses to chemical terrorism, toxins, radiologic threats, and opioids.



DLS is ready 24/7 to quickly find and help people at risk of harmful exposures during a public health emergency.

Detecting New and Likely Chemical Threats

DLS develops and performs unique laboratory tests, such as the Rapid Toxic Screen, to assess chemical exposure in people during a public health emergency or terrorist event. With the Rapid Toxic Screen, DLS can analyze urine and blood at the scene of chemical threats.

Within 36 hours of receiving samples, DLS can detect up to 150 chemical agents in 40 samples. After identifying the chemicals causing problems, DLS can measure up to 1,000 patient samples per day during an emergency. This information helps public health officials quickly figure out where the risks are, ensure the right treatment, and prevent added contact with harmful chemicals.

DLS has used the Rapid Toxic Screen to detect sulfur mustard, ricin, and other potential warfare agents. DLS's ability to screen deters the use of these chemicals.

Helping People at Risk of Radiation Exposure

DLS is always ready to quickly find people at risk of contact with harmful radiation. DLS developed the Urine Radionuclide Screen to identify people's contact with alpha-, beta-, and gamma-emitting radionuclides that often cannot be detected by conventional means. With this process, DLS can screen more than 1,000 samples for above-normal amounts of radioactivity within 24 hours. The information helps public health officials determine when people are at risk, ensure effective treatment, and prevent additional harmful contact.

DLS used the Urine Radionuclide Screen to measure radiation exposures in federal workers returning to the United States from Japan after the 2011 Fukushima Daiichi Nuclear Power Plant radiation release. Test results showed low levels of radionuclides, posing no threat to health, after the nuclear disaster.

Improving Botulism, Anthrax, and Ricin Tests

DLS develops unique mass spectrometry-based methods for rapidly and accurately detecting and diagnosing diseases caused by dangerous toxins. These include tests to better detect unsafe human exposure to botulism, anthrax, and ricin.

Strengthening National Preparedness

DLS helps prepare a wide variety of public health laboratories to detect biological and chemical threats and assist with other public health emergencies. To prepare for an emergency, DLS provides quality control materials, performance testing, and training to hundreds of participants in the national Laboratory Response Network for Chemical Threats. The network includes state and local public health labs.

DLS also helps strengthen public health preparedness for threats of radiological or nuclear terrorism by leading a pilot Radiological Lab Response Network. This group of state public health labs has the equipment and trained personnel to provide vital surge capability during a large-scale emergency. DLS provides these labs with technical assistance and reference materials for method development and validation.



FY 2025 Accomplishments

Improved laboratory capabilities for Novichoks

DLS developed the first-ever qualitative diagnostic test for confirming exposures to Novichoks, a class of highly toxic nerve agents that are extremely stable and evade current treatments. The technique for this innovative method could be duplicated to confirm exposures to other chemical threats, including organophosphate pesticides and new nerve agents.

Developed a more rugged test for anthrax lethal factor

DLS developed a method for measuring anthrax lethal factor in dried blood spots. This method will improve CDC's response to anthrax threats in remote locations where refrigerated shipping is difficult and in large-scale events where quicker and easier sample collection is needed.

Completed a first-of-its-kind sample collection exercise to enhance preparedness

For the first time, DLS completed a sample collection drill to enhance radiation emergency response skills. By practicing urine sample collection under conditions simulating a radiological emergency, DLS helped generate real-world data on sample collection and processing times. These data will enhance CDC and, ultimately, state, tribal, local, and territorial emergency response capabilities.

