CDC's HIV, Viral Hepatitis, STD, and TB Laboratories

At-A-Glance

CDC Laboratories in Action

The Centers for Disease Control and Prevention's HIV, viral hepatitis, STD, and tuberculosis (TB) laboratories work around the clock to protect the health of all Americans. Using the most advanced technologies, some of which are only available at the national level, the laboratories

- help state and local health departments identify diseases.
- aid in outbreak detection.
- improve disease diagnoses.
- create and test new therapies.
- develop technologies to monitor disease and antibiotic resistance.
- model prevention strategies to guide clinical trials and recommendations.
- increase quality and efficiency by researching, evaluating, and adopting new technologies that are better, faster, and cheaper.

By the Numbers

165,834 — The number of tests the viral hepatitis laboratory conducted from 2013-2017 for outbreak investigations and disease surveillance.

3,500 — The number of gonorrhea samples the STD laboratory sequenced to advance research on how gonorrhea becomes resistant to antibiotics.

6,000-8,000 — The number of tests the HIV laboratory conducts every year to monitor the spread of HIV and help in cluster analyses and outbreak investigations, providing states with the data needed to target prevention efforts.

9,000 — The number of *M. tuberculosis* isolates for which the TB laboratory, in collaboration with Michigan Public Health Laboratory, performed conventional genotyping in the last year to help public health programs in detection and investigation of TB transmission.

$0.0 — Cost to health departments for all testing performed by the laboratories.

Main Areas of Work

Supporting Diagnosis and Determining Drug Resistance

The laboratories have the technology and personnel to handle complex or less-widely available tests in a cost-effective and timely way. This allows them to provide diagnostic support for difficult cases.

Developing Innovative Tools

The laboratories pioneer novel tools and develop diagnostic and prognostic tests. These tools aid in preventing infections and ensure accurate diagnoses and appropriate treatment.

Helping State and Local Laboratories

The laboratories provide expertise to state and local public health laboratories, public health programs, and clinical providers. By diagnosing and monitoring infections and developing testing guidelines and recommendations, the laboratories are improving disease diagnoses and treatment and helping Americans get the care they need.

Identifying Outbreaks and Monitoring Trends

The laboratories rapidly identify outbreaks and areas of ongoing transmission as well as monitor drug resistance. They do this by coupling surveillance data with multiple latest-generation laboratory tools, such as advanced molecular detection.

Notable Accomplishments

Using Advanced Molecular Detection to Detect Outbreaks

CDC laboratory scientists recently used molecular surveillance to combat one of the largest outbreaks in recent years – the Indiana HIV outbreak where more than 200 cases of HIV occurred. CDC determined that the outbreak was limited to one county, letting public health experts focus limited resources on people at greatest risk and most in need of HIV testing and treatment services.

Quickly Diagnosing Drug-Resistant Tuberculosis

CDC's tuberculosis (TB) laboratory quickly determines if a strain of TB is resistant to treatments using its Molecular Detection of Drug Resistance (MDDR) service. By providing results to state and local health departments in only a few days, the MDDR service allows patients to begin treatment earlier and reduces their ability to transmit drug-resistant TB to others.

Investigating Antibiotic Resistance to Prevent Untreatable Gonorrhea

CDC's STD laboratory identifies resistant strains from the Gonococcal Isolate Surveillance Project (GISP) to monitor and analyze trends in gonorrhea's resistance to antibiotics across the country. Data collected in GISP ensures that gonorrhea is successfully treated with the right antibiotic. This benefits the patient, whose infection will be appropriately treated, and the public, by preserving the few remaining antibiotics that work.

Quickly Identifying Clusters of Hepatitis

CDC's viral hepatitis laboratory developed the Global Hepatitis Outbreak and Surveillance Technology (GHOST), a web-based system that quickly shows genetic linkages between hepatitis C virus (HCV) patient samples. For laboratories that have next generation sequence capability, GHOST improves the detection of HCV transmission and decreases the costs of analyses.

On the Horizon

Faster and Improved HIV Testing

CDC's HIV laboratory is developing and evaluating new tests to improve turnaround time for results and reduce the "window period" in which someone may have HIV but will test negative for infection. An earlier diagnosis means a person can quickly begin treatment, which reduces their risk of transmitting the virus to others and improves their own health.

Tuberculosis Whole Genome Sequencing

CDC's TB laboratory is transitioning to whole genome sequencing (WGS) to improve methods for tracking and linking TB cases and is incorporating newer technologies for their MDDR service. WGS is more complete than the previous methods of genetic analysis.

Rapid Identification of Antibiotic Resistance

CDC's STD laboratory is developing a software tool to improve tracking and identify new mechanisms of antibiotic resistance using genetic information of gonorrhea samples. These advances may eliminate the need for culture testing, likely decreasing costs of monitoring resistance and improving surveillance.

Finding a Safer, More Efficient Technology for a Hepatitis B Vaccine with Microneedle

CDC's viral hepatitis laboratory, in collaboration with the Georgia Institute of Technology, is evaluating a microneedle patch for the delivery of the hepatitis B vaccine. Currently in development, this new method may be safer, is easier to use and less painful, eliminates the need for required refrigeration, and is expected to increase vaccination rates.

CDC's laboratories are vital to the health of the country. Keeping pace with evolving technology allows us to detect outbreaks sooner and, in some cases, predict where they will occur; quickly pinpoint drug-resistant strains of TB and STDs; support health departments in the diagnosis of difficult cases; and protect people with better treatments.