

AMD Projects

Innovate • Transform • Protect

CDC's Advanced Molecular Detection (AMD) initiative fosters scientific innovation in genomic sequencing, epidemiology, and bioinformatics to transform public health and protect people from disease threats.

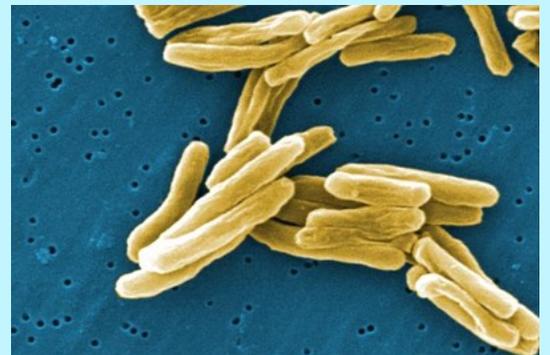
AMD Projects: Improving TB Detection and Surveillance

Using whole genome sequencing to transform tuberculosis outbreak detection and surveillance

Outbreaks of *Mycobacterium tuberculosis* (TB) continue to be a challenge in the United States. Public health professionals use laboratory methods, such as genotyping, to determine when people get TB from the same strain of bacteria. Genotyping can help scientists pinpoint outbreaks that otherwise might be hidden. Since TB that spreads from one person to another will have the same genetic make-up, scientists can isolate bacteria from different people in the laboratory and compare the genetic sequences to find cases caused by the same strain of the bacteria.

But this tool also can mistakenly indicate an outbreak where there isn't one, especially for genotypes that are common in the population. False matches can slow down the work of local public health professionals as they try to identify, track, and control a potential outbreak when this occurs. It also consumes resources without leading to an effective solution.

CDC scientists studying TB believe genomic surveillance has the power to increase the accuracy of outbreak detection



An outbreak investigation aims to stop transmission of TB. This public health intervention involves rapidly identifying and treating all infectious persons.



systems. Whole genome sequencing (WGS) lets CDC scientists examine about 90% of the TB genome, allowing them to measure the genetic differences between isolates more easily. CDC expects that the data generated through genomic surveillance will provide more accurate information to public health officials.

Through the work of this project, CDC hopes to implement genomic surveillance at the national level and build the capacity of state laboratory professionals to conduct WGS for TB. In addition, this work has the potential to help local public health officials more precisely identify how the infection has spread and which locations are most important to field investigations in an outbreak. This will ensure interventions have the greatest impact and protect people's health even better. At the same time, genomic surveillance will be more cost efficient by focusing investigations on cases that are truly linked.

For more information on *Mycobacterium tuberculosis*, please visit the CDC website, www.cdc.gov/tb.



2016 Update

Since the project began in 2014, investigators have used advanced molecular detection (AMD) technologies to characterize hundreds of isolates of *Mycobacterium tuberculosis* from patients in 37 genotype clusters in 15 states. This information has allowed local and state TB control programs to focus resources on those clusters and patients in whom recent TB transmission was likely to have occurred. Current analytic pipelines only allow for the comparison of small numbers of very similar strains. Investigators are testing a new analytic pipeline that will allow for the comparison of thousands of diverse strains. For this purpose, a whole-genome sequencing dataset for ~2,000 *M. tuberculosis* isolates has been created. The ultimate goal is to develop the expertise, tools, and infrastructure necessary to conduct advanced molecular surveillance of all isolates of *M. tuberculosis* in the United States.

Updated: March 2016