

Better tuberculosis treatment starts with a better test

ASU research could lead to faster, more effective TB treatment

By Mikala Kass, ASU News
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Tuberculosis is an ancient disease that still threatens human health around the world today. This infectious disease causes over 10 million illnesses and 1.5 million deaths every year — including some close to home.

"A large TB outbreak recently occurred in the Kansas City area, with 68 active cases of infectious TB disease, two deaths and more than 650 people evaluated or monitored throughout the outbreak investigation," says [Shelley Haydel](#), an infectious disease researcher at Arizona State University. "Despite being preventable and curable, TB can spread like wildfire. TB anywhere is a threat to people everywhere."

Scientists developed powerful treatments for TB in the mid-1900s. But new strains of the disease evolved to resist them. These include multidrug-resistant strains that resist at least two of the most effective first-line treatments. Nearly 20% of patients with multidrug-resistant TB die within a year of starting treatment.

That's why Haydel and fellow ASU scientist [Shaopeng Wang](#) are working to develop technology that helps doctors quickly find out whether a patient's tuberculosis is resistant to new TB drugs. Ultimately, this means faster, more effective TB treatment.

Their project was recently funded with a \$2.3 million grant from the National Institute of Allergy and Infectious Diseases.

Haydel and Wang are both faculty in the [Biodesign Center for Bioelectronics and Biosensors](#). Haydel is also a professor in the [School of Life Sciences](#). Wang is an associate professor in the [John Shufeldt School of Medicine and Medical Engineering](#) and the [School of Biological and Health Systems Engineering](#).

"By applying advanced imaging techniques and data-driven analysis, our proposed technology has the potential to revolutionize universal TB drug susceptibility testing, particularly for new, repurposed and experimental drugs that don't yet have molecular resistance tests," Haydel says.

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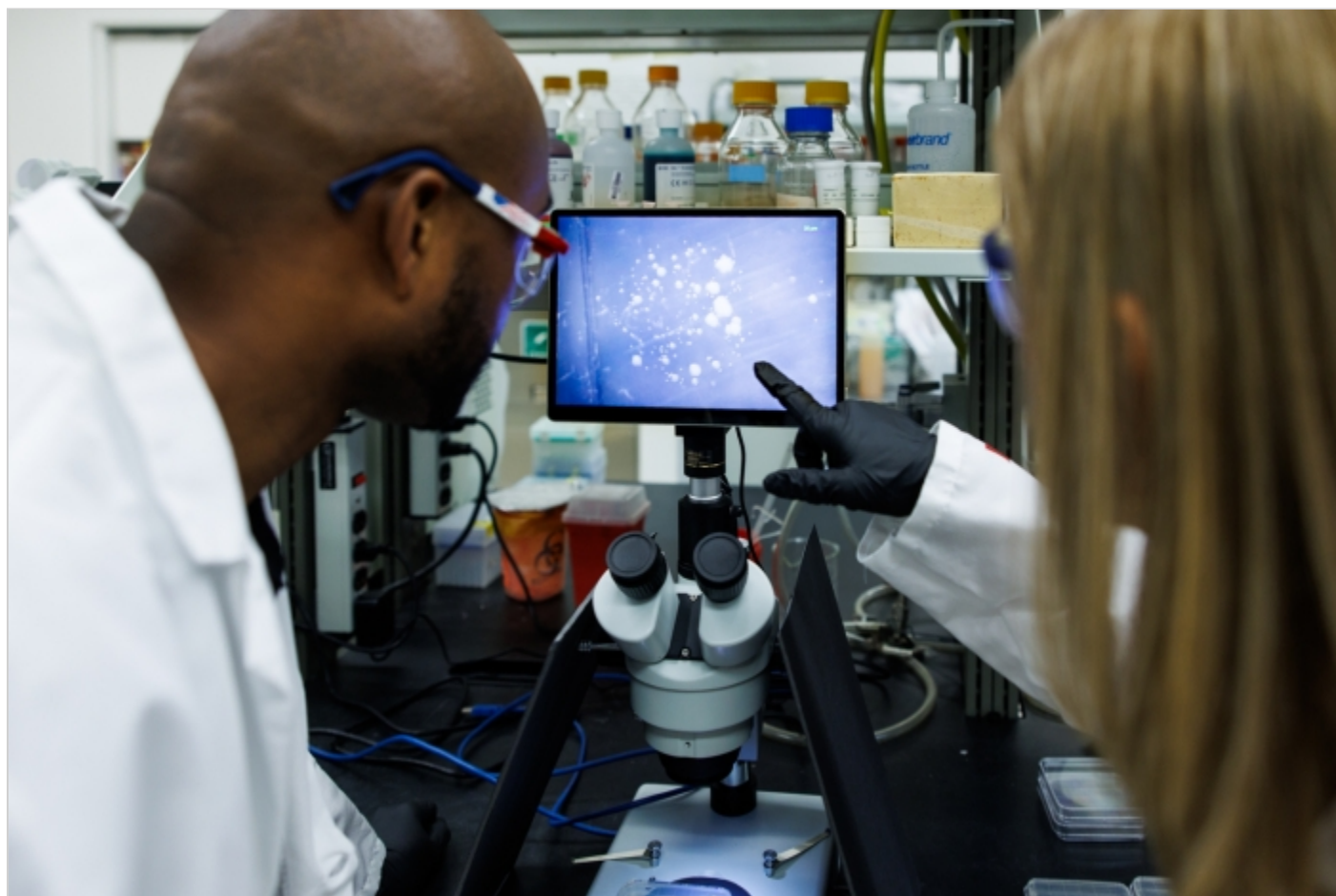
There are two ways to test if TB bacteria from a patient can resist different drugs, and they force medical professionals to make a tough choice. A molecular test is fast, but it can't check for resistance to new TB drugs. A phenotypic test can check resistance more broadly but takes much longer and delays treatment.

Haydel and Wang propose a new approach that greatly reduces the time needed for phenotypic test results. Their tool will combine scattering-based optical imaging with advanced deep learning to analyze bacterial growth, allowing practitioners to rapidly and accurately determine TB drug susceptibility.

This capability will help doctors quickly find the best medication for specific strains of TB, so they can get the right treatment to patients faster — ultimately saving more lives.

This story originally appeared on [ASU News](#).

Main image



Student researcher Timothy Williams Jr. (left) and Professor Shelley Haydel look at mycobacterial colony forming units with a digital microscope. Photo by Andy DeLisle/ASU

Text image(s)



ASU researchers are working on technology that will help doctors quickly find the best medication for specific strains of TB. From left: Haydel with students Anh Pham, Lauryn Langford, Timothy Williams Jr. and Jaycee Glover in the Haydel Lab at the Biodesign Institute. Photo by Andy DeLisle/ASU