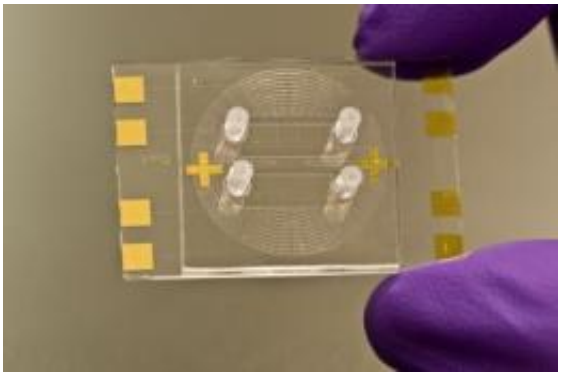
New latent tuberculosis test promises to be cheap and fast

May 22 2012



This microfluidic chip invented at UC Davis uses DNA, coated on the gold spots, to test for gamma interferon -- a test for latent TB infection. The test promises to be cheaper and faster than existing tests. Credit: Ying Liu, UC Davis

Biomedical engineers at UC Davis have developed a microfluidic chip to test for latent tuberculosis. They hope the test will be cheaper, faster and more reliable than current testing for the disease.

"Our assay is cheaper, reusable, and gives results in real time," said Ying Liu, a research specialist working with Professor Alexander Revzin in the UC Davis Department of Biomedical Engineering.

The team has already conducted testing of blood samples from patients in China and the United States.

About one-third of the world's population is infected with the bacteria that cause tuberculosis, a disease that kills an estimated 1.5 million people worldwide every year, according to the U.S. Centers for Disease Control and Prevention.

Most infected people have latent TB, in which the bacteria are kept in check by the immune system. Patients become sick only when the immune system is compromised, enabling the bacteria to become active. People with HIV are at especially high risk.

Current tests for latent TB are based on detecting interferon-gamma, a disease-fighting chemical made by cells of the immune system. Commercially available tests require sending samples to a lab, and can be used just once.

Liu and Revzin used a novel approach: They coated a gold wafer with short pieces of a single-stranded DNA segment known to stick specifically to interferon-gamma. They then mounted the wafer in a chip that has tiny channels for blood samples. If interferon-gamma is present in a blood sample, it sticks to the DNA, triggering an electrical signal that can be read by a clinician.

"If you see that the interferon-gamma level is high, you can diagnose latent TB," Liu said.

The researchers plan to refine the system so that the microfluidic sensor and electronic readout are integrated on a single chip.

A patent application has been filed for the technology, and the researchers hope the test can be commercialized after FDA approval. The work was supported by the National Science Foundation.

Provided by Queen's University Belfast