Researchers invent device to rapidly detect infectious disease

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Infectious diseases can spread very rapidly, so quickly identifying them can be crucial to stopping an epidemic. However, current testing for such diseases can take hours and days. But not for much longer.

Jayne Wu, associate professor of computer science and electrical engineering at the University of Tennessee, Knoxville, and Shigetoshi Eda, associate professor of Forestry, Wildlife and Fisheries at the UT Institute of Agriculture Center for Wildlife Health, have developed a portable device that can be used onsite to detect infectious diseases, pathogens as well as physiological conditions in people and animals.

"Time is of the essence in treating infectious diseases," said Wu. "This device has the potential to save a lot of lives by saving time in detection. It also saves a lot of money as it is cheaper to detect diseases than the system that is currently being used since we do not have to send them to a lab and have the sample be scrutinized by technicians."

The device can be used by any health care professional, anywhere. All that's needed is a droplet of blood to place on a microchip within the device. The microchip is treated with disease-specific antigens—a toxin or other foreign substance that induces an immune response in the body—and captures disease-specific antibodies in the blood. If the antigens and antibodies match, then the device tells the health care provider that the patient or animal is infected. This happens in a matter of minutes. So far the device has been used to detect tuberculosis in humans and wild animals, as well as Johne's disease in cattle.

"Johne's disease is highly prevalent in this country and is causing more than $200 million of annual losses to the U.S. dairy industry," said Eda. "Since there is no practical treatment for the disease, early diagnosis is critically important for disease control in dairy farms. This, in turn, helps farmers' business and the milk supply."

The scientists say they expect the device to be expanded to detect various diseases and physiological conditions. For instance, the researchers predict it could be useful in diagnosing Alzheimer's disease and cancer. Their recent development indicated the device could detect pathogens in food materials. The device also could be valuable for applications in disaster relief, biodefense or disease outbreaks.

Wu and Eda recently received $15,000 from the UT Research Foundation to assist in further developing their technology to improve its positioning for licensing and commercialization. The scientists say they have industry interested in taking their invention to market.

Provided by University of Tennessee at Knoxville

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