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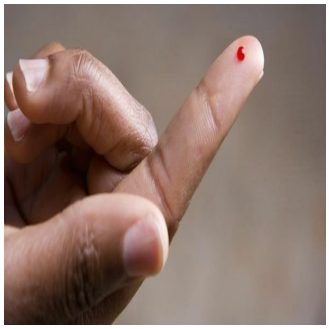
## Smartphone Accessory Detects STDs Via Finger Prick



A new smartphone accessory can rapidly detect three infectious disease markers from a single drop of blood drawn from a finger. The device connects to a smartphone or computer and replicates the electrical, mechanical and optical functions of a lab-based blood test. It builds upon the previous work of the research team in miniaturising equipment for the rapid diagnosis of sexually transmitted diseases such as syphilis and HIV, which can be transmitted from mother to child during pregnancy.

By drawing power from a smartphone, the device, or dongle, performs an enzyme-linked immunosorbent assay (ELISA). The triplexed immunoassay screens for the HIV antibody, the treponemal-specific antibody for syphilis, and the non-treponemal antibody for active syphilis infection. There is currently no single test format for the three disease markers.

“Our work shows that a full laboratory-quality immunoassay can be run on a smartphone accessory,” said Samuel K. Sia, associate professor of biomedical engineering at Columbia University’s School of Engineering and Applied Science. “Coupling microfluidics with recent advances in consumer electronics can make certain lab-based diagnostics accessible to almost any population with access to smartphones. This kind of capability can transform how health care services are delivered around the world.”

The device was pilot-tested in Rwanda, where healthcare workers collected whole blood from 96 patients. The workers were trained for 30 minutes on a user-friendly interface which provided step-by-step pictorial directions to guide them through each test. Built-in timers signalled next steps, and the test results were recorded for subsequent review.

The dongle is small and lightweight, with an estimated manufacturing cost of $34. By comparison, the typical equipment for running ELISA assays cost $18,450. Another innovative aspect of the device is its low power consumption, which is important in places where access to electricity is unpredictable. The device does not need a battery, since the team made it possible to use the audio jack for transmitting power and data. Since audio jacks do not vary, the dongle can be attached to whichever smart device is compatible.

The patients who participated in the pilot study were enrolling into clinics for the prevention of mother-to-child disease transmission or centres for voluntary counselling and testing. Almost all participants (97 percent) said they would recommend the device for its simplicity, its ability to provide the results for multiple diseases, and its rapid turn-around time.

The research represents an international effort, with the involvement of the Institute of HIV Disease Prevention and Control, Rwanda Biomedical Center. Sia also worked with researchers from the Mailman School of Public Health at Columbia University, the Department of Pathology and Cell Biology at Columbia University Medical Center, the Laboratory Reference and Research Branch of the Centers for Disease Control and Prevention, and OPKO Diagnostics.

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The results of the research are published in the February 4 issue of *Science Translational Medicine*.

Source: Columbia University School of Engineering and Applied Science

Image Credit: Google Images

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