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ASIA EDITION

UCLA develops smartphone enabled kidney device

26 August 2013 | News | By BioSpectrum Bureau

Singapore: University of California Los Angeles (UCLA), US, has invented a lightweight, field-portable device that conducts kidney tests and transmits data through a smartphone attachment. The device is designed to reduce the need for frequent doctor visits by people with diabetes and others with chronic kidney ailments.

The smartphone-based device was developed in the research lab of Mr Aydogan Ozcan, professor of electrical engineering and bioengineering at the UCLA Henry Samueli School of Engineering and Applied Science, and associate director of the California NanoSystems Institute. Weighing about one-third of a pound, the gadget can determine levels of albumin in the patient's urine and transmit the results within seconds. Albumin is a protein in blood that signals danger when found in urine.

"Albumin testing is frequently done to assess kidney damage, especially for diabetes patients," Prof Ozcan said. "This device provides an extremely convenient platform for chronic patients at home or in remote locations where cell phones work."

Patients at risk for diabetes, kidney disease and other ailments must regularly provide fluid samples, sometimes more than one a day, to monitor their health, which requires visits to labs or health centers.

The new device projects beams of visible light through two small fluorescent tubes attached to the device, one containing a control liquid and the other a urine sample mixed with fluorescent dyes. The smartphone camera captures the fluorescent light after it passes through an additional lens. An Android application then processes the raw images in less than one second and the device transmits the test results to a database or healthcare provider.

The test, which measures albumin concentration in urine, is accurate to within less than 10 micrograms per milliliter, well within accepted clinical standards used in diagnosing conditions such as microalbuminuria.

The time it takes to conduct a test, including preparation of a sample using a small syringe to inject the urine into a fluorescent tube, is about five minutes. Prof Ozcan estimates that the device, for which his lab also has developed an iPhone app, could be produced commercially for $50-to-$100 per unit.