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LEAKED: Apple's Next Smart Device

## TOP NEWS

### Smartphones allow do-it-yourself stress hormone tests

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By Lorraine L. Janeczko

NEW YORK (Reuters Health) - The next addition to the collection of health apps coming online for smartphones may be a stress test, researchers said at a recent conference.

With a simple tube, some software and a saliva sample, people and their doctors can measure levels of the stress hormone cortisol, according to new research presented last week at ICE/ENDO 2014, the joint meeting of the International Society of Endocrinology and the Endocrine Society in Chicago.

"We have designed a method by which anyone with a smartphone will be able to measure their salivary cortisol level quickly, easily and inexpensively," said lead investigator Dr. Joel Ehrenkranz, director of diabetes and endocrinology at Intermountain Healthcare in Murray, Utah.

While a commercial lab in the United States may charge up to \$50 to run a quantitative salivary cortisol test and take up to a week to provide the results, the smartphone test will cost under \$5 and give results in less than about 10 minutes, Ehrenkranz told Reuters Health in an interview.

"Parts of the United States and the rest of the world that lack facilities to measure cortisol will now be able to perform this essential diagnostic test," he said. "Also, measuring salivary cortisol with this technology will provide a way for individuals to monitor their personal biometric stress levels easily and inexpensively."

Ehrenkranz and his research team would like to see healthcare providers around the world, especially in low-resource areas, use the smartphone test to help diagnose disorders involving excessive cortisol or depletion of the hormone, and to allow cortisol levels to be monitored easily over time.

They'd also like the public to monitor their own cortisol levels whenever they want. So they designed their device to be inexpensive to manufacture, and easy to use on all cell phones, all platforms and all form factors.

It consists of a case, a light pipe, and a lens, it uses no battery power and it's unbreakable and reusable, they say.

For the developing world, it needs to be inexpensive, Ehrenkranz said, and it costs only about \$1 to make.

Project collaborator Dr. Randall Polson, senior optical engineer in the College of Engineering at the University of Utah in Salt Lake City, wrote in an email, "We are trying to make sure a skilled 8th-grader – a 12-year-old – can get accurate results."

"The measurement system's smartphone and reader act as a photo studio. . . . The complex and difficult processes are put into the strip chemistry and embedded into the smartphone application, so if you have a charged phone and a test kit you can get accurate results without complicated infrastructure and highly trained technicians," Polson wrote.

To take the test, a person puts a straw-like saliva collector under the tongue, and capillary action wicks the saliva to an assay strip in a cassette that's inserted into a reader; the reader aligns a lens and light diffuser with a smartphone's camera and flash. A few minutes later, the smartphone image analysis app quantifies the cortisol value.

The abstract for the team's June 24 presentation is online here: <http://bit.ly/1IUb2mD>.

Dr. Ehrenkranz said the first screening test for hypercortisolism is salivary cortisol, and that 3 percent of people with type 2 diabetes actually have Cushing's disease - of which excess cortisol would be a sign - but they don't get screened because their doctors don't have access to the technology.

It will also help individuals, Ehrenkranz said. As an example, he cited the 10 percent of people with depression who have psychotic depression, with cortisol levels that rise before the onset of psychosis. Using this device, people at risk for psychotic depression will be able to check their salivary cortisol level every day and take steps to avoid a psychotic break.

The Ministry of Public Health of Thailand plans to introduce the cortisol test later this year, as a consumer product to monitor individuals' stress, Ehrenkranz said. His team is collecting clinical data to submit to the FDA to gain approval to market the test as a class 2 medical device, which they hope will be granted in 2015.

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