

# Smartphone device may help diagnose cancer

A new device that can be added to a smartphone may be able to accurately and cheaply diagnose cancer, a technology which could be useful in remote areas, US researchers said Monday.

Known as D3, the add-on is designed to be used by medical experts, not the general public, and so far appears as accurate as more involved and costly tests in current use, but at a price of a mere \$1.80 per patient.

The research is described in the Proceedings of the National Academy of Sciences, a peer-reviewed US journal.

"We believe the platform we have developed provides essential features at an extraordinary low cost," said co-author Cesar Castro, a doctor at the Massachusetts General Hospital Cancer Center and Center for Systems Biology.

D3 stands for digital diffraction diagnosis, and the system "features an imaging module with a battery-powered LED light clipped onto a standard smartphone that records high-resolution imaging data with its camera," said the study.

"With a much greater field of view than traditional microscopy, the D3 system is capable of recording data on more than 100,000 cells from a blood or tissue sample in a single image."

The process involves adding microbeads to a sample of blood or tissue. The microbeads bind to known cancer-related molecules. The sample is then loaded into the D3 imaging module.

That data can be quickly sent via a secure, encrypted cloud service to a processing server.

Then, the presence of specific molecules, which show if cancer is present, can be detected by analyzing the diffraction patterns generated by the microbeads, the study said.

Results can be returned to the doctor in minutes or hours, rather than days or weeks.

A pilot test of the system using cervical biopsy samples from 25 women who had abnormal

Pap smears showed a level of accuracy that matched the current industry standard for diagnostic testing, the study said.

Another test using the D3 to analyze fine-needle lymph node biopsy samples "was accurately able to differentiate four patients whose lymphoma diagnosis was confirmed by conventional pathology from another four with benign lymph node enlargement," said the findings.

More research is needed on a larger number of cancers to verify the preliminary findings

of the new device.

But researcher Ralph Weissleder, director of the MGH Center for Systems Biology, said he expects the device will break down many of the barriers that exist in cancer diagnosis, particularly in remote or impoverished areas.

"By taking advantage of the increased penetration of mobile phone technology worldwide, the system should allow the prompt triaging of suspicious or high-risk cases that could help to offset delays caused by limited pathology services in those regions and reduce the need for patients to return for follow-up care, which is often challenging for them."