



Cancer Testing? There's an App for That

Physicians are using smartphones to diagnose diseases, check blood cell counts and identify pathogens in drinking water

By [Melinda Wenner Moyer](#) | May 5, 2011

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Many people already use their smartphones as far more than mere telephones—as gadgets for Web surfing, e-mailing or listening to music. Some scientists are now turning them into handheld tools to diagnose [cancer](#) or infectious disease, track treatment progress or check [water](#) safety. Given that the handsets are so common, they could bring cutting-edge health care technology to the developing world.

Diagnosing cancer is a challenge because it requires expensive, time-consuming assays. But in a recent study published in *Science Translational Medicine*, Ralph Weissleder and his colleagues at Harvard Medical School used a cell phone and a lunch box-size machine to diagnose cancer from tiny pieces of tissue, taken via needle from the abdomens of patients with suspected metastatic cancers. Researchers mixed the samples with antibodies that bound to four known cancer-related proteins. The machine analyzed the samples using nuclear magnetic resonance—measuring levels of the antibody-bound proteins based on their magnetic properties. It then sent the results to the smartphone, which, using an app that the researchers designed, displayed the data. Because doctors don't need a laptop or desktop, it would be easier for them to assess patients outside the clinic. In comparison, results from more traditional diagnostic methods are typically not available for three days and



Image: Illustration by Thomas Fuchs

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require more invasive tissue sampling.

By using different antibodies, doctors could use the device to diagnose any form of cancer, says Harvard systems biologist and co-author Hakho Lee. They could also track treatment progress. "If there is a decrease in either the number of cancer cells or the expression levels of certain disease markers, then that means the treatment might be working," he says. He expects a product within five years.

Other researchers are taking advantage of smartphone cameras to create diagnostic microscopes. Electrical engineer Aydogan Ozcan and his colleagues at the University of California, Los Angeles, have developed a 4.5-centimeter-long phone attachment that shines LED light on biological samples, producing holograms of each cell based on how the light scatters. The phone's camera then snaps a photograph, compresses the image and sends it to a clinic for evaluation. With the ability to decipher details as small as 1/1,000th of a meter, the microscope could identify sickle-cell disease or [malaria](#) from blood samples and perform blood cell counts. The devices could bring an elegant simplicity to nations that struggle with infectious diseases.

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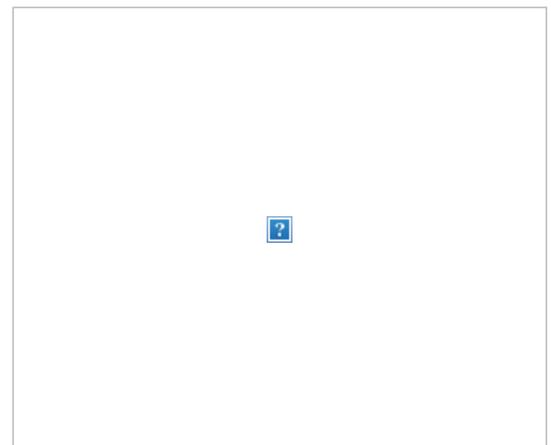
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