

# Smartphone app for cancer diagnosis may be on the way

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Portable NMR smartphone app. Image credit: R. Weissleder et al.  
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(PhysOrg.com) -- Researchers in the US have developed a device that works with a smartphone to diagnose a suspicious lump in a patient and determine within an hour if it is benign or cancerous.

The current procedure for diagnosis of suspicious lumps is to use a needle to extract a sample from the lump and then to send the cells to a pathology laboratory for examination. The sample is stained to look for tell-tale proteins and the cell shape is examined. The results are obtained

within a few days, but are occasionally inconclusive.

Dr Ralph Weissleder of the Massachusetts General Hospital in Boston and colleagues have developed a miniaturized [nuclear magnetic resonance](#) (NMR) scanner that identifies molecules by the way their nuclei are affected by magnetic fields. It also attaches [magnetic nanoparticles](#) to proteins to allow specific proteins, such as those found in tumor cells, to be identified.

The gadget was tested on suspicious cells collected by fine needle aspiration from 50 patients. Because the samples needed are so small, cells could be taken from several areas of the suspected tumor. The samples were labeled with magnetic nanoparticles and then injected into the micro-NMR machine.

The results can be read by connecting the device to a [smartphone](#) loaded with a specially-programmed application. The samples tested revealed nine [protein](#) markers for [cancer cells](#). When the results for four of these proteins were combined they allowed the team to produce a diagnosis.



A portable Nuclear Magnetic Resonance device. Image credit: R. Weissleder.

The tests and analyses took an average of less than one hour for each patient and resulted in accurate diagnosis in 48 of the 50 patients. Another test produced 100% accuracy in 20 patients. Standard pathology tests on similar biopsies produce an accurate diagnosis in 74 to 84 percent of cases.

Dr Weissleder said being able to sample the suspected tumor at several sites made the test more accurate. He said having the results available within the hour is a great advantage because it would reduce patient stress as people hate the days of waiting for standard pathology results to arrive, not knowing whether or not they have cancer. The greater accuracy of the micro-NMR would also cut the number of repeat biopsies needed.

In their paper, published in the journal *Science Translational Medicine*, the researchers say eventually the micro-NMR machine could be used to test cancer patients to determine if they are responding to drugs by analyzing for specific proteins in blood samples.

**More information:** J. B. Haun, C. M. Castro, R. Wang, V. M. Peterson, B. S. Marinelli, H. Lee, R. Weissleder, Micro-NMR for Rapid Molecular Analysis of Human Tumor Samples. *Sci. Transl. Med.* 3, 71ra16 (2011). [DOI:10.1126/scitranslmed.3002048](https://doi.org/10.1126/scitranslmed.3002048)

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