

Smartphone app helps diagnose cancers

February 23, 2011

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Physicians may soon replace scalpels with smartphones for many tumour diagnoses.

A cellular app and a \$200 portable attachment can accurately diagnose life-threatening cancers at the bedside, without need for often painful and disfiguring surgeries, a new study reports.

"From beginning to end it takes about 60 minutes," says Dr. Cesar Castro, a study co-author.

Castro says the entire diagnostic bundle consists of a specially programmed smartphone and a Nuclear Magnetic Resonance screener – microNMR – about the size of a desk phone.

The diagnostic end of the array, the microNMR, is basically a miniaturized version of the Magnetic Resonance Imaging (MRI) machinery that scans deep into your body.

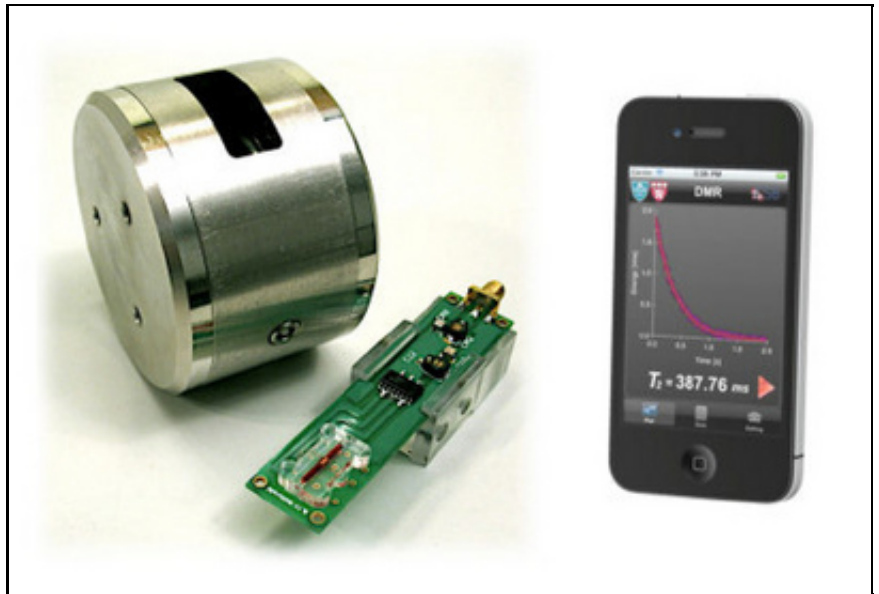
"But instead of looking inside a body, we're looking at a very small volume of (cell-containing) fluids," says Castro, an oncologist at Boston's [Massachusetts General Hospital](#).

While traditional biopsies require billions of tumour cells be carved or drawn out of patients, the microNMR can make due with several thousand, Castro says.

"At the end of the day, the mantra in oncology is tissue is the issue," Castro says, noting the less you need for diagnosis, the better.

The scant cell volumes that the new technology requires can be extracted with a fine needle and syringe, wherever they exist in the body, he says.

The suspect cells are inserted into a receptacle in the scanner – which can be cobbled together for a couple of hundred dollars — where proteins unique to specific cancers are analyzed.



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A portable Nuclear Magnetic Resonance system and user-friendly smartphone app has been proven to make bedside cancer diagnoses.

The results are then transmitted to a smartphone that's been equipped with an app to operate the apparatus and display easily readable results.

The 60-minute diagnostic turnaround, Castro says, is one of the new technology's chief blessings.

Traditional biopsies can leave patients fretting for a week to find out if a lump or lesion is malignant, he says.

The study used the smartphone technology to analyze tumours taken from suspicious stomach lesions in 50 patients already scheduled for traditional biopsies.

It was released Wednesday by the journal *Science Translational Medicine*.

For the research, a small portion of the biopsied tissue – an average of 3,600 cells — was inserted in the micro-scanner to compare its results to the normal pathologist examination.

In the end, it accurately diagnosed 44 malignancies. By fine-tuning the equipment in an additional 20 patients, the accuracy rate was lifted to 96 per cent, which significantly surpasses the 84 per cent average claimed by traditional biopsy examinations.

The device scanned for nine cancer-related proteins – or markers — that can indicate the type of cancer and whether it's likely to spread.

"We're trying to extract as much information from small amounts of cells, so that there's minimal harm to the patient," Castro says.

The microNMR can be programmed to detect proteins related to any type of hard tumour, each of which can produce their own specific markers. It can also be retrofitted to look at the cancer pathways that chemotherapies are targeted to interrupt, and provide an ongoing analysis of a therapy's success during the course of treatments, Castro says.

Eventually, the equipment might be amped up to find cancer specific markers in simple blood samples, Castro says.