

A SmartPhone diagnoses tumors at your bedside

By Janet Fang | Feb 23, 2011 | [0 Comments](#)

Don't get up, no need to leave the room... scientists have designed a device to diagnose life-threatening tumors that attaches to a phone.

The portable in-phone device is a **microNMR chip** – which measures proteins in scant numbers of tumor cells using just a speck of tissue. This allows doctors to track the malignancy of a tumor without having the patient undergo repeated biopsies or surgeries to get large tissue samples.

This promises to be faster, cheaper, and more accurate than the current gold standard of cancer diagnosis known as [immunohistochemistry](#).

“The device steers patients away from invasive and potentially harmful procedures,” says study coauthor [Cesar Castro](#) of Harvard, “and reduces anxiety with its rapid turnaround time” (in under an hour, compared to the typical 3 days).

This system for bedside diagnostics features a mini NMR – nuclear magnetic resonance, like in MRIs – probe that can detect single cells, along with a smartphone-friendly interface (pictured, iPhone not for scale).

The device is basically a highly sensitive detector of magnetism, operating like an [MRI](#) machine but with a handheld magnet. “It's a miniaturized version,” says study author [Jered Haun](#) of Harvard, “so instead of looking inside a body, we're looking inside a small sample volume.”

Because tumor cells don't exhibit a magnetic signature of their own, the researchers tagged them with **magnetic nanosensors** targeted to protein markers associated with cancer. This gives them an idea of the cells' molecular makeups.

Fifty patients receiving biopsies of suspicious stomach tissue at **Massachusetts General Hospital** agreed to have a small portion analyzed by the new device – which correctly identified 44 patients as having malignant tumors.

The researchers even found 9 **protein markers** that act as molecular fingerprints of cancer. And by using just 4 of those markers to look for tumor signatures, they correctly identified cancer in 96% of patients in a pilot study. This surpasses the 84% of immunohistochemistry, they say.



“We feel our work further underscores the need to move beyond a simplistic one-tumor-marker-fits-all philosophy for diagnosing cancers,” Castro says. These molecular diagnostics leverage protein markers to better describe cancers, and with more specificity, there wouldn’t be a need for large tissue samples.

The chip can also help measure if drugs are affecting the tumors they’re meant to target, which can hone in on dosages better.

“Our device has the potential for transforming cancer care through it’s ability to provide real time readouts,” Castro adds, “using only a few cancer cells.”

The study was published in *Science Translational Medicine* today.

Image: C. Min, H. Lee, R. Weissleder

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