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Microchip Spots Cancerous Tumors Within an Hour, Study Shows

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By Maureen Salamon
HealthDay Reporter

WEDNESDAY, Feb. 23 (HealthDay News) — Scientists say they have developed a microchip that can be attached to a smart phone and diagnose cancerous tumors within an hour, from the patient's bedside.

The so-called microNMR chip, which uses magnetic nanoparticles to measure proteins and other chemical compounds in tumors, requires only tiny amounts of tissue to make a diagnosis, researchers said. Instead of more invasive methods, the biopsy can be done with fine needle aspiration, which withdraws cells from suspicious lesions.

"We tried to determine a molecular fingerprint, if you will," said study co-author Jered B. Haun, a postdoctoral researcher at Massachusetts General Hospital in Boston. "It was a nice surprise just how well it worked with all the protein markers. One of our big goals was not only to be able to tell patients they have cancer as accurately as possible, but as quickly as possible."

The study, which was funded by grants from the U.S. National Institutes of Health, is published in the Feb. 23 issue of the journal *Science Translational Medicine*.

Using the microchip — which can be hooked up to smart phones such as iPhones and Blackberrys — researchers analyzed tissue samples from 50 patients with suspected malignancies, correctly diagnosing cancer in 44 patients within 60 minutes in 96 percent of cases by zoning in on four of nine protein markers.

In contrast, standard pathology methods typically require three or more days to produce a diagnosis and are only 84 percent accurate, the researchers noted.

Study participants, whose average age was 64, had suspicious lesions in a variety of organs, including the lungs, colon, pancreas, liver and breasts, and were already scheduled to receive biopsies for abnormal stomach tissue. Their results were validated with traditional pathology — which also didn't assess differences in tumor cell types as well as the microchip — along with an independent group of 20 additional patients, Haun said. The microchip diagnoses in the additional group were 100 percent accurate, according to the study.

"False negatives and non-diagnostic samples are both at higher incidence with standard pathology," Huan said. "Since the [microchip-tested] sample size is so small, we take small aspirants of different areas of the tumor ... to get a more global view of the results," which can also impact treatment requirements.

Huan and the other study authors reported no financial conflicts of interest.

Dr. Moritz Kircher, a diagnostic radiologist at Memorial Sloan-Kettering Cancer Center in New York City, said he envisions the microchip eventually being used to diagnose an array of malignancies, both internal and external.

"I see it more as a universal method because it relies on biological markers," said Kircher, also an assistant professor of radiology at Weill

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Cornell Medical College. "This is basically the first time they've used this in a clinical study and the results are very promising."

Haun and Kircher agreed more research would be needed before the microchip technology could be used routinely and that greater numbers of patients with more types of possible malignancies should be studied. Haun said he also hopes the microchip will one day be able to analyze blood samples to minimize invasive procedures.

Once marketed, the tool should be inexpensive to produce, Haun noted, possibly only dollars per chip.

"Like cell phones in general, the more you make, the cheaper they get," he said. "It's not an expensive device at all."

With the data at hand, however, it should be easy to convince potential investors to put the necessary cash into promoting the technology, said Dr. Jan Grimm, a nanotechnology researcher and radiologist at Memorial Sloan-Kettering Cancer Center.

"When they can claim a better result than [traditional diagnostic methods], that's pretty amazing," Grimm said. "It's better than pathology, which is considered the gold standard."

More information

For more on cancer pathology, visit the [National Cancer Institute](#).

SOURCES: Jered B. Haun, Ph.D., postdoctoral researcher, Massachusetts General Hospital, Boston; Moritz Kircher, M.D., Ph.D., diagnostic radiologist, Memorial Sloan-Kettering Cancer Center, New York City, and assistant professor, radiology, Weill Cornell Medical College; Jan Grimm, M.D., Ph.D., radiologist, Memorial Sloan-Kettering Cancer Center, New York City; Feb. 23, 2011, *Science Translational Medicine*

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