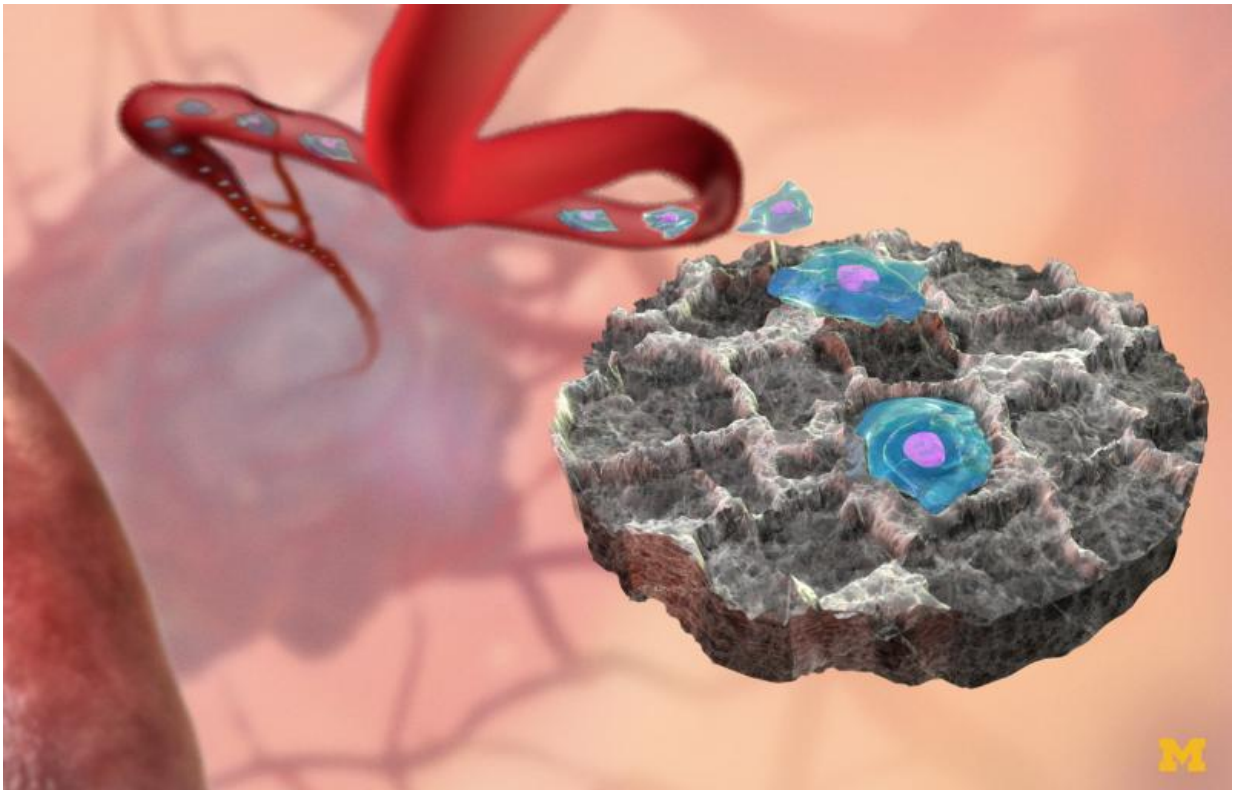


Cancer decoy could attract, capture malignant cells

September 11 2015, by Gabe Cherry



Conceptual illustration of implantable sponge-like device attracts cancer cells from the bloodstream.

A small, implantable device that researchers are calling a cancer "super-attractor" could eventually give doctors earlier warnings of relapse in breast cancer patients and even slow the disease's spread to other organs.

The sponge-like [device](#) developed at the University of Michigan is designed to attract [cancer cells](#) that emerge in the bloodstream during the early stages of cancer's recurrence—before tumors form elsewhere in the body.

A new study in mice shows that the device attracts detectable numbers of cancer cells before they're visible anywhere else. In the study, cancer cells spread to the lungs 88 percent more slowly in mice that received the implants. The findings are published in *Nature Communications*.

Researchers envision the super-attractor being implanted just beneath the skin of [breast cancer patients](#). Doctors could monitor it using a noninvasive scan and it could enable them to detect and treat relapse sooner. It also has the potential to be used as a preemptive measure in those who are at high risk for breast cancer.

"Breast cancer is a disease that can recur over a long period in a patient's life, and a recurrence is often very difficult to detect until the cancer becomes established in another organ," said Dr. Jacqueline Jeruss, associate professor of surgery in the U-M Comprehensive Cancer Center. "Something like this could be monitored for years and we could use it as an early indicator of recurrence."

Jeruss said the idea for the super-attractor was born from the knowledge that cancer cells don't spread randomly. Instead, they're attracted to specific areas within the body. So the team worked to design a device that exploited that trait.



U-M Researchers construct cancer "super-attractor" scaffolds from mouse tissue, using a tumor as a control in the experimental process at the NCRC.

"We set out to create a sort of decoy—a device that's more attractive to cancer cells than other parts of the patient's body," said Lonnie Shea, the William and Valerie Hall Department Chair of Biomedical Engineering at U-M. "It acts as a canary in the coal mine. And by attracting cancer cells, it steers those cells away from vital organs."

The device takes advantage of interaction that naturally takes place between cancer and the body's immune system. Cancer co-opts the immune system, turning a patient's [immune cells](#) into drones that gather in specific organs to prepare them for the arrival of cancer cells. The immune cells then act like a beacon in the body that attracts cancer to

that location. In essence, the team has built a brighter beacon.

When the super-attractor was implanted just beneath the skin of the mice in the study, their cancer-compromised immune systems responded as they would to any foreign object, sending out cells to attack the intruder. Cancer cells were then attracted to the immune cells within the device, where they took root in tiny pores designed to be hospitable to them.

The study also found that the cells the implant captured didn't group together into a secondary tumor, as they normally would.

"We were frankly surprised to see that cancer cells appeared to stop growing when they reached the implant," Shea said. "We saw [individual cells](#) in the implant, not a mass of cells as you would see in a tumor, and we didn't see any evidence of damage to surrounding tissue."

The team is evaluating noninvasive scanning technologies that could be used to monitor the device.

The device's spongy structure is particularly attractive to circulating cancer cells. It's made of an FDA-approved material that's already widely used in surgical sutures and dissolves in the body over time. The device implanted in the mouse study was only a few millimeters in diameter. A human-sized version might be a bit larger than a pencil eraser.

While it's likely several years away from patient use, Shea believes the technology could potentially be used for other types of cancer as well, including pancreatic and prostate cancer. And it could be an important tool in the emerging field of precision medicine, where captive cells could be analyzed to identify the best therapies for individual patients.

The team is now working to better understand why cancer cells are attracted to specific areas of the body and why they're so strongly attracted to the device. Shea believes that this information could lead to new insight into how cancer metastasizes and how to stop it.

"A detailed understanding of why cancer cells are attracted to certain areas in the body opens up all sorts of therapeutic and diagnostic possibilities," he said. "Maybe there's something we can do to interrupt that attraction and prevent cancer from colonizing an organ in the first place."

The study is titled "In vivo capture and label-free detection of early metastatic cells." Funding was provided by the National Institutes of Health (grant number R01CA173745) and the Northwestern H Foundation Cancer Research Award. The university is pursuing patent protection for the intellectual property and is seeking commercialization partners to help bring the technology to market.

Provided by University of Michigan

Citation: Cancer decoy could attract, capture malignant cells (2015, September 11) retrieved 3 May 2024 from <https://phys.org/news/2015-09-cancer-decoy-capture-malignant-cells.html>

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