

Nanodevices Can 'Hear' Cancer

Two engineering professors at the University of California, Riverside are developing devices 100,000 times thinner than a human hair, that can listen to cancerous cells, deliver chemotherapy to them and leave surrounding healthy tissue intact.

Assistant professors, Mihri Ozkan of Electrical Engineering and Cengiz Ozkan of Mechanical Engineering at UCR's Bourns College of Engineering, are leading research into micro-electrical arrays, or the signals cells emit, and the nanodevices to deliver anti-cancer drugs.

The married couple hopes to combine the technologies to "listen" for the subtle electrical cues that cancerous cells emit and deliver chemotherapies with such precision that only the cancerous cells are affected.

The UCR Project is part of a National Cancer Institute (NCI)-spearheaded effort that puts the UC Riverside researchers in a consortium that forms the Center for Cancer Nanotechnology Excellence, which was established last month at UC San Diego. It is one of seven such NCI centers nationwide.

"UCSD is happy because no one there is doing this type of research," said Mihri Ozkan. She said that the standard practice of injecting dyes into cells to find those affected by a certain disease has unintended, often unwanted, effects.

"The stains (dyes) now in use are often toxic and affect how cells react and transmit chemicals," she added. "The result is that sometimes study results are affected by these issues so that you don't really know if the cell dies from the cancer or from the dye."

Cengiz Ozkan says focusing on the electrical signals cells emit is far more benign process and one that holds a great deal of promise, when coupled with nanofabrication (building things at the molecular scale) techniques.

"You effectively listen to the cells. The ones with cancer emit a different signal than healthy ones," he said. Using DNA and nanotube technologies, Cengiz Ozkan is also developing a drug delivery system that targets the cancerous cells.

The UCR project is one of five underway at the UCSD center, funded through a five-year, \$20 million NCI initiative. The effort has created a consortium of five research institutions, UCSD, UCR, the Burnham Institute in La Jolla, UC Santa Barbara, UC Irvine, along with six corporate partners.

The seven Centers of Cancer Nanotechnology Excellence will develop clinically useful nanotechnology "platforms" to treat, understand and monitor cancer. It is the first time UCR has participated in such a national center effort.

The NCI's initiative recognizes the potential of nanotechnology for advancing the fight against cancer.

"We believe that nanotechnology will have a transformative effect on cancer diagnosis and treatment. In fact, its impact is already visible in the research being conducted through many of the centers we are announcing today," said Dr. Andrew von Eschenbach, director of the NCI. "Through the applications of nanotechnology, we will increase the rate of progress towards eliminating the suffering and death due to cancer."

For Mihri and Cengiz Ozkan, the focus is to develop the technologies and processes that, like the NCI's mission statement points out, will reduce cancer to an illness that is treatable with off-the-shelf drugs.

“Imagine having the ability to find the very first cancer cell in your body and killing it with targeted therapies” said Cengiz Ozkan. “We have a lot of capabilities in our nano-toolbox. It’s time to apply them to cancer therapy.”

Source: University of California, Riverside

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