

**Science goes beyond surgery to fight cancer head-on ; 'Cooking,' freezing help kill tumors; [FINAL Edition]**

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Abstract (Document Summary)

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The procedures are especially important for diseases such as liver cancers, which have tumors that usually can't be removed surgically, [Brad Wood] says. The Society of Interventional Radiology says two-thirds of tumors that start in the liver are inoperable, as are 90% of tumors that spread to the liver from another organ.

In Stultz's case, Wood opted to "cook" the tumor from the inside. He inserted a thick needle through Stultz's skin into her liver. Using technology called radiofrequency ablation, or RFA, he heated the needle with radio waves, killing all the tissue in the immediate area.

Full Text (868 words)

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Sylvia Stultz is battling cancer on several fronts. The disease, which was diagnosed in her cervix last year, has spread to four other organs. She has had a hysterectomy as well as chemotherapy and radiation.

Although chemo shrank tumors in her lungs and bone, cancer in her liver was growing quickly and wasn't responding to treatment, says Stultz, 57, of Washington, D.C. The liver tumor's location -- close to her heart -- makes surgery risky. She's so tired from chemo and radiation that she doesn't feel strong enough for another operation.

Doctors have developed a number of new procedures to help patients like Stultz who are unable to endure major surgery. Some procedures freeze tumors, while others heat them up or allow doctors to combine radiation and surgery.

Though the procedures can cure small tumors, they are not usually considered lifesaving. Instead, doctors hope to make patients more comfortable and give them more time, says Brad Wood, Stultz's doctor and a senior clinical investigator at the National Institutes of Health in Bethesda, Md.

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'Cooking' tumors

In Stultz's case, Wood opted to "cook" the tumor from the inside. He inserted a thick needle through Stultz's skin into her liver. Using technology called radiofrequency ablation, or RFA, he heated the needle with radio waves, killing all the tissue in the immediate area.

Typically, doctors position needles by looking at images on the wall or on a computer screen that were taken days or weeks ago, Wood says. This time, though, Wood used a new technique, inserting a needle equipped with an electromagnetic sensor. The sensor also allows doctors to track the needle even when the heating process clouds ultrasound images.

In the future, Wood says, robots could make the procedures more precise. He hopes to test a remote-controlled device that could position needles while patients are inside CT scanners.

In addition to heat, doctors frequently kill liver tumors by freezing them using a needle and substances such as argon gas or liquid nitrogen.

Wood says the procedures pose some risks. Inserting even relatively thin needles into a lung, for example, can cause the organ to collapse.

Stultz says the heating procedures weren't terribly painful. She spent four nights in the hospital after the first procedure and two nights after the second one.

"Despite the fact that I've had a lot of cancer all over the place, I'm very hopeful," Stultz says. "I'm not so debilitated that I feel any question about whether it's worth pursuing."

'Smart' capsules

Heating or freezing procedures don't always kill the entire tumor. Though Wood targeted the core of Stultz's tumor in his first

procedure, he had to follow up a few weeks later to try to wipe out cancerous cells around the edges of the tumor that may have survived.

An experimental technique aims to kill more liver cancer cells in one procedure. In addition to heating a tumor with a needle, doctors inject patients with tiny capsules containing chemotherapy drugs. The capsules are designed to open and release their contents only when heated. That delivers drugs only to the margins of the "burn zone," Wood says, largely sparing the rest of the body from chemotherapy's toxic side effects.

Lung cancer strategies

In early-stage lung cancer, the best way to cure patients is to remove the entire affected lobe or section of the lung. Many lung cancer patients, however, are too elderly or sick to make it through major surgery, and they might have trouble breathing if they lost such a large part of their lung, says Mark Trombetta, a radiation oncologist at Allegheny General Hospital in Pittsburgh.

In the past, doctors removed only part of the affected lobe, Trombetta says. Although that surgery is easier on patients, it might miss some cancer cells. Tumors returned in 20% to 25% of such patients.

Trombetta and his colleagues have found a way to reduce the risk of recurrence to less than 5%.

They combine a smaller surgery with a type of radiation called brachytherapy. Doctors stitch radioactive pellets, which are contained in a mesh, around the tumor site, Trombetta says. The radiation helps to kill any malignant cells that remain after surgery.

Trombetta, who presented a study involving 167 patients at a meeting of the Society of Thoracic Surgeons in January, says researchers are conducting a larger study to confirm these benefits.

Walter Curran, chairman of radiation oncology at Thomas Jefferson University Hospital in Philadelphia, says the technique is promising. But he also notes that surgeons and radiation oncologists have to work together very closely during the procedure. Relatively few hospitals have teams who work together this well, he says.

Trombetta says he hopes such procedures will help cure more patients.

"There really has been an explosion in the technology," he says. "It has improved our ability to target cancer and to deliver therapies that we were unable to deliver just a few years ago."

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