

Using ultrasound, MRI to guide needle-thin, tumor-cooking laser

FIRST-EVER TARGETED LASER PROSTATE SURGERY A SUCCESS

By Todd Neff



Al Barqawi, MD, during the first-ever MRI-guided focal laser therapy, which he led at UCH on September 25.

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Frying the prostate tumors took about two minutes. Making sure the laser-heated probe was in just the right spots, on the other hand, was a five-hour affair. On September 25, Al Barqawi, MD, conducted the first-ever in-situ prostate tumor cooking, in the basement of University of Colorado Hospital's Anschutz Inpatient Pavilion.

On the menu were a pair of sand-grain-size tumors in the prostate of a physician, 66, who agreed to comment via e-mail but requested anonymity. Barqawi had isolated the two-millimeter-wide growths using three-dimensional prostate mapping, a technique the University of Colorado Denver urologist pioneered (*Insider*, August 18).

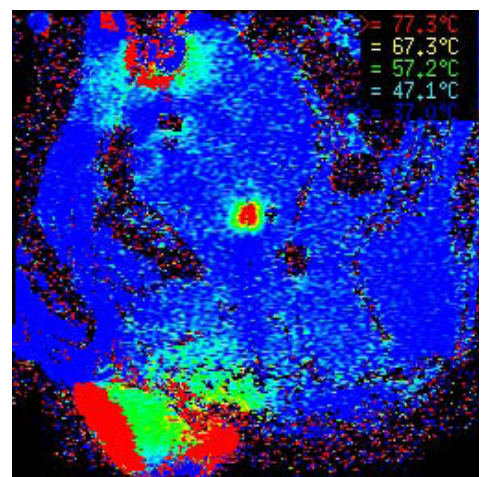
Typically, once the target was mapped in advance, Barqawi would go in with a cryogenic – ultracold – probe and, guided by ultrasound images, freeze the targets.

The combination of 3D prostate mapping and cryogenics, although a technique in its infancy, is already revolutionizing care for prostate cancer, a disease diagnosed 192,000 times each year in the United States. Before the precision of 3D prostate mapping, standard practice had been – and continues to be – some combination of radiation therapy and total prostate removal.

Barqawi estimates about 300 men annually have prostatectomies at UCH alone. Identifying and freezing tumors seems to achieve similar outcomes while sparing men incontinence, impotence and other complications of less targeted approaches.

Fire up the grill. Still, if freezing prostate tumors is good, frying them could be better, Barqawi believed. So on this particular Friday, he tried a new approach.

Visualase, a Houston, Texas-based medical device startup, was offering the use of a tiny grill with a big name – laser induced interstitial thermal therapy. It is FDA



The red spot in the center is a prostate tumor being cooked. Photo courtesy Visualase.

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approved and has been used on brain, bone, spinal and thyroid cancers, according to the company. Barqawi would guide a laser probe into the prostate, where it would heat tissues to above 77 degrees Celsius (170 degrees Fahrenheit). That's hot enough to kill cells, cancerous and otherwise, in a matter of seconds. The laser probe also does a better job than its cryogenic counterpart of limiting collateral damage.

Instead of ultrasound, however, the laser heating would depend on magnetic resonance image (MRI) guidance, which involved working with the patient inside the cave of an MRI machine as well as assistance from UC Denver radiologists Gerald Dodd, MD, and Nayana Patel, MD.

TK, the patient, was an exceptionally well-informed consumer, having studied urology journals and reports from urology meetings. Being the first to undergo the procedure would involve trade-offs, he said, but "I feel that the positive of receiving a considerable amount of multidisciplinary attention from professionals who are highly motivated to produce a good outcome outweighs the negative of inexperience with the procedure contributing to the possibility of unanticipated adverse events."

Exceeding hopes, but slowly.

Barqawi said the laser technique's precision surpassed his expectations. He could monitor the target area from all angles. There was no bleeding, which Barqawi called "unknown in prostate surgery. Even the cryo will have bleeding when

it thaws." The laser cooking had a cauterizing effect, slowing bleeding and limiting the time the patient needed a post-surgery catheter to less than 24 hours.

"I had the procedure on a Friday and was able to work a full day on Monday, with the only problems related to the time of healing of the irritation from the catheter," the patient said.

The treatment took exactly 90 seconds, Barqawi said, but that number is misleading. "Finding the cancer, introducing the laser probes, then moving the patient into the MRI and positioning everything again is what took the five hours," he added.



The business end of the Visualase laser thermal therapy system. Photo courtesy Visualase.

Barqawi says better technology to assist with the MRI-guided identification of cancer will help cut surgery times in the future. Experience will speed things up, too. He's planning a clinical trial to understand how laser therapy holds up against such alternatives as cryosurgery, radiation therapy, and prostate removal in terms of complications and, foremost, its effectiveness in snuffing out cancer.



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“We’re still in the early stages. It’s important that nobody gets the idea that we’ve solved it,” Barqawi said.

While recognizing the treatment’s open questions, the patient believes the laser holds great promise in helping patients like him “avoid the considerable expense, recovery time and potential side effects of unnecessary prostatectomies without having the ongoing stress of engaging in what has been called ‘watchful waiting,’ but is really ‘worried waiting.’

“Combined with the power of the mapping biopsy to locate and precisely characterize areas of suspicion and prostate cancer itself,” the patient added, “this procedure could eliminate a tremendous amount of suffering and expense.”