

Radiation gun takes dead aim at tumors

CyberKnife: Using the technology of a guided missile, the tool lets doctors focus a ray of energy to the millimeter.

By DAVID KOHN
SUN STAFF

Of all the brain surgeries Cindy Feld has experienced, this one was by far her favorite.

In the previous three, doctors had opened her skull and bored into her brain to remove tumors, leaving her in pain and out of work for months. But this time was different — no anaesthetic, no blood and no scalpel.

All Feld had to do was lie on a table while a radiation "gun" revolved around her head, peppering her tumor with invisible rays. Her biggest complaint was boredom — during one 90-minute session, she actually dozed off.

"You don't feel a thing," said the 43-year-old Westminster resident. "It's amazing. It really is."

Called the CyberKnife, the robotic device is the Smart Bomb of cancer treatments. It lets doctors target a beam of tumor-killing radiation down to the millimeter, keeping healthy tissue around the tumor safe.

"This thing uses the same technology that a guided missile does," says Dr. Mark Brenner, director of the Sinai Hospital Cancer Center, which began using the \$3 million CyberKnife two weeks ago. "It knows where the target is at all times."

Treating tumors the traditional way involves blasting a relatively broad swath of the body with radiation. To avoid destroying healthy tissue, doctors often decrease the strength of radiation, which protects the area around the tumor but also limits the effect on the tumor.

"This tool will allow us to treat thousands of tumors that we really couldn't treat before,"



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Drs. Neal Naff (left) and Charles Lee monitor a procedure. Wendy Wifler, of CyberKnife maker Accuray, watches.

says Dr. Neal Naff, director of Sinai's CyberKnife program and chief of neurosurgery. Feld, the hospital's first CyberKnife patient, had a tumor behind her left eye. Had doctors used traditional surgery, she faced a high risk of blindness. Doctors won't know for several months whether the series of five treatments killed her tumor.

The CyberKnife's inventor, Stanford University neurosurgery professor John Adler, said he got the idea for the device while watching *Star Trek*. "I'd see Dr. McCoy waving some gadget around people, and that cured whatever was bothering them," says Adler, who began work on the knife in 1986.

A 6-foot mechanical robot arm with a boxy "gun" at one end, the CyberKnife moves over and around a patient, shooting bursts of precisely targeted radiation. X-rays taken every seven seconds provide the device with constant feedback on the location of the tumor. The X-rays are much weaker than normal; several hundred are the equivalent of one chest X-ray, Brenner says.

The system allows patients to lie unrestrained on the table without anesthetic. A full course of CyberKnife treatments costs about \$10,000, less than half as much as equivalent surgery.

The tool is particularly useful

Targeting a tumor

Doctors use the CyberKnife to attack difficult-to-reach tumors that cannot be removed by traditional surgery.

Mounted on a robotic arm, the CyberKnife rotates around the patient, aiming a precise beam of radiation at tumors from an almost endless variety of angles.

Tumor close to vulnerable tissue, located deep in the brain

Flexible-mesh mask limits major movements

Source: Accuray

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for cancers that are difficult to reach or near vulnerable spots, such as the spine. Normal radiation treatment can easily damage the spinal cord and cause paralysis, but doctors say the CyberKnife can hit the tumor while sparing nearby areas.

Doctors don't operate the device during treatment. They give the CyberKnife the tumor's location, and the robot does the work. There is a kind of beauty to it, says Brenner: "It is so elegant and precise. It's like watch-

ing mechanized tai chi."

Since the CyberKnife was approved in 1999 by the Food and Drug Administration, 20 have been placed in service worldwide, treating more than 5,000 patients. Sinai's is the second on the East Coast. The other is at Georgetown University.

Adler is working on ways to use the CyberKnife to treat other problems. For example, he sees precisely targeted radiation as a way to deal with epilepsy and heart arrhythmia.