

In its 2003 survey, *U.S. News & World Report* named City of Hope one of America's Best Cancer Hospitals.

City of Hope is the only Southern California partner in the National Comprehensive Cancer Network (NCCN), an alliance of 19 of the world's leading cancer centers.

One of 39 elite institutions nationwide to be named as a National Cancer Institute-designated Comprehensive Cancer Center.

It all adds up to Hope.

The Joint Commission on Accreditation of Health Care Organizations (JCAHO) recently gave City of Hope an overall score of 99. This was the highest score among the nation's 11 freestanding cancer centers.

The Patients Evaluation of Performance in California (PEP-C II) survey, recognized City of Hope as the only hospital in Los Angeles and Orange Counties to earn the highest rating possible in every applicable category in patient satisfaction.

How powerful is hope in treating cancer? More than you realize. Our research and discoveries have not only changed cancer treatment, but also helped to save thousands of lives worldwide. As Southern California's premier Comprehensive Cancer Center, we are pleased to be recognized for our outstanding work. But our true achievement is helping cancer patients and their families to get their lives back. So if you or a loved one has been diagnosed with cancer, find hope where the world finds it. With us, City of Hope Cancer Center.



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EXCITING PROGRESS IN CANCER TREATMENT

Smarter Technologies: Minimally Invasive IMRT

All articles written by
Gregory M. Vogel, medical writer

A new, high-tech treatment that destroys tumors with finely tuned beams of radiation energy is improving outcomes for cancer patients. IMRT—short for Intensity Modulated Radiation Therapy—uses 3D imaging to target tumors more precisely, for even better treatment results with lower incidence of side effects.

Doctors at City of Hope Comprehensive Cancer Center call IMRT one of the most important advances in cancer treatment in years. "IMRT offers a very sophisticated, computer-controlled delivery of radiation therapy," explains Richard Pezner, MD, associate chair, Division of Radiation Oncology. "It's a powerful new technique, and for many patients, it's superior to conventional therapy." Staff Physician Yi-Jen Chen agrees. "This is a more targeted way of delivering radiation," he says. "The tumor gets a higher dose, while normal tissue is spared."

Rooting Out the Problem

Jeffrey Wong, MD, chair, Division of Radiation Oncology, explains why IMRT is such an important advance. "Many tumors are irregularly shaped, with fingers that extend like roots of a weed, wedged in between normal tissue. With IMRT, we can target a patient's treatment much more precisely, whatever the shape of the tumor." Increasingly, IMRT is being used to treat cancers in different areas, including the prostate, pancreas, liver, lung, brain, head and neck.

IMRT's powerful computer imaging capabilities allow physicians to create a kind of radiation "hologram," matching the tumor's shape exactly, in 3D. Data can be used from all kinds of scans, including computed axial tomography (CT), magnetic resonance imaging (MRI) and positron emission tomography (PET). "These imaging techniques are seamlessly integrated into treatment planning and delivery, so that both tumor and normal tissue can be captured in three-dimensional space," Dr. Wong says. "We can define the target with pinpoint accuracy, and the computer systems optimize the dose delivery to the tumor."



Photo by Mark Robert Halper

From left: Yi-Jen Chen, MD, radiation oncologist; Timothy Schultheiss, PhD, director, Department of Radiation Physics; Jeffrey Wong, MD, chair, Division of Radiation Oncology; Richard Pezner, MD, associate chair, Division of Radiation Oncology, all from City of Hope.

The new therapy also helps avoid treating radiation-sensitive organs such as the lungs, which is better for patients, explains Dr. Pezner. "IMRT is able to limit exposure to surrounding lung tissue better than other technologies," he says. "For many types of tumors, I predict it will become the standard treatment over the next few years."

Power and Precision

As the patient lies on the treatment couch, information on the tumor's exact location, shape and size is captured using a CT or other scanner. A virtual model of the tumor is created from the information gathered to help direct the actual treatment sessions. A custom-made foam cast ensures proper positioning of the patient during treatment.

A device called a linear accelerator generates an energy beam, like a regular X-ray but far more powerful, which is repositioned at various angles. Meanwhile, the machine splits the beam into hundreds of pencil-thin "beamlets," with intensities that are adjusted to pinpoint treatment to the tumor precisely where needed. The computer directs the beamlets, building up the radiation dose to fit the tumor's size and shape. "It's like an inkjet printer," Dr. Wong says. "You can actually paint the tumor with radiation, varying the shade at each point."

Maximum Benefits

IMRT's pinpoint precision has several advantages: It gives the tumor the maximum dose—which increases the likelihood of completely eradicating the cancer; and it avoids exposing healthy tissue nearby. IMRT can actually wrap and angle beams of radiation around tissue and organs, protecting normal cells. That means that IMRT patients typically have fewer side effects and complications, helping them stay stronger and have a better treatment experience.

For more information about City of Hope and the Division of Radiation Oncology, please visit www.cityofhope.org, or call 1-800-341-HOPE (4673). ■

THE FUTURE OF CANCER THERAPY

City of Hope Among First to Offer New Technology

Every cancer patient wants the best treatment possible. Internationally respected City of Hope Comprehensive Cancer Center in Duarte, California, has been providing advanced treatment of cancer and other life-threatening diseases for more than 90 years.

Soon, an advanced new technology called helical tomotherapy will again affirm City of Hope's position as a leading cancer center.

In early 2004, City of Hope is slated to become the first in Southern California to offer radiation therapy treatment using the TomoTherapy Hi-ART[®] System.

Only a few of these systems have been installed in the United States. City of Hope doctors and staff are currently training to operate the new system, designed to deliver radiation to cancer tissues with unsurpassed accuracy, providing optimal treatment with minimal side effects for patients.

The system combines the advances in Intensity Modulated Radiation Therapy (IMRT), 3D medical imaging and computer control that have been making cancer treatment better for patients (see article on IMRT). Currently, treatment requires two separate

units—one for visualizing the target, the other for the actual radiation delivery. With helical tomotherapy, the computed tomography (CT) scanner is married to the radiation source all in one system.

According to Timothy Schultheiss, PhD, director, Department of Radiation Physics, "By combining everything in one machine, we can take a CT scan of the patient on the same unit just before treatment. Using this scan to reposition the patient if necessary, we can achieve pin-point accuracy in dose delivery. We believe this accuracy will further improve our treatment results."

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TREATING CANCER FROM WITHIN

Advances with Brachytherapy and MammoSite®

When a cancer patient requires radiation therapy, several different treatments are available, based on the needs of the patient and the extent of the disease.

Often, doctors will use a radiation source external to the body; innovations with computer imaging are making this procedure even safer and more effective (see article on IMRT). Another approach, called brachytherapy, helps patients by implanting the source directly inside the tumor, to treat the cancer from within.

Brachytherapy (pronounced “breaky-therapy”) comes from the Greek word for “short,” because it operates over a short distance. The technique uses tiny amounts of radioactive materials (usually iodine, iridium or palladium) sealed inside needles, wires or pellets called “seeds” smaller than a grain of rice [see photo]. These are carefully positioned inside the affected tissue or cavity, sending out energy that disrupts the growth of cancer cells.

Brachytherapy not only targets the source of the problem, it minimizes exposure to normal healthy tissue. Doctors increasingly recommend brachytherapy for prostate, breast, esophageal and lung cancer. And with good reason: brachytherapy can radically shrink a tumor, reducing or even eliminating the need for surgery; it can also be used to destroy any microscopic cancer cells that remain after a tumor has been removed, significantly decreasing the chance of recurrence.

Prostate Cancer: Right on Target

This year, about 220,000 men in the United States will be diagnosed with prostate cancer. Options for treatment include surgical procedures such as radical prostatectomy, laparoscopic radical prostatectomy, hormonal therapies to slow tumor growth, and radiation treatments from an external or internal source.

“Prostate cancer patients are divided into low-, moderate- and high-risk categories,” explains Nayana Vora, MD, clinical director and chief, Interstitial Brachytherapy at City of Hope’s Division of Radiation Oncology. “Treatment depends on how advanced the cancer is, and whether or not it has spread.”

A low-risk patient who receives brachytherapy spends just one day in the hospital, during which doctors will implant 70 to 100 seeds into the prostate, guided by ultrasound. The seeds stay radioactive for a limited time: iodine-125, for example, lasts about 120 days. “The radiation dose is so localized that patients are pretty much unrestricted in what they can do—go home, go shopping, and so on. And we monitor the patient periodically to make sure that treatment is progressing as planned,” Dr. Vora says.

After treatment, the inactive seeds remain inside the prostate, to avoid additional surgery to remove them. Moderate- and high-risk patients may receive more extensive combination treatments, including hormones and external beam therapy.

Brachytherapy has proven to be an excellent way to treat other tumors, including those of the breast. And a new procedure available at City of Hope is making brachytherapy for breast cancer easier and faster than ever.

Breast Cancer: The High Dose Rate Advantage

In breast cancer surgery, the trend has been away from radical mastectomy; today, breast conservation techniques such as lumpectomy are preferred whenever possible, in which only the tumor is removed with a certain amount of other tissue.

To help ensure that any cancer cells remaining after surgery are destroyed, doctors may prescribe brachytherapy. Often, this involves low-dose radiation: thin plastic tubes are implanted temporarily around the site, and filled with mildly radioactive seeds. For five days, the patient is hospitalized, during which time the radiation therapy is continuously at work. Certain precautions must be taken to minimize exposure to anyone who comes in close proximity, including doctors and nurses.

Today, City of Hope and other cancer centers are offering patients a faster, more convenient procedure that’s equally effective—and fits better with patients’ lives and schedules. High Dose Rate (HDR) brachytherapy uses radiation sources that are implanted only briefly, then removed. Its benefits include the rapid, direct delivery of radiation, without hospitalization or unwanted exposure.

HDR is given on an outpatient basis: each treatment lasts about five minutes, and is given twice a day for five days.

“The beauty of High Dose Rate is that it can be given in a few minutes, and it’s done,” Dr. Vora says. “What takes five days of continuous radiation with lower doses, we now

can do in the treatment room. And it avoids exposing the non-cancerous area of the breast, which doesn’t need treatment.”

MammoSite® Offers Another Advance

Breast conservation therapy is taking another step forward with an innovative new treatment called MammoSite®, newly available at City of Hope on an outpatient basis.

When a tumor is surgically removed, doctors focus on the edges of the tissue that were closest to the tumor, known as margins, where any residual cancer cells might remain. MammoSite specifically targets these margins: The procedure, which can be set up during surgery or soon after, involves placing a thin balloon catheter into the breast tissue. The patient receives brief high-dose radiation treatments, during which an iridium seed is put into the catheter for 10 minutes, and then removed. Again, the patient can go home, have lunch or just relax between sessions. It’s painless, and no one is exposed unnecessarily. Treatments are twice a day for five days, then the catheter is taken out.

MammoSite is so promising that a clinical study is being conducted to evaluate its cosmetic effects, as well as patient satisfaction with the procedure. “This is a formal study at City of Hope,” explains Richard Pezner, MD, associate chair, Division of Radiation Oncology. “We’ll be using the same criteria that we used with patients who had external radiation in the past, so we can compare the old with the new.”

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Photo by Markie Ramirez/City of Hope

Seed implant used to deliver radiation directly to a tumor site from inside the tumor rather than via a traditional external beam radiation source.



The TomoTherapy Hi-ART® System uses a rotating beam of radiation that is constantly adjusted to target the exact size and shape of the tumor. During treatment, radiation is focused on the tumor area while minimizing radiation to surrounding healthy tissue.

COMING HOME TO HOPE:

A Prostate Cancer Survivor’s Story

San Diego manufacturing executive Michael Speyer spent a few days this summer fly fishing up at Colorado’s Little Snake River. Standing waist-deep in the sparkling water, listening to the wind whistling through the fir trees, it was a placid, restful scene.

Even the fish cooperated: the rainbow trout were huge, and abundant. Still, Michael released every fish he caught, letting each one slip gently back into the river, to vanish under the surface.

As a prostate cancer survivor, Michael Speyer knows what it’s like to have a second chance.

It began a couple of years ago when Michael was seeing his internist for a complete physical. Along with the usual blood samples and X-rays, he’d had a special stress test. “My doctor said, if you pass this, you’re going to live forever,” Michael recalls. “I left there feeling great.”

It turned out his heart was fine, but his PSA (Prostate-Specific Antigen) level had surged since his last check-up. The prostate, a gland about the size and shape of a walnut, surrounds the urethra. The PSA test measures a protein made by prostate cells. When that level increases, it signals that the prostate is growing—which could be benign, or it could mean prostate cancer, a disease that claims the lives of 40,000 American men every year.

Michael was shocked. He had no symptoms, no difficulty urinating. He had two biopsies, but the results were inconclusive. Meanwhile, his PSA level was climbing. Finally, a third biopsy confirmed a diagnosis of prostate cancer.

Michael went for a radical prostatectomy at a San Diego hospital. His surgeon was able to remove the prostate without cutting some tiny but critical nerves, which meant he’d avoid having problems such as erectile dysfunction or urinary incontinence. That was the good news.

The bad news was that the cancer had spread to Michael’s lymph nodes.

Michael, who describes himself as a “double Type A personality,” wanted to eliminate the residual cancer as soon as possible. “I told my doctors, I need some insurance that this isn’t going to get worse. I want radiation treatment to get rid of it.”

Since his local hospital didn’t have state-of-the-art radiation services, Michael decided to search for one that did, traveling to meet with physicians at several nationally respected hospitals. At a major cancer center in New York, a doctor urged him to try IMRT (Intensity Modulated Radiation Therapy). But could Michael find such advanced treatment closer to home? “I asked him what he thought of City of Hope. He told me it would be a good choice, a first-class institution, world-renowned for its facilities.”

Coincidentally, Michael had grown up in City of Hope’s back yard—in fact, he’d even delivered newspapers there as a boy on a paper route. “I grew up in Duarte, so I was comfortable coming there. It felt like I was coming back to the San Gabriel Valley to have my life saved.”

Michael called for an appointment with Nayana Vora, MD, clinical director, City of Hope Division of Radiation Oncology. She suggested a combination of external beam radiation and IMRT as the best approach. External beam therapy covers a wider area, to reach a swath of possible cancer sites, while IMRT targets the area precisely and avoids healthy tissue.



Photo by Mark Robert Halper

From left: Nayana Vora, MD, clinical director, City of Hope Division of Radiation Oncology with former City of Hope patient Michael Speyer.

After two days of planning and preparations, Michael’s treatment began. He received radiation five days a week for nine weeks. “They were very careful with me, and my treatment. In fact, everyone at City of Hope was compassionate, from the radiation oncologists to the dieticians, nurses and volunteers.”

That was about nine months ago. So far, the signs of Michael’s recovery have been good. Following radiation therapy, his PSA level dropped from a residual 0.2 to zero. His latest test, taken right after his Colorado vacation, confirmed it. For now, he’ll continue to be monitored quarterly. “I’m looking forward to the two-year mark, because Dr. Vora says that’s a pretty strong indicator that everything is clear.”

This summer, Michael’s enjoying his life again. He’s even planning a fishing trip to a lake in Alaska later this year. But the trout won’t have to worry. He’s planning to give any fish he catches up there a second chance, too. ■

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As the patient lies on a treatment couch, the device rotates continuously around him or her. Its radiation beam turns on and off rapidly, splitting into hundreds of tiny beamlets that deliver precise amounts of energy to

the tumor from every angle. Jeffrey Wong, MD, chair, Division of Radiation Oncology, explains, “By conforming the radiation more tightly to the target, helical tomotherapy will allow us to treat areas that are uniquely shaped, and that cover a larger region of the body.”

Helical tomotherapy will improve the treatment of sensitive organs such as the lungs, where it’s hard to target tumors without affecting the healthy tissue around them. It should also be useful in prostate cancer where limiting radiation to the adjacent rectum and bladder is critical.

Importantly, physicians will evaluate the potential of helical tomotherapy to precisely treat patients with leukemia, lymphoma, or multiple myeloma, particularly in the setting of bone marrow transplantation. “We’ll be able to target just the bone marrow, while sparing normal tissue,” Dr. Schultheiss asserts. “Current practices cannot target bone marrow specifically and therefore require irradiating the whole body.”

“We’ve always had the goal to be a leader in radiation oncology, particularly in the delivery of focused radiation treatments,”

says Dr. Wong. “We’ve brought the latest advances to our community, and our new system will be another step forward in providing even better therapies for patients.”

“City of Hope is already offering treatments that are on the leading edge in radiation oncology,” echoes Dr. Schultheiss. “With helical tomotherapy and other new technologies, we’re staying ahead of the curve.”

Acquisition of the TomoTherapy Hi-ART® System was supported in part by a generous grant from the U.S. Department of Defense. ■