Medical Xpress

Rapid radiation therapy minimizes treatment time, improves quality of life

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When it comes to radiation therapy for cancer, Kimberly Johung, MD, (left) and Daniel Longo, RTT, say a shorter treatment regimen called hypofractionated radiotherapy can improve patients' quality of life. Credit: Robert A. Lisak

Faster isn't always better, but in the case of radiation therapy for some cancers, accelerating radiation courses can help patients get on the road to recovery sooner.

Today, about half of people with cancer are treated with radiation therapy, or radiotherapy. This treatment, which was developed at the turn of the 20th century, harnesses the power of radiation to kill cancer cells while trying to avoid harming nearby healthy tissue.

Radiation therapy has come a long way since its discovery. Recent advances have allowed doctors to develop a safer and more rapid delivery method. It's called hypofractionated radiotherapy, and it helps doctors cut courses of radiation almost in half, significantly reducing the total number of radiation treatments patients need. Having fewer radiotherapy sessions can improve patients' quality of life—fewer treatment sessions may mean fewer unpleasant side effects, such as the skin irritation, loss of appetite, nausea and fatigue so often associated with cancer treatment. It also means fewer trips to the cancer center.

"In some cases, a higher dose delivered in a smaller number of sessions can be a more effective treatment," reports radiation oncologist Roy Decker, MD, Ph.D., the director of Yale Medicine's Thoracic Radiotherapy Program, who treats lung cancer with hypofractionated radiotherapy.

While conventional radiation therapy delivers small amounts of radiation to a patient over nine weeks, hypofractionated radiotherapy delivers larger doses, or fractions, of radiation often in about five weeks and sometimes in just a few days. Stereotactic body radiotherapy (SBRT), a precise, high-dose form of hypofractionated radiotherapy, allows physicians to treat cancer in just one to five treatments.

In part, rapid radiation treatments are effective because the advanced technology helps physicists to calculate the right dose of radiation—and to precisely position the patient to receive it, so that only tumors are targeted. The goal is to leave as many healthy surrounding cells as possible untouched by radiation.

"Our ability to preserve a patient's quality of life improves with each advance in radiation technology," says radiation oncologist James Yu, MD, director of the Prostate & Genitourinary Radiotherapy Program.

Advances include high-tech computing software, technology that helps protect neighboring body parts from irradiation and 4-D scanning for treatment planning. "That ability is better than it was five years ago, and leaps and bounds beyond what we were able to do 10 years ago," Dr. Yu says.

Rapid radiation therapy, however, isn't an option for all patients—or even all cancers. At Yale Medicine, radiation oncologists prescribe hypofractionation for eligible patients being treated for certain prostate, gastrointestinal, lung and breast cancers.

Rapid radiation therapy for prostate cancer

Treatment times: Standard treatment is a course of 44 treatments given over nine weeks, says Dr. Yu. With hypofractionated radiotherapy, patients are given five treatments over two weeks.

New advances: Radiotherapy is a common treatment for advanced prostate cancers. However, radiation can damage the rectum, which is close to the prostate. Protecting the rectum is important; if damaged, a man may experience incontinence.

New technologies have "opened the door to safe, rapid treatment of prostate cancers," says Dr. Yu. One of them, SpaceOAR, is essentially a gel spacer that helps keep the rectum away from the prostate during radiation treatment. "It gives us one more level of safety—we are able to place fluid between the prostate and rectum, effectively protecting the rectum from very high doses of radiation," says Dr. Yu.

Doctors at Yale Medicine also use advanced technology to track the natural movement of the prostate during radiation treatment. It's a 4-D tracking system that uses micro-sized transponders, which are implanted into the prostate by a urologist during a quick outpatient procedure. If the prostate moves during treatment, the transponders set off an alarm that alerts the radiation oncology team. Treatment is automatically stopped until the technicians make necessary adjustments in order to protect the areas surrounding the prostate, especially the rectum and bladder.

"We are traditionally conservative when it comes to changing treatment schema for prostate cancer, given our wariness about side effects," Dr. Yu says. "However, by integrating SpaceOAR and radiofrequency tracking, we were convinced that we could safely deliver prostate SBRT treatment. And it's going very well."

Who is eligible: "Rapid radiotherapy is possible for most patients," Dr. Yu says. Exceptions include men with severe urinary symptoms (more rapid treatments have slightly higher short-term urinary side effects, he says, such as inflammation and urinary obstruction). Also, this method is not used for men who need androgen deprivation therapy (a hormone therapy that suppresses testosterone) or who need radiation to regional lymph nodes.

Rapid radiation therapy for gastrointestinal cancer

Treatment times: Gastrointestinal (GI) cancers occur in the esophagus, stomach, biliary system, pancreas, small intestine, large intestine, rectum and anus. With standard radiation treatment, patients receive treatment five days a week for about six weeks. SBRT, however, reduces treatments to a total of five high-dose fractions in all. This faster treatment approach also eliminates the need for concurrent chemotherapy.

New advances: "We are using 4-D CT scans for treatment planning," says Kimberly Johung, MD, director of the Gastrointestinal Radiotherapy Program, who explains that the scan is essentially a video that shows the motion of a tumor as the patient breathes. "These 4-D planning CT scans allow the radiation field to be focused on the precise area that tumors occupy during the respiratory cycle." She explains that her department also uses technology to limit tumor motion from breathing, and to track the motion of tumors during treatment.

Who is eligible: For patients who aren't receiving chemotherapy, SBRT is a treatment option in cases where the pancreatic cancer is inoperable or can only be partially removed during surgery, or for patients who are unable to have surgery for other medical reasons. It's also an option for patients who have a tumor reoccur in the same area after surgery. SBRT is also used in patients with primary liver tumors (such as hepatocellular carcinoma and cholangiocarcinomas) and for patients with a limited number of liver metastases.

Rapid radiation therapy for lung cancer

Treatment times: Traditionally, patients with early-stage lung cancer receive about seven weeks of radiation therapy. That time can be reduced to just three to five treatments over two weeks, and patients with advanced cancer that has not metastasized can be treated in about four weeks, says Dr. Decker.

New advances: "By using high-precision, on-board imaging technology that offers the ability to target tumors more accurately, we can deliver higher radiation doses in a shorter number of treatments," he says.

Who is eligible: Patients with cancer limited to the chest, who are not going to receive chemotherapy, may be candidates for hypofractionated radiotherapy.

Rapid radiation therapy for breast cancer

Treatment times: For early-stage breast cancer, standard care consists of either having a mastectomy or breast conservation therapy (also known as breast-conserving surgery or a lumpectomy) followed by five to seven weeks of radiation to the breast. For some patients, hypofractionated radiotherapy is now being recommended. "Breast-conserving surgery combined with hypofractionated radiation delivered in three to four weeks has been demonstrated in multiple clinical trials to be as effective as the standard fractionation course of five to seven weeks of radiation to the breast," says Meena Moran, MD, who is the director of Yale Medicine's Breast Cancer Radiotherapy Program. The side effects of treatment with the shorter course are also equivalent to, if not better than, standard treatment.

The hypofractionated radiation therapy treatment course for breast cancer consists of delivering a slightly larger daily dose of radiation five days a week, with about 15 fractions over four weeks, instead of about 33 fractions over seven weeks. "Ultimately, the total dose delivered with hypofractionated therapy is equivalent and produces similar outcomes and side effects," explains Dr. Moran.

New advances: A technology called Deep Inspiration Breath-Hold (DIBH) makes breast radiotherapy safer for patients with left-sided breast cancers by decreasing the exposure of radiation to their heart. When radiation is targeting the whole breast or chest wall, the radiation beam destroys all tissue it comes in contact with. In left-sided breast cancer patients, portions of the heart and lungs situated under the rib cage are sometimes exposed to the radiation beam. With the DIBH technique, radiation is only delivered when the patient is taking a deep breath, and in a precise position, which expands the rib cage and moves the heart safely out of the way of the radiation beam.

Who is eligible: Hypofractionated whole breast irradiation is a recommended treatment approach for a select group of patients with early-stage breast cancer. Ask your radiation oncologist if you're a candidate for hypofractionated breast radiotherapy.

Thanks to hypofractionated radiotherapy, cancer treatments are becoming faster and easier for eligible patients with prostate, gastrointestinal, lung and breast cancers. And clinical trials are underway to determine if quicker treatment times would effectively treat other cancers, too.

"We are constantly looking for ways to improve the patient experience, not only making radiation more effective but also safer, and more convenient," Dr. Decker says.

Provided by Yale University

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