

How We Do It—A Prostate Cancer Patient Receives IMRT

by Nimisha Deb, M.D., and James Gerlog, R.T.(T)

WHEN A PATIENT with localized prostate cancer receives IMRT in the Department of Radiation Oncology at St. Luke's Hospital in Bethlehem, Pa., his first appointment is a meeting with the radiation oncologist who heads his treatment team. This physician explains the IMRT procedure to the patient in detail from start to finish. The patient's individual IMRT plan is then created by the radiation oncologist and the other members of the team, including a radiation therapist, a dosimetrist, and a medical physicist.

The next step is to perform a treatment simulation. First, the radiation therapist (RT) makes a thermoplastic cast of the patient's pelvis (called a "hip fix"), in which the patient will be immobilized during treatment. The RT places the patient on a fluoroscopic couch in the hip fix, images the prostate, and locates radiation portals that target the prostate volume. The locations of the radiation portals are drawn on the cast.

The next step is the CT scanner. The radiation oncologist takes the patient to the CT suite, places him in his marked hip fix, and performs a CT scan of the pelvis to determine how accurately the portals target the prostate. Adjustments are made as necessary, then the CT scan of the approved portals is sent to the computers in the radiation physics department where the actual treatment plan is developed based on the CT study. The physics team consists of the medical physicist and the dosimetrist, and they will decide how to send the maximum dose of radiation to the prostate and the minimum dose to the surrounding bladder, rectum, intestines, and pelvic bones. This typically involves five to eight different radiation portals, depending on the physician's prescription.

Once the radiation plan has been generated, the patient's radiation oncologist will review it to make sure the patient is getting the prescribed radiation dose. If the plan is correct, it is transferred to the linear accelerator and the patient is treated, in the hip fix, five days a week for seven to eight weeks.

Each aspect of the treatment plan is checked by taking verification films. To make sure the patient is in the correct position on the treatment table, X-rays are

taken from every assigned radiation portal and compared to the plan and the simulator films before the therapeutic beam is turned on. The position of all radiation therapy patients at our clinic is checked regularly, but IMRT patients have more films to review because more beams are involved. IMRT patients are also checked more often (twice the first week and once a week thereafter if their internal positions remain stable compared to their baseline films).

Other than performing added position rechecks and testing the beams in the morning when the machines are brought online, radiation therapists do no extra work when they administer IMRT treatment. No extra shielding is involved, and the patient spends no more time in the radiation department or on the treatment table than patients receiving more conventional types of radiation therapy.

A lot more work takes place in the physics suite, however. Planning IMRT treatment takes a minimum of three times as long as 3D-CRT or more conventional therapies because there are usually more radiation portals and because the therapeutic beam is constantly moving instead of staying still. Every movement of the beam requires a separate calculation. 3D-CRT beams are square and static. These static blocks overlap to make the treatment pattern, which stays the same the entire time the patient is on the table. An IMRT beam is modified by mechanical "leaves" 5 mm apart, moving in and out through five to eight different portals to shape the beam to the precise dimensions of the patient's prostate. IMRT allows us to increase the amount of tumoricidal radiation we administer, decrease the amount of radiation absorbed by normal tissues, boost the curative effect of the treatment we provide, and reduce the number and severity of the side effects patients experience. ☐

Nimisha Deb, M.D., is chair of the Department of Radiation Oncology at St. Luke's Hospital in Bethlehem, Pa. James Gerlog, R.T.(T), is a staff therapist in the same department.