IGRT

Frequently Asked Questions

How does radiation therapy work?

Cancer cells grow and divide more rapidly than many of the normal cells around them. High doses of radiation can kill cells or damage their ability to reproduce. Radiation has been shown to be particularly effective in killing cancer cells and shrinking tumors. Although some normal cells are affected by radiation, most normal cells recover more fully from the effects of radiation than do cancer cells.

What is Dynamic Targeting® IGRT?

Dynamic Targeting IGRT (image-guided radiotherapy) involves using a variety of digital imaging techniques to pinpoint the exact location of a targeted tumor while the patient is in the treatment position, just prior to each daily treatment. It is the most advanced—and most precise—form of radiation therapy currently available. This precision is very important because tumors are not stationary. They can shift and move slightly between treatments, and even during treatments due to normal physiological processes, such as breathing. IGRT uses advanced imaging techniques to verify the patient's exact position and the tumor's precise location at the moment of treatment. Dynamic Targeting IGRT is a radiotherapy treatment approach that utilizes multiple imaging and motion management techniques for ultra-accurate tumor targeting.

With Dynamic Targeting® IGRT, clinicians can deliver more tightly focused and precise beams to cancerous tumors.

Why would I want to be treated with IGRT?

Because it enhances radiotherapy treatment precision, IGRT allows physicians to escalate the radiation dose to cancer cells while keeping the dose to surrounding tissues as low as possible. This increases the chances of eradicating the tumor and minimizing treatment side effects.

What kind of radiation is used in IGRT?

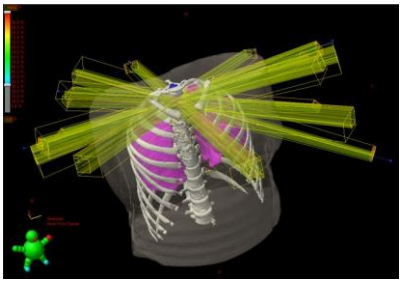
Currently, photons (X-rays) are used to deliver IGRT. The radiation is generated by a machine called a medical linear accelerator. This machine stands approximately nine feet tall, is nearly 15 feet long and can be rotated around the patient with great precision. Operationally, microwave energy, similar to that used in satellite television transmission, is used to accelerate electrons to early the speed of light. As they reach maximum speed they collide with a tungsten target which, in turn, releases photons, or X-rays.

Does radiation therapy expose people to radioactive substances?

Many people, when they hear the word "radiation," think immediately of radioactive substances. However, no radioactive substances are involved in the creation of X-rays or electrons by a medical linear accelerator. When a linear accelerator is switched "on," radiation is produced and aimed directly at cancer cells. Then, like a flashlight, when the machine is switched off, there is no more radiation—none is "stored" or "transported."

What happens when a person is treated with IGRT?

IGRT treatment involves three basic steps: diagnosis, treatment planning and delivery. As part of diagnosis, physicians generate three-dimensional diagnostic images (usually CT or MRI) of the patient's anatomy and use these to specify the dose of radiation each area will receive. In some cases, treatment planning includes a simulation session to further localize the cancer and finalize the radiation treatment plan.



A spinal tumor treatment plan using Dynamic Targeting® IGRT technology. The radiation beams converge to deliver high doses directly to the targeted tumor while avoiding the sensitive spinal cord.

Patients receive their IGRT treatments according to various schedules, usually five days a week for six or seven weeks. Each treatment takes ten to fifteen minutes.

What is the IGRT process like?

The IGRT process is similar to a typical radiation treatment, except that it includes an additional imaging step just prior to each daily treatment. Typically, after conducting a physical exam and a medical history review, the radiation oncologist determines an individualized course of treatment for each patient.

Treatment Preparation

Most cases require a treatment preparation session. Special molded devices that help the patient maintain the same position every day are sometimes developed at this point. Colored, semi-permanent ink may be used to mark the patient's skin, to assist in positioning the patient for treatment by aligning the radiation equipment with the targeted area. A special CT scan in the treatment position is sometimes taken, for use as a reference image later on in the process. The treatment preparation session might take from thirty minutes to an hour and the CT scan might take an additional 15-30 minutes.

Following the CT scan, the radiotherapy treatment planning process usually takes several days. When the plan is complete, the patient is given an appointment to begin radiation treatments.

Treatment Delivery

The first IGRT treatment session is sometimes longer than subsequent ones so that additional X-ray films and checks can be done. A typical treatment session lasts about 15 minutes.

In the treatment room, the radiation therapist uses the marks on the patient's skin to locate the treatment area. The patient is positioned on a treatment table. Sometimes, special molded devices are used to help with rough positioning.

The radiation therapist leaves the treatment room and remotely controls a digital On-Board Imager® kV imaging system to fine-tune the patient's position and move the treatment couch into final position. The On-Board Imager rotates around the patient to take digital images of the targeted area. Usually two or more images are taken from different angles. A complete rotation of the machine may be used to generate a three-dimensional image. These images are then used to guide the final adjustments of the treatment couch.

Although the patient is alone in the treatment room, he or she can be seen on a television screen or through a window in the control room. The therapist can talk with the patient through an intercom. Patients do not see or hear the radiation and usually do not feel anything.

Who gives the treatment?

A doctor who has had special training in using radiation to treat disease--a **radiation oncologist**-prescribes the type and amount of treatment that best suits a particular patient's needs. The radiation oncologist works closely with other doctors and also heads a highly trained health care team. This team often includes: 1) a **radiation physicist** who participates in the planning process and ensures that the machines deliver the right dose of radiation, 2) a **dosimetrist**, who plans the treatment with the oncologist and the physicist, 3) a **radiation therapy nurse**, who provides nursing care and helps patients learn about treatment and how to manage any side effects, and 4) a **radiation therapist**, who sets the patient up for treatment and runs the equipment that delivers the radiation.

Varian's On-Board Imager® kV imaging system gathers images, pinpointing the exact tumor location just prior to treatment.

How long is a course of treatment?

Radiation therapy usually is given five days a week for six or seven weeks. When radiation is used for palliative care, the course of treatment lasts for two to three weeks. For each radiation therapy session, the patient is in the treatment room for about 15 to 30 minutes. These types of schedules, which use small amounts of daily radiation rather than a few large doses, help protect normal body tissues in the treatment area. Weekend rest breaks allow normal cells to recover. The total dose of radiation and the number of treatments a patient needs depend on the size and location of the cancer, the type of tumor, the patient's general health and other factors.

What are the effects of treatment?

External radiation therapy does not cause a patient's body to become radioactive. Patients need not avoid being with other people because of treatment. Even hugging, kissing, or having sexual relations with others poses no risk to them of radiation exposure.

Side effects of radiation therapy most often are related to the area that is being treated. Most side effects that occur during radiation therapy, although unpleasant, are not serious and can be controlled with medication or diet. They usually go away within a few weeks after treatment ends. With Dynamic Targeting IGRT, side effects are minimized, and some patients have no side effects at all.

Is IGRT Expensive?

Treatment of cancer with radiation can be costly. It requires very complex equipment and the services of many health care professionals. The exact cost of your radiation therapy will depend on the type and number of treatments you need.

Medicare does provide additional reimbursement for the various steps involved in delivering IGRT, whether the treatment occurs in a hospital outpatient environment or in a freestanding outpatient clinic. Many health insurance policies cover charges for radiation therapy. It's a good idea to talk with your insurer or with your doctor's office staff or the hospital business office about your policy and how expected costs will be paid.

How is Varian's Dynamic Targeting IGRT different from other forms of image-guided radiation therapy?

Varian's technologies for delivering Dynamic Targeting IGRT include an On-Board Imager for generating high-quality digital images of the targeted area just prior to treatment, as well as a respiratory gating system for coordinating treatment with the patient's breathing cycle. The On-Board Imager gives clinicians three powerful ways of imaging a patient's anatomy prior to treatment:

A patient is positioned for radiation therapy treatment using Varian's On-Board Imager® kV imaging system.

- In "radiographic" mode, the imager generates two-dimensional X-ray images that show detailed bony anatomy and any implanted fiducial markers, such as gold seeds, that have been placed into the tumor area to facilitate visualization. The device can take the data from these images and calculate how much the patient should be shifted in three-dimensional space in order to bring the tumor directly into the path of the treatment beam.

- In "fluoroscopic" mode, the On-Board Imager generates a moving sequence of images that show how the anatomy is moving over time, usually due to the patient's respiration. By analyzing these images, doctors can determine the optimal window in a patient's breathing cycle for delivering the treatment.

- Finally, in “cone-beam CT” mode, the On-Board Imager generates three-dimensional images that show soft-tissue structures (organs such as the prostate, or the tumors directly), and make it possible to check for changes in tumor size or position.

Also, because the Varian system is entirely integrated, information can be moved electronically and seamlessly from one part of the process to the next, improving safety and expediting the treatment process.

For more information, please visit www.varian.com.