

INTRODUCTION TO RADIATION THERAPY

Radiation therapy is the precise delivery of high-energy x-rays or other forms of radiation to treat disease, especially cancer. Radiation therapy, which is also sometimes called radiation oncology, may be used alone or in combination with surgery or chemotherapy drugs. For many types of cancer, radiation therapy is the treatment of choice for cure. For other cancers, it may be used to relieve the symptoms of cancer or to control its spread. The exact course of treatment is determined according to the type of cancer and its stage at the time of diagnosis. More than half of cancer patients in America receive radiation therapy at some point during their treatment.

How Does Radiation Therapy Work?

Radiation may be delivered to the body internally, by implanting radioactive materials inside the body at a tumor site, or it may be delivered externally, by directing beams of x-rays, gamma rays or atomic particles at a cancerous tumor. The information presented in this article focuses on external beam radiation.

Usually, the radiation delivered during external beam radiation is produced by a machine called a linear accelerator. This machine generates high-energy radiation by accelerating electrons to nearly the speed of light. The radiation produced by a linear accelerator contains so much energy that it is measured in millions of volts.

When this powerful form of radiation strikes human tissue, it damages cell DNA, causing the cells to die as they are about to divide. Healthy cells are able to adapt and regenerate, but malignant cells are not. Thus, a carefully planned series of accurate radiation therapy treatments can gradually shrink and destroy malignant tumor cells.

To minimize damage to healthy tissue that surrounds a tumor site, members of the radiation oncology team work together to ensure that the radiation dose is calculated carefully, that the radiation beam is targeted precisely, and that each radiation treatment is delivered accurately.

Preparation for Radiation Therapy

Before radiation therapy can begin, a radiation oncologist must prescribe the dose of radiation that is needed, taking into consideration the general health of the patient and the type and stage of the cancer. A radiation oncologist is a physician who uses radiation to evaluate and treat cancer patients. The radiation oncologist will work with a medical dosimetrist to develop a customized treatment plan that delivers the prescribed dose in the safest and most effective manner possible.

The next step in preparing for radiation therapy is called simulation. During simulation, x-rays are taken of the tumor site and the exact boundaries of the treatment area are identified. This area will be marked on your skin with long-lasting ink. These marks must stay on your skin throughout the entire treatment period, which may last four to eight weeks, because they show exactly where the radiation will be delivered.

For many patients, the next step is creation of a lead-alloy block that prevents healthy areas from receiving radiation. For example, in treating a patient for lung cancer, a physician would want to block out as much of the heart and healthy lung as possible. Blocks are made from a diagram drawn on the simulation x-ray. The block is attached directly to the linear accelerator, helping focus the radiation beam as precisely as possible for each patient.

Once these steps are completed, your treatments can begin. Most radiation therapy patients receive treatment three to five days a week for four to eight weeks. The total number of treatments depends on the tumor's location and size. The treatments are administered by radiation therapists, highly skilled medical specialists educated in physics, radiation safety, patient anatomy and patient care.

During the Treatment

Radiation therapy treatments take only a few minutes each day. The radiation therapist will help you onto the treatment table, positioning you so that the marks put on your skin during simulation match the radiation field. The radiation dose then will be administered. It usually is delivered from several different angles so that healthy tissue is exposed to a lower total dose of radiation and to give a more uniform dose to the treatment area. Sometimes an additional “boost” or higher dose of radiation is given to the area where the cancer was found.

It’s important that you remain as still as possible throughout the treatment. The radiation therapist will not be in the room with you while the treatment is taking place, but will be able to see and hear you from an adjacent control area.

To get the full benefit from radiation therapy, you need to complete all your treatments as scheduled. Throughout your course of therapy, you will have regular physical exams and blood tests to check your general health.

Please remember that the material presented here is for informational purposes only. If you have specific questions about a medical imaging procedure, contact your physician or the radiology department of the institution where your test will be performed.