

Understanding Radiation Therapy



*For Patients, Care Givers and the
General Public*

Introduction to Radiation Oncology

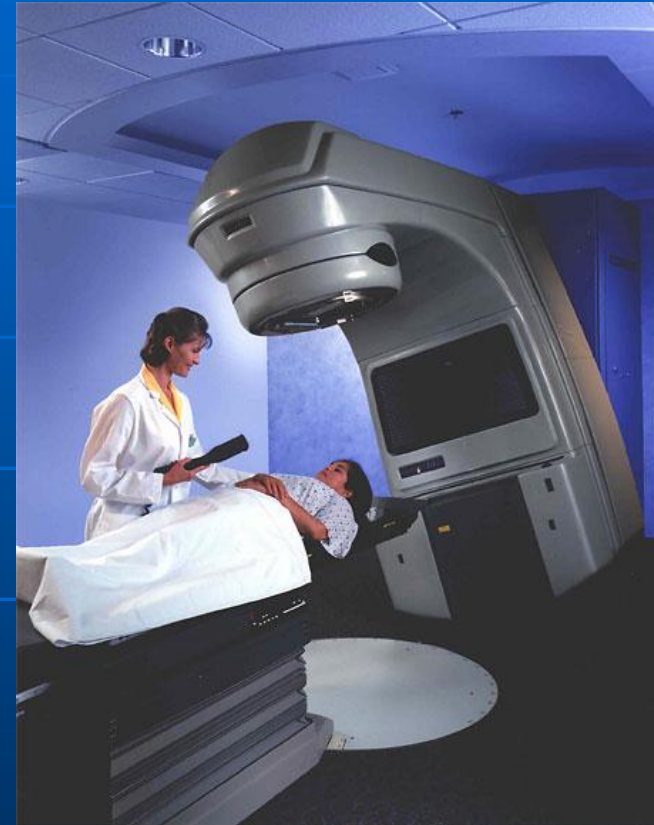
- Radiation therapy, or radiotherapy, is the use of various forms of radiation to safely and effectively treat cancer and other diseases.
- Radiation therapy has been an effective tool for treating cancer for more than 100 years.
- About two-thirds of all cancer patients will receive radiation therapy as part of their treatment.
- Radiation oncologists are doctors trained to use radiation to treat cancer.



Patient being treated with modern radiation therapy equipment.

Brief History of Radiation Therapy

- The first patient was treated with radiation therapy in 1896, just two months after the discovery of the X-ray.
- Rapid technology advances began in the early 1950s, with the invention of the linear accelerator.
- Planning and treatment delivery advances have enabled radiation therapy to be more effective and precise, while decreasing the severity of side effects.



The linear accelerator is still used today to deliver external beam radiation therapy.

How Does Radiation Therapy Work?

- Radiation therapy works by damaging the DNA within cancer cells, destroying their ability to reproduce and causing the cells to die.
- When the damaged cancer cells are destroyed by radiation, the body naturally eliminates them.
- Normal cells can be affected by radiation, but they can repair themselves in a way cancer cells cannot.



When is radiation used?

- The best treatment plan for each patient is frequently determined by a team of doctors, including a radiation oncologist, a medical oncologist and a surgeon.
- Sometimes radiation therapy is the only treatment a patient needs.
- Other times, it is combined with other treatments, such as surgery and chemotherapy.



Tumor boards meet to discuss comprehensive patient treatment plans

Is Radiation Therapy Safe?

- New advances in technology and treatment delivery continue to make radiation safe and effective.
- A team of medical professionals develop and review the treatment plan for each patient to minimize side effects and assure that the area where the cancer is located is receiving the dose of radiation needed.
- The treatment plan and equipment are constantly reviewed to ensure the proper treatment is being given.



Why Use Radiation Therapy?

■ To cure cancer:

- Destroy tumors that have not spread to other body parts.
- Reduce the risk that cancer will return after surgery or chemotherapy.
- Shrink the cancer before surgery.

■ For palliation (to reduce symptoms):

- Shrink tumors affecting quality of life, like a lung tumor that is causing shortness of breath.
- Alleviate pain or neurologic symptoms by reducing the size of a tumor.

Meet the Radiation Oncology Team

A team of highly trained medical professionals work together to make sure you receive the best possible care while you are undergoing radiation therapy.

■ **Radiation Oncologist**

- Oversees the radiation therapy treatments, including working with other members of the radiation therapy team to develop the treatment plan and ensure that each treatment is given safely and accurately.

■ **Medical Radiation Physicist**

- Ensures that complex treatment plans are properly tailored for each patient and directs quality control programs for equipment and procedures.

Meet the Radiation Oncology Team, cont.

■ **Dosimetrist**

- Works with the radiation oncologist and medical physicist to calculate the proper dose of radiation given to the tumor.

■ **Radiation Therapist**

- Administers the daily radiation under the radiation oncologist's prescription and supervision.

■ **Radiation Oncology Nurse**

- Cares for the patient and family by providing education, emotional support and tips for managing side effects.

■ **Additional Members of the Team**

- Social workers, nutritionists, dentists, physical therapists and patient navigators may also assist in a patient's care during their treatment.

What to Expect

- Referral
- Consultation
- Simulation
- Treatment Planning
- Treatment Process

Referral

- A cancer is diagnosed.
- The diagnosing or referring physician reviews potential treatment options with patient.
- Treatment options may include radiation therapy, surgery, chemotherapy or a combination.



It is important for a patients to ask their referring physician about all possible treatment options available to them

Consultation

- Radiation oncologist discusses the radiation therapy treatment options with patient.
- A treatment plan is developed.
- Care is coordinated with other members of patient's oncology team.



The radiation oncologist will discuss with the patient which type of radiation therapy treatment is best for their type of cancer

Simulation

A CT scan of the area of the body to be treated with radiation. The CT images are reconstructed and used to design the best and most precise treatment plan.



- Patient is set up in treatment position on a dedicated CT scanner.
 - Immobilization devices may be created to assure patient comfort and daily reproducibility.
 - Reference marks or “tattoos” may be placed on patient.
- CT simulation images are often fused with other scans such as MRI or PET scans to create a treatment plan.

Treatment Planning

- The radiation oncologist works with the medical physicist and dosimetrist to create an individualized treatment plan for the patient.
- The treatment is mapped out in detail including the type of machine to be used, the amount of radiation that is needed and the number of treatments that will be given.



Radiation oncologist and dosimetrist creating a treatment plan

Treatment Process

- Each day the patient will check in at the cancer center for treatment.
- They will then be verified as the correct patient and be set up for their treatment.
- The radiation oncologist will monitor the treatments and the patient will meet with them weekly to discuss their treatment.



During their check in at the cancer center, a patient's identity will be verified.

How is Radiation Therapy Delivered?



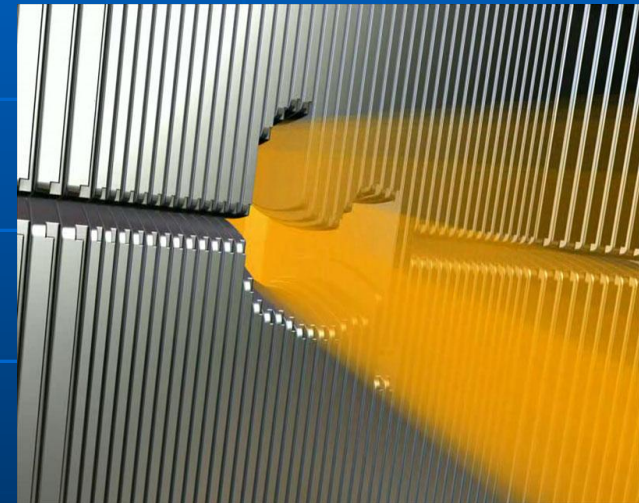
The type of treatment used will depend on the location, size and type of cancer.

- Radiation therapy can be delivered either externally or internally.
 - *External beam* radiation therapy typically delivers radiation using a linear accelerator.
 - Internal radiation therapy, called *brachytherapy*, involves placing radioactive sources into or near the tumor.

Types of External Radiation Therapy

The type of equipment used will depend on the location, size and type of cancer.

- **Three-dimensional conformal radiation therapy (3D-CRT)**
 - A technique where beams of radiation used in treatment are shaped to match the tumor and are delivered accurately from several directions.
- **Intensity modulated radiation therapy (IMRT)**
 - A form of 3-D CRT in which the physician designates specific doses of radiation that the tumor and normal surrounding tissues receive.



A multileaf collimator is used to shape the radiation beam to match the tumor, sparing surrounding healthy tissue

Types of External Beam Radiation Therapy

- **Proton Beam Therapy**

- A type of radiation therapy that uses high-energy beams (protons) rather than X-rays to treat certain types of cancer.
- Most commonly used in the treatment of pediatric, CNS and intraocular cancers.



Stereotactic Body Radiotherapy or Stereotactic Radiosurgery

- A specialized form of radiation therapy that focuses high-power energy on a small area of the body. Despite its name, radiosurgery is a treatment, not a surgical procedure.
- Radiosurgery generally implies a single high dose or just a few high dose treatments.

Internal Radiation Therapy

- Radioactive material is placed into tumor or surrounding tissue.
 - Also called brachytherapy.
 - Radiation sources are placed close to the tumor so large doses can damage the cancer cells.
 - Allows minimal radiation exposure to normal tissue.
 - Radioactive sources used are thin wires, ribbons, capsules or seeds.
 - These can be either permanently or temporarily placed in the body



Radioactive seeds for a permanent prostate implant, an example of low-dose-rate brachytherapy.

Permanent vs. Temporary Implants

- Permanent implants release small amounts of radiation over a period of several months
 - Examples include low-dose-rate prostate implants (“seeds”),
 - Patients receiving permanent implants may be minimally radioactive and should temporarily avoid close contact with children or pregnant women.
- Temporary implants are left in the body for several hours to several days
 - Patient may require hospitalization during the implant depending on the treatment site ,
 - Examples include low-dose-rate gynecologic implants and high-dose-rate prostate or breast implants,

Side Effects of Radiation Therapy

- Most side effects begin during the second or third week of treatment. Doctors and nurses may prescribe medications to help with these side effects.
- Side effects, like skin redness, are generally limited to the area receiving radiation.
- Fatigue is a common side effect for all cancer patients.
- Side effects may last for several weeks after the final day of treatment.



Side effects vary based on a patient's medical profile or diagnosis

Who is the Cancer Care Team?

All those involved with a patient during and after their care is part of the Cancer Care Team. This includes:

- The Treatment Team including
 - Physicians
 - Nurses
 - Radiation therapists
 - Physicists
 - Dosimetrists
 - Social workers
 - Receptionists
- Family and Friends

The Cancer Care Team, cont.

It is important for the Cancer Care Team to have an open dialogue throughout the treatment process.

- Always ask questions if you have them - there are no dumb questions.
- Always share your concerns – whether you are the patient or the caregiver, discuss your concerns with the medical team during the treatment consultations.
- Do your research – there are many good resources out there to help patients before, during and after their treatment.

For More Information...

Visit www.rtanswers.org

- To view information on how radiation therapy works to treat various cancers
- To find a radiation oncologist in your area
- For support resources



The screenshot shows the RTAnswers website homepage. At the top, there is a navigation bar with links for ABOUT US, DICTIONARY, SURVIVORSHIP, TREATMENT INFO, and RESOURCES. Below this, there is a large banner area. On the left, there is a section titled "TREATMENT INFORMATION" with a blue star icon and a link to "Learn More". Next to it is a pie chart showing "2/3 of all cancer is treated with radiation" with a link to "VIEW MORE STATISTICS". On the right, there is a photo of two medical professionals in white coats talking to a patient, with text stating: "Your radiation oncologist uses sophisticated medical equipment to make sure the radiation goes directly to your tumor while avoiding healthy organs." Below the banner, there are three main sections: "Feature Definition" with a link to "View more", "Spotlight" with a link to "View more", and "Find a Radiation Oncologist". The "Find a Radiation Oncologist" section contains a form with fields for Last Name, Company/Facility, City, State (dropdown), Zip Code, Distance (dropdown), Country (dropdown), Specialty (dropdown), and Languages (dropdown).