

# Understanding Radiation Therapy



*For Patients and the Public*

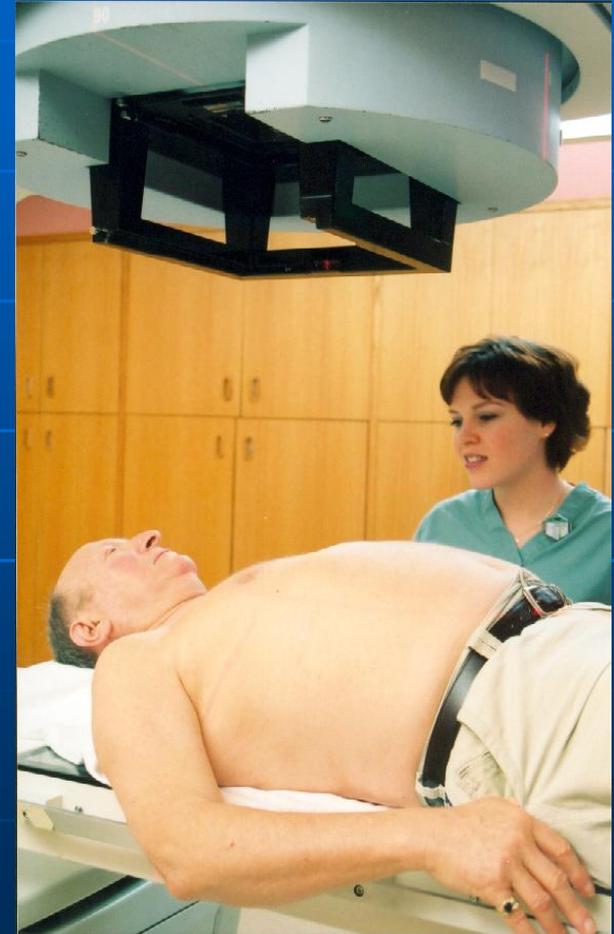
# Introduction to Radiation Oncology

- Radiation has been an effective tool for treating cancer for more than 100 years.
- Radiation oncologists are doctors trained to use radiation to eradicate cancer.
- About two-thirds of all cancer patients will receive radiation therapy as part of their treatment.



# What Is Radiation Therapy?

- Radiation therapy works by damaging the DNA within cancer cells and destroying their ability to reproduce.
- When the damaged cancer cells are destroyed by radiation, the body naturally eliminates them.
- Normal cells can be affected by radiation, but they are able to repair themselves.
- Sometimes radiation therapy is the only treatment a patient needs.
- Other times, it is combined with other treatments, like surgery and chemotherapy.



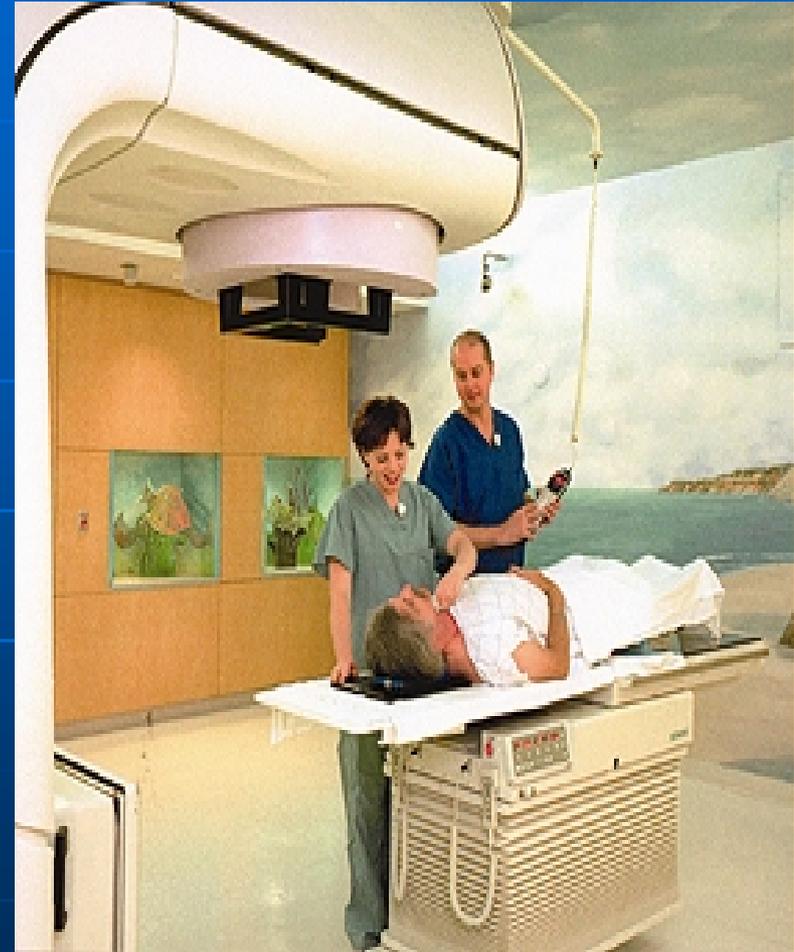
# Brief History of Radiation Therapy

- The first patient was treated with radiation in 1896, two months after the discovery of the X-ray.
- Back then, both doctors and non-physicians treated cancer patients with radiation.
- Rapid technology advances began in the early 1950s with cobalt units followed by linear accelerators a few years later.
- Recent technology advances have made radiation more effective and precise.

# Methods of Delivering Radiation Therapy



Early 1950s



Today

# How Is Radiation Therapy Used?



Radiation therapy is used two different ways.

- To cure cancer:
  - Destroy tumors that have not spread to other body parts.
  - Reduce the risk that cancer will return after surgery or chemotherapy.
- To reduce symptoms:
  - Shrink tumors affecting quality of life, like a lung tumor that is causing shortness of breath.
  - Alleviate pain by reducing the size of a tumor.

# Meet the Radiation Oncology Team

- **Radiation Oncologist**
  - The doctor who oversees the radiation therapy treatments.
- **Medical Radiation Physicist**
  - Ensures that complex treatment plans are properly tailored for each patient.
- **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 doctor's prescription and supervision.
- **Radiation Oncology Nurse**
  - Cares for the patient and family by providing education, emotional support and tips for managing side effects.



# Types of Radiation Therapy



- Radiation therapy can be delivered two ways – externally and internally.
  - External beam radiation therapy delivers radiation using a linear accelerator.
  - Internal radiation therapy, called brachytherapy or seed implants, involves placing radioactive sources inside the patient.
- The type of treatment used will depend on the location, size and type of cancer.

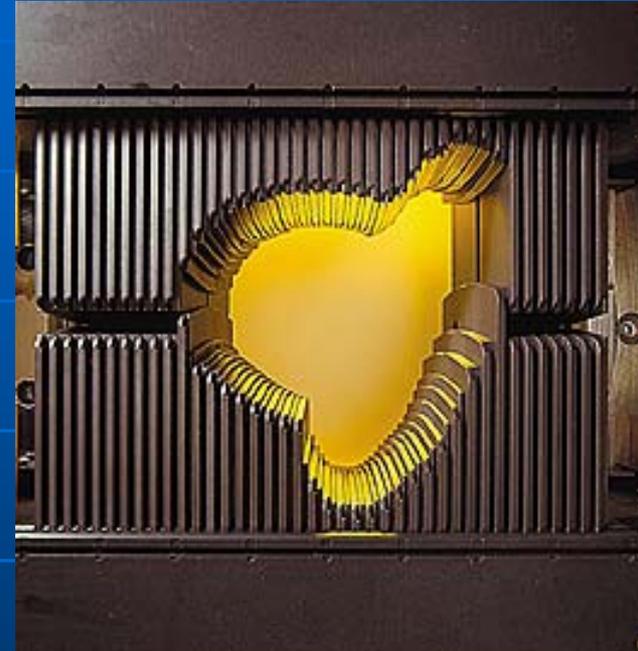
# Planning Radiation Therapy - Simulation

- Each treatment is mapped out in detail using treatment planning software.
- Radiation therapy must be aimed at the same target every time. Doctors use several devices to do this:
  - Skin markings or tattoos.
  - Immobilization devices – casts, molds, headrests.



# External Radiation Therapy

- Specialized types of external beam radiation therapy
  - **Three-dimensional conformal radiation therapy (3D-CRT)**
    - Uses CT or MRI scans to create a 3-D picture of the tumor.
    - Beams are precisely directed to avoid radiating normal tissue.
  - **Intensity modulated radiation therapy (IMRT)**
    - A specialized form of 3D-CRT.
    - Radiation is broken into many "beamlets" and the intensity of each can be adjusted individually.



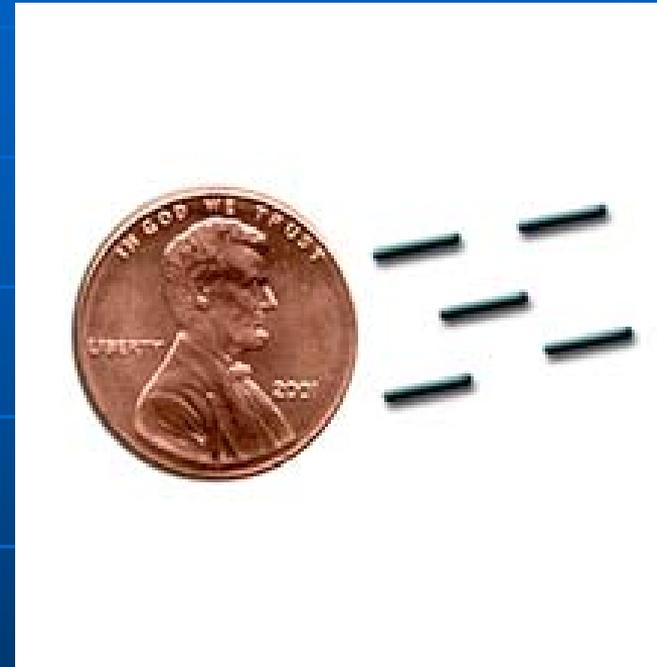
# External Radiation Therapy



- Proton Beam Therapy
  - Uses protons rather than X-rays to treat certain types of cancer.
  - Allows doctors to better focus the dose on the tumor with the potential to reduce the dose to nearby healthy tissue.
- Neutron Beam Therapy
  - A specialized form of radiation therapy that can be used to treat certain tumors that are very difficult to kill using conventional radiation therapy.
- Stereotactic Radiotherapy
  - Sometimes called stereotactic radiosurgery, this technique allows the radiation oncologist to precisely focus beams of radiation to destroy certain tumors, sometimes in only one treatment.

# Internal Radiation Therapy

- Places radioactive material into tumor or surrounding tissue.
  - Also called brachytherapy – brachy Greek for “short distance.”
  - Radiation sources placed close to the tumor so large doses can hit 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.



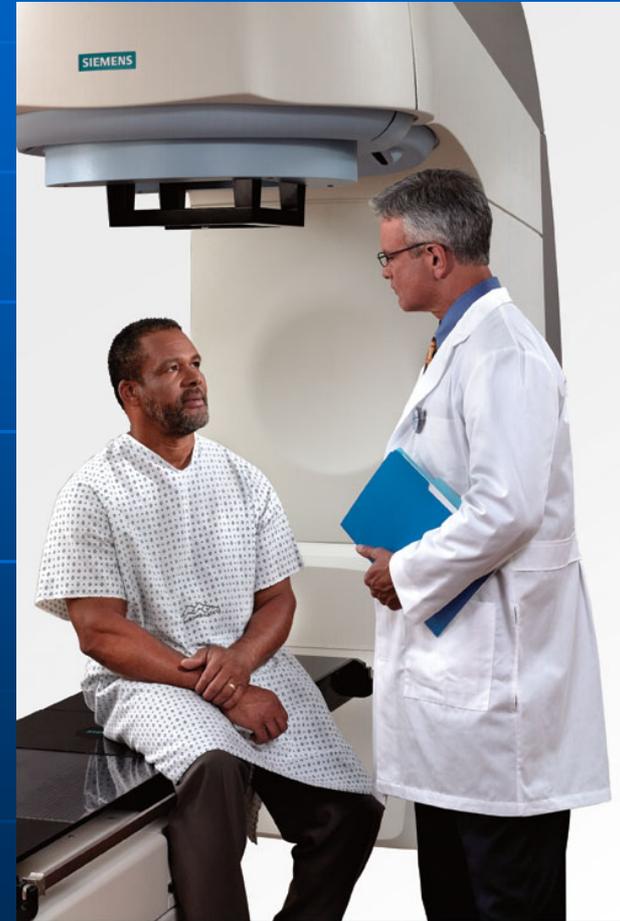
# Side Effects of Radiation Therapy

- Side effects, like skin tenderness, are generally limited to the area receiving radiation.
- Unlike chemotherapy, radiation usually doesn't cause hair loss or nausea.
- Most side effects begin during the second or third week of treatment.
- Side effects may last for several weeks after the final treatment.



# Is Radiation Therapy Safe?

- Many advances have been made in the field to ensure it remains safe and effective.
- Multiple healthcare professionals develop and review the treatment plan to ensure that the target area is receiving the dose of radiation needed.
- The treatment plan and equipment are constantly checked to ensure proper treatment is being given.



## More Information

- The American Society for Therapeutic Radiology and Oncology (ASTRO) can also provide more information on radiation therapy.
- Visit [www.astro.org/patient](http://www.astro.org/patient) for free brochures on how radiation therapy works to treat various cancers.

