

Radiation Therapy

Radiation therapy, or radiotherapy, is the use of high-energy particles or waves to kill or damage cells.

Radiation therapy is used to treat cancer, as well as some noncancer conditions. The goal of radiation therapy is to deliver a specific amount of radiation to a specific tumor (cancer) site. Radiation damages tumor cells and causes cell death. Because most of the radiation is aimed directly at the tumor, damage to surrounding normal cells is minimized but not completely avoided. Radiation therapy can be used alone or together with chemotherapy or surgery to treat different types of cancer. For example, radiation therapy can be used to shrink a tumor before surgery or used after surgery to decrease the chance of a tumor returning. Doctors who manage radiation therapy are called **radiation oncologists**, and they often work together with **medical oncologists** (doctors who manage chemotherapy) and surgeons.

Types of Radiation Therapy

- **External-beam radiation therapy** refers to radiation delivered from outside the body via a special machine inside which the patient lies.
- A special type of external-beam radiation therapy is **stereotactic body radiation therapy** or **stereotactic radiosurgery**. This method uses special technology to provide a very high dose of radiation to the tumor and minimizes radiation exposure to normal tissue. It is used only for certain types of tumors.
- Another special, newer type of external-beam radiation therapy is **proton radiotherapy**. This is used more commonly in children than in adults. In adults, it can sometimes be used for prostate cancer.
- **Brachytherapy** refers to radiation delivered from inside the body using radiation "seeds" implanted in the body. These seeds can be either temporary or permanent.
- **Systemic radiation therapy** refers to radiation delivered to the entire body. This is done by injecting a radioactive protein into the bloodstream or by swallowing a radioactive pill. An example is the radioactive iodine pill used to treat thyroid cancer.

How Radiation Therapy Is Given

Usually, radiation treatments are given Monday through Friday and may be given in a single dose, daily, or weekly, depending on the type of cancer being treated. Patients who have external-beam radiation therapy do not need to stay in the hospital overnight, but patients who have brachytherapy sometimes do.

Side Effects

Most of the short-term side effects from radiation therapy occur at the site of radiation, unlike chemotherapy, in which side effects can involve the whole body. Examples include

- Skin irritation
- Mouth soreness or trouble swallowing if the radiation area involves the head or neck
- Nausea, vomiting, or diarrhea if the radiation area involves the stomach or abdomen
- Decreased blood cell counts, if the radiation affects a large part of the bone marrow
- Fatigue, which can be a general side effect with any area of radiation

Some long-term side effects of radiation therapy may not become apparent for years or even decades after treatment. These mostly affect the heart and lungs and occur when the radiation area involves the chest.

Some patients are concerned about the general safety of radiation therapy. Radiation therapy is usually safe because radiation oncologists work with medical physicists to make sure that the total level of radiation exposure is not too high. Patients who receive external-beam radiation therapy will not be "radioactive" after treatment is finished. However, patients who get brachytherapy do hold a small amount of radiation in their bodies for a certain amount of time. During this time, they could possibly expose others to radiation. Talk to your doctor about specific questions or concerns you may have regarding radiation therapy.

FOR MORE INFORMATION

- American Society for Radiation Oncology
www.rtanswers.org/index.aspx

+ To find this and previous JAMA Patient Pages, go to the Patient Page link on JAMA's website at www.jama.com. Many are available in English and Spanish. A Patient Page on chemotherapy was published in the July 10, 2013, issue.

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Sources: American Society for Radiation Oncology
Halperin EC, Perez CA, Brady LW. *Perez and Brady's Principles and Practice of Radiation Oncology*. 5th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2008.

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