



A Guide to Radiation Therapy

More than half of everyone diagnosed with cancer will receive some form of radiation therapy. That's because radiation therapy is relatively safe and effective, and it may result in fewer physical side effects than other treatments, such as chemotherapy and surgery.

How radiation therapy works

Simply put, radiation is energy that travels as waves or extremely small particles. In radiation therapy, high doses of these invisible waves or particles are directed at cancer cells. The radiation damages the cells' DNA, causing them to eventually die or stop multiplying.

Sometimes cancer can be cured using radiation therapy alone or combined with chemotherapy or surgery. In other cases, radiation therapy cannot kill all the cancer cells, but it can shrink the tumor to relieve cancer-related symptoms. If radiation therapy cannot cure or shrink a tumor, it may be able to at least stop or slow the tumor's growth.

Radiation therapy can be external beam (delivered from the outside by a machine) or internal (delivered by a radioactive material embedded in or near the tumor). Both treatment methods are considered "local" because they take place at the site of the cancer, rather than throughout the body. The type of radiation therapy used depends on the type of cancer, its size and location, and other factors.

External beam radiation therapy

In *external beam radiation therapy*, a radiation-generating machine aims a beam of radiation at the cancer. The beam, which is painless, passes through the skin and hits the tumor.

Traditional radiation therapy uses

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multiple beams of energy that come from different directions and intersect at the tumor. Ideally, only the tumor receives the damaging dose of energy delivered by these intersecting beams, but the radiation can also harm healthy tissue nearby.

A newer technology called *intensity modulated radiation therapy* uses a three-dimensional map of the cancer to deliver the energy more precisely. Based on this map, a computer calculates different beam intensities and directions that allow the energy to be concentrated inside the tumor. Another newer technology is *proton beam radiation therapy*, which uses a beam of energy that goes into the tumor and then stops. Both intensity modulated radiation therapy and proton beam radiation therapy have much less potential for damaging the healthy tissue surrounding a tumor.

Usually, external beam radiation therapy is given in short, daily sessions for 2–10 weeks. The therapy itself is painless, and it doesn't make the patient radioactive.

Internal radiation therapy

Unlike external beam therapy, *internal radiation therapy* typically requires a small incision so the doctor can place small bits of radioactive material in or near the tumor. Those radioactive implants—often referred to as "seeds"—give off a cancer-killing dose of radiation for a few days or weeks (depending on the type of seed used) and then become harmless. The doctor may or may not have to remove the seeds after therapy.

Since internal radiation therapy involves an invasive procedure, a local anesthetic may be used to reduce discomfort. The radiation itself cannot be felt. However, depending on the dose, a brief hospital stay may be required while the radioactivity subsides.

Side effects

Doctors are getting better all the time at avoiding damage to healthy cells from radiation therapy. However, there is still a chance that healthy tissues will be harmed. This can cause a wide range of side effects, depending on the type of treatment:

- External beam radiation can cause skin irritation wherever the radiation enters the body. This side effect is common and usually temporary. Fatigue is another common side effect of radiation therapy, regardless of the site being treated.
- Radiation for head and neck cancers can result in mouth irritation, loss of taste, discomfort, and hair loss.
- Radiation for cancers in the pelvic area may cause reduced fertility, bladder problems, and digestive problems.
- Radiation for cancers in the breast and chest area can result in shortness of breath, problems swallowing, and changes in the breast.
- Radiation for cancers in the abdomen may cause vomiting, nausea, and diarrhea.

There is also a small chance that radiation therapy may cause a new cancer to develop years later. Patients considering radiation therapy should discuss with their doctors how this risk and others compare to the potential benefits. ●

Sources: *The National Cancer Institute and the American Cancer Society*

For more information, talk to your physician, or:

- call askMDAnderson at 1-877-632-6789
- visit www.mdanderson.org

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