
Radiation for a Brain Tumor

The goal of radiation therapy is to slow or control tumor growth. In some cases, it may fully destroy a tumor. Or it may be used to ease symptoms. Radiation therapy uses painless X-rays or particles to destroy tumor cells. Radiation therapy may sometimes be used as your only type of treatment. Or it may be combined with surgery or chemotherapy. If your healthcare provider advises radiation therapy for you, an important question is how the radiation will be delivered. You may have one of the methods below.

External beam radiation

This type of radiation is delivered from a large machine outside of the body. It moves around you and aims the radiation at the tumor. External beam radiation is the most common type of radiation used for brain tumors. There are several methods used to deliver external radiation. They all have the goal of directing all radiation at the tumor. This spares healthy tissue as much as possible.

- **3-D conformal radiation therapy (3DCRT).** This treatment sends radiation beams from many angles to copy the shape of the tumor. This helps to reduce damage to nearby tissues.
- **Intensity modulated radiation therapy (IMRT).** This type of treatment uses a computer to help determine the best angles and number of beams to be used to best treat the cancer while protecting nearby tissues. The beam can be shaped during the treatment to supply a high focus.
- **Whole brain radiation.** This is used to treat the entire brain. It may be needed if you have more than one tumor. Or it may be used if cancer has spread through the brain or is in the cerebrospinal fluid (CSF) around the brain. It can also be used to prevent tumor spread for cancers that have a high risk of going to the brain.
- **Stereotactic radiosurgery.** There's no surgery or cutting with this treatment. It's done with a high dose of radiation that's aimed right at the tumor from many angles. It may be given in one high dose or as a few lower doses (often 3 to 5 treatments). Since it's very focused and precise, the normal tissue around the tumor gets little or no radiation. The different trade names you may be familiar with like Gamma Knife, X-Knife, CyberKnife, Truebeam, or Halcyon refer to the manufacturer.
- **Proton therapy.** This type of radiation uses charged particles instead of X-rays to deliver the treatment. Proton beams may allow a more tailored radiation treatment and is often used in certain pediatric brain cancers. Proton energy is released at the very end of the beam. This may cause less damage to the tissues that the beam passes through to get to the tumor, so normal tissue is spared. This type of treatment is not available everywhere and is still under clinical studies.

Internal radiation (brachytherapy)

This type of radiation is occasionally used for brain tumors. The source of radiation is inserted surgically into or near the tumor. Small radioactive seeds or a balloon filled with radioactive liquid may be placed during brain surgery. The radiation only travels a short distance, so damage to nearby tissue may be reduced. Sometimes radioactive seeds may be removed after a few minutes or after a few days. Weaker seeds may be left in. They become inactive over time.

Side effects of radiation therapy

Side effects tend to show up a few weeks after starting radiation therapy. They vary depending on factors such as:

- Type and strength of radiation used
- Tumor type
- Tumor size
- Where the tumor is located

Short-term side effects can include:

- Brain and tumor swelling (called edema)
- Fatigue
- Nausea
- Vomiting
- Infection
- Dizziness
- Headache
- Seizures
- Hair loss
- Hearing loss
- Skin changes in the treated area

Long-term side effects can include:

- Memory loss
- Trouble thinking
- Personality changes
- Permanent hair loss in the treated area
- Hormonal changes
- Death of nearby tissue (necrosis), which may need treatment including surgery