

RADIATION THERAPY

Radiation therapy, sometimes called **radiotherapy**, involves the use of radiation to treat cancer and other diseases. Specially trained doctors called **radiation oncologists** use radiation to cure cancer, to stop a tumor from growing, or to relieve symptoms such as pain.

Radiation has been used to treat cancer and other diseases for more than 100 years. **External beam radiation therapy** is the most common method for giving radiation therapy. Similar to an X-ray, external beam radiation therapy is delivered from a machine that doesn't touch your skin. Your doctor directs the radiation beams toward the tumor inside your body to destroy it. This works because tumor cells are unable to repair themselves after being damaged by radiation, unlike normal cells. Typical external beam radiation is given daily for several weeks. This allows doctors to deliver enough radiation to the cancer cells in your body, while allowing healthy cells time to recover.

STEREOTACTIC RADIATION

A specialized type of external beam radiation therapy called **stereotactic radiation** uses focused radiation beams targeting a well-defined tumor, relying on detailed imaging, computerized three-dimensional treatment planning, and precise treatment set-up to deliver the radiation dose with extreme accuracy (i.e., stereotactically).

There are two types of stereotactic radiation:

1. **Stereotactic radiosurgery (SRS)** refers to a single or several stereotactic radiation treatments of the brain or spine. **SRS is delivered by a team involving a radiation oncologist and a neurosurgeon.**
2. **Stereotactic body radiation therapy (SBRT)** refers to a one or several stereotactic radiation treatments within the body, excluding the brain or spine.

SRS/SBRT is best for very small tumors. Doctors use specialized scans to pinpoint exactly where within the body the tumor target is located. A customized holder may be used to keep the body perfectly still during treatment, or the treatment machine may have the ability to adjust for patient motion such as during breathing. These techniques allow doctors to give a high dose of radiation to the tumor in a short amount of time. **SRS/SBRT is a type of external beam radiation therapy that can be completed in one to five days rather than over several weeks.**

The advantage of SRS/SBRT is it delivers the right amount of radiation to the cancer in a shorter amount of time than traditional treatments. Plus the treatment is delivered with extreme accuracy, minimizing the effect on other nearby organs.

A disadvantage of SRS/SBRT is that this technique is suitable only for small, well-defined tumors that can be seen on imaging such as CT or MR scans, thus this approach is not suitable for all situations. Also, the amount of radiation that may be safely delivered may be limited if the cancer is located close to a sensitive normal structure, such as the spinal cord or bowel.

OTHER NAMES FOR STEREOTACTIC RADIATION

There is sometimes confusion about the branding of equipment separate from the terminology of SRS or SBRT. Stereotactic radiation may be delivered by a number of different devices; brand name stereotactic treatment machines you may hear mentioned include Axesse, CyberKnife, Gamma Knife, Novalis, Primatom, Synergy, X-Knife, TomoTherapy, or Trilogi. It is important not to confuse these brand names with the actual type of stereotactic radiation under consideration.

HOW ARE THESE TREATMENTS ALIKE?

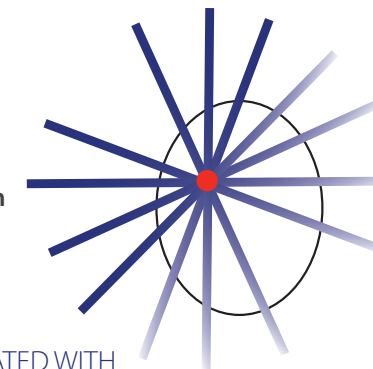
- Use multiple narrow radiation beams.
- Target small, well-defined areas with precision.
- Use immobilization devices or techniques that limit or monitor and adjust for any movement during treatment.
- Give high doses of radiation safely and accurately over just a few treatments (usually one to five sessions overall).

HOW ARE THESE TREATMENTS DIFFERENT?

- Different capabilities: Some stereotactic systems can treat only tumors in the head, others in the head and neck, and others anywhere in the body.
- Different schedules: Some stereotactic treatments may be best given in a single session, others may be given in a few treatments over several days.
- Different ways to achieve accuracy: Different systems use different ways to keep patients in the correct position. Some use customized holders that keep the patient immobile, and others have the machine track any movement of the patient.



Stereotactic treatments direct multiple narrow beams of radiation toward a tumor.



CONDITIONS TREATED WITH STEREOTACTIC RADIATION

Stereotactic radiosurgery (SRS) is used to treat conditions involving the brain or spine including:

- Cancers that start in the brain (gliomas and other primary brain tumors).
- Cancers that spread to the brain (brain metastases).
- Benign tumors arising from the membranes covering the brain (meningiomas).
- Benign tumors of the inner ear (acoustic neuromas).
- Abnormal blood vessels in the brain (arteriovenous malformations).

Stereotactic body radiation therapy (SBRT) is used to treat small tumors in the chest, abdomen or pelvis that cannot be removed surgically or treated with conventional radiation therapy, including:

- Small lung cancers.
- Cancers that started elsewhere and spread to the lung (lung metastases).
- Cancers that started elsewhere and spread to the liver (liver metastases).

These lists cover commonly treated conditions but cannot include every possibility. Stereotactic radiation may be useful for other cancers not readily addressed with surgery or conventional radiation therapy. **Patients with tumors that are small and few in number are the best candidates for stereotactic techniques. Not all patients can benefit from this type of treatment.**

Your radiation oncologist can tell you whether this approach is an option for your specific condition as new research continues to broaden the use of this technology.