Radiation Therapy: Which type is right for me?

There are two main types of radiation therapy. External radiation therapy is when a beam of radiation is directed into the body. It is also called x-ray therapy, 3D conformal radiation, intensity-modulated radiation therapy (IMRT), cobalt, photon, or proton therapy. Internal radiation therapy is when a radioactive source is placed inside the body, in or near the tumor. This is called brachytherapy or implant therapy.

External radiation therapy is named after the type of radiation particles that are used to give the treatment:

- Photons.
- Electrons.
- Protons.

Photon, electron, and proton therapy all harm cancer cells. Each type has possible benefits and challenges. Your treatment team will work together to pick the best type of radiation therapy for your type of cancer.

Photon and electron radiation are found in most radiation centers and are the most used. Protons are only at some cancer centers, with new proton therapy centers being built and others in the planning stage.

Photon Treatment

Photon beams are the same type of beam used in x-ray machines, like those used to take chest x-rays. In radiation therapy, much higher energy photon beams are used. Photons can be used in many types of radiation therapy.

Two-Dimensional Photon Therapy ("Conventional" Radiation Therapy)

With two-dimensional (2D) conventional radiation therapy, x-ray films are used to guide and position the radiation beams. A machine called a “fluoroscopic simulator” is often used to plan the radiation treatments. The bones seen on the x-rays are used as landmarks to find where the tumor is and where to position the radiation beams to treat the tumor.

Planning does not take a long time and patients can often start treatment within a week. It is often used for urgent treatments.

3D Conformal Radiation Therapy

Many hospitals are able to use a CT scanner (Cat Scan) to plan radiation treatments. This is called 3D conformal radiotherapy. With CT-guided therapy, the tumor and normal organs are looked at in three dimensions instead of using the "flat" image of an x-ray (like in “conventional” radiation therapy).

Intensity Modulated Radiation Therapy (IMRT)

IMRT is another way to deliver photons but it affects less healthy tissue. Treatment planning for IMRT also starts with a simulation. Like 3D conformal therapy, the tumor and normal organs are outlined on the CT in 3D. Many beams are placed around the person to give the radiation. These beams are split into a grid-like pattern, turning the one big beam into many smaller "beamlets." These beamlets help to protect the healthy tissues.

Stereotactic Radiation Therapy (SRT)

SRT uses many angles to focus the radiation on one small area and give a high dose of radiation. The tissues

around it get a much lower dose, lowering the risk of side effects. There are two types of stereotactic radiation therapy: Stereotactic radiosurgery (SRS) and Stereotactic body radiation therapy (SBRT).

Brachytherapy

Brachytherapy is the use of a radioactive source, often one that releases photons. The source is put into the tumor (*interstitial brachytherapy)* or placed near the cancer, often in a body cavity (*intracavity brachytherapy)*. Since brachytherapy is placed in, or very close to the tumor, less healthy tissue is affected by the radiation. The dose of radiation given by the source is very high but much less in the nearby tissues.

Brachytherapy can only be used in cancers where a radioactive source can be placed safely to treat the tumor.

Orthovoltage Radiation

Orthovoltage was often used before linear accelerators (a machine used to aim the radiation) became available for the treatment of many different tumors. Orthovoltage radiation uses lower energy photons to treat tumors that are found on or very close to the skin. The lower energy of orthovoltage beams doesn't work well for deep tumors. Orthovoltage units are not used as much since these tumors can now be treated with electrons.

Electron Radiation

Electrons release their energy close to the skin's surface and are often used to treat superficial tumors (tumors close to the surface of the skin), such as skin cancers, keloids, and some lymph nodes. The radiation does not go much past the skin to deeper healthy tissues. This often replaces orthovoltage because it can be combined in the same machine as a linear accelerator. Electron radiation can be used to treat the skin of the whole body or only certain spots.

Proton Therapy

Proton therapy is a type of radiation that uses protons to give radiation while keeping the dose low to nearby healthy tissue. Proton machines can be very large, but smaller machines are being made, so more clinics are starting to have these machines.

Benefits of protons are:

- They give large amounts of radiation to the tumor.
- They only release small amounts of radiation to the nearby healthy tissues.
- Very little radiation reaches other parts of the body.

There are many types of radiation therapy. Your radiation care team will consider your treatment goals, type of tumor, and where your tumor is when deciding which type of radiation is best for you. Talk with your radiation care team about any questions or concerns you might have.