

# Radiation Therapy

The goal of radiation therapy is to eradicate cancer cells while preserving healthy tissue. Depending on the location, size and type of cancer, you may receive one or a combination of techniques. Your treatment team will help you to decide which treatments are best for you.

Radiation therapy can be delivered in two ways, externally and internally. During external beam radiation therapy, the radiation oncology team uses a machine (linear accelerator) to direct high-energy photons and electrons in a tight CT scan guided beam at the cancer. Internal radiation therapy, or brachytherapy, involves placing radioactive devices inside your body.

## External Beam Radiation Therapy

External beam radiation therapy utilizes a linear accelerator to direct high-energy photons and electrons in a tight CT scan guided beam at the cancer. To minimize side effects, the treatments are usually given on week days for a specific number of weeks calculated by your radiation oncologist, physicist, and dosimetrist.

Using sophisticated treatment planning software, your treatment team controls the size and shape of the beam, as well as how it is directed at your body, to effectively treat your tumor while sparing the surrounding normal tissue. Several types of external beam therapy are discussed in the next sections. Your radiation oncologist will recommend one of these treatments if it is medically indicated and appropriate for your care.

## Three-Dimensional Conformal Radiation Therapy (3D-CRT)

Three-dimensional conformal radiation therapy, or 3D-CRT, utilizes computers and special imaging techniques to delineate the specific size, shape and location of the tumor. CT scans or MRI scans or PET CT scans are used to create detailed, three-dimensional representations of the tumor and surrounding organs. Your radiation oncologist can precisely tailor the radiation beams to the size and shape of your tumor with multileaf collimators or custom field shaping blocks. The goal of this therapy is to eradicate tumor cells while sparing healthy tissue.

## Intensity Modulated Radiation Therapy (IMRT)

Intensity modulated radiation therapy, or IMRT, is a specialized form of 3D-CRT that allows radiation to more exactly mirror the specific tumor shape. With IMRT, the radiation beam can be divided into smaller beamlets, and the intensity of each beamlet can be adjusted individually. Using IMRT, it may be possible to further limit the amount of radiation that is received by healthy tissue near the tumor. In some situations, this may also allow a higher dose of radiation

to be delivered to the tumor, potentially increasing the chance of a cure.

### **Image-Guided Radiation Therapy (IGRT)**

Radiation oncologists use image-guided radiation therapy, or IGRT, to better deliver the radiation to the cancer since tumors can move between treatments due to differences in organ filling or movements while breathing. IGRT involves conformal radiation treatment guided by CT imaging. All patients undergo a CT scan simulation as part of treatment planning. The radiographic information from the CT scan is then transmitted to a computer in the treatment room to allow doctors to more precisely adjust treatments to eradicate tumor and spare healthy tissue. In some cases, doctors will implant a tiny marker in or near the tumor to pinpoint it for IGRT.

### **Stereotactic Radiosurgery**

Certain patients may be candidates for receiving high doses of precision guided radiation on a daily basis for one to several days, i.e. Stereotactic Radiosurgery or Radiation Surgery Without Incisions. Stereotactic Radiosurgery utilizes very high doses of CT guided radiation beams and requires that the patient remain immobile during treatments to maintain the precision of therapy. This technique may sometimes be indicated in brain cancer, lung cancer, painful metastatic lesions to organs such as the liver, and even in specific benign conditions such as trigeminal neuralgia and brain blood vessel malformations.