

The therapist will leave the room before your treatment begins. Your therapist will likely be in constant contact with you, using cameras and microphones set up in the treatment room. During the treatment, you will not see the radiation beam. You may hear the quiet buzz or shuffling of the beam-shaping device located inside the head, or gantry, of the machine. This beam-shaping device is called a multi-leaf collimator (MLC) and it adjusts to create a uniquely shaped opening for the radiation beam to pass through. As the gantry rotates around you to deliver radiation beams from various angles, the MLC continuously adjusts the beam to conform to the shape of the tumour, which helps to deliver accurate treatment. The linac will rotate around you as radiation is administered directly to the tumour.

FOLLOW-UP CARE

After you complete your treatment, your clinical oncologist and healthcare team will monitor your progress with a series of follow-up visits. These visits can include a physical examination, blood screening, additional imaging, and other tests that may be needed. Your follow-up appointments are also a good opportunity for you and your caregivers to ask any questions about your progress, or inquire about the status of your overall health.



THE CLINICAL TEAM

Should radiotherapy or radiosurgery be prescribed for you, your treatment will be planned and delivered by a team of specialists that may include a clinical oncologist, medical physicist, dosimetrist, radiation therapist and oncology nurse. For radiosurgery treatments, a neurosurgeon, interventional radiologist or other related surgeons may also be involved. The team may also be supported by other healthcare professionals, such as radiologist, dietitian, physiotherapist, counsellor and other individuals who specialize in the area of the body being treated (e.g., a urologist for prostate cancer).



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A Patient’s Guide
to Radiation
Treatment
for Cancer

INTRODUCTION

Our radiation oncology team uses sophisticated software and highly specialized equipment to deliver a variety of treatments, based on the treatment plan for each patient. Your clinical oncologist will review the radiation treatment options with you and determine which one is appropriate for your particular cancer.

HOW IS RADIATION USED TO FIGHT CANCER?

Radiation treatment uses focused X-rays, which are a form of energy, to destroy cancerous cells while minimizing exposure to healthy tissue. Radiation damages the DNA in cancer cells, which interrupts their ability to reproduce, causing them to die and the tumour to shrink. Most normal cells, however, have the ability to repair themselves and can more easily recover from the radiation. If normal cells near the tumour area are exposed to the radiation, it can cause some side effects.



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TREATMENT TECHNIQUES

There are two basic types of radiation treatment, namely radiotherapy and radiosurgery. With both techniques, treatment delivery is non-invasive, so there are no incisions. These techniques focus a beam of radiation directly to the tumour while minimizing exposure to surrounding healthy tissue. The main differences between the two techniques are the number of treatment sessions and the strength of each radiation dose given.

Radiotherapy usually involves having treatment sessions five days a week for four to six weeks, with each treatment session lasting about two to 15 minutes. Radiosurgery is delivered in five or fewer sessions over one or two weeks, with each treatment delivery taking from a few minutes to 30 minutes. Also, the strength of each dose is much higher in radiosurgery, which makes it more appropriate for treating deep-seated tumours, smaller tumours, and cancers that have spread (metastases) to multiple locations in the body.

Each of these two types of treatment can be designed and delivered in a variety of ways, depending on what’s most appropriate for the patient. The most common techniques are:



3DCRT

Three-dimensional conformal radiotherapy (3DCRT) involves taking detailed digital images of a tumour and the surrounding normal structures (bones, organs, etc.) to deliver highly “conformed” (focused) radiation to match the shape of a tumour.

IMRT and IMRS

Intensity-modulated radiotherapy (IMRT) and intensity-modulated radiosurgery (IMRS) allow doctors to adjust the intensity of a radiation beam so that the tumour receives a very high dose of radiation, while minimizing exposure to normal tissue. Your clinical team uses three-dimensional scans of the target site to visualize the treatment “field” from many different angles. At each of these angles, the intensity of the radiation beam is modulated and the shape of the beam is changed to match the shape of the tumour. When this technique was introduced in the early 1990s, it was considered to be a major advancement in the treatment of cancer. Today, this technique is being used by most treatment facilities all over the world.

IGRT and IGRS

Image-guided radiotherapy (IGRT) and Image-guided radiosurgery (IGRS) enables your clinical team to visualize a tumour’s position before and during treatment, which is especially important when treating the chest or abdomen, areas in which the tumour may move when you breathe. IGRT and IGRS use advanced imaging techniques and motion management technology to verify the exact position of the tumour at the moment of treatment.

VMAT

Volumetric arc therapy (VMAT) is an advanced form of radiation treatment and also called RapidArc® radiotherapy technology. RapidArc® is a special software that can be used with an advanced linac to deliver IMRT treatments quickly. With conventional IMRT treatments, a typical treatment can take anywhere between 15 minutes to 30 minutes. With RapidArc®, most treatments can be delivered in less than two minutes.

SRS and SBRT

SRS, or stereotactic radiosurgery, is a type of radiosurgery that refers specifically to treatment of tumours or other abnormalities in the brain and spine. When radiosurgery technology is used to treat parts of the body outside the central nervous system, it is called stereotactic body radiotherapy (SBRT). SBRT is most often used to treat the prostate, lungs, pancreas or kidneys. Because the intensity of each dose is much higher with radiosurgery, it is not appropriate for all cancer types. Your clinical team will determine the most appropriate way to treat your cancer.

THE TREATMENT PROCESS

There are several steps to any radiotherapy or radiosurgery treatment. They consist of tumour visualization, treatment planning, treatment delivery and follow-up. Again, the clinical team will determine which treatment technique is right for you, and will be able to answer any questions you may have before, during or after treatment.

TUMOUR VISUALIZATION

In order to design your treatment plan, the treatment team will take images to reveal the exact location of the tumour, including its size and position relative to the surrounding tissues and organs. This is typically done with a CT scan. Depending on the general

location of the tumour and other factors, additional types of scans may be taken, such as an *MRI*, a *PET scan* or an *ultrasound scan*. With the help of these scans or images, your clinical team can see details of the tumour from a variety of angles.

Depending on your treatment needs, a custom body mould (or mask if your head is being treated) will be made. Tiny skin marks may be made to help ensure you are exactly in the same position for each treatment session.

PLANNING

With the completed scans, the clinical team will use sophisticated treatment planning software to develop a three-dimensional or four-dimensional “picture” of the area where you will receive treatment. They will determine the amount of radiation to be delivered, the appropriate angles from which to deliver it, and the number of sessions needed to deliver the prescribed treatment. The clinical team also takes into account many other factors - including the type of cancer being treated, its location and size, your medical history and your lab test results to produce an effective treatment plan.

TREATMENT

Before each treatment session, your *radiation therapist (RT)* will help position you on the linac’s treatment table, or “couch.” Once you are positioned, the therapist may use the machine’s imaging system to take a new image of the tumour in that day’s treatment position to verify the correct target. During imaging, you will notice motion from the robotic imager arms on each side of the linac as these arms extend and the linac begins to rotate around you. Adjustments to your position may then be made so that it precisely matches the position that was planned for you.