



Radiation therapy for prostate cancer

Prostate cancer can often be cured by radiotherapy. Soon after treatment most men will be able to resume their usual lifestyle.

The prostate is a gland that sits below the bladder. It wraps around the portion of the urethra (the urinary channel) between the bladder and its control muscle, the urethral sphincter. Its main function is to produce part of the semen ejaculated at orgasm. Each vas deferens (carrying-away vessel) carrying sperm from the testicles connects to the prostate. The nerves carrying signals to produce erections run on either side of the prostate.

Cancer may develop in the prostate and can grow into surrounding tissues or spread to other parts of the body (**"metastasize"**), especially to lymph nodes or bone. Determining the extent of your cancer is based on a number of factors including how the prostate feels on examination and the **PSA** (prostate specific antigen) blood level. Microscopic examination of prostate biopsies can confirm the suspicion of cancer and also allows some prediction of the tumour's expected behaviour. This is known as the tumour **grade** or Gleason score.

Additional investigations may be performed, when necessary, to determine the extent or **stage** of the cancer. Your prostate cancer appears to be confined to the region of the prostate, although there is always a chance of undetectable, microscopic spread.

You have discussed several treatment options with your urologist, including:

- observation without treatment (sometimes called "active surveillance" or "watchful waiting");
- surgical removal of the prostate (prostatectomy); or
- radiation therapy.

Each option has its own advantages and risks.

Radiation therapy uses high-energy x-rays, either beamed from a machine or emitted by radioactive seeds implanted in the prostate, to kill cancer cells. Other names for this common method of treating cancer are radiotherapy, x-ray therapy or irradiation. Radiation in high doses can cure or control cancer by inhibiting the cancer cells from dividing or reproducing. During radiation therapy, both cancer cells and healthy cells are affected but most healthy cells can repair themselves afterwards. There have been vast improvements in the equipment and delivery of radiation treatment over the last 20 to 30 years, such that today it can be used safely and effectively in men of all ages.

In Canada, radiation therapy is given in specialized cancer centres. There, a team of experts will provide your care. The **radiation oncologist** is the medical doctor in charge of a patient's radiation treatment. He or she prescribes and plans the radiation course to be given. Any side effects from the radiation will be recognized and

treated by the radiation oncologist. The other members of the team involved in the delivery of radiotherapy include oncology nurses, the medical physicist and the radiation therapist.

Because there are many different types of radiation and many ways to deliver it, planning for the treatments is an important step. After discussion with the radiation oncologist and the choice of radiation is made, radiation planning is performed to ensure that the prostate is targeted precisely while minimizing exposure to surrounding healthy tissues. During the planning process you may need to have special tests, scans or x-rays that will help the team make decisions about your treatment.

There are different types of radiation therapy for prostate cancer; the most frequently used types include **external beam radiation** and internal radiation or "seed" therapy (**brachytherapy**).

External beam radiation therapy

In external beam radiation therapy, radiation is directed at the cancer and surrounding tissue from a machine outside of the body. This radiation is given on an outpatient basis, which means that overnight hospitalization will not be necessary. Generally, one treatment is given each day of the week from Monday through Friday, for six to eight weeks. The treatments are painless and take only a few minutes but you will need to spend 15 to 30 minutes in the treatment room to ensure you are placed properly on the treatment table and to check the machine settings.

The primary target is the prostate gland itself. In addition, organs and tissue around the prostate may be irradiated. Radiating the lymph nodes in the pelvis is not performed on all patients, but it may be necessary in certain circumstances. Depending on a number of risk factors regarding your prostate cancer, it may be advised that you receive medication to block the production of testosterone prior to starting radiation therapy. Prostate cancer is stimulated or fuelled by testosterone (the male hormone) and removing this from the body can be useful in shrinking the prostate and increasing the effect of radiation.

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Brachytherapy

Radiation can also be delivered to the prostate from dozens of tiny radioactive seeds implanted directly into the prostate gland. This approach, known as interstitial implantation or brachytherapy, has the advantage of delivering a high dose of radiation to tissues in a focused area, while minimizing damage to healthy tissues such as the rectum and bladder.

Brachytherapy relies on imaging techniques, usually ultrasound, to guide the placement of thin needles through the skin of the crotch. Seeds made of radioactive palladium or iodine are delivered through the needles into the prostate, according to a customized pattern to conform to the shape and size of each man's prostate. The implantation procedure is much different than external beam radiation in that it is done in an operating room or procedure unit and can be completed in an hour or two. This is usually done as a day procedure either under general anaesthesia or under spinal anesthesia.

The seeds emit radiation for several weeks, then remain permanently and harmlessly in place. Alternatively, some doctors use much more powerful radioactive seeds left in only over a period of several days. Such temporary implants, which require hospitalization, may be combined with low doses of external beam radiation.

Brachytherapy is not suitable for all patients. This form of radiation may not be appropriate for men with large prostates or those with advanced disease. Men who have undergone prostate surgery for the relief of voiding difficulty due to non-cancerous prostate enlargement run a significant risk of urinary complications after brachytherapy.

Risks and complications

Because the radiation used to control cancer in the prostate passes through normal tissues such as the rectum, the bladder and the intestines, it can cause damage to some healthy cells. Many of these effects are only temporary. Patients frequently experience fatigue near the end of their treatments but this usually clears up when the treatments are over. After brachytherapy, post-implant discomfort in the prostate can occur but can usually be controlled by oral painkillers.

Radiation to the rectum often causes increased number of bowel movements and some blood in the stool, although this often clears up soon after treatment. These problems are usually effectively controlled with changes to your diet or with medications. Radiation can occasionally cause a variety of long-term problems with the bowels including inflammation of the rectum (proctitis), with bleeding and bowel problems such as diarrhea.

Similar to changes in the bowels, it is common to notice changes in your voiding pattern during treatment. Most men will notice some increased urge to void as well as an increased need to void during the day or night. Blood may also be visible in the urine which is usually short lived but may persist for many years. Some patients will notice permanent changes to their bladder function. Long-term complications, such as urinary incontinence, are uncommon and generally not severe.

In the longer term, many men having radiation therapy will lose the ability to have natural erections. Today, several forms of treatment are available to restore erections if this becomes necessary. While the feeling of orgasm usually is preserved, ejaculation will often be dry following radiation to the prostate and semen glands, and the absence of sperm may make you infertile.

When radiation therapy is given to treat prostate cancer, a small amount of bladder and rectum are also treated given that they are close to the prostate. As a result, there is a small risk of developing a radiation induced cancer in these other organs. Studies show an approximate 1% risk of developing a radiation induced bladder cancer and a less than 1% risk of developing rectal cancer. These percentages are reported in patients having received radiation many years ago, prior to the newer and more precise radiation techniques used today that treat less normal rectal and bladder tissue surrounding the prostate.

There is always the risk of cancer recurrence after any treatment for prostate cancer. A regular follow-up schedule will be advised. In some patients who have had surgery to remove the prostate because of prostate cancer they can be treated with radiation after surgery to attempt to kill any remaining or recurring cancer cells. It is important to note that patients who have received radiation initially are typically not a candidate for surgery after radiation due to the high risk of complications.

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