

Prostate Cancer

This information is reviewed by a physician with expertise in the area presented and is further reviewed by committees from the American College of Radiology (ACR) and the Radiological Society of North America (RSNA), comprising physicians with expertise in several radiologic areas.

Prostate cancer overview

Prostate cancer is the most common form of cancer in American men, most prevalent in men over age 65 and fairly common in men 50-64 years old. However, prostate cancer can occur in men younger than 50. The incidence of diagnosed prostate cancer among American men has increased dramatically since 1990 because of the use of a screening blood test called prostate-specific antigen (PSA). More recently, men below the age of 65 years have shown an increased incidence of this disease.

What are my treatment options?

- Treatment options overview
- How can I choose from among the options?
- If I choose surgery, will radiation treatment still be required?
- How effective is modern radiation treatment of prostate cancer?

Treatment options overview

There are many treatment options for prostate cancer that is confined to the prostate gland. Each option should be considered carefully, balancing the advantages against the disadvantages as they relate to the individual man's age, overall health and personal preferences.

Historical standard options include:

- Surgery (radical prostatectomy) - An incision is made in the lower abdomen or through the perineum (between the anus and the scrotum), and the prostate is removed. Incomplete surgery, in which the entire tumor cannot be removed, may need to be followed by radiation therapy. Possible side effects of surgery can include incontinence (inability to control urination) and impotence (inability to achieve erection).

More recently, several centers are using three small incisions to do robot assisted prostatectomy that results in shorter hospitalization and faster recuperation. This may be preferable for selected patients, but not for all.

- External beam therapy (EBT): a method for delivering a beam of high-energy x-rays to the location of the tumor. The beam is generated outside the patient (usually by a linear accelerator) and is targeted at the tumor site. These x-rays can destroy the cancer cells and careful treatment planning allows the surrounding normal tissues to be relatively spared. No radioactive sources are placed inside the patient's body.
- Watchful waiting - No treatment, with careful observation and medical monitoring.

Newer, advanced options have been developed in the past 10 to 15 years. These newer options avoid or minimize some of the unpleasant side effects sometimes associated with the standard therapies. These options include:

- Nerve-sparing radical prostatectomy - Surgical procedure in which the prostate gland is removed without severing the critical nearby nerves that send signals between the brain and penis to allow normal sexual functioning. A skilled and experienced surgeon may be able to preserve sexual function in 50 percent to 90 percent of patients by successfully using this procedure.
- Conformal external beam radiation therapy - Uses advanced technology to tailor the radiation therapy to an individual's body structures. Relying on computerized three-dimensional images of the prostate, bladder, and rectum, the x-ray radiation beam is aimed precisely ("conformed") to affect the diseased area. In this way, less radiation reaches the surrounding normal tissues.

Today there are two levels of conformal radiation therapy: 3-D conformal radiation therapy and intensity modulated radiation therapy (IMRT). Both allow for increased doses to the tumor while protecting the normal surrounding organs. IMRT is considered the more conformal of the two but is not necessary or appropriate for all patients.

- Image-guided radiation therapy – for either 3-D conformal or IMRT, daily image guidance is increasingly used. Typically three gold fiducial markers, or tiny pieces of metal, are placed in the prostate before the simulation and treatment. X-rays are taken either with the same beam as that of the treatment or an add-on low energy x-ray beam aligned to the linear accelerator. The metallic markers will be visible on the x-rays. This is done to check the position of the prostate on a daily basis just before the treatment and appropriate adjustment and alignment of prostate to high-dose external beam radiation therapy.
- Proton beam therapy: a type of conformal therapy that bombards the diseased tissue with protons instead of x-rays.
- Cryotherapy - A procedure that uses extremely low temperatures (-190°C) to freeze and destroy cancer cells. Some experienced physicians have had good results with low complication rates using cryotherapy; however, others have not. This should be considered experimental at this time as upfront treatment for prostate cancer, until there is longer follow-up for patients treated with this modality. This technique was developed as an alternative to surgery for patients who have recurrent cancer in the prostate after radiation treatments.
- Brachytherapy: the temporary placement of radioactive materials within the body, usually employed to give an extra dose—or boost—of radiation to the area of the excision site.
- With seed implant treatment, radiation hits the prostate first, and only then strikes normal tissues. While the implant technique has been around for decades, recent advances in imaging technology have made it more effective. Using ultrasound to see the prostate gland better, physicians can place each seed in the prostate more carefully and better control the effect on surrounding tissues. Long-term results are available for up to 10–12 years at some institutions. These results show that ultrasound-guided radioactive implantation is highly effective in controlling prostate cancer and has essentially the same result as surgery or external radiation for appropriately selected low-risk prostate cancer patients.

High Dose Rate (HDR) Brachytherapy - This technique was developed to supplement the dose of radiation given as external beam therapy for patients with high risk prostate cancer. In skilled hands, this is an effective regimen to treat such cancers. Patients receive several weeks of standard external beam radiation therapy, followed by one to three HDR sessions. These sessions require anesthesia and placement of several needles into the prostate. The patient is then hooked up to the HDR machine, where a radioactive source moves up and down each needle, delivering radiation. This type of brachytherapy leaves no permanent radiation in the patient.

Use of this technique by itself (i.e., without the external beam treatments) for low-risk patients is still in the experimental stages.

How can I choose from among the options?

In addition to talking with family and friends, you will need a team of physicians to help advise you. By the time of diagnosis, you will already have met two of the three or four doctors you will need for your cancer treatment planning: your primary care physician (an internist or family practice doctor) and a urologist, who probably performed the biopsy. (In some cases, a radiologist performs the biopsy.) If you have an early-stage cancer or moderately advanced cancer and there is no evidence of spread to other organs (non-metastatic), you need to talk to one more doctor: a radiation oncologist. The two major options for treatment are surgery (performed by your urologist) and radiation therapy (performed by a radiation oncologist).

If your cancer is advanced and you require chemotherapy, then you will also need a medical oncologist, who administers chemotherapy. Hormones, which are often used to treat prostate cancer, can be administered by your internist, urologist, radiation oncologist or medical oncologist.

If I choose surgery, will radiation treatment still be required?

If your surgery is incomplete (meaning that some cancer still remains), additional radiation therapy within three to six months can prevent reoccurrence in many men. You will want to discuss this option with your physician team.

How effective is modern radiation treatment of prostate cancer?

With modern technology, radiation therapy can:

- give more radiation dose directly to the prostate than to surrounding healthy tissues
- help physicians use x-rays to see the prostate and surrounding tissues in three dimensions, so that the radiation beams can be tailored more precisely to the individual patient's unique needs
- estimate what dose of radiation the nearby rectum, bladder, and hips will receive during the course of x-ray treatments to the prostate
- safely provide a higher dose of radiation than even five years ago, which helps to improve the chances of cure.

What happens during radiation therapy?

Radiation is a special kind of energy carried by waves or a stream of particles. When radiation is used at high doses (many times those used for x-ray imaging exams), it can destroy abnormal cells that cause cancer and other illnesses.

What are possible side effects of radiation therapy?

As radiation treatment progresses, it may cause patients to become tired. Resting is important, but doctors usually advise patients to try to stay as active as they can. Patients may have diarrhea and/or frequent and uncomfortable urination. In addition, when patients receive external radiation therapy, it is common for the skin in the treated area to become dry. Redness or tenderness is unusual. Radiation therapy can also cause hair loss in the pelvic area. The loss may be temporary or permanent, depending on the amount of radiation used.

Radiation therapy (either external radiation or "seed" implant) causes impotence in some men. The rate of impotence is similar to patients who undergo nerve-sparing prostatectomy. There is also a risk that bladder or rectal problems may occur with either type of radiation. If this occurs, it usually presents itself one to three years after radiation therapy. Simple interventions, usually medications, are sometimes required.

What kind of treatment follow-up should I expect?

Patients are usually asked to return to see the radiation oncologist about two to four weeks after the last session of radiation therapy. The main purpose of this first visit after the treatment is to see whether the side effects—such as loose bowels or urinary symptoms—have subsided. In more than 90 percent of patients, these symptoms do subside in two weeks. The doctor will check your skin and ask you to use moisturizing lotions on any dry skin. Prostate-specific antigen (PSA) is a protein found in semen. An elevated level of PSA can indicate the presence of prostate cancer. A blood test will be performed to measure your PSA level. A digital rectal examination will be done to feel the prostate gland.

Depending on the PSA level and stage of the cancer, hormones may be used in addition to radiation therapy to help control the cancer.

If you ask the radiation oncologist, "How am I doing? Is the cancer all gone? Am I cured?" he or she cannot answer these questions immediately, as is the case following surgery. After radiation therapy, the response may take months to become fully manifest. Dead cancer cells have to be gradually disposed of by the body. Some cancer cells, even if technically dead (i.e., they cannot multiply), may continue to function for some time before they ultimately die.

Are there any new developments in treating my disease?

Clinical Trials

To learn about current clinical trials being conducted, see the Clinical Trials page of the National Cancer Institute's Web site. (<http://www.cancer.gov>)

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