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Treating Prostate Cancer

If you've been diagnosed with prostate cancer, your cancer care team will discuss your treatment options with you. It's important to think about the benefits of each treatment option compared to the possible risks and side effects.

How is prostate cancer treated?

Depending on each person's situation, treatment options for prostate cancer might include:

- [Observation or Active Surveillance for Prostate Cancer](#)
- [Surgery for Prostate Cancer](#)
- [Radiation Therapy for Prostate Cancer](#)
- [Cryotherapy, HIFU, and Other Ablative Treatments for Prostate Cancer](#)
- [Hormone Therapy for Prostate Cancer](#)
- [Chemotherapy for Prostate Cancer](#)
- [Immunotherapy for Prostate Cancer](#)
- [Targeted Drug Therapy for Prostate Cancer](#)
- [Treatments for Prostate Cancer Spread to Bones](#)

Common treatment approaches

Treatments for prostate cancer are generally used one at a time, although in some cases they may be combined.

- [Initial Treatment of Prostate Cancer, by Stage and Risk Group](#)
- [Following PSA Levels During and After Prostate Cancer Treatment](#)
- [Treating Prostate Cancer That Doesn't Go Away or Comes Back After Treatment](#)

Who treats prostate cancer?

The main types of doctors who treat prostate cancer include:

- **Urologist:** A surgeon who treats diseases of the urinary system and male reproductive system (including the prostate)
- **Radiation oncologist:** A doctor who treats cancer with radiation therapy
- **Medical oncologist:** A doctor who treats cancer with medicines, such as chemotherapy, hormone therapy, targeted therapy, and immunotherapy

Many other specialists may be involved in your care as well, including nurse practitioners (NPs), physician assistants (PAs), nurses, nutritionists, pharmacists, social workers, rehabilitation specialists, and other health professionals, pharmacists, social

- [Seeking a Second Opinion](#)
- [Considering Treatment Options for Early Prostate Cancer](#)

Thinking about taking part in a clinical trial

Clinical trials are carefully controlled research studies that are done to get a closer look at promising new treatments or procedures. Clinical trials are one way to get state-of-the-art cancer treatment. In some cases they may be the only way to get access to newer treatments. They are also the best way for doctors to learn better methods to treat cancer. Still, they're not right for everyone.

If you would like to learn more about clinical trials that might be right for you, start by asking your doctor if your clinic or hospital conducts clinical trials.

- [Clinical Trials](#)

Considering complementary and alternative methods

You may hear about alternative or complementary methods that your doctor hasn't mentioned to treat your cancer or relieve symptoms. These methods can include vitamins, herbs, and special diets, or other methods such as acupuncture or massage, to name a few.

Complementary methods refer to treatments that are used *along with* your regular medical care. **Alternative** treatments are used instead of standard medical treatment. Although some of these methods might be helpful in relieving symptoms or helping you feel better, many have not been proven to work. Some might even be harmful.

Be sure to talk to your cancer care team about any method you are thinking about using. They can help you learn what is known (or not known) about the method, which can help you make an informed decision.

- [Complementary and Integrative Medicine](#)

Help getting through cancer treatment

People with cancer need support and information, no matter what stage of illness they may be in. Knowing all of your options and finding the resources you need will help you make informed decisions about your care.

Whether you are thinking about treatment, getting treatment, or not being treated at all, you can still get supportive care to help with pain or other symptoms. Communicating with your cancer care team is important so you understand your diagnosis, what treatment is recommended, and ways to maintain or improve your quality of life.



- Isn't causing any symptoms
 - Is small and is just in the prostate
- Is expected to grow slowly, because it's in the very low, low, or favorable intermediate-
-
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compared observation (with less intense follow-up than active surveillance) versus treatment. Some studies that have looked at this issue also included men who would now be considered at higher risk (and therefore likely wouldn't be offered active surveillance today).

In the studies that have been done so far, it doesn't appear that men who are treated right away are likely to live any longer than men who choose active surveillance.

Finally, it's important to keep in mind that while there are still some questions about active surveillance, the tools doctors use to decide which men might benefit from it have improved a great deal in recent years. This includes the development of risk groups and molecular tests, as well as imaging tests, such as multiparametric MRI (mpMRI), all of which can help tell which men are most likely to be good candidates for active surveillance.

Doctors also continue to refine the best ways to monitor men who are on active surveillance, so they get the necessary tests to look for cancer progression while not being tested too often.

Hyperlinks

1. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/how-diagnosed.html
2. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/signs-symptoms.html
3. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/risk-groups.html

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Surgery for Prostate Cancer

Surgery is a common choice to try to cure prostate cancer if it is not thought to have spread outside the prostate gland.

- [Radical prostatectomy](#)
- [Transurethral resection of the prostate \(TURP\)](#)
- [Orchiectomy \(castration\)](#)
- [More information about Surgery](#)

Surgery is a common choice to try to cure prostate cancer if it is not thought to have spread outside the prostate gland.

Radical prostatectomy

The main type of surgery for prostate cancer is a **radical prostatectomy**. In this operation, the surgeon (urologist) removes the entire prostate gland plus some of the tissue around it, including the [seminal vesicles](#)¹. S302 gs (spread outsid fain tS311 69rby lymph 0 d31

the lower half of the body) along with sedation during the surgery.

After the prostate and nearby structures have been removed, and while you are still under anesthesia, a catheter (thin, flexible tube) will be put in your penis to help drain your bladder. The catheter will usually stay in place for 1 to 2 weeks while you heal. You will be able to urinate on your own after the catheter is removed.

You will probably stay in the hospital for a few days after the surgery, and your activities will be limited for several weeks.



Radical perineal prostatectomy

In this open operation, the surgeon makes the cut (incision) in the skin between the anus and scrotum (the perineum), as shown in the picture above.

This approach is used less often because it's more likely to lead to erection problems

some short-term advantages over open radical prostatectomy. For example, it usually results in:

- Less blood loss during the operation
- Less pain after the operation
- A shorter hospital stay
- A quicker recovery time
- Less time the urinary catheter needs to stay in place
- A lower risk of some rare but potentially serious side effects

However, the results of robotic and open prostatectomy seem to be about the same when it comes to the long-term side effects that many men are most concerned about, including erection problems and trouble holding urine (incontinence). (These are described below.)

There also doesn't appear to be much difference between robotic and open prostatectomy when it comes to long-term outcomes. That is, studies haven't shown that either approach is clearly better than the other when it comes to how likely the cancer is to return after surgery or how likely a man is to die from prostate cancer. Both approaches generally result in good outcomes when done by experienced surgeons.

In some instances, there might be clear reasons to favor one approach over the other.

But no matter which prostatectomy approach you choose, the biggest factor in the success of your surgery is likely to be the experience and skill of your surgeon. Because of this, it's very important to find an experienced surgeon whom you're comfortable with and whom you can trust.

Risks of prostatectomy

The risks with any type of radical prostatectomy are much like those of any major surgery. Problems during or shortly after the operation can include:

- Reactions to anesthesia
- Bleeding from the surgery
- Blood clots in the legs or lungs
- Damage to nearby organs
- Infections at the surgery site

Rarely, part of the intestine might be injured during surgery, which could lead to

infections in the abdomen and might require more surgery to fix. Injuries to the intestines are more common with laparoscopic and robotic surgeries than with the open approach.

If lymph nodes are removed, a collection of lymph fluid (called a lymphocele) can form and may need to be drained.

Your risks depend, in part, on your overall health, your age, and the skill of your surgical team.

Side effects of prostatectomy

The major possible side effects of radical prostatectomy are:

- **Urinary incontinence** (being unable to control urine)
- **Erectile dysfunction** (problems getting or keeping erections)

These side effects can also occur with some other forms of prostate cancer treatment.

Other side effects are also possible (see below).

Urinary incontinence

You may not be able to control your urine, or you may have leakage or dribbling after your surgery. Your overall health, your age, and the skill of your surgical team can affect your risk of urinary incontinence after surgery. Your doctor can help you understand your risk and what you can do to reduce it.

continuous incontinence.

After surgery for prostate cancer, bladder control usually improves slowly over several weeks or months. But doctors can't predict for sure how any man will be affected. In general, older men tend to have more incontinence problems than younger men. Large cancer centers, where prostate surgery is done often and surgeons have a lot of experience, generally report fewer problems with incontinence.

probably not be able to have a spontaneous erection, so you may need to use medicines or other treatments.

Many doctors feel that regaining potency is helped along by trying to get an erection as soon as possible once the body has had a chance to heal (usually several weeks after the operation). Some doctors call this **penile rehabilitation**. Medicines (see below) may be helpful at this time, although it's not clear if they work better if taken daily or just on an as-needed basis. Be sure to talk to your doctor about your situation.

There are several options for treating erectile dysfunction:

- **Phosphodiesterase-5 (PDE5) inhibitors**, such as sildenafil (Viagra), vardenafil (Levitra), tadalafil (Cialis), and avanafil (Stendra), are pills that can help with erections. These drugs won't work if both nerves that control erections have been damaged or removed. Common side effects of these drugs include headache, flushing (skin becoming red and feeling warm), upset stomach, light sensitivity, and runny or stuffy nose. Rarely, these drugs can cause vision problems, possibly even blindness. Some other drugs such as nitrates, which are used to treat heart disease, can cause problems if you are taking a PDE5 inhibitor, so be sure your doctor knows what medicines you take.
- **Alprostadil** is a man-made version of prostaglandin E1, a substance naturally made in the body that can produce erections. It can be injected almost painlessly into the base of the penis 5 to 10 minutes before intercourse or placed into the tip of the penis as a suppository. You can even increase the dosage to prolong the erection. You might have side effects, such as pain, dizziness, and prolonged erection, but they are not usually serious.
- **Vacuum devices** are another option to create an erection. These are clear, plastic tubes connected to pumps that are placed over the penis. The pump sucks the air out of the tube, which draws blood into the penis to produce an erection. After the device is removed, the erection is maintained by placing an elastic ring around the base of the penis, which keeps the blood from draining out. The ring is then removed after sex.
- **Penile implants** might restore your ability to have erections if other methods don't help. An operation is needed to put them inside the penis. There are several types of penile implants, including those using silicone rods or inflatable devices.

For more on coping with erection problems and other sexuality issues, see [Sex and the Adult Male With Cancer](#).⁶

Changes in orgasm

After surgery, the sensation of orgasm should still be pleasurable, but there is no ejaculation of semen – the orgasm is “dry.” This is because the glands that made most of the fluid for semen (the seminal vesicles and prostate) were removed during the prostatectomy, and the pathways used by sperm (the vas deferens) were cut. In some men, orgasms might become less intense. Less often, men report pain with orgasm.

Loss of fertility

During a radical prostatectomy, the surgeon cuts the vas deferens, which are the pathways between the testicles (where sperm are made) and the urethra (through which sperm leave the body). Your testicles will still make sperm, but they can't leave the body as a part of the ejaculate. This means that a man can no longer father a child the natural way.

Often, this is not an issue, as men with prostate cancer tend to be older. But if it is a concern for you, you might want to ask your doctor about “banking” your sperm before the operation. To learn more, see [Male Fertility and Cancer](#)⁷.

Lymphedema

This is a rare but possible complication of removing many of the lymph nodes around the prostate. Lymph nodes normally provide a way for fluid to return to the heart from all areas of the body. When nodes are removed, fluid can collect in the legs or genital region over time, causing swelling.

Transurethral resection of the prostate (TURP)

This operation is more often used to treat men with non-cancerous enlargement of the prostate called **benign prostatic hyperplasia (BPH)**. But it is also sometimes used in men with advanced prostate cancer to help relieve symptoms, such as trouble urinating. (It is not used to try to cure the cancer.)

During this operation, the surgeon removes the inner part of the prostate gland that surrounds the urethra (the tube through which urine leaves the bladder). The skin is not cut with this surgery. An instrument called a **resectoscope** is passed through the tip of the penis and into the urethra to the level of the prostate. Once it's in place, either electricity is passed through a wire to heat it or a laser is used to cut or vaporize the tissue.

This operation is done with either spinal anesthesia (which numbs the lower half of your body) or general anesthesia (where you are in a deep sleep), and it usually takes about an hour.

After surgery, a catheter (thin, flexible tube) is inserted through the penis and into the bladder. It remains in place for about a day to help urine drain while the prostate heals. You can usually leave the hospital after 1 to 2 days and return to normal activities in 1 to 2 weeks.

You will probably have some blood in your urine after surgery.

Other possible side effects from TURP include infection and any risks that come with the type of anesthesia used.

Orchiectomy (castration)

In this operation, the surgeon removes the testicles, where most of the androgens (male hormones) are made. Although this is a type of surgery, its main effect is as a form of hormone therapy. To learn more about this operation, see [Hormone Therapy for Prostate Cancer](#).

More information about Surgery

For more general information about surgery as a treatment for cancer, see [Cancer Surgery](#)⁹.

To learn about some of the side effects listed here and how to manage them,

see [Managing Cancer-related Side Effects](#)¹⁰.

Hyperlinks

1. www.cancer.org/cancer/types/prostate-cancer/about/what-is-prostate-cancer.html
2. www.cancer.org/cancer/diagnosis-staging/lymph-nodes-and-cancer.html
3. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/how-diagnosed.html
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Radiation Therapy for Prostate Cancer

Radiation therapy uses high-energy rays or particles to kill cancer cells.

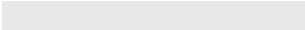
- [When might radiation therapy be used?](#)
- [Types of radiation therapy](#)
- [External beam radiation therapy \(EBRT\)](#)
- [Brachytherapy \(internal radiation therapy\)](#)

- [Radiopharmaceuticals](#)
- [More information about radiation therapy](#)

When might radiation therapy be used?

Depending on the [stage](#)¹ of the prostate cancer and other factors, radiation therapy might be used:

As the first treatment for cancer that is still just in the prostate gland (especially if the cancer is in a lower [risk group](#))



outpatient center, for at least several weeks. Many centers now give slightly higher doses of radiation over fewer treatments, which is known as **hypofractionated radiation**. This allows the treatment to be completed in a shorter amount of time, and it seems to be just as effective.

Each treatment is much like getting an x-ray, although the radiation dose is stronger. The treatment itself is painless and typically lasts only a few minutes, although the setup time — getting you into place for treatment — takes longer.

Modern EBRT techniques can focus the radiation more precisely on the tumor than was possible in the past. This lets doctors give higher doses of radiation to the tumor while reducing the radiation exposure to nearby healthy tissues.

Three-dimensional conformal radiation therapy (3D-CRT)

3D-CRT uses special computers to precisely map the location of your prostate. Radiation beams are then shaped and aimed at the prostate from several directions, which makes them less likely to damage surrounding normal tissues and organs.

Intensity modulated radiation therapy (IMRT)

IMRT, an advanced form of 3D-CRT therapy, is the most common type of external radiation therapy for prostate cancer. It uses a computer-driven machine that moves around the patient as it delivers radiation. Along with shaping the beams and aiming them at the prostate from several angles, the intensity (strength) of the beams can be adjusted to limit the doses of radiation reaching nearby normal tissues. This lets doctors deliver an even higher radiation dose to the cancer.

IMRT is often used along with **image-guided radiation therapy (IGRT)**, in which an imaging test is used to create pictures of the prostate just before giving each treatment. Because the prostate's position in the body can vary slightly from day to day, IGRT can help ensure the radiation is aimed more precisely, which might result in fewer side effects.

A variation of IMRT is called **volumetric modulated arc therapy (VMAT)**. It uses a machine that delivers radiation quickly as it rotates once around the body. This allows each treatment to be given in just a few minutes. Although this can be more convenient, it's not yet clear if it's more effective than standard IMRT.

Stereotactic body radiation therapy (SBRT)

This technique, also known as **stereotactic ablative radiotherapy (SABR)**, uses advanced image-guided techniques to deliver large doses of radiation to a precise area, such as the prostate. Because there are large doses of radiation in each dose, the entire course of treatment is given in just a few days.

SBRT is often known by the names of the machines that deliver the radiation, such as Gamma Knife, X-Knife, CyberKnife, and Clinac.

SBRT might be an option to treat some cancers that are just in the prostate. The main advantage of SBRT over IMRT in this setting is that the treatment takes much less time (days instead of weeks). However, some side effects might be worse with SBRT than with IMRT.

SBRT might also be used to treat cancer that has spread to a small number of spots in the bones.

MRI-guided radiation therapy

This approach combines some features of IMRT, IGRT, and SBRT therapies into one. It is done with a machine known as an **MRI-linac**, which combines an MRI scanner with a linear accelerator (linac, the machine that delivers the radiation).

As with other types of IGRT, MRI pictures can be taken before each treatment, so the aim of the radiation can be adjusted to account for any change in the position of the prostate (and the tumor) since the last treatment.

MRI images can also be taken while the radiation is being given. If body functions (like breathing or digestion) cause the tumor to move out of the path of the radiation, the radiation stops until it is aimed correctly again. This can help reduce the amount of radiation to healthy tissues and organs around the tumor.

Proton beam radiation therapy

Proton beam therapy focuses beams of protons instead of x-rays on the cancer. Standard radiation therapy is given in the form of x-rays (photons), which release their energy both before and after they hit their target. However, protons cause little damage to tissues they pass through and release their energy only after traveling a certain distance. This means that proton beam radiation can, in theory, deliver more radiation to the cancer while doing less damage to nearby normal tissues. Proton beam radiation can be aimed with techniques similar to those used for 3D-CRT and IMRT.

Although in theory proton beam therapy might be more effective than using x-rays, so far studies haven't shown if this is true.

from surgery, where erection issues occur right away and may get better over time. But overall, the long-term risk of erection problems is about the same after radiation as it is after surgery.

As with surgery, the older you are, the more likely it is you will have problems with erections. Erection problems can often be helped by treatments such as those listed in the [surgery](#) section, including medicines.

For more about coping with erection problems and other sexuality issues, see [Sex and the Adult Male With Cancer](#)⁵.

Feeling tired: Radiation therapy can cause [fatigue](#)⁶ that might not go away until a few weeks or months after treatment stops.

Lymphedema: Lymph nodes normally provide a way for fluid to return to the heart from all areas of the body. If the lymph nodes around the prostate are damaged by radiation, fluid can collect in the legs or genital region over time, causing swelling and pain. Lymphedema can usually be treated with physical therapy, although it may not go away completely. See [lymphedema](#)⁷ to learn more.

Brachytherapy (internal radiation therapy)

Brachytherapy (also called **seed implantation** or **interstitial radiation therapy**) uses small radioactive pellets, or “seeds,” each about the size of a grain of rice. These pellets are placed directly into your prostate.

- Brachytherapy alone is generally used only in men with early-stage prostate cancer that is in a lower-risk group.
- Brachytherapy combined with external radiation is sometimes an option for men who have a higher risk of the cancer growing outside the prostate.

The use of brachytherapy is also limited by some other factors. For men who have had a [transurethral resection of the prostate \(TURP\)](#) or for those who already have urinary problems, the risk of urinary side effects may be higher. Brachytherapy might not work as well in men with large prostate glands because it might be harder to place the seeds into all of the needed locations. One way to get around this may be to get a few months of [hormone therapy](#) beforehand to shrink the prostate.

Need for radiation precautions: If you get **permanent (LDR) brachytherapy**, the seeds will give off small amounts of radiation for several weeks or months. Even though the radiation doesn't travel far, your doctor may advise you to stay away from pregnant women and small children during this time. If you plan on traveling, you might want to get a doctor's note regarding your treatment, as low levels of radiation can sometimes be picked up by detection systems at airports.

There's also a small risk that some of the seeds might move (migrate). You may be asked to strain your urine for the first week or so to catch any seeds that might come out. You may be asked to take other precautions as well, such as wearing a condom during sex. Be sure to follow any instructions your doctor gives you.

There have also been reports of the seeds moving through the bloodstream to other parts of the body, such as the lungs. As far as doctors can tell, the chances of this causing ill effects seems to be very small. Still, seeds are now often implanted in connected strands, which can lower the risk of them migrating.

Erection problems can often be helped by treatments, such as those listed in the [surgery](#) section, including medicines. For more about coping with erection problems and other sexuality issues, see [Sex and the Adult Male With Cancer](#)⁹.

Radiopharmaceuticals

Radiopharmaceuticals are drugs that contain radioactive elements. They are injected into a vein and travel through the blood to reach cancer cells that have spread to other parts of the body. These drugs then give off radiation that kills the cancer cells. (The type of radiation they use travels only a short distance, which helps limit side effects.) Unlike other types of radiation, these drugs can reach cancer anywhere in the body.

Radiopharmaceuticals that target PSMA

Prostate-specific membrane antigen (PSMA) is a protein that is often found in large amounts on prostate cancer cells.

Lutetium Lu 177 vipivotide tetraxetan (also known as ¹⁷⁷Lu-PSMA-617 or **Pluvicto**) is a radiopharmaceutical that attaches to PSMA, bringing radiation directly to the prostate cancer cells.

This drug can be used to treat prostate cancer that has spread and that has already been treated with [hormone therapy](#) and [chemotherapy](#). The cancer cells must also have the PSMA protein. Your doctor will order a [PSMA PET scan](#)¹⁰ before you get this drug to make sure the cancer cells have PSMA.

This drug is given as an injection or infusion into a vein (IV), typically once every 6 weeks for up to 6 doses.

Possible side effects

Some of the more common side effects of this drug include:

- Feeling tired
- Dry mouth
- Nausea
- Loss of appetite
- Constipation

This drug can lower blood cell counts:

- A **low red blood cell count** can cause tiredness, weakness, pale skin, or shortness of breath.

A **low blood platelet count**

1. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/staging.html
2. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/risk-groups.html
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Cryotherapy, HIFU, and Other Ablative

laser ablation (FLA), are still being studied for treating prostate cancer, and most doctors still consider them to be experimental at this time.

Cryotherapy

Cryotherapy (also called **cryosurgery** or **cryoablation**) is the use of very cold temperatures to freeze and kill prostate cancer cells. Even though it is sometimes called cryosurgery, it's not actually a type of surgery.

Compared with surgery or radiation therapy, doctors know much less about the long-term effectiveness of cryotherapy. While some forms of cryotherapy have been around for decades, modern cryotherapy techniques are still fairly new, so less is known about them.

When is cryotherapy used?

Cryotherapy is sometimes used if the cancer has come back after [radiation therapy](#).

It may be an option to treat men with low-risk, early-stage prostate cancer who can't have surgery or radiation therapy. However, most doctors don't use cryotherapy as the first treatment for prostate cancer.

As with [brachytherapy](#), this may not be a good option for men with large prostate glands.

How is cryotherapy done?

This procedure can be done with spinal or epidural anesthesia (where the lower half of your body is numbed) or general anesthesia (where you are in a deep sleep).

The doctor uses [transrectal ultrasound \(TRUS\)](#)² to guide several thin, hollow probes (needles) through the skin between the anus and scrotum and into the prostate. Very cold gases are then passed through the needles to create an ice ball that freezes and destroys the prostate tissue. Warmer gases are then passed through the probes to thaw out the area. This process is usually repeated.

To be sure the prostate tissue is destroyed without too much damage to nearby structures, tiny probes are put in and around the prostate before the procedure to monitor the temperature. The doctor also carefully watches the ultrasound during the procedure to make sure the right areas are being treated. Warm saltwater is passed through a catheter in the urethra to keep it from freezing. The catheter is left in place for

several weeks afterward to allow the bladder to empty while you recover.

After the procedure, you might need to stay in the hospital overnight, but many men can go home the same day.

Cryotherapy is less invasive than [surgery](#), so there is usually less blood loss, a shorter hospital stay, a shorter recovery period, and less pain.

Possible side effects of cryotherapy

Side effects from cryotherapy depend on how much of the prostate is treated. They tend to be worse if it is done in men who have already had radiation therapy, compared to men who have it as their first treatment.

Most men have [blood in their urine](#)³ for a day or two after the procedure, as well as **soreness** in the area where the needles were placed. **Swelling** of the penis or scrotum is also common.

Freezing might also affect the bladder and rectum, which can lead to **pain, burning**

While HIFU devices have been approved by the US Food and Drug Administration (FDA) to destroy prostate tissue (and therefore doctors can use them to treat prostate cancer), these devices have not been approved specifically to treat prostate cancer. It's not yet clear how the long-term effectiveness of HIFU compares to surgery or radiation therapy.

When is HIFU used?

HIFU might be a treatment option if prostate cancer has come back after therapy.

The risks of long-term problems, such as urinary incontinence and erectile dysfunction, are likely to be lower than they are with treatments such as surgery or radiation therapy, although they are still possible.

Other types of ablative therapies

Other types of ablative treatments are being developed as well. Some of these are now available, although most expert groups believe they need to be studied further before they become commonly used. Examples include:

Transurethral ultrasound ablation (TULSA): This procedure is similar to HIFU (described above) in that it uses high-intensity ultrasound beams to precisely heat and destroy parts or all of the prostate. But for TULSA, a thinner ultrasound probe is inserted through the tip of the penis and into the urethra (which runs through the prostate), rather than being inserted into the rectum. Real-time MRI is then used to image the prostate and guide treatment.

Focal laser ablation (FLA): In this approach, a thin laser fiber is inserted into the prostate near the tumor. This is typically done using MRI images for guidance, although some researchers are now studying the use of ultrasound as well. The laser is then activated to heat and destroy the prostate tissue.

Photodynamic therapy (PDT): For PDT, a light-activated drug is injected into the blood through an IV. A short time later, a low-energy laser light source is inserted into the prostate and directed at the tumor using thin optical fibers. The light activates the drug, which then destroys the blood vessels around the tumor. This procedure, which is also known as **vascular-targeted photodynamic therapy (VTP)**, is not yet available in the United States. To learn more about PDT in general, see [Getting Photodynamic Therapy](#)⁶.

Hyperlinks

1. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/risk-groups.html
2. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/how-diagnosed.html
3. www.cancer.org/cancer/managing-cancer/side-effects/stool-or-urine-changes.html
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have these treatments for some other reason.

To learn more, see [Initial Treatment of Prostate Cancer, by Stage and Risk Group](#) and [Treating Prostate Cancer That Doesn't Go Away or Comes Back After Treatment](#).

Treatment to lower testicular androgen levels

Some hormone treatments use surgery or medicines to lower the levels of androgens made by the testicles.

Orchiectomy (surgical castration)

Even though this is a type of surgery, its main effect is as a form of hormone therapy. In this operation, the surgeon removes the testicles, where most of the androgens (such as testosterone and DHT) are made. This causes most prostate cancers to stop growing or shrink for a time.

This is done as an outpatient procedure. It is probably the least expensive and simplest form of hormone therapy. But unlike some of the other treatments, it is permanent, and many men have trouble accepting the removal of their testicles. Because of this, they may instead choose treatment with drugs that lower hormone levels (such as an LHRH agonist or antagonist – see below).

Some men having this surgery are concerned about how it will look afterward. If wanted, artificial testicles that look much like normal ones can be placed in the scrotum.

LHRH agonists

Luteinizing hormone-releasing hormone (LHRH) agonists (also called LHRH analogs or GnRH agonists) are drugs that lower the amount of testosterone made by the testicles. Treatment with these drugs is sometimes called **medical castration** because they lower androgen levels just as well as orchiectomy.

With these drugs, the testicles stay in place, but they will shrink over time, and they may even become too small to feel.

LHRH agonists are injected or placed as small implants under the skin. Depending on the drug used, they are given anywhere from once a month up to once every 6 months. The LHRH agonists available in the United States include:

- **Leuprolide (Lupron, Eligard) and leuprolide mesylate (Camcevi)**
- **Goserelin (Zoladex)**
- **Triptorelin (Trelstar)**

When LHRH agonists are first given, testosterone levels go up briefly before falling to very low levels. This effect, called **tumor flare**, results from the complex way in which these drugs work. Some men whose cancer has spread to the bones may have bone pain. Men whose prostate has not been removed may have trouble urinating. If the cancer has spread to the spine, a short-term increase in tumor growth as a result of the flare could, in very rare cases, press on the spinal cord and cause pain or paralysis.

A flare can be avoided by giving drugs called **anti-androgens** (discussed below) for a few weeks when starting treatment with LHRH agonists.

LHRH antagonists

LHRH antagonists can be used to treat advanced prostate cancer. These drugs work in a slightly different way from the LHRH agonists, but they lower testosterone levels more quickly and don't cause tumor flare like the LHRH agonists do. Treatment with these drugs can also be considered a form of medical castration.

- **Degarelix (Firmagon)** is given as a monthly injection under the skin. Some men may notice problems at the injection site (pain, redness, and swelling).
- **Relugolix (Orgovyx)** is taken as pills, once a day, so it might allow for less frequent office visits.

Possible side effects

Orchiectomy and LHRH agonists and antagonists can all cause similar side effects from lower levels of hormones such as testosterone. These can include:

- Reduced or absent sexual desire
- Erectile dysfunction (impotence)
- Shrinkage of testicles and penis
- Hot flashes, which may get better or go away with time
- Breast tenderness and growth of breast tissue (gynecomastia)
- Osteoporosis (bone thinning), which can lead to broken bones
- Anemia (low red blood cell counts)

- Decreased mental sharpness
- Loss of muscle mass
- Weight gain
- Fatigue
- Increased cholesterol levels
- Depression or mood swings

Some research has suggested that the risk of high blood pressure, diabetes, strokes, heart attacks, and even death from heart disease is higher in men treated with hormone therapy, although not all studies have found this.

Many side effects of hormone therapy can be prevented or treated. For example:

- Hot flashes can often be helped by treatment with certain antidepressants or other drugs.
- Brief radiation treatment to the breasts can help prevent their enlargement, but this is not effective once breast enlargement has occurred.
- Several drugs can help prevent and treat osteoporosis.
- Depression can be treated with antidepressants and/or counseling.
- Exercise can help reduce many side effects, including fatigue, weight gain, and the loss of bone and muscle mass.

There is growing concern that hormone therapy for prostate cancer may lead to problems thinking, concentrating, and/or with memory, but this has not been studied thoroughly. These problems are rarely severe, and most often affect only some types of memory. More studies are being done to look at this issue.

Treatment to lower androgen levels from other parts of the body

LHRH agonists and antagonists can stop the testicles from making androgens, but cells in other parts of the body, such as the adrenal glands and prostate cancer cells themselves, can still make male hormones, which can fuel cancer growth. Some drugs can block the formation of androgens made by these cells.

Abiraterone (Zytiga) blocks an enzyme called CYP17, which helps stop cells in the body from making androgens.

Abiraterone can be used in men with advanced prostate cancer that is either:

- High risk (cancer with a high [Gleason score](#)², spread to several spots in the bones, or spread to other organs)
- Castration-resistant (cancer that is still growing despite low testosterone levels from an LHRH agonist, LHRH antagonist, or orchiectomy)

This drug is taken as pills every day.

Abiraterone doesn't stop the testicles from making testosterone, so men who haven't had an orchiectomy need to continue treatment with an LHRH agonist or antagonist. Because abiraterone also lowers the level of some other hormones in the body, a low dose of prednisone (a corticosteroid drug) needs to be taken during treatment as well to avoid certain side effects.

Ketoconazole (Nizoral), first used for treating fungal infections, also blocks production of androgens made in the adrenal glands, much like abiraterone. It's most often used to treat men just diagnosed with advanced prostate cancer who have a lot of cancer in the body, as it offers a quick way to lower testosterone levels. It can also be tried if other forms of hormone therapy are no longer working.

Ketoconazole also can block the production of cortisol, an important steroid hormone in the body, so men treated with this drug often need to take a corticosteroid (such as prednisone or hydrocortisone).

Possible side effects: Abiraterone can cause joint or muscle pain, high blood pressure, fluid buildup in the body, hot flashes, upset stomach, and diarrhea. Ketoconazole can cause elevated liver blood tests, nausea, vomiting, gynecomastia (enlargement of breast tissue in men), and skin rash.

Drugs that stop androgens from working

For most prostate cancer cells to grow, androgens have to attach to a protein in the prostate cancer cell called an **androgen receptor**.

Anti-androgens, also called **androgen receptor antagonists**, are drugs that connect to androgen receptors, which stops the androgens from fueling tumor growth.

First-generation anti-androgens

These drugs were the first anti-androgens to become available, and they are often still used. Drugs of this type include:

- **Flutamide (Eulexin)**
- **Bicalutamide (Casodex)**
- **Nilutamide (Nilandron)**

These drugs are taken daily as pills.

In the United States, anti-androgens are most often used along with treatments that lower testosterone levels:

- An anti-androgen may be added to treatment if orchiectomy or an LHRH agonist or antagonist is no longer working by itself.
- An anti-androgen is also sometimes given for a few weeks when an LHRH agonist is first started. This can help prevent a tumor flare.
- An anti-androgen can also be combined with orchiectomy or an LHRH agonist as first-line hormone therapy. This is called **combined androgen blockade (CAB)**.

In some men, if an anti-androgen is no longer working, simply stopping the anti-androgen can cause the cancer to stop growing for a short time. This is called the **anti-androgen withdrawal effect**, although it is not clear why it happens.

Possible side effects: Anti-androgens have similar side effects to LHRH agonists, LHRH antagonists, and orchiectomy. When these drugs are used alone, they may have fewer sexual side effects. Sexual desire and erections can often be maintained. When these drugs are given to men already being treated with LHRH agonists, diarrhea is the major side effect. Nausea, liver problems, and tiredness can also occur.

Newer (second-generation) anti-androgens

Enzalutamide (Xtandi), **apalutamide (Erleada)**, and **darolutamide (Nubeqa)** are newer types of anti-androgens. They can sometimes be helpful even when older anti-androgens are not.

- **Any of these drugs** can be helpful in men with cancer that has not spread but is no longer responding to other forms of hormone therapy (known as **non-metastatic castration-resistant prostate cancer (nmCRPC)**).
- **Any of these drugs** can also be used for **metastatic castration-sensitive prostate cancer (mCSPC)** (cancer that has spread but that is still responding to other forms of hormone therapy).
- **Enzalutamide can also be used for non-metastatic castration-sensitive**

prostate cancer (nmCSPC) that appears to have come back after treatment based on a high PSA level (a biochemical recurrence), and that is thought to be at high risk for spreading to other parts of the body.

- **Enzalutamide** can also be used for **metastatic castration-resistant prostate cancer (mCRPC)**.

These drugs are taken as pills each day.

Side effects can include diarrhea, fatigue, rash, and worsening of hot flashes. These drugs can also cause some nervous system side effects, including dizziness and, rarely, seizures. Men taking one of these drugs are more likely to fall, which may lead to injuries. Some men have also had heart problems when taking these newer types of anti-androgens.

Other androgen-suppressing drugs

Estrogens (female hormones) were once the main alternative to removing the testicles (orchiectomy) for men with advanced prostate cancer. Because of their possible side effects (including blood clots and breast enlargement), estrogens have been replaced by other types of hormone therapy. Rarely, estrogens may be tried if other hormone treatments are no longer working.

Current issues in hormone therapy

There are many issues around hormone therapy that not all doctors agree on, such as the best time to start and stop it and the best way to give it. Studies are now looking at these issues. A few of them are discussed here.

Treating early-stage cancer

Some doctors have used hormone therapy instead of [observation or active surveillance](#) in men with early-stage prostate cancer who do not want surgery or radiation. Studies have not found that these men live any longer than those who don't get any treatment until the cancer progresses or symptoms develop. Because of this, hormone treatment is not usually advised for early-stage prostate cancer.

Early versus delayed treatment

For men who need (or will eventually need) hormone therapy, such as men whose PSA

levels are rising after surgery or radiation or men with advanced prostate cancer who don't yet have symptoms, it's not always clear when it is best to start hormone treatment.

Some doctors think that hormone therapy works better if it's started as soon as possible, even if a man feels well and isn't having any symptoms. Some studies have suggested that hormone treatment may slow the disease down and perhaps even help men live longer.

But not all doctors agree with this approach. Some are waiting for more evidence of benefit. They feel that because of the side effects of hormone therapy and the chance that the cancer could become resistant to therapy sooner, treatment shouldn't be started until a man has symptoms from the cancer. This issue is being studied.

Intermittent versus continuous hormone therapy

Some doctors believe that constant androgen suppression might not be needed, so they advise intermittent (on-again, off-again) treatment. This can allow for a break from side effects like decreased energy, sexual problems, and hot flashes.

In one form of intermittent hormone therapy, treatment is stopped once the PSA drops to a very low level. If the PSA level begins to rise, the drugs are started again. Another form of intermittent therapy uses hormone therapy for fixed periods of time – for example, 6 months on followed by 6 months off.

At this time, it isn't clear how this approach compares to continuous hormone therapy. Some studies have foundn't beln t horttsft nther

the use of this triple androgen blockade at this time.

Castration-sensitive, castration-resistant, and hormone-refractory prostate cancer

These terms are sometimes used to describe how well a man's prostate cancer is responding to hormone therapy.

- **Castration-sensitive prostate cancer (CSPC)**, also known as **hormone-sensitive prostate cancer (HSPC)**, means the cancer is being controlled by keeping the testosterone level as low as what would be expected if the testicles were removed by castration. Levels can be kept this low with an orchiectomy, or by taking an LHRH agonist or an LHRH antagonist.
- **Castration-resistant prostate cancer (CRPC)** means the cancer is still growing even when the testosterone levels are at or below the level that would be expected

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Chemotherapy for Prostate Cancer

Chemotherapy (chemo) uses anti-cancer drugs injected into a vein or taken by mouth to reach cancer cells in most parts of the body.

- [When is chemotherapy used?](#)
- [Chemo drugs used to treat prostate cancer](#)
- [How is chemotherapy given?](#)
- [Possible side effects of chemotherapy](#)
- [More information about chemotherapy](#)

When is chemotherapy used?

Chemo isn't part of the treatment for most men with prostate cancer, but it can be used to treat advanced prostate cancer, especially if there is a lot of cancer outside the prostate gland. It can be used along with [hormone therapy](#), or by itself if hormone therapy is no longer working.

Chemo is not a standard treatment for early prostate cancer.

Chemo drugs used to treat prostate cancer

Most often, docetaxel is the first chemo drug given. It is typically combined with a steroid drug, such as prednisone or dexamethasone. If docetaxel doesn't work (or stops working), cabazitaxel is often the next chemo drug tried (along with a steroid), although there may be other treatment options as well.

Docetaxel and cabazitaxel have been shown to help men live longer, on average, than older chemo drugs. They may shrink the cancer or slow its growth, and they may also reduce [symptoms](#)¹, resulting in a better quality of life. Still, chemo is very unlikely to cure prostate cancer.

Other chemo drugs are being studied for use in prostate cancer treatment as well.

How is chemotherapy given?

Chemo drugs for prostate cancer are typically given into a vein (IV) as an infusion over a certain period of time. This can be done in a doctor's office, chemotherapy clinic, or in a hospital setting. Some drugs, such as estramustine, are given as a pill.

Sometimes, a slightly larger and sturdier IV might be put into a vein to give chemo. These are known as [central venous catheters](#)² (CVCs), central venous access devices (CVADs), or central lines. They are used to put medicines, blood products, nutrients, or fluids right into your blood. They can also be used to take out blood for testing. Many kinds of CVCs are available. The most common types are the port and the PICC line.

Doctors give chemo in cycles, with each period of treatment followed by a rest period to give you time to recover from the effects of the drugs. Cycles are most often about 3 weeks long. The schedule varies depending on the drugs used. For example, with some drugs, the chemo is given only on the first day of the cycle. With others, it is given for a few days in a row, or once a week. Then, at the end of the cycle, the chemo schedule repeats to start the next cycle.

How long you'll get chemo depends on how well it's working and what side effects you have.

Possible side effects of chemotherapy

Chemo drugs attack cells that are dividing quickly, which is why they work against cancer cells. But other cells in the body, such as those in the bone marrow (where new blood cells are made), the lining of the mouth and intestines, and the hair follicles, also divide quickly. These cells can also be affected by chemo, which can lead to side

effects.

The side effects of chemo depend on the type and dose of drugs given and how long

see [Managing Cancer-related Side Effects](#)⁵.

Hyperlinks

1. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/signs-symptoms.html
2. www.cancer.org/cancer/managing-cancer/making-treatment-decisions/tubes-lines-ports-catheters.html
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Immunotherapy for Prostate Cancer

Immunotherapy is the use of medicines to stimulate a person's own immune system to recognize and destroy cancer cells more effectively. Certain types of immunotherapy can be used to treat prostate cancer.

- [Cancer vaccine](#)
- [Immune checkpoint inhibitors](#)
- [More information about immunotherapy](#)

Cancer vaccine

Sipuleucel-T (Provenge) is a [cancer vaccine](#)¹. Unlike traditional vaccines, which boost the body's immune system to help prevent infections, this vaccine boosts the immune system to help it attack prostate cancer cells.

The vaccine is used to treat advanced prostate cancer that's no longer responding to [hormone therapy](#) but that is causing few or no symptoms.

This vaccine is made specifically for each man. To make it, white blood cells (cells of the immune system) are removed from your blood over a few hours while you are hooked up to a special machine.

The cells are then sent to a lab, where they are mixed with a protein from prostate cancer cells called **prostatic acid phosphatase (PAP)**. The white blood cells are then sent back to the doctor's office or hospital, where they are given back to you by infusion into a vein (IV).

This process is repeated 2 more times, 2 weeks apart, so that you get 3 doses of cells. The cells help your other immune system cells attack the prostate cancer.

The vaccine hasn't been shown to stop prostate cancer from growing, but studies suggest it may help men live an average of several months longer. As with hormone

Doctors are also studying these and other checkpoint inhibitors combined with other types of medicines in treating prostate cancer.

Possible side effects

Side effects of these drugs can include fatigue, cough, nausea, itching, skin rash, decreased appetite, constipation, joint pain, and diarrhea.

Other, more serious side effects occur less often.

Infusion reactions: Some people might have an infusion reaction while getting one of these drugs. This is like an allergic reaction, and can include fever, chills, flushing of the face, rash, itchy skin, feeling dizzy, wheezing, and trouble breathing. It's important to tell your doctor or nurse right away if you have any of these symptoms while getting this drug.

Autoimmune reactions: These drugs work by basically removing one of the safeguards on the body's immune system. Sometimes the immune system starts attacking other parts of the body, which can cause serious or even life-threatening problems in the lungs, intestines, liver, hormone-making glands, kidneys, or other organs.

It's very important to report any new side effects to your cancer care team promptly. If serious side effects do occur, treatment may need to be stopped and you may get high doses of corticosteroids to suppress your immune system.

More information about immunotherapy

To learn more about how drugs that work on the immune system are used to treat cancer, see [Cancer Immunotherapy](#)².

To learn about some of the side effects listed here and how to manage them, see [Managing Cancer-related Side Effects](#)³.

Hyperlinks

1. www.cancer.org/cancer/managing-cancer/treatment-types/immunotherapy/cancer-vaccines.html

Targeted Drug Therapy for Prostate Cancer

As researchers have learned more about some of the changes inside prostate cancer cells that help them grow, they have developed newer types of drugs that target these changes.

- [How targeted drugs work](#)
- [PARP inhibitors](#)
- [More information about targeted therapy](#)

How targeted drugs work

Targeted drugs attack specific parts of cancer cells that make them different from normal cells. This is different from [chemotherapy \(chemo\)](#) and [hormone therapy](#) drugs. Targeted drugs sometimes work when these other types of drugs don't, and they often have different side effects.

Like chemo and hormone therapy, these drugs enter the bloodstream and reach almost all areas of the body, which makes them useful against some cancers that have spread to distant parts of the body.

PARP inhibitors

PARP (poly(ADP)-ribose polymerase) enzymes are proteins inside cells that normally help repair damaged DNA.

Some other proteins inside cells (including the *BRCA1* and *BRCA2* proteins) also help repair DNA, but in a different way. Mutations (changes) in genes that code for one of these DNA repair proteins can stop them from working like they should.

Drugs called **PARP inhibitors**, which block the PARP proteins, make it very hard for tumor cells with an abnormal DNA repair gene (including a *BRCA1* or *BRCA2* gene change) to repair their damaged DNA, which often leads to the death of these cells.

These drugs are only likely to be helpful if the cancer cells have changes in one of the DNA repair genes. Your doctor will likely test your blood or your cancer cells to be sure the cells have a DNA repair gene change before starting treatment with a PARP inhibitor.

These drugs are taken by mouth as pills or capsules, typically once or twice a day. They are given along with some type of hormone therapy, such as an LHRH agonist or after an orchiectomy.

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Treatments for Prostate Cancer Spread

to Bones

If prostate cancer spreads (metastasizes) to other parts of the body, it nearly always goes to the bones first. If the cancer has grown outside the prostate, a major goal of treatment is preventing or slowing the spread of the cancer to the bones. If the cancer has already reached the bones, controlling or relieving pain and other complications is also a very important part of treatment.

- [Dealing with bone metastasis](#)
- [Bisphosphonates](#)
- [Denosumab](#)
- [Corticosteroids](#)
- [External radiation therapy](#)
- [Radiopharmaceuticals](#)
- [Ablative treatments](#)
- [Surgery](#)
- [Pain medicines](#)

Dealing with bone metastasis

[Bone metastasis](#)¹ can be painful and can cause other problems, such as fractures (breaks), spinal cord compression (when a tumor presses on the spinal cord), or high blood calcium levels, which can be dangerous or even life threatening.

Treatments such as [hormone therapy](#), [chemotherapy](#), [targeted drugs](#), and [immunotherapy](#) may help with this, but other treatments specifically target bone metastasis and the problems it may cause.

Bisphosphonates

Bisphosphonates are drugs that work by slowing down bone cells called **osteoclasts**. These cells normally break down the hard mineral structure of bones to help keep them healthy. When prostate cancer spreads to the bones, osteoclasts can become overactive, which can cause problems. Bisphosphonates can be used:

- To help relieve pain and high calcium levels caused by cancer that has spread to the bones
- To help slow the growth of cancer that has spread to the bones and help delay or

prevent fractures

- To help strengthen bones in men who are getting hormone therapy

Zoledronic acid (Zometa, other names) is a commonly used bisphosphonate for prostate cancer. This drug is given as an intravenous (IV) injection, usually once every 3 or 4 weeks. Men given this drug are advised to take a supplement containing calcium and vitamin D to prevent problems with low calcium levels.

Sometimes other bisphosphonates are used to treat prostate cancer that has spread to bone.

Side effects of bisphosphonates can include flu-like symptoms and bone or joint pain. These drugs can also cause kidney problems, so patients with poor kidney function might not be able to be treated with these medicines.

A rare but very serious side effect of these drugs is **osteonecrosis of the jaw (ONJ)**. With this condition, part of the jawbone loses its blood supply and dies. This can lead to

[tired](#)⁵. Like the bisphosphonates, denosumab can also cause ONJ, so doctors recommend taking the same precautions (such as having teeth and jaw problems treated **before** starting the drug).

Corticosteroids

Corticosteroid drugs (such as prednisone and dexamethasone) might also help relieve bone pain in some men. They also can help lower PSA levels.

These drugs are often already a part of treatment for prostate cancer that has spread, as they're often given along with certain chemo or hormone therapy drugs.

External radiation therapy

[Radiation therapy](#) can help reduce bone pain, especially if the pain is limited to one or only a few areas of bone. Radiation can be aimed at tumors on the spine, which can help relieve pressure on the spinal cord in some cases, and prevent paralysis. In some centers this is done with stereotactic body radiation therapy (SBRT), which allows the treatment to be completed more quickly.

Radiation therapy may also help relieve other symptoms by shrinking tumors in other parts of the body.

Radiopharmaceuticals

Radiopharmaceuticals are drugs that contain radioactive elements. They are injected into a vein and settle in areas of damaged bones (like those containing cancer spread). Once they've settled in the bones, they release radiation that kills cancer cells.

All of these drugs can help relieve pain caused by bone metastases.

Radium-223 has also been shown to help men who have prostate cancer spread only to their bones (as opposed to spread to other organs such as the lungs) to live longer. For these men, radium-223 may be an early part of treatment.

The major side effect of these drugs is a [decrease in blood cell counts](#)⁶, which could increase risks for [infections](#)⁷ or [bleeding](#)⁸, especially if your counts are already low. Other side effects are also possible, so ask your doctor what you can expect.

Ablative treatments

These treatments focus extreme heat or cold on bone tumors to ablate (destroy) them. [Ablative treatments](#) might be an option if there are only a few tumors, especially if radiation isn't helpful. One drawback with some ablative techniques is that they require a probe to be inserted into the tumor, which isn't always possible with bone tumors.

Examples of ablative treatments include:

High-intensity focused ultrasound (HIFU): For this technique, a probe outside the body precisely focuses ultrasound waves on the tumor to heat and destroy the cancer cells.

Radiofrequency ablation (RFA): In this approach, a thin metal probe is inserted into the tumor. An electric current is then run through the probe, which heats the tip to destroy the cancer cells.

Cryoablation (cryotherapy): For this treatment, a thin, hollow metal probe is inserted into the tumor. Very cold gases are passed into the probe, which freezes the cancer cells. The tumor is then thawed, and the process is typically repeated.

Other ablative techniques now being studied include microwave ablation, laser ablation, and irreversible electroporation (IRE).

Surgery

Kyphoplasty is a minor surgery to stabilize a painful collapsed bone in a spine weakened by prostate cancer. During this procedure, a small incision is made in the middle of the back, and a balloon is placed into the weak spinal bone. The balloon is first filled with air and then a cement-like mixture (which will harden) to stabilize the bone and spine.

<https://www.cancer.gov/types/prostate/hp/prostate-treatment-pdq> on August 11, 2023.

National Comprehensive Cancer Network (NCCN). Practice Guidelines in Oncology: Prostate Cancer. Version 2.2023. Accessed at https://www.nccn.org/professionals/physician_gls/pdf/prostate.pdf on August 10, 2023.

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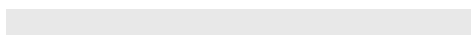
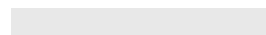
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Zelevsky MJ, Morris MJ, and Eastham JA. Chapter 70: Cancer of the Prostate. In: DeVita VT, Lawrence TS, Rosenberg SA, eds. *DeVita, Hellman, and Rosenberg's Cancer: Principles and Practice of Oncology*. 11th ed. Philadelphia, Pa: Lippincott Williams & Wilkins; 2019.

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Considering Treatment Options for Early Prostate Cancer

and overall health, and the likelihood that the cancer will cause problems for you, before deciding on what to do. You should also think about the possible side effects of treatment and how likely they are to bother you. Some men, for example, may want to avoid possible side effects, such as [incontinence](#)² or [erection problems](#)³, for as long as possible. Other men might be less concerned about these side effects and more concerned about removing or destroying the cancer.



Making such a complex decision is often hard to do by yourself. You might find it helps to talk with your family and friends before making a decision. You might also find it helpful to speak with other men who have faced or are currently facing the same issues. The American Cancer Society and other organizations offer support programs where you can meet and discuss these and other cancer-related issues. For more information about our programs, call us toll-free at 1-800-227-2345 or see [Patient Programs and Services](#)⁵.

It's important to know that each man's experience with prostate cancer is different. Just because someone you know had a good (or bad) experience with a certain type of treatment doesn't mean the same will be true for you.

You might also want to consider getting more than one medical opinion, perhaps even from different types of doctors. It is natural for doctors to favor the forms of treatment they're most comfortable with. For example, surgical specialists such as urologists might favor surgery, while radiation oncologists might lean more toward radiation therapy. In the same way, doctors specializing in newer types of treatment may be more likely to recommend their therapies. Talking to each of them might give you a better perspective on your options. Your primary care doctor may also be helpful in sorting out which treatment might be right for you.

Some things to consider when choosing among treatments

Before deciding on treatment, here are some questions you may want to ask yourself:

- Are you the type of person who needs to do something about your cancer, even if it might result in serious side effects?
- Would you be comfortable with active surveillance (or observation), even if it means you might have more anxiety and need more frequent follow-up visits and tests in the future?
- If it's an option, would you consider a form of focal therapy to treat your cancer, which might have fewer side effects than surgery or radiation but is not yet well proven?
- Do you need to know right away whether your doctor was able to get all of the cancer out (as a result of surgery)? Or are you comfortable with perhaps not knowing the results of treatment for a while (as is the case in radiation therapy or focal therapies) if it means not having to have surgery?
- Are you more inclined to go with a newer technology (such as proton beam radiation therapy), which in theory might have some advantages, even if it's not yet well proven?

- Which potential treatment side effects (incontinence, erection problems, bowel problems) might be most distressing to you?
- How important for you are issues like the amount of time spent in treatment or recovery?
- If your initial choice of treatment isn't successful, what would your treatment options be at that point?

Many men find it very stressful to have to choose between treatment options, and they might worry they will choose the “wrong” one. But in many cases, there is no single option that is clearly better than all the others. What's more, unless the cancer is known to be growing quickly or has other concerning features, it most likely won't need to be treated right away, so it's important to take your time to consider your options carefully when deciding which one is right for you.

Hyperlinks

1. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/staging.html
2. www.cancer.org/cancer/managing-cancer/side-effects/stool-or-urine-changes/bladder-incontinence.html
3. www.cancer.org/cancer/managing-cancer/side-effects/fertility-and-sexual-side-effects/sexuality-for-men-with-cancer.html
4. www.cancer.org/cancer/survivorship/long-term-health-concerns/cancer-as-a-chronic-illness.html
5. www.cancer.org/support-programs-and-services.html

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Initial Treatment of Prostate Cancer, by Stage and Risk Group

The [stage](#)¹ of your cancer is one of the most important factors in choosing the best way to treat it. Prostate cancer is staged based on the extent of the cancer (using T, N, and M categories) and the [PSA level and Gleason score \(Grade Group\)](#)² when it is first diagnosed.

- [Very-low-risk group](#)
- [Low-risk group](#)
- [Favorable intermediate-risk group](#)
- [Unfavorable intermediate-risk group](#)
- [High- or very-high-risk group](#)
- [Stage IV](#)
- [Prostate cancer that has spread or come back](#)

For prostate cancers that haven't spread (stages I to III), doctors also use [risk groups](#)³ (based on how far the prostate tumor has grown, PSA level, grade, and prostate biopsy results) and sometimes special lab tests to help guide treatment options. Risk groups range from very low-risk to very high-risk. **Cancers in the lower-risk groups have a smaller chance of growing and spreading compared to those in higher-risk groups.**

Other factors, such as your age, overall health, life expectancy, and personal preferences are also important when looking at treatment options. This is especially true for [early-stage cancers](#), where you might have several options.

You might want to ask which factors your doctor is considering when discussing your treatment options. There is also some variability in what different doctors consider to be “standard” options, so some doctors might recommend options different from those listed here.

Taking part in a [clinical trial](#)⁴ of newer treatments is also an option for many men with prostate cancer.

Very-low-risk group

These prostate cancers are very unlikely to grow and spread, even if they aren’t treated. For men whose cancers are in this group, [active surveillance](#) is typically recommended. (For men who have medical problems that might shorten their lifespan, observation, which is a less intense form of monitoring, might be an option as well.) This is because these tumors are unlikely to cause any harm, while treatments such as radiation and surgery can have side effects that can affect a man’s quality of life. If the cancer starts to show signs of growing at some point, treatments such as surgery or radiation can then be considered.

For men who aren’t comfortable with just monitoring the cancer and choose to start treatment right away, [radiation therapy](#) (external beam or brachytherapy) or [surgery](#) (radical prostatectomy) may be options.

Another option for some men who prefer to treat the cancer might be some type of focal therapy, such as [cryotherapy or high-intensity focused ultrasound \(HIFU\)](#). However, most expert groups don’t recommend these as a first treatment, unless surgery and radiation aren’t good options. This is mainly because there isn’t enough long-term data yet to show if these treatments are as effective as surgery or radiation.

If surgery is done and it finds concerning features in the cancer, your doctor might recommend external radiation therapy to the prostate bed (the area where the prostate was before it was removed), possibly along with [hormone therapy](#).

Low-risk group

Most men whose prostate cancers are in the low-risk group will be offered [active surveillance](#) (or observation, for men who have other serious health issues that might affect their lifespan), since very few of these cancers will spread to distant parts of the body. If the cancer starts to show signs of growing at some point, treatments such as surgery or radiation can then be considered.

Other options, depending on a man's preferences, might include [radiation therapy](#) (external beam or brachytherapy) or [surgery](#) (radical prostatectomy).

Another option for some men who prefer to treat the cancer might be some type of focal therapy, such as [cryotherapy or high-intensity focused ultrasound \(HIFU\)](#). However, most expert groups don't recommend these as a first treatment, unless surgery and radiation aren't good options. This is mainly because there isn't enough long-term data yet to show if these treatments are as effective as surgery or radiation.

If surgery is done and it finds concerning features in the cancer, your doctor might recommend external radiation therapy to the prostate bed (the area where the prostate was before it was removed), possibly along with [hormone therapy](#).

Favorable intermediate-risk group

These cancers are slightly more likely to grow and spread. Initial treatment options for men with these cancers might include:

- Active surveillance
- Surgery (radical prostatectomy, possibly with the removal of nearby lymph nodes)
- [Radiation therapy](#) (external beam or brachytherapy)

Another option for some men who prefer to treat the cancer might be some type of focal therapy, such as [cryotherapy or high-intensity focused ultrasound \(HIFU\)](#). However, most expert groups don't recommend these as a first treatment, unless surgery and radiation aren't good options. This is mainly because there isn't enough long-term data yet to show if these treatments are as effective as surgery or radiation.

If surgery is done and it finds concerning features in the prostate cancer, your doctor might recommend external radiation therapy to the prostate bed (the area where the prostate was before it was removed), possibly along with [hormone therapy](#). If cancer is found in the lymph nodes, hormone therapy might be recommended, possibly along with external radiation.

Men who have other serious medical problems that might affect their life span may choose a less aggressive first treatment such as radiation alone, or less intensive monitoring ([observation](#)).

Unfavorable intermediate-risk group

of the body) when the cancer is first found. For men who don't have other serious medical problems that might affect their life span or who are having symptoms from the cancer, options include:

- [External beam radiation treatment](#) with [hormone therapy](#) (which often includes the newer hormone drug abiraterone)
- Hormone therapy (which might include abiraterone)
- [Surgery](#) (radical prostatectomy, along with the removal of nearby lymph nodes), only in men who are most likely to benefit from it

If surgery is done and it finds concerning features in the prostate cancer, your doctor might recommend external radiation therapy to the prostate bed (the area where the prostate was before it was removed), possibly along with hormone therapy. If cancer is found in the lymph nodes, hormone therapy might be recommended, possibly along with external radiation.

Men who have other serious medical problems that might affect their life span and who aren't having symptoms may choose a less aggressive first treatment such as hormone therapy, or less intensive monitoring (observation).

Stage IVB cancers have spread to distant organs such as the bones when the cancer is found. Most stage IVB cancers can't be cured, but they are treatable. The goals of treatment are to keep the cancer under control for as long as possible and to improve a man's quality of life. Initial treatment options may include:

- Hormone therapy (which typically includes a newer hormone drug, such as abiraterone, apalutamide, or enzalutamide)
- Hormone therapy (which typically includes a newer hormone drug, such as abiraterone or darolutamide) along with [chemotherapy](#) (usually docetaxel), especially if there is a lot of cancer in the body
- Hormone therapy with external beam radiation to the tumor in the prostate
- Surgery (TURP) to relieve [symptoms](#)⁵, such as bleeding or urinary obstruction
- [Observation](#) (for those who are older or have other serious health issues and do not have major symptoms from the cancer)
- Taking part in a [clinical trial](#)⁶ of newer treatments

Treatment of stage IV prostate cancer may also include treatments to help prevent or relieve symptoms, such as pain from [bone metastases](#). This can be done with external radiation (including stereotactic body radiation therapy, or SBRT) or with drugs like denosumab (Xgeva), a bisphosphonate such as zoledronic acid (Zometa), or a

[radiopharmaceutical](#) such as radium-223, strontium-89, or samarium-153.

Prostate cancer that has spread or come back

The options above are for the initial treatment of different risk groups and stages of prostate cancer. But if the cancer continues to grow and spread or if it comes back, other treatments might be options, such as [immunotherapy](#), [targeted drug therapy](#), chemotherapy, or other forms of hormone therapy. (See [Treating Prostate Cancer That Doesn't Go Away or Comes Back After Treatment](#).)

Hyperlinks

1. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/staging.html
2. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/how-diagnosed.html
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Still, having any detectable PSA after surgery can be stressful for men and their loved ones. If your PSA is still detectable after surgery, even at a very low level, talk to your doctor about what it might mean, and what the best course of action might be. Some doctors advise following such low PSA levels over time to get a better idea of what's going on. Other doctors might recommend further treatment.

If your PSA increases after surgery, your doctor might also want to know how fast it is rising. Some evidence shows that faster-rising PSA levels may be more of a concern. Men who have a shorter **PSA doubling time** (the time it takes for the PSA level to double) tend to have a worse prognosis (outlook) compared to men with longer PSA doubling times.

After radiation therapy

[Radiation therapy](#) doesn't kill all of the cells in the prostate gland, so it's not expected to cause the PSA to drop to an undetectable level. The remaining normal prostate cells will still make some PSA.

The pattern of the drop in PSA after radiation therapy is also different from after surgery. PSA levels after radiation tend to drop slowly, and they might not reach their lowest level until 2 years or more after treatment.

Doctors tend to follow the PSA levels every few months to look for trends. A one-time, small rise in PSA might be cause for closer monitoring, but it might not mean that the cancer is still there (or has returned), as PSA levels can fluctuate slightly from time to time. However, a PSA that is rising on consecutive tests after treatment might indicate that cancer is still there. Some medical groups have proposed that if the PSA rises more than 2 ng/mL above the lowest level reached, further treatment should be considered, but some doctors might advise tests to look for cancer in the body even if the PSA has not yet risen this much.

As is the case after surgery, if your PSA begins to rise after radiation treatment, your doctor might also want to know how fast it is rising. Men who have a shorterIf your PSA increases after

During treatment for advanced prostate cancer

When treatments such as [hormone therapy](#), [chemotherapy](#), or [immunotherapy](#) are used for more advanced prostate cancer, the PSA level can help show how well the treatment is working or when it might be time to try a different treatment.

Treatments should lower the PSA level (at least at first), although in some cases they may just help keep it from rising further, or even just slow the rise. Of course, other factors, such as whether you're having [symptoms](#)³ from your cancer and whether [imaging tests](#)⁴ show it is growing, are also important when deciding if it might be time to change treatments.

If the cancer has spread outside the prostate, the actual PSA level is often not as important as the direction and speed with which it changes. The PSA level itself does not predict whether or not a man will have symptoms or how long he will live. Many men have very high PSA levels and feel just fine, while other men with low PSA levels might have symptoms.

Hyperlinks

1. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/how-diagnosed.html
2. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/how-diagnosed.html
3. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/signs-symptoms.html
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- [Cancer that has spread to other parts of the body](#)
- [Castration-resistant and hormone-refractory prostate cancer](#)

Follow-up treatment options

Follow-up treatment will depend on where the cancer is thought to be, what treatment(s) you've already had, and other factors. [Imaging tests](#) (such as MRI, PET scans, or bone scans) or biopsies may be done to get a better idea about where the cancer is and which treatments are most likely to be helpful.

Cancer that is thought to still be in or around the prostate (or that isn't seen on imaging tests)

If the cancer is still thought to be just in the area of the prostate, a second attempt to cure it might be possible.

After surgery: If you've had a [radical prostatectomy](#), [radiation therapy](#) to the area where the prostate was might be an option, sometimes along with [hormone therapy](#) (which might include a newer hormone drug such as abiraterone).

After radiation therapy: If your first treatment was radiation, treatment options might include surgery (radical prostatectomy) or some type of [ablative therapy](#) (such as cryotherapy or high-intensity focused ultrasound (HIFU)). However, when these treatments are done after radiation, they carry a higher risk for side effects such as [incontinence](#)². Getting radiation therapy again might not be a good option because of the increased risk of serious side effects, although in some cases [brachytherapy](#) may be an option as a second treatment after external radiation.

Sometimes when the cancer doesn't go away (or when it comes back) after the first treatment, it might not be clear exactly where the remaining cancer is in the body. If the only sign of cancer is a **biochemical recurrence** (a rising PSA level alone, without cancer being seen on imaging tests), another option for some men might be [active surveillance](#) instead of treatment. Prostate cancer often grows slowly, so even if it does come back, it might not cause problems for many years, at which time further treatment could then be considered.

Factors such as how quickly the PSA is rising and the original [Gleason score](#)³ of the cancer can help predict how soon the cancer might show up in distant parts of the body and cause problems. If the PSA is going up very quickly, some doctors might recommend that you start treatment even before the cancer can be seen on tests or

causes [symptoms](#)⁴.

Observation (less intensive monitoring) might be a more appealing option for some groups of men, such as those who are older and in whom the PSA level is rising slowly. Still, not all men might be comfortable with this approach.

If the PSA is rising quickly enough to warrant treatment, but localized treatments (such as surgery, radiation therapy, or ablative therapy) aren't likely to be helpful, [hormone therapy](#) with a drug such as enzalutamide is often the next option. If one type of hormone therapy isn't helpful, another can be tried (see "Castrate-resistant prostate cancer," below).

Cancer that has reached nearby areas

If tests show that the cancer has spread to the pelvic area (but hasn't yet spread to other parts of the body), treatment options will likely depend on what type of treatment you've had.

After surgery: If you've had a [radical prostatectomy](#), [radiation therapy](#) to the pelvic area might be an option, typically along with [hormone therapy](#) (which might include a newer hormone drug such as abiraterone).

After radiation therapy: If your first treatment was radiation, treatment options might include hormone therapy or monitoring the cancer (and then treating it with hormone therapy if it becomes necessary). Other options for some men might include surgery to remove the pelvic lymph nodes (pelvic lymph node dissection, or PLND) or radiation to the pelvic lymph nodes (if it hasn't been done already).

Cancer that has spread to other parts of the body

If the cancer has spread to other parts of the body, it will most likely go to the bones or other lymph nodes outside of the pelvis first. Much less often the cancer might spread to the liver or other organs.

When prostate cancer has spread to other parts of the body (including the bones), [hormone therapy](#) is usually the preferred treatment. But while it's often very effective for a time, it isn't likely to cure the cancer, and at some point it might stop working. Usually the first treatment is a luteinizing hormone-releasing hormone (LHRH) agonist (often along with a first-generation anti-androgen), LHRH antagonist, or orchiectomy. It might be used:

- Along with a newer hormone drug, such as abiraterone, apalutamide, or enzalutamide
- Along with a [chemotherapy](#) drug (usually docetaxel) and a newer hormone drug, such as abiraterone or darolutamide
- By itself

For tumors in the bones, other treatments aimed at [bone metastases](#)⁵ might be used as well.

Castration-resistant and hormone-refractory prostate cancer

[Hormone therapy](#) is often very effective at shrinking or slowing the growth of prostate cancer that has spread, but it usually becomes less effective over time. Doctors use different terms to describe cancers that are no longer responding to hormones.

- **Castration-resistant prostate cancer (CRPC)** is cancer that is still growing despite the fact that hormone therapy (an orchiectomy or an LHRH agonist or antagonist) is keeping the testosterone level in the body as low as what would be expected if the testicles were removed (called *castrate levels*). The cancer might still respond to other forms of hormone therapy, though.
- **Hormone-refractory prostate cancer (HRPC)** is cancer that is no longer helped by any form of hormone therapy.

Men with prostate cancer that is still growing despite initial hormone therapy (CRPC) now have many more treatment options than they had in the past.

If the prostate cancer cells haven't been tested for gene or protein changes that might affect treatment options, that might be done at this time.

If a first-generation anti-androgen (flutamide, bicalutamide, or nilutamide) was not part of the initial hormone therapy, it may be added at this time. If a man is already getting GS3343 gs ()Tj 0 2

The [prostate cancer vaccine](#) sipuleucel-T (Provenge) is another option for men whose cancer is causing few or no symptoms. This might not lower PSA levels, but it can often help men live longer.

For cancers that are no longer responding to initial hormone therapy and are causing symptoms, several options might be available. If it hasn't been used already, [chemotherapy](#) with the drug docetaxel is often the first choice because it has been shown to help men live longer, as well as to reduce pain. If docetaxel doesn't work or stops working, other chemo drugs, such as cabazitaxel, may help.

Depending on which treatments a man has had, other options at some point might include:

- A different type of hormone therapy, such as abiraterone or enzalutamide (if they haven't been tried yet)
- The [radiopharmaceutical](#) lutetium Lu 177 vipivotide tetraxetan (Pluvicto), if the cancer cells have the PSMA protein
- A [targeted therapy](#) drug, such as rucaparib (Rubraca), olaparib (Lynparza), talazoparib (Talzenna), or niraparib plus abiraterone (Akeega), typically along with hormone therapy, if the cancer cells have a change (mutation) in a DNA repair gene such as *BRCA1* or *BRCA2*
- [Immunotherapy](#) with pembrolizumab (Keytruda) or dostarlimab (Jemperli), if the cancer cells have certain gene changes (MSI-H, dMMR, or high TMB)

Several types of treatment might be helpful if cancer has spread to the bones. These include:

Several promising new medicines are now being tested against castration-resistant and hormone-refractory prostate cancer. Because these cancers can become hard to treat, men with these cancers might want to consider exploring new options by taking part in [clinical trials](#)⁷.

Hyperlinks

1. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/how-diagnosed.html
2. www.cancer.org/cancer/managing-cancer/side-effects/stool-or-urine-changes/bladder-incontinence.html
3. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/how-diagnosed.html
4. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/signs-symptoms.html
5. www.cancer.org/cancer/managing-cancer/advanced-cancer/bone-metastases.html
6. www.cancer.org/cancer/managing-cancer/side-effects/pain.html
7. www.cancer.org/cancer/managing-cancer/making-treatment-decisions/clinical-trials.html

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Hussain A, Dawson NA. Chemotherapy in castration-resistant prostate cancer. UpToDate. 2023. Accessed at <https://www.uptodate.com/contents/chemotherapy-in-castration-resistant-prostate-cancer> on August 12, 2023.

National Cancer Institute. Physician Data Query (PDQ). Prostate Cancer Treatment – Health Professional Version. 2023. Accessed at <https://www.cancer.gov/types/prostate/hp/prostate-treatment-pdq> on August 13, 2023.

