
Prostate Cancer Causes, Risk Factors, and Prevention

Learn about the risk factors for prostate cancer and what you might be able to do to help lower your risk.

Risk Factors

A risk factor is anything that increases your chances of getting a disease such as cancer. Learn more about the risk factors for prostate cancer.

- [Prostate Cancer Risk Factors](#)
- [What Causes Prostate Cancer?](#)
- [Genetic Counseling and Testing for Prostate Cancer Risk](#)

Prevention

There is no sure way to prevent prostate cancer. But there are things you can do that might lower your risk. Learn more.

- [Can Prostate Cancer Be Prevented?](#)

Prostate Cancer Risk Factors

All men are at risk for developing prostate cancer, but there are factors that can

increase your risk. Understanding how these factors apply to you might help you make decisions about screening for prostate cancer.

- [What is a risk factor?](#)
- [Family history](#)
- [Inherited gene changes](#)
- [Factors with less clear effects on prostate cancer risk](#)

What is a risk factor?

A risk factor is anything that raises your chances of getting a disease such as cancer.

Different cancers have different risk factors. Some risk factors, like smoking, can be changed. Others, like a person's age or family history, can't be changed.

But having a risk factor, or even several, does not mean that you will get the disease. Many people with one or more risk factors never get cancer, while others who get cancer may have had few or no known risk factors.

Researchers have found some factors that can affect prostate cancer risk.

Older age

Prostate cancer is rare in men younger than 40, but the chance of having prostate cancer rises rapidly after age 50. About 6 in 10 prostate cancers are found in men older than 65.

Race/ethnicity

Prostate cancer develops more often in African American men and in Caribbean men of African ancestry than in men of other races. And when it does develop in these men, they tend to be younger.

Prostate cancer occurs less often in Asian American, Hispanic, and Latino men than in non-Hispanic White men. The reasons for these racial and ethnic differences are not clear.

Family history

Prostate cancer seems to run in some families, which suggests that in some cases

there may be an inherited or [genetic factor](#)¹. Still, most prostate cancers occur in men **without** a family history of it.

Having a father or brother with prostate cancer more than doubles a man's risk of developing this disease. (The risk is higher for men who have a brother with the disease than for those who have a father with it.) The risk is much higher for men with several affected relatives, particularly if their relatives were young when the cancer was found.

Inherited gene changes

Certain gene changes (known as **variants** or **mutations**) that are inherited from a parent can raise prostate cancer risk, although these probably account for only a small percentage of prostate cancers overall. For example:

- Inherited variants of the ***BRCA1* or *BRCA2* gene**, which are linked to an increased risk of breast, ovarian, and other cancers in some families, can also increase prostate cancer risk in men (especially mutations in *BRCA2*).
- Men with **Lynch syndrome** (also known as **hereditary non-polyposis colorectal cancer**, or **HNPCC**), a condition caused by inherited gene changes, are at increased risk for some types of cancer, including prostate cancer.

Other inherited gene changes can also raise a man's risk of prostate cancer. For more on some of these gene changes, see [What Causes Prostate Cancer?](#)

Factors with less clear effects on prostate cancer risk

Diet

The exact role of diet in prostate cancer is not clear, but several factors have been studied.

Men who consume a lot of **dairy products** may have a slightly higher chance of getting prostate cancer.

Some studies have suggested that men who consume a lot of **calcium** (through foods or supplements) may have a higher risk of developing prostate cancer. But most studies have not found such a link with the levels of calcium found in the average diet, and it's important to note that calcium is known to have other important health benefits.

Dietary vegetable intake, soy products, coffee, and multivitamin use have also been studied. However, none of these factors has consistently been linked to prostate cancer risk.

Obesity

[Obesity](#)² does not seem to increase the overall risk of getting prostate cancer.

Some studies have found that men with obesity have a lower risk of getting a low-grade (slower-growing) form of the disease, but a higher risk of getting more aggressive (faster-growing) prostate cancer. The reasons for this are not clear.

Some studies have also found that men with obesity may be at higher risk for having more advanced prostate cancer and of dying from prostate cancer, but not all studies have found this.

Smoking

Most studies have not found a link between [smoking](#)³ and **getting** prostate cancer. Some research has linked smoking to a small increased risk of dying from prostate cancer, but this finding needs to be confirmed by other studies. Importantly, smoking is clearly linked with many other health effects, including an increased risk of many other types of cancer.

Chemical exposures

Research has suggested that exposure to some chemicals might increase prostate cancer risk. For example:

Some studies have suggested a link between exposure to **arsenic** and a higher risk of prostate cancer. To learn more, see [Arsenic and Cancer Risk](#)⁴.

There is some evidence that **firefighters** can be exposed to chemicals that may increase their risk of prostate cancer. To learn more, see [Firefighters and Cancer Risk](#)⁵.

A few studies have suggested a possible link between exposure to **Agent Orange**, a chemical used widely during the Vietnam War, and the risk of prostate cancer, although not all studies have found such a link. The National Academies of Science, Engineering, and Medicine considers there to be “limited/suggestive evidence” of a link between Agent Orange exposure and prostate cancer. To learn more, see [Agent Orange and Cancer](#)⁶.

Inflammation of the prostate

Some studies have suggested that **prostatitis** (inflammation of the prostate gland) may be linked to an increased risk of prostate cancer, but other studies have not found such a link. Inflammation is often seen in samples of prostate tissue that also contain cancer. The link between the two is not yet clear, and this is an active area of research.

Sexually transmitted infections

Researchers have looked to see if sexually transmitted infections (like gonorrhea or chlamydia) might increase the risk of prostate cancer, because they can lead to inflammation of the prostate. So far, studies have had conflicting results, and no firm conclusions have been reached.

Vasectomy

Some studies have suggested that men who have a vasectomy (minor surgery to make men infertile) have a slightly increased risk for prostate cancer, but other studies have found no increase in risk. Research on this possible link is still underway.

Hyperlinks

1. www.cancer.org/cancer/risk-prevention/genetics.html
2. www.cancer.org/cancer/risk-prevention/diet-physical-activity/body-weight-and-cancer-risk.html
3. www.cancer.org/cancer/risk-prevention/tobacco.html
4. www.cancer.org/cancer/risk-prevention/chemicals/arsenic.html
5. www.cancer.org/cancer/risk-prevention/chemicals/firefighting.html
6. www.cancer.org/cancer/risk-prevention/chemicals/agent-orange-and-cancer.html

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What Causes Prostate Cancer?

Researchers have found some [risk factors for prostate cancer](#), although it's not yet clear exactly how these factors might increase prostate cancer risk. On a basic level, prostate cancer is caused by changes in the DNA of a normal prostate cell.

- [Gene changes that might lead to prostate cancer](#)
- [Inherited gene mutations](#)
- [Acquired gene mutations](#)

Gene changes that might lead to prostate cancer

DNA is the chemical in our cells that makes up our **genes**, which control how our cells function. We usually look like our parents because they are the source of our DNA. But our genes affect more than just how we look.

Some genes normally help control when our cells grow, divide to make new cells, or repair mistakes in DNA, or they cause cells to die when they're supposed to. If these genes aren't working properly, it can lead to cells growing out of control. For example:

- Changes in genes that normally help cells grow, divide, or stay alive can lead to these genes being more active than they should be, causing them to become **oncogenes**. These genes can result in cells growing out of control.
- Genes that normally help keep cell division under control or cause cells to die at the right time are known as **tumor suppressor genes**. Changes that turn off these genes can result in cells growing out of control.
- Some genes normally help repair mistakes in a cell's DNA. Changes that turn off these **DNA repair genes** can result in the buildup of DNA changes within a cell, which might lead to them growing out of control.

Any of these types of DNA changes might lead to cells growing out of control and forming a tumor. To learn more, see [Oncogenes, Tumor Suppressor Genes, and DNA Repair Genes](#)¹.

DNA changes can either be **inherited** from a parent, or they can be **acquired** during a person's lifetime.

Inherited gene mutations

Some gene mutations can be passed on in families and are found in all of a person's cells. Such inherited gene changes are thought to be a major factor in up to 10% of

prostate cancers. Cancer caused by inherited genes is called **hereditary cancer**.

Inherited mutations in several genes have been linked to hereditary prostate cancer, including:

- **BRCA1 and BRCA2:** These genes normally help repair mistakes in a cell's DNA (or cause the cell to die if the mistake can't be fixed). Inherited mutations in either of these genes greatly increase the risk of breast and ovarian cancer in women. They are also linked to some other cancers. For example, changes in these genes (especially *BRCA2*) are linked to an increased risk of prostate cancer.
- **CHEK2, ATM, PALB2, and RAD51:** Mutations in these other DNA repair genes might also be responsible for some hereditary prostate cancers.
- **DNA mismatch repair genes (such as MSH2, MSH6, MLH1, and PMS2):** These genes normally help fix mistakes (mismatches) in DNA that can happen when a cell is preparing to divide into 2 new cells. (Cells must make a new copy of their DNA each time they divide.) Men with inherited mutations in one of these genes have a condition known as **Lynch syndrome** (also known as hereditary non-polyposis colorectal cancer, or HNPCC), and are at increased risk of colorectal, prostate, and some other cancers.
- **RNASEL (formerly HPC1):** The normal function of this tumor suppressor gene is to help cells die when something goes wrong inside them. Inherited mutations in this gene might let abnormal cells live longer than they should, which can lead to an increased risk of prostate cancer.
- **HOXB13:** This gene is important in the development of the prostate gland. Mutations in this gene have been linked to early-onset prostate cancer (prostate cancer diagnosed at a young age) that runs in some families. This mutation is rare.

Other inherited gene mutations may account for some hereditary prostate cancers, and research is being done to find these genes.

If you have prostate cancer, [testing the cancer cells](#)² for these types of gene changes might be important, for a couple of reasons:

- The results of testing might affect your treatment options. Some medicines used to treat prostate cancer (such as certain [targeted drugs](#)³) are only likely to be helpful if your cancer cells have one of these gene changes.
- If testing finds a gene change, your doctor might suggest genetic counseling and testing. If the tumor cells have a gene mutation, testing some of your other cells (such as from a blood sample) for the same mutation can show if you inherited it

(and therefore if it's in all of your cells). This might help you learn more about your risk of other cancers, and possibly the risks among other members of your family. To learn more, see [Genetic Counseling and Testing for Prostate Cancer Risk](#).

Acquired gene mutations

Some genes can change during a person's lifetime. This type of mutation is not passed on to children, and it's found only in cells that come from the original mutated cell. These are called **acquired** mutations. Most gene mutations linked to prostate cancer develop during a man's life, rather than having been inherited.

Every time a cell prepares to divide into 2 cells, it needs to make a copy of its DNA for the new cell. This process isn't perfect, and sometimes errors occur, leaving defective DNA in the new cell. It's not clear how often these DNA changes might be random events, and how often they are influenced by other factors (such as diet, hormone levels, etc.).

In general, the more quickly prostate cells grow and divide, the more chances there are for mutations to occur. Therefore, anything that speeds up this process might make prostate cancer more likely.

For example, androgens (male hormones), such as testosterone, can promote prostate cell growth. Having higher levels of androgens might contribute to prostate cancer risk in some men, although studies so far have not found a consistent link.

Some research has found that men with high levels of another hormone, insulin-like growth factor-1 (IGF-1), might be more likely to get prostate cancer. However, other studies have not found such a link. Further research is needed to make sense of these findings.

As mentioned in [Prostate Cancer Risk Factors](#), some studies have found that inflammation in the prostate might be linked to prostate cancer. One theory is that inflammation might lead to cell DNA damage, which could contribute to a normal cell becoming a cancer cell. More research is needed in this area.

Exposure to [radiation](#)⁴ or [cancer-causing chemicals](#)⁵ can cause DNA mutations in many organs, but so far these factors haven't been shown to be important causes of mutations in prostate cells.

Hyperlinks

1. www.cancer.org/cancer/understanding-cancer/genes-and-cancer/oncogenes-tumor-suppressor-genes.html
2. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/how-diagnosed.html
3. www.cancer.org/cancer/types/prostate-cancer/treating/targeted-therapy.html
4. www.cancer.org/cancer/risk-prevention/radiation-exposure.html
5. www.cancer.org/cancer/risk-prevention/understanding-cancer-risk.html

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Genetic Counseling and Testing for Prostate Cancer Risk

Some people inherit changes (mutations) in certain genes that increase their risk of prostate cancer (and possibly other cancers).

Genetic testing can look for mutations in some of these genes. Genetic testing can be helpful in some situations. But not everyone needs to be tested, and it's important to understand what genetic testing can and can't tell you before these tests are done.

- [Inherited gene changes that can increase prostate cancer risk](#)
- [Why might genetic counseling and testing be helpful?](#)
- [Who might be advised to get genetic testing?](#)
- [Considering genetic counseling and testing for prostate cancer risk](#)
- [How genetic testing is done](#)
- [Getting the results of genetic testing](#)

Inherited gene changes that can increase prostate cancer risk

Inherited mutations in several genes have been linked to an increased risk of prostate cancer, including:

- ***BRCA1*** and ***BRCA2***
- ***CHEK2***
- ***ATM***
- ***PALB2***
- **DNA mismatch repair genes (such as *MSH2*, *MSH6*, *MLH1*, and *PMS2*)** (linked with **Lynch syndrome**, also known as hereditary non-polyposis colorectal cancer, or HNPCC)
- ***HOXB13***

Other inherited gene mutations may account for some hereditary prostate cancers as well. To learn more about these genes, see [What Causes Prostate Cancer?](#)

Why might genetic counseling and testing be helpful?

The main benefit of genetic testing is that it can help you better understand your risk for

a certain disease, such as prostate cancer. Genetic testing isn't perfect, but it can often help you make decisions about your health. Here are some ways in which the results of genetic testing might be helpful:

If testing shows you have a gene mutation that raises your risk of prostate cancer (and possibly other cancers, depending on the gene change), it might lead you to:

- Take steps that could lower your risk.
- Start getting screening tests at a younger age, which might help find cancer early.
- Be aware of possible signs and symptoms of cancer, so you can see your health care provider earlier if you have them.
- Inform your family members about the gene mutation, so they can decide if they want to be tested for it as well.

If you have prostate cancer and genetic testing shows you have an inherited mutation, this might affect your treatment options. For example, some [targeted drugs](#)¹ are only likely to be helpful if your cancer cells have certain gene mutations. The test result might also lead you to inform your family members, who can then decide if they want to be tested.

If testing does not find a gene mutation, it can help reassure you and might help lessen your anxiety about your prostate cancer risk (as well as that of your family members). At the same time, it's important to know that genetic testing has limits. For example, not all tests look for the same gene changes. Tests often look for the most common gene mutations, but they don't look for every gene change that might affect your risk. This means it's possible you might still have an inherited gene mutation even if testing doesn't find one.

And of course, not having an inherited gene mutation doesn't mean your prostate cancer risk is zero. It means you have about the same risk as most other men, and you can decide what steps you want to take based on this information.

The results of genetic testing aren't always straightforward. This is why genetic counseling is an important part of the genetic testing process. Before testing, a health care provider trained in genetic counseling can explain what the tests can tell you, which can help you decide if testing is right for you. Then, if testing is done, they can help you understand the results and what could they mean for you.

Who might be advised to get genetic testing?

Not all men need genetic testing for prostate cancer risk. Genetic counseling and testing is more likely to be recommended if there's reason to think you could have an inherited gene change that raises your risk of prostate cancer.

Some expert groups have developed guidelines for who should consider genetic counseling and testing for prostate cancer risk. These guidelines can be complex, and they vary slightly between groups, but in general they include two main groups of people:

If you've never had prostate cancer, genetic counseling and testing might be recommended if, for example:

- There is a known gene change (such as in one of the *BRCA* genes) that runs in your family.
- You have a strong family history of prostate cancer (or certain other cancers) that suggests one of these gene changes might run in your family. For example, if many family members (related by blood) have had cancer, if there have been unusual cancers in your family (such as breast cancer in a man), or if cancers have appeared at a younger age than usual.

If you have prostate cancer, genetic counseling and testing might be recommended if, for example:

- Either of the conditions above are true.
- You've also had another type of cancer (especially breast cancer).
- You are of Ashkenazi Jewish descent (and therefore at higher risk for a *BRCA* gene mutation).
- Your prostate cancer has spread to other parts of your body.
- Your prostate cancer has [high-risk features](#)², or it includes [intraductal carcinoma](#)³.
- Your prostate cancer cells have been tested and found to have a gene change that might have been inherited. In this case, genetic testing can show if the change is inherited (and therefore in all the cells of your body), or if it's only in the cancer cells.

Considering genetic counseling and testing for prostate cancer risk

If you're concerned about your risk because of a personal or family history of prostate cancer, talk with your doctor about whether genetic counseling and testing might be a

good option for you.

Your doctor will probably want to know more about your family history and other factors to get a better idea about your risk of having an inherited gene mutation that increases prostate cancer risk.

Your doctor might suggest that you could benefit from speaking with a genetic counselor or other health care professional trained in genetic counseling. They can review your family history in detail to see how likely it is that you might have an inherited gene mutation.

The counselor can also describe genetic testing to you and explain what the tests might (and might not) be able to tell you, which can help you decide if genetic testing is right for you.

Genetic testing is covered by many health insurance plans, but it might not be covered (or might be covered only partially) by some of them.

If you do decide to get tested, the genetic counselor (or other health professional) can also help explain what the results mean, both for you and possibly other family members. To learn more about genetic testing in general, see [Genetic Testing for Cancer Risk](#)⁴.

How genetic testing is done

Genetic testing can be done on samples of blood or saliva, or from a swab of the inside of a cheek. The samples are sent to a lab for testing.

There are many different mutations in genes known to be related to prostate cancer risk. Testing can be done to look for one (or a few) specific mutation(s), or more extensive testing can be done to look for many different mutations. For example:

- If someone is being tested because they have a family member with a known *BRCA* gene mutation, testing might focus only on that specific mutation.
- In people of Ashkenazi Jewish descent, testing might focus on the specific *BRCA* mutations that are most common in this group of people.
- If there's no reason to suspect a specific gene change, testing will likely look for many different gene mutations.

Getting the results of genetic testing

Genetic test results are usually available within 2 to 3 weeks. The results might come back as:

- **Positive for a mutation that was tested for.** If the test does find an important mutation, there might be [steps you can take to help lower your risk of prostate cancer](#)⁵ (or other cancers), or to find it early, when treatment is most likely to be successful. If you've already been diagnosed with prostate cancer, a positive result might affect your cancer treatment options. A positive result might also have implications for your family members.
- **Negative for the mutation(s) tested for.** It can be reassuring to find out that the test didn't find a mutation that increases your risk. But it's important to know that genetic test results can't always guarantee that you're not at increased risk. For instance, you might have a gene change that was not tested for.
- **Inconclusive.** In some cases, the test might not be able to tell for sure if you have a gene mutation.
- **Positive for a variant of unknown significance (VUS).** This means that the test found a gene change (variant), but it's not known if this particular change affects your risk.

The results of genetic testing can sometimes be complex or confusing, which is why it's important to go over them with a genetic counselor or another health care professional trained in genetic counseling. They can explain what the results might mean for you (and possibly other family members).

To learn more about the process of genetic testing and the different types of test results, see [What Happens During Genetic Testing for Cancer Risk?](#)⁶

Hyperlinks

1. www.cancer.org/cancer/types/prostate-cancer/treating/targeted-therapy.html
2. www.cancer.org/cancer/types/prostate-cancer/detection-diagnosis-staging/risk-groups.html
3. www.cancer.org/cancer/diagnosis-staging/tests/biopsy-and-cytology-tests/understanding-your-pathology-report/prostate-pathology/high-grade-

- [prostatic-intraepithelial-neoplasia.html](#)
4. www.cancer.org/cancer/risk-prevention/genetics/genetic-testing-for-cancer-risk.html
 5. www.cancer.org/cancer/types/breast-cancer/risk-and-prevention/can-i-lower-my-risk.html
 6. www.cancer.org/cancer/risk-prevention/genetics/genetic-testing-for-cancer-risk/what-happens-during-genetic-testing-for-cancer.html

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Can Prostate Cancer Be Prevented?

There is no sure way to prevent prostate cancer. Many [prostate cancer risk factors](#), such as age, race, and family history, can't be controlled. But there are some things you can do that might lower your risk of prostate cancer.

- [Body weight, physical activity, and diet](#)
- [Vitamin, mineral, and other supplements](#)
- [Medicines](#)

Body weight, physical activity, and diet

The effects of body weight, physical activity, and diet on prostate cancer risk aren't completely clear, but there are things you can do that might lower your risk.

Some studies have found that men with **excess body weight** have a higher risk of developing advanced prostate cancer or prostate cancer that is more likely to be fatal.

Although not all studies agree, several have found a higher risk of prostate cancer in men whose diets are high in **dairy products and calcium**.

For now, the best advice about diet and activity to possibly reduce the risk of prostate cancer is to:

- Get to and stay at a healthy weight.
- Be physically active.
- Follow a healthy eating pattern, which includes a variety of colorful fruits and vegetables and whole grains, and avoids or limits red and processed meats, sugar-sweetened beverages, and highly processed foods.

It may also be sensible to limit calcium supplements and to not get too much calcium in the diet. (This does not mean that men who are being **treated for** prostate cancer should not take calcium supplements if their doctor recommends them.)

To learn more, see the [American Cancer Society Guideline for Diet and Physical Activity for Cancer Prevention](#)¹.

Vitamin, mineral, and other supplements

Vitamin E and selenium: Some early studies suggested that taking vitamin E or selenium supplements might lower prostate cancer risk.

But a large study known as the Selenium and Vitamin E Cancer Prevention Trial (SELECT) found that **neither vitamin E nor selenium supplements lowered prostate cancer risk**. In fact, men in the study taking the vitamin E supplements were found to

have a slightly higher risk of prostate cancer.

Soy and isoflavones: Some early research has suggested possible benefits from soy proteins (called isoflavones) in lowering prostate cancer risk. Several studies are now looking more closely at the possible effects of these proteins.

Taking any supplement could have both risks and benefits. Before starting vitamins or other supplements, talk with your doctor.

Medicines

Some drugs might help reduce the risk of prostate cancer.

5-alpha reductase inhibitors

5-alpha reductase is an enzyme in the body that changes testosterone into dihydrotestosterone (DHT), the main hormone that causes the prostate to grow. Drugs called **5-alpha reductase inhibitors**, such as **finasteride** and **dutasteride**, block this enzyme from making DHT. These drugs are used to treat benign prostatic hyperplasia (BPH), a non-cancerous growth of the prostate.

Large studies of both of these drugs have tested if they might also be useful in lowering prostate cancer risk. In these studies, men taking either drug were less likely to develop prostate cancer after several years than men getting an inactive placebo.

When the results were looked at more closely, the men who took these drugs had fewer low-grade prostate cancers, but they had about the same risk of higher-grade prostate cancers, which are more likely to grow and spread. It's not clear if these drugs can lower the risk of dying from prostate cancer, as men in these studies had similar survival rates whether or not they took one of these drugs.

These drugs can cause sexual side effects such as lowered sexual desire and erectile dysfunction (impotence), as well as the growth of breast tissue in some men. But they can help with urinary problems from BPH, such as trouble urinating and leaking urine (incontinence).

These drugs aren't approved by the FDA specifically to help lower prostate cancer risk, although doctors can prescribe them "[off label](#)" for this use. Men who want to know more about these drugs should discuss them with their doctors.

Aspirin

Some research suggests that men who take a daily aspirin might have a lower risk of getting and dying from prostate cancer. But more research is needed to show if the possible benefits outweigh the risks. Long-term aspirin use can have side effects, including an increased risk of bleeding in the digestive tract. While aspirin can also have other health benefits, at this time most doctors don't recommend taking it just to try to lower prostate cancer risk.

Other drugs

Other drugs and dietary supplements that might help lower prostate cancer risk are now being studied. But so far, no drug or supplement has been found to be helpful in studies large enough for experts to recommend them.

Hyperlinks

1. www.cancer.org/cancer/risk-prevention/diet-physical-activity/acs-guidelines-nutrition-physical-activity-cancer-prevention.html
2. [/cancer/managing-cancer/treatment-types/off-label-drug-use.html](http://cancer/managing-cancer/treatment-types/off-label-drug-use.html)

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