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# Prostate Cancer Causes, Risk Factors, and Prevention

## 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?](#)

## 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?](#)

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# Prostate Cancer Risk Factors

A risk factor is anything that raises your risk 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 several factors that might affect a man's risk of getting prostate cancer.

## 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 cases of prostate cancer 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 and Hispanic/Latino men than in non-Hispanic whites. The reasons for these racial and ethnic differences are not clear.

## Geography

Prostate cancer is most common in North America, northwestern Europe, Australia, and on Caribbean islands. It is less common in Asia, Africa, Central America, and South America.

The reasons for this are not clear. More intensive screening for prostate cancer in some developed countries probably accounts for at least part of this difference, but other factors such as lifestyle differences (diet, etc.) are likely to be important as well. For example, Asian Americans have a lower risk of prostate cancer than white Americans, but their risk is higher than that of men of similar ethnic backgrounds living in Asia.

## Family history

Prostate cancer seems to run in some families, which suggests that in some cases there may be an inherited or [genetic factor](#)<sup>1</sup>. 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.

## Gene changes

Several inherited gene changes (mutations) seem to raise prostate cancer risk, but they probably account for only a small percentage of cases overall. For example:

- Inherited mutations of the **BRCA1 or BRCA2 genes**, which are linked to an increased risk of breast and ovarian 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, have an increased risk for a number of cancers, 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 eat a lot of **dairy products** appear to have a slightly higher chance of getting prostate cancer.

Some studies have suggested that men who consume a lot of **calcium** (through food 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.

### Obesity

Being **obese**<sup>2</sup> (very overweight) does not seem to increase the overall risk of getting prostate cancer.

Some studies have found that obese men 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 obese men may be at greater 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](#)<sup>3</sup> and **getting** prostate cancer. Some research has linked smoking to a possible small increased risk of dying from prostate cancer, but this finding needs to be confirmed by other studies.

## Chemical exposures

There is some evidence that **firefighters** can be exposed to chemicals that may increase their risk of prostate cancer.

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 Academy of 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](#)<sup>4</sup>.

## 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 not agreed, and no firm conclusions have been reached.

## Vasectomy

Some studies have suggested that men who have had a vasectomy (minor surgery to make men infertile) have a slightly increased risk for prostate cancer, but other studies have not found this. Research on this possible link is still under way.

## Hyperlinks

1. [www.cancer.org/cancer/cancer-causes/genetics.html](http://www.cancer.org/cancer/cancer-causes/genetics.html)
2. [www.cancer.org/cancer/cancer-causes/diet-physical-activity/body-weight-and-cancer-risk.html](http://www.cancer.org/cancer/cancer-causes/diet-physical-activity/body-weight-and-cancer-risk.html)
3. [www.cancer.org/cancer/cancer-causes/tobacco-and-cancer.html](http://www.cancer.org/cancer/cancer-causes/tobacco-and-cancer.html)
4. [www.cancer.org/cancer/cancer-causes/chemicals/agent-orange-and-cancer.html](http://www.cancer.org/cancer/cancer-causes/chemicals/agent-orange-and-cancer.html)

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<sup>5</sup>Nelson WG, Antonarakis ES, Carter HB, DeMarzo AM, DeWeese TL. Chapter 81: Prostate Cancer. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE, eds. *Abeloff's Clinical Oncology*. 6th ed. Philadelphia, Pa: Elsevier; 2020.

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<sup>6</sup>Zelevsky MJ, Morris MJ, 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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## What Causes Prostate Cancer?

Researchers do not know exactly what causes prostate cancer. But they have found some risk factors and are trying to learn just how these factors might cause prostate cells to become cancer cells.

On a basic level, prostate cancer is caused by changes in the DNA of a normal prostate cell. 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 DNA affects more than just how we look.

Some genes control when our cells grow, divide into new cells, and die:

- Certain genes that help cells grow, divide, and stay alive are called **oncogenes**.
- Genes that normally keep cell growth under control, repair mistakes in DNA, or cause cells to die at the right time are called **tumor suppressor genes**.

Cancer can be caused by DNA mutations (or other types of changes) that keep oncogenes turned on, or that turn off tumor suppressor genes. These types of gene changes can lead to cells growing out of control.

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

### Inherited gene mutations

Some gene mutations can be passed from generation to generation (inherited) and are found in all cells in the body. Inherited gene changes are thought to play a role in about 10% of prostate cancers. Cancer caused by inherited genes is called **hereditary**

**cancer.** Several inherited mutated genes have been linked to hereditary prostate cancer, including:

- ***BRCA1 and BRCA2***: These tumor suppressor 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 these genes more commonly cause breast and ovarian cancer in women. But changes in these genes (especially *BRCA2*) also account for a small number of prostate cancers.
- ***CHEK2, ATM, PALB2, and RAD51D***: 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 be made 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. Fortunately, this mutation is rare.

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

## Acquired gene mutations

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

Every time a cell prepares to divide into 2 new cells, it must copy its DNA. 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 may make prostate cancer more likely.

For example, androgens (male hormones), such as testosterone, promote prostate cell growth. Having higher levels of androgens might contribute to prostate cancer risk in some men.

Some research has found that men with high levels of another hormone, insulin-like growth factor-1 (IGF-1), are 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](#)<sup>1</sup> or [cancer-causing chemicals](#)<sup>2</sup> 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/cancer-causes/radiation-exposure.html](http://www.cancer.org/cancer/cancer-causes/radiation-exposure.html)
2. [www.cancer.org/cancer/cancer-causes/general-info.html](http://www.cancer.org/cancer/cancer-causes/general-info.html)

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## Can Prostate Cancer Be Prevented?

There is no sure way to prevent prostate cancer. Many [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

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 who are **overweight or obese** 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.
- Keep 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 our [American Cancer Society Guideline for Diet and Physical Activity for Cancer Prevention](#)<sup>1</sup>.

## 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 in a large study known as the Selenium and Vitamin E Cancer Prevention Trial (SELECT), **neither vitamin E nor selenium supplements were found to lower prostate cancer risk**. In fact, men in the study taking the vitamin E supplements were later 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 supplements can 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 (Proscar)** and **dutasteride (Avodart)**, 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 been done to see 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 (or a slightly higher) risk of higher-grade prostate cancers, which are more likely to grow and spread. Long term, it's not clear if these drugs affect death rates, as men in these studies had similar survival

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 prevent prostate cancer, although doctors can prescribe them "[off label](#)"<sup>2</sup> for this use. Right now, it isn't clear that taking one of these drugs just to lower prostate cancer risk is very helpful. Still, 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/healthy/eat-healthy-get-active/acs-guidelines-nutrition-physical-activity-cancer-prevention.html](http://www.cancer.org/healthy/eat-healthy-get-active/acs-guidelines-nutrition-physical-activity-cancer-prevention.html)
2. [www.cancer.org/treatment/treatments-and-side-effects/treatment-types/off-label-drug-use.html](http://www.cancer.org/treatment/treatments-and-side-effects/treatment-types/off-label-drug-use.html)

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