



# Non-Small Cell Lung Cancer Causes, Risk Factors, and Prevention

## Risk Factors

A risk factor is anything that affects your chance of getting a disease such as cancer. Learn more about the risk factors for non-small cell lung cancer.

- [Non-Small Cell Lung Cancer Risk Factors](#)
- [What Causes Non-Small Cell Lung Cancer?](#)

## Prevention

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

- [Can Non-Small Cell Lung Cancer Be Prevented?](#)
- [Lung Cancer Prevention and Early Detection](#)

## Non-Small Cell Lung Cancer Risk Factors

A risk factor is anything that affects a person's chance 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. And some people who get the disease may have few or no known risk factors.

Several risk factors can make you more likely to develop lung cancer.

# Risk factors you can change

## Tobacco smoke

[Smoking](#) is by far the leading risk factor for lung cancer. About 80% of lung cancer deaths are thought to result from smoking. The risk for lung cancer among smokers is many times higher than among non-smokers. The longer you smoke and the more packs a day you smoke, the greater your risk.

[Cigar smoking](#) and pipe smoking are almost as likely to cause lung cancer as cigarette smoking. Smoking low-tar or “light” cigarettes increases lung cancer risk as much as regular cigarettes. Smoking menthol cigarettes might increase the risk even more since the menthol allows smokers to inhale more deeply.

[Secondhand smoke](#): If you don’t smoke, breathing in the smoke of others (called secondhand smoke or environmental tobacco smoke) can increase your risk of developing lung cancer. Secondhand smoke is thought to cause more than 7,000 deaths from lung cancer each year.

If you or someone you care about needs help quitting, see our [Guide to Quitting Smoking](#) or call the American Cancer Society at 1-800-227-2345

## Exposure to radon

Radon is a naturally occurring radioactive gas that results from the breakdown of uranium in soil and rocks. You can’t see, taste, or smell it. According to the US Environmental Protection Agency (EPA), radon is the second leading cause of lung cancer in this country, and is the leading cause among non-smokers.

Outdoors, there is so little radon that it is not likely to be dangerous. But indoors, radon can be more concentrated. Breathing it in exposes your lungs to small amounts of radiation. This may increase a person’s risk of lung cancer.

Homes and other buildings in nearly any part of the United States can have high indoor radon levels (especially in basements).

For more information, see [Radon and Cancer](#).

## Exposure to asbestos

People who work with asbestos (such as in mines, mills, textile plants, places where insulation is used, and shipyards) are several times more likely to die of lung cancer. Lung cancer risk is much greater in workers exposed to asbestos who also smoke. It's not clear how much low-level or short-term exposure to asbestos might raise lung cancer risk.

People exposed to large amounts of asbestos also have a greater risk of developing mesothelioma, a type of cancer that starts in the pleura (the lining surrounding the lungs). For more on this type of cancer, see [Malignant Mesothelioma](#).

In recent years, government regulations have greatly reduced the use of asbestos in commercial and industrial products. It's still present in many homes and other older buildings, but it's not usually considered harmful as long as it's not released into the air by deterioration, demolition, or renovation. For more information, see [Asbestos and Cancer Risk](#).

## **Exposure to other cancer-causing agents in the workplace**

Other carcinogens (cancer-causing agents) found in some workplaces that can increase lung cancer risk include:

- Radioactive ores such as uranium
- Inhaled chemicals such as [arsenic](#), beryllium, cadmium, silica, vinyl chloride, nickel compounds, chromium compounds, coal products, mustard gas, and chloromethyl ethers
- [Diesel exhaust](#)

The government and industry have taken steps in recent years to help protect workers from many of these exposures. But the dangers are still there, so if you work around these agents, be careful to limit your exposure whenever possible.

## **Arsenic in drinking water**

Studies of people in parts of Southeast Asia and South America with high levels of [arsenic](#) in their drinking water have found a higher risk of lung cancer. In most of these studies, the levels of arsenic in the water were many times higher than those typically seen in the United States, even areas where arsenic levels are above normal. For most Americans who are on public water systems, drinking water is not a major source of arsenic.

## **Certain dietary supplements**

Studies looking at the possible role of vitamin supplements in reducing lung cancer risk have had disappointing results. In fact, 2 large studies found that smokers who took beta carotene supplements actually had an increased risk of lung cancer. The results of these studies suggest that smokers should avoid taking beta carotene supplements.

## **Risk factors you cannot change**

### **Previous radiation therapy to the lungs**

People who have had [radiation therapy to the chest for other cancers](#) are at higher risk for lung cancer, particularly if they smoke; for example, people who have been treated for [Hodgkin disease](#) or women who get radiation after a mastectomy for [breast cancer](#). Women who have radiation therapy to the breast after a lumpectomy do not appear to have a higher than expected risk of lung cancer.

### **Air pollution**

In cities, air pollution (especially near heavily trafficked roads) appears to raise the risk of lung cancer slightly. This risk is far less than the risk caused by smoking, but some researchers estimate that worldwide about 5% of all deaths from lung cancer may be due to outdoor air pollution.

### **Personal or family history of lung cancer**

If you have had lung cancer, you have a higher risk of developing another lung cancer.

Brothers, sisters, and children of people who have had lung cancer may have a slightly higher risk of lung cancer themselves, especially if the relative was diagnosed at a younger age. It's not clear how much of this risk might be due to shared genes among family members and how much might be from shared household exposures (such as tobacco smoke or radon).

Researchers have found that genetics seems to play a role in some families with a strong history of lung cancer. (See [Do We Know What Causes Non-Small Cell Lung Cancer?](#)).

## **Factors with uncertain or unproven effects on lung cancer risk**

## Smoking marijuana

There are some reasons to think that smoking marijuana might increase lung cancer risk. Marijuana smoke contains tar and many of same cancer-causing substances that are in tobacco smoke. (Tar is the sticky, solid material that remains after burning, and is thought to contain most of the harmful substances in smoke.)

Marijuana cigarettes (joints) are typically smoked all the way to the end, where tar content is the highest. Marijuana is also inhaled very deeply and the smoke is held in the lungs for a long time, which gives any cancer-causing substances more opportunity to deposit in the lungs. And because marijuana is still illegal in many places, it may not be possible to control what other substances it might contain.

But those who use marijuana tend to smoke fewer marijuana cigarettes in a day or week than the amount of tobacco consumed by cigarette smokers. The lesser amount smoked would make it harder to see an impact on lung cancer risk.

It's been hard to study whether there is a link between marijuana and lung cancer because marijuana has been illegal in many places for so long, and it's not easy to gather information about the use of illegal drugs. Also, in studies that have looked at past marijuana use in people who had lung cancer, most of the marijuana smokers also smoked cigarettes. This can make it hard to know how much any increased risk is from tobacco and how much might be from marijuana. More research is needed to know the cancer risks from smoking marijuana.

## Talc and talcum powder

Talc is a mineral that in its natural form may contain asbestos. Some studies have suggested that talc miners and millers might have a higher risk of lung cancer and other respiratory diseases because of their exposure to industrial grade talc. But other studies have not found an increase in lung cancer rate.

[Talcum powder](#) is made from talc. By law since the 1970s, all home-use talcum products (baby, body, and facial powders) in the United States have been asbestos-free. The use of cosmetic talcum powder has not been found to increase lung cancer risk.

- [References](#)

[See all references for Non-Small Cell Lung Cancer](#)

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# What Causes Non-Small Cell Lung Cancer?

We don't know what causes each case of lung cancer. But we do know many of the risk factors for these cancers (see [Non-Small Cell Lung Cancer Risk Factors](#)) and how some of them cause cells to become cancerous.

## Smoking

[Tobacco smoking](#) is by far the leading cause of lung cancer. About 80% of lung cancer deaths are caused by smoking, and many others are caused by exposure to secondhand smoke.

Smoking is clearly the strongest risk factor for lung cancer, but it often interacts with other factors. Smokers exposed to other known risk factors such as [radon](#) and [asbestos](#) are at even higher risk. Not everyone who smokes gets lung cancer, so other factors like genetics likely play a role as well (see below).

## Lung cancer in non-smokers

Not all people who get lung cancer are smokers. Many people with lung cancer are former smokers, but many others never smoked at all.

Lung cancer in non-smokers can be caused by exposure to [radon](#), [secondhand smoke](#), air pollution, or other factors. Workplace exposures to [asbestos](#), [diesel exhaust](#) or certain other chemicals can also cause lung cancers in some people who don't smoke.

A small portion of lung cancers occur in people with no known risk factors for the disease. Some of these might just be random events that don't have an outside cause, but others might be due to factors that we don't yet know about.

Lung cancers in non-smokers are often different in some ways from those that occur in smokers. They tend to occur at younger ages. Lung cancers in non-smokers often have certain gene changes that are different from those in tumors from smokers. In some

cases, these changes can be used to guide treatment.

## Gene changes that may lead to lung cancer

Scientists know how some of the risk factors for lung cancer can cause certain changes in the DNA of lung cells. These changes can lead to abnormal cell growth and, sometimes, 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 DNA also can influence our risk for developing certain diseases, including some kinds of cancer.

Some genes help control when cells grow, divide to make new cells, and die:

- Genes that help cells grow, divide, or stay alive are called *oncogenes*.
- Genes that help keep cell division under control or cause cells to die at the right time are called *tumor suppressor genes*.

Cancers can be caused by DNA changes that turn on oncogenes or turn off tumor suppressor genes.

### Inherited gene changes

Some people inherit DNA mutations (changes) from their parents that greatly increase their risk for developing certain cancers. But inherited mutations alone are not thought to cause very many lung cancers.

Still, genes do seem to play a role in some families with a history of lung cancer. For example, people who inherit certain DNA changes in a particular chromosome (chromosome 6) are more likely to develop lung cancer, even if they don't smoke or only smoke a little.

Some people seem to inherit a reduced ability to break down or get rid of certain types of cancer-causing chemicals in the body, such as those found in tobacco smoke. This could put them at higher risk for lung cancer.

Other people inherit faulty DNA repair mechanisms that make it more likely they will end up with DNA changes. People with DNA repair enzymes that don't work normally might be especially vulnerable to cancer-causing chemicals and radiation.

Researchers are developing tests that may help identify such people, but these tests are not yet used routinely. For now, doctors recommend that all people avoid tobacco

smoke and other exposures that might increase their cancer risk.

## Acquired gene changes

Gene changes related to lung cancer are usually acquired during life rather than inherited. Acquired mutations in lung cells often result from exposure to factors in the environment, such as cancer-causing chemicals in tobacco smoke. But some gene changes may just be random events that sometimes happen inside a cell, without having an outside cause.

Acquired changes in certain genes, such as the *TP53* or *p16* tumor suppressor genes and the *K-RAS* or *ALK* oncogenes, are thought to be important in the development of non-small cell lung cancer. Changes in these and other genes may also make some lung cancers more likely to grow and spread than others. Not all lung cancers share the same gene changes, so there are undoubtedly changes in other genes that have not yet been found.

- [References](#)

[See all references for Non-Small Cell Lung Cancer](#)

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# Can Non-Small Cell Lung Cancer Be Prevented?

Not all lung cancers can be prevented. But there are things you can do that might lower your risk, such as changing the [risk factors](#) that you can control.

## Stay away from tobacco

The best way to reduce your risk of lung cancer is not to smoke and to avoid breathing in other people's smoke.



If you stop smoking before a cancer develops, your damaged lung tissue gradually starts to repair itself. No matter what your age or how long you've smoked, quitting may lower your risk of lung cancer and help you live longer. If you would like help quitting smoking, see our [Guide to Quitting Smoking](#) or call the American Cancer Society at 1-800-227-2345.

## Avoid radon

Radon is an important cause of lung cancer. You can reduce your exposure to radon by having your home tested and treated, if needed. For more information, see [Radon and Cancer](#).

## Avoid or limit exposure to cancer-causing chemicals

Avoiding exposure to known cancer-causing chemicals, in the workplace and elsewhere, may also be helpful (see [What Are the Risk Factors for Non-Small Cell Lung Cancer?](#)). When people work where these exposures are common, they should be kept to a minimum.

## Eat a healthy diet

A [healthy diet](#) with lots of fruits and vegetables may also help reduce your risk of lung cancer. Some evidence suggests that a diet high in fruits and vegetables may help protect against lung cancer in both smokers and non-smokers. But any positive effect of fruits and vegetables on lung cancer risk would be much less than the increased risk from smoking.

Attempts to reduce the risk of lung cancer in current or former smokers by giving them high doses of vitamins or vitamin-like drugs have not been successful so far. In fact, some studies have found that supplements of beta-carotene, a nutrient related to vitamin A, appear to increase the rate of lung cancer in these people.

Some people who get lung cancer do not have any clear risk factors. Although we know how to prevent most lung cancers, at this time we don't know how to prevent all of them.

- [References](#)

[See all references for Non-Small Cell Lung Cancer](#)

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