Thyroid Cancer Causes, Risk Factors, and Prevention

Learn about the risk factors for thyroid cancer and if there are things you can do that might help lower your risk.

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 thyroid cancer.

- Thyroid Cancer Risk Factors
- What Causes Thyroid Cancer?

Prevention

Most people with thyroid cancer have no known risk factors that can be changed, so it isn't possible to prevent most of these cancers. Learn more.

- Can Thyroid Cancer Be Prevented?

Thyroid Cancer Risk Factors

A risk factor is anything that increases 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 your age or family history, can’t be changed.

But having a risk factor, or even several, doesn’t mean you will get the disease. And many people who get the disease may have few or no known risk factors. Even if a person with thyroid cancer has a risk factor, it’s hard to know how much that risk factor may have contributed to their cancer.

Scientists have found a few risk factors that make a person more likely to develop thyroid cancer.

- Sex
- Age
- Hereditary conditions
- Family history
- Radiation
- Excess body weight
- Iodine in the diet

Sex

For unclear reasons, thyroid cancer occurs almost 3 times more often in wofoM,p4 n in occurs almost

People with this syndrome have an increased risk of certain benign (non-cancerous) growths, including some called **hamartomas**.

They also have an increased risk of developing cancers of the thyroid, breast[4], and some other organs. These cancers tend to develop at an earlier age. The thyroid cancers tend to be either the papillary or follicular type.

This syndrome is most often caused by defects in the *PTEN* gene.

Carney complex

People with this rare syndrome typically have pigmented (dark) areas on their skin, as well as an increased risk of certain types of benign (non-cancerous) tumors. They also have an increased risk of papillary and follicular thyroid cancers which tend to occur at a young age.

This syndrome is most often caused by defects in the *PRKAR1A* gene.

If you suspect you have an inherited condition that increases your risk of thyroid cancer, talk with your health care provider. They might recommend genetic counseling and testing[5], depending on your medical history.

Family history

If you have a first-degree relative (parent, brother, sister, or child) with thyroid cancer, you are at an increased risk of developing it as well. This is true even without a known inherited syndrome in the family. Still, most people with thyroid cancer do not have a family history of the disease.

Radiation

Radiation exposure is a risk factor for thyroid cancer. This includes radiation exposure from certain medical treatments and tests, as well as radiation fallout from power plant accidents or nuclear weapons.

Radiation from medical treatments

Having head or neck radiation treatments in childhood increase the risk of thyroid cancer. This includes radiation therapy to treat cancers such as Hodgkin lymphoma, as well as radiation treatment given before a stem cell transplant (bone marrow transplant).

The amount of risk depends on how much and at what age the radiation is given. In general, the risk increases with larger doses and with younger age at treatment.

Learn more in: Second Cancers Related to Treatment[6]

Before the 1960s, children were sometimes treated with low doses of radiation for things we wouldn't use radiation for now, like acne, fungal infections of the scalp (ringworm), and enlarged tonsils or adenoids. Years later, the people who had these treatments were found to have a higher risk of thyroid cancer.

Radiation from imaging tests

Imaging tests such as x-rays and CT scans also expose children to radiation, but at much lower doses, so it's not clear how much these tests might raise the risk of thyroid cancer (or other cancers).

If there is an increased risk, it's most likely small. But to be safe, experts advise that children should not have these tests unless absolutely necessary. When this type of imaging test *is* needed, it should be done using the lowest dose of radiation that still provides a clear picture.

Radiation fallout

Thyroid cancer risk is also higher in children exposed to radioactive fallout from nuclear weapons or power plant accidents.

For instance, thyroid cancer risk was many times higher in children who lived near Chernobyl, the site of the 1986 nuclear plant accident. Adults involved with the cleanup after the accident, or who lived near the plant, have also had higher rates of thyroid cancer.

Some radioactive fallout occurred over certain regions of the United States (and other parts of the world) during nuclear weapons testing after World War II. This exposure was generally much lower than the exposure around Chernobyl.

Being exposed to radiation when you are an adult carries much less risk of thyroid cancer compared to exposure that happens when you are a child.

Excess body weight

People with excess body weight have a higher risk of thyroid cancer than those who do

not have excess weight. The risk appears to go up as _____

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Last Revised: August 23, 2024

What Causes Thyroid Cancer?

While we know about some risk factors for thyroid cancer[1], including certain inherited conditions, it's not always clear exactly what causes thyroid cancer. Here is what we *do* know about the gene changes (mutations) that contribute to certain types of thyroid cancer.

- Gene changes (mutations) and cancer
- Papillary thyroid cancer
- Follicular thyroid cancer
- Anaplastic thyroid cancer
- Medullary thyroid cancer (MTC)

Gene changes (mutations) and cancer

Cells are the basic building blocks of all living things, including our bodies. **Genes** are what control how cells function. **DNA** is the chemical in our cells that makes up those genes. Our DNA, which comes from both our parents, affects more than just how we look.

Cancer is caused by changes in the DNA inside our cells.

Different genes have different functions in our bodies. If they are working properly, certain genes help control when our cells grow, divide to make new cells, or repair mistakes in DNA. They also 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[2].

Inherited versus acquired gene mutations

People have 2 copies of each gene in their cells. One copy comes from each parent.

Some people **inherit** DNA changes (mutations) from a parent that increase their risk of thyroid cancer.

But most thyroid cancers are not caused by inherited gene changes. Instead, the gene changes are **acquired** during a person's life. Sometimes these changes might be caused by something in a person's environment, like radiation. But sometimes they may just be random events that happen inside a cell, without having an outside cause.

In different types of thyroid cancer[3], the cells tend to have changes in different genes.

Doctors sometimes test thyroid biopsy samples for certain gene mutations. This information can help diagnose the cancer. It might also affect a person's treatment options.

Learn more: Tests for Thyroid Cancer[4]

The main gene changes in people with medullary thyroid cancer (MTC) are mutations in different parts of the ***RET gene***. These changes are not the same as the *RET* gene changes seen in some papillary thyroid cancers (see above).

RET gene changes are found in the cancer cells of about 2 out of 3 people with the sporadic (non-inherited) form of MTC. These gene changes are only in the cancer cells, so they can't be passed down to a person's children.

Nearly all people with an inherited form of MTC, such as from multiple endocrine neoplasia type 2 (MEN2), have a mutation in the *RET* gene. These people inherit the *RET* mutation from a parent, so it is in every cell in the body and can be passed on to a person's children.

Hyperlinks

1. www.cancer.orgamericancancer.sharepoint.com/cancer/types/thyroid-cancer/causes-risks-prevention/risk-factors.html
2. www.cancer.orgamericancancer.sharepoint.com/cancer/understanding-cancer/genes-and-cancer/oncogenes-tumor-suppressor-genes.html
3. www.cancer.orgamericancancer.sharepoint.com/cancer/types/thyroid-cancer/about/what-is-thyroid-cancer.html#types-of-thyroid-cancers
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Last Revised: August 23, 2024

Can Thyroid Cancer Be Prevented?

Most people with thyroid cancer have no known risk factors that can be changed, so it fh

neoplasia type 2 (MEN2). If a person has MEN2, they are at a very high risk of getting MTC, starting at an early age.

Most of these cancers can be prevented or treated early by removing the thyroid gland. If MTC is known to run in a family, family members can be tested at a very early age for the mutated gene that causes it.

If you have a family history of MTC, it's important to see a doctor who is familiar with the latest advances in genetic counseling and genetic testing for this disease.

Hyperlinks

1. www.cancer.orgamericancancer.sharepoint.com/cancer/types/thyroid-cancer/causes-risks-prevention/risk-factors.html

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Last Revised: August 23, 2024

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