Basal and Squamous Cell Skin Cancer Causes, Risk Factors, and Prevention

Learn about the risk factors for basal and squamous cell skin cancer and what you might be able to do to 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 basal and squamous cell skin cancer.

Prevention

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

Basal and Squamous Cell Skin Cancer Risk Factors

It's important to know about the risk factors for skin cancer because there may be things you can do that could lower your risk of getting it. If you are at higher risk because of certain factors, there are also things you can do that might help find it early[1], when it's likely to be easier to treat.

What is a risk factor?

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 and excess sun exposure, can be changed. Others, like your age or family history, can't be changed.

Having a risk factor, or even many risk factors, does not mean that you will get skin cancer. Many people with risk factors for skin cancer never get it. And some people who do get it may have few or no known risk factors.

Several risk factors make a person more likely to get basal cell or squamous cell skin cancer.

Ultraviolet (UV) light exposure

Exposure to ultraviolet (UV) rays[2] is a major risk factor for most skin cancers. Sunlight is the main source of UV rays. Tanning beds are another source of UV rays.

While UV rays make up a very small portion of the sun's rays, they are the main cause of the damaging effects of the sun on the skin. UV rays damage the DNA (genes) inside skin cells. Skin cancers can begin when this damage affects genes that control skin cell growth.

To learn more about UV exposure and what you can do to protect yourself and your loved ones, see How Do I Protect Myself from Ultraviolet (UV) Rays?[3]

Having light-colored skin

Anyone can get skin cancer, but people with light-colored skin have a much higher risk than people with naturally darker skin color. This is because the skin pigment melanin has a protective effect in people with darker skin. White people with fair (light-colored) skin that freckles or burns easily, blue or green eyes, and naturally red or blonde hair are at especially high risk.

Albinism is an inherited lack of protective skin pigment. People with this condition may have pink-white skin and white hair. They have a very high risk of getting sunburns and skin cancer, so they need to be extra careful to protect their skin.

Being older

The risk of getting basal and squamous cell skin cancers rises as people get older. This is probably because of the buildup of sun exposure over time. But these cancers are becoming more common in younger people as well, probably because they are spending more time in the sun with their skin exposed.

Being male

Men are more likely than women to get basal and squamous cell cancers of the skin. This is thought to be due mainly to getting more sun exposure.

Exposure to certain chemicals

Being exposed to large amounts of arsenic[4] increases the risk of developing skin cancer. Arsenic is an element found naturally in well water in some areas. It's also used

in making some pesticides and in some other industries.

Workers exposed to coal tar, paraffin, and certain types of petroleum products may also have an increased risk of skin cancer.

Radiation exposure

People who have had radiation treatment have a higher risk of developing skin cancer in the area where the radiation was focused. This is particularly a concern in children who have had radiation treatment for cancer.

Previous skin cancer

People who have had a basal or squamous cell cancer have a much higher chance of developing another one.

Long-term or severe skin inflammation or injury

Scars from severe burns, areas of skin over serious bone infections, and skin damaged by some severe inflammatory skin diseases are more likely to develop skin cancers (mostly squamous cell cancers), although this risk is generally small.

Psoriasis treatment

Psoralens and ultraviolet light (PUVA) treatments given to some people with psoriasis (a chronic inflammatory skin disease) can increase the risk of developing squamous cell skin cancer and probably other skin cancers.

Xeroderma pigmentosum (XP)

This very rare inherited condition reduces the ability of skin cells to repair DNA damage caused by sun exposure. People with this disorder often develop many skin cancers, starting in childhood.

Basal cell nevus syndrome (also known as nevoid basal cell carcinoma syndrome or Gorlin syndrome)

In this rare congenital (present at birth) condition, people develop many basal cell

cancers over their lifetime. People with this syndrome may also have abnormalities of the jaw (and other bones), eyes, and nervous tissue.

Most often basal cell nevus syndrome is inherited from a parent. In families with this syndrome, those affected often start to develop basal cell cancers as children or teens. Exposure to UV rays can increase the number of tumors these people get.

Other genetic syndromes

Several other genetic syndromes have also been linked with an increased risk of skin cancer. Examples include:

- Epidermolysis bullosa
- Fanconi anemia
- Muir-Torre syndrome
- Rothmund-Thomson syndrome
- Bloom syndrome
- Werner syndrome

Having a weakened immune system

The immune system helps the body fight cancers of the skin and other organs. People with weakened immune systems (from certain diseases or medical treatments) are more likely to develop many types of skin cancer, including squamous cell cancer, melanoma[5], and less common types such as Kaposi sarcoma[6] and Merkel cell carcinoma[7].

For example, people who get organ transplants are usually given medicines that weaken their immune system to help prevent their body from rejecting the new organ. This increases their risk of developing skin cancer. Skin cancers in people with weakened immune systems tend to grow faster and are often harder to treat.

Treatment with large doses of corticosteroid drugs can also weaken the immune system. This may also increase a person’s risk of skin cancer.

People infected with HIV[8], the virus that causes AIDS, often have weakened immune systems and also are at increased risk for basal and squamous cell cancers.

HPV infection

Human papillomaviruses (HPVs)[9] are a group of more than 150 viruses, many of which can cause papillomas, or warts. The warts that people commonly get on their hands and feet are not related to any form of cancer. But some HPV types, especially those that affect the genital and anal areas and the skin around the fingernails, are often related to squamous cell skin cancers in these areas.

Smoking

People who smoke[10] are more likely to develop squamous cell skin cancer, especially on the lips. Smoking is not a known risk factor for basal cell cancer.

Hyperlinks

1. www.cancer.org/cancer/types/basal-and-squamous-cell-skin-cancer/detection-diagnosis-staging/detection.html
2. www.cancer.org/cancer/risk-prevention/sun-and-uv/uv-radiation.html
3. www.cancer.org/cancer/risk-prevention/sun-and-uv/uv-protection.html
4. www.cancer.org/cancer/risk-prevention/chemicals/arsenic.html
5. www.cancer.org/cancer/types/melanoma-skin-cancer.html
6. www.cancer.org/cancer/types/kaposi-sarcoma.html
7. www.cancer.org/cancer/types/merkel-cell-skin-cancer.html
8. www.cancer.org/cancer/risk-prevention/infections/hiv-infection-aids.html
9. www.cancer.org/cancer/risk-prevention/hpv.html
10. www.cancer.org/cancer/risk-prevention/tobacco.html

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What Causes Basal and Squamous Cell Skin Cancers?

There are many known risk factors for basal and squamous cell skin cancers, but it's not always clear exactly how these factors might cause cancer.

Most basal cell and squamous cell skin cancers are caused by repeated and unprotected skin exposure to ultraviolet (UV) rays[1] from sunlight, as well as from man-made sources such as tanning beds. UV rays can damage the DNA inside skin cells and cause changes in genes.

- How DNA damage can cause cancer
- Gene changes that can lead to basal or squamous skin cancer

How DNA damage can cause cancer

DNA is the chemical in each of 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 help control when our cells grow, divide into new cells, repair mistakes in DNA, or 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].

Gene changes that can lead to basal or squamous skin cancer

Researchers don't yet know all of the DNA changes that result in basal or squamous cell skin cancer, but they have found that in many skin cancers the cells have changes in tumor suppressor genes or DNA repair genes.

The gene most often changed in **squamous cell cancers** is the *TP53* tumor suppressor gene. This gene normally causes cells with damaged DNA to die. When *TP53* is altered, these abnormal cells may live longer and might go on to become cancerous.

Genes often mutated in **basal cell cancers** include the *PTCH1* or *PTCH2* genes, which are part of the "hedgehog" signaling pathway inside cells. These are tumor suppressor genes that normally help keep cell growth in check, so changes in one of these genes can allow cells to grow out of control. People who have **basal cell nevus syndrome (Gorlin syndrome)**, which is often inherited from a parent and results in getting many basal cell cancers, have an altered *PTCH1* gene in all the cells of their body.

These are not the only gene changes that play a role in the development of skin cancer. There are many others as well.

People with **xeroderma pigmentosum (XP)** have a high risk for skin cancer. XP is a rare, inherited condition resulting from a change in one of the *XP* (*ERCC*) genes, which leads to a defect in one of the proteins that normally helps repair DNA damage. Because people with XP are less able to repair DNA damage caused by sunlight, they often develop many cancers on sun-exposed areas of their skin.

The link between squamous cell skin cancer and infection with some types of HPV (human papillomavirus[3]) also involves DNA and genes. These viruses have genes that affect growth-regulating proteins of infected skin cells. This can cause skin cells to grow too much and to not die when they're supposed to.

Scientists are studying other links between DNA changes and skin cancer. A better understanding of how damaged DNA leads to skin cancer might be used to design medicines to overcome or repair that damage.

Hyperlinks

1. www.cancer.org/cancer/risk-prevention/sun-and-uv/uv-radiation.html
2. www.cancer.org/cancer/understanding-cancer/genes-and-cancer/oncogenes-tumor-suppressor-genes.html
3. www.cancer.org/cancer/risk-prevention/hpv.html

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Can Basal and Squamous Cell Skin Cancers Be Prevented?

There is no sure way to prevent all basal and squamous cell skin cancers. Some risk factors such as your age, sex, race, and family history can't be controlled. But there are things you can do that could lower your risk of getting these and other skin cancers.

- Limit your exposure to ultraviolet (UV) rays
- Avoid harmful chemicals
- Check your skin regularly
- Don't smoke
- Avoid weakening your immune system (when possible)
- Medicines to lower skin cancer risk

Limit your exposure to ultraviolet (UV) rays

The most important way to lower your risk of basal and squamous cell skin cancers is to limit your exposure to UV rays[1]. Practice sun safety when you are outdoors.

Look for shade

Simply staying in the shade is one of the best ways to limit your UV exposure.

"Slip! Slop! Slap! ®… and Wrap"

This catchphrase can help you remember some of the key steps you can take to protect yourself from UV rays. If you are going to be in the sun:

- Slip on a shirt.
- Slop on sunscreen.

- Slap on a hat.
- Wrap on sunglasses to protect the eyes and sensitive skin around them.

Avoid tanning beds and sun lamps

Just like UV rays from the sun, the UV rays of tanning beds are harmful. Tanning lamps give off UV rays, which can cause long-term skin damage and can contribute to skin cancer. Most skin doctors and health organizations recommend not using tanning beds and sun lamps.

Avoid weakening your immune system (when possible)

Having a weakened immune system increases your risk of getting skin cancer. It can also make skin cancers harder to treat.

Infection with HIV[7], the virus that causes AIDS, can weaken the immune system. You can lower your risk of skin cancer, as well as many other types of cancer, by avoiding known risk factors for HIV infection, such as intravenous (IV) drug use and having unprotected sex with many partners.

Some people, such as those with autoimmune diseases or who have had organ transplants, might need to take medicines meant to suppress their immune system. Other people might need medicines that weaken their immune system as a side effect, such as chemotherapy to treat cancer. For people who need these medicines, the benefit from taking them will likely far outweigh the small increased risk of getting skin cancer.

Medicines to lower skin cancer risk

Some people at increased risk for skin cancer, such as people with certain inherited conditions or a weakened immune system, might be helped by medicines that could lower their risk (known as **chemoprevention**).

Doctors are studying many drugs that might lower risk, although these are not commonly used at this time. To learn more, see What's New in Basal and Squamous Cell Skin Cancer Research?[8]

Hyperlinks

1. www.cancer.org/cancer/risk-prevention/sun-and-uv/uv-radiation.html
2. www.cancer.org/cancer/risk-prevention/sun-and-uv/uv-protection.html
3. www.cancer.org/cancer/risk-prevention/chemicals/arsenic.html
4. www.cancer.org/cancer/risk-prevention/sun-and-uv/skin-exams.html
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