Skin Cancer: Basal and Squamous Cell

What is cancer?

The body is made up of trillions of living cells. Normal body cells grow, divide into new cells, and die in an orderly way. During the early years of a person's life, normal cells divide faster to allow the person to grow. After the person becomes an adult, most cells divide only to replace worn-out or dying cells or to repair injuries.

Cancer begins when cells in a part of the body start to grow out of control. There are many kinds of cancer, but they all start because of out-of-control growth of abnormal cells.

Cancer cell growth is different from normal cell growth. Instead of dying, cancer cells continue to grow and form new, abnormal cells. Cancer cells can also invade (grow into) other tissues, something that normal cells cannot do. Growing out of control and invading other tissues are what makes a cell a cancer cell.

Cells become cancer cells because of damage to DNA. DNA is in every cell and directs all its actions. In a normal cell, when DNA gets damaged the cell either repairs the damage or the cell dies. In cancer cells, the damaged DNA is not repaired, but the cell doesn't die like it should. Instead, this cell goes on making new cells that the body does not need. These new cells will all have the same damaged DNA as the first cell does.

People can inherit damaged DNA, but most DNA damage is caused by mistakes that happen while the normal cell is reproducing or by something in our environment. Sometimes the cause of the DNA damage is something obvious, like cigarette smoking or ultraviolet (UV) light exposure. But often no clear cause is found.

In most cases the cancer cells form a tumor. Some cancers, like leukemia, rarely form tumors. Instead, these cancer cells involve the blood and blood-forming organs and circulate through other tissues where they grow.

Cancer cells often travel to other parts of the body, where they begin to grow and form new tumors that replace normal tissue. This process is called *metastasis*. It happens when the cancer cells get into the bloodstream or lymph vessels of our body.

No matter where a cancer may spread, it is named (and treated) based on the place where it started. For example, breast cancer that has spread to the liver is still breast cancer, not liver cancer. Likewise, prostate cancer that has spread to the bone is still prostate cancer, not bone cancer.

Different types of cancer can behave very differently. For example, lung cancer and breast cancer are very different diseases. They grow at different rates and respond to different treatments. That is why people with cancer need treatment that is aimed at their particular kind of cancer.

Not all tumors are cancerous. Tumors that aren't cancer are called *benign*. Benign tumors can cause problems – they can grow very large and press on healthy organs and tissues. But they cannot grow into (invade) other tissues. Because they can't invade, they also can't spread to other parts of the body (metastasize). These tumors are almost never life threatening.

What are basal and squamous cell skin cancers?

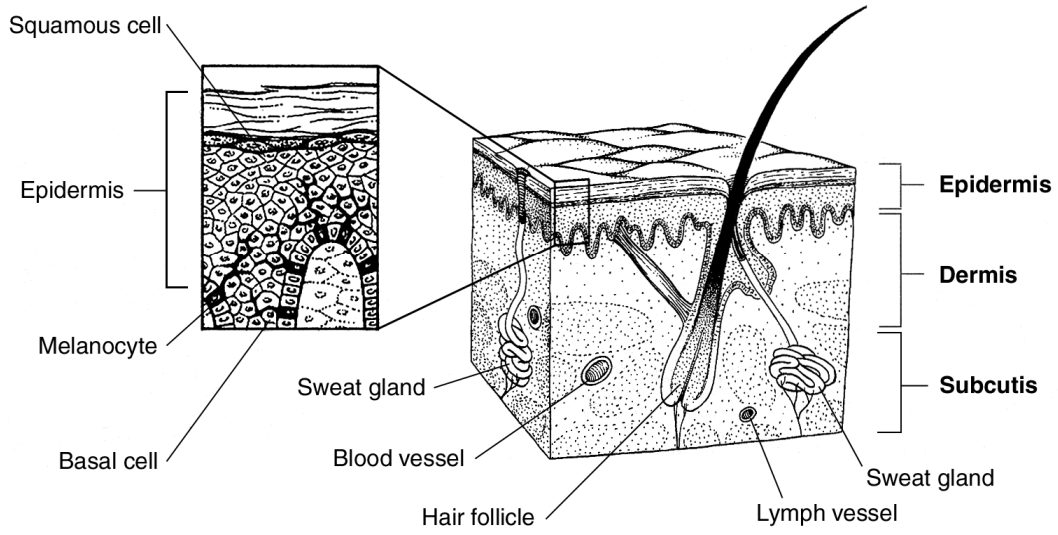
To understand basal and squamous cell skin cancers, it helps to know about the normal structure and function of the skin.

Normal skin

The skin is the largest organ in your body. It does many different things, such as:

- Covering the internal organs and helps protect them from injury
- Serving as a barrier to germs such as bacteria
- Preventing the loss of too much water and other fluids
- Helping control body temperature
- Protecting the rest of the body from ultraviolet (UV) rays
- Helping the body make vitamin D

The skin has 3 layers: the epidermis, the dermis, and the subcutis (see picture).



Epidermis

The top layer of skin is the epidermis. The epidermis is very thin, averaging only about 1/100 of an inch thick. It protects the deeper layers of skin and the organs of the body from the environment.

Keratinocytes are the main cell type of the epidermis. These cells make an important protein called *keratin* that helps the skin protect the rest of the body.

The outer part of the epidermis is composed of flat keratinocytes called *squamous cells* that are constantly shed as new ones form. The lowest part of the epidermis is called the *basal layer*, and the keratinocytes here are called *basal cells*. These cells constantly divide to form new keratinocytes to replace the ones that wear off the skin's surface.

Cells called *melanocytes* are also found in the epidermis. These skin cells make a brown pigment called *melanin*, which gives the skin its tan or brown color. It protects the deeper layers of the skin from some of the harmful effects of the sun. For most people, when skin is exposed to the sun, melanocytes make more of the pigment, causing the skin to tan or darken.

The epidermis is separated from the deeper layers of skin by the basement membrane. This is an important structure because when a skin cancer becomes more advanced, it generally grows through this barrier and into the deeper layers.

Dermis

The middle layer of the skin is called the *dermis*. The dermis is much thicker than the epidermis. It contains hair follicles, sweat glands, blood vessels, and nerves that are held in place by a protein called *collagen*, which gives the skin its elasticity and strength.

Subcutis

The deepest layer of the skin is called the *subcutis*. The subcutis and the lowest part of the dermis form a network of collagen and fat cells. The subcutis helps the body conserve heat and has a shock-absorbing effect that helps protect the body's organs from injury.

Types of skin cancer

Keratinocyte cancers

These are by far the most common skin cancers. They are called *keratinocyte carcinomas* or *keratinocyte cancers* because when seen under a microscope, their cells look like early forms of keratinocytes, the most common type of skin cell. Most keratinocyte cancers are basal cell carcinomas or squamous cell carcinomas.

Basal cell carcinoma

This is not only the most common type of skin cancer, but the most common type of cancer in humans. About 8 out of 10 skin cancers are basal cell carcinomas (also called *basal cell cancers*). When seen under a microscope, the cells in these cancers look like cells in the lowest layer of the epidermis, called the *basal cell layer*.

These cancers usually develop on sun-exposed areas, especially the head and neck. Basal cell carcinoma was once found almost entirely in middle-aged or older people. Now it is also being seen in younger people, probably because they are spending more time in the sun.

These cancers tend to grow slowly. It's very rare for a basal cell cancer to spread to other parts of the body. But if a basal cell cancer is left untreated, it can grow into nearby areas and invade the bone or other tissues beneath the skin.

After treatment, basal cell carcinoma can recur (come back) in the same place on the skin. People who have had basal cell cancers are also more likely to get new ones elsewhere on the skin. As many as half of the people who are diagnosed with one basal cell cancer will develop a new skin cancer within 5 years.

Squamous cell carcinoma

About 2 out of 10 skin cancers are squamous cell carcinomas (also called *squamous cell cancers*). The cells in these cancers look like abnormal versions of the squamous cells seen in the outer layers of the skin.

These cancers commonly appear on sun-exposed areas of the body such as the face, ears, neck, lips, and backs of the hands. They can also develop in scars or chronic skin sores elsewhere. They sometimes start in actinic keratoses (described below). Less often, they form in the skin of the genital area.

Squamous cell cancers are more likely to grow into deeper layers of skin and spread to other parts of the body than basal cell cancers, although this is still uncommon.

Keratoacanthomas are dome-shaped tumors that are found on sun-exposed skin. They may start out growing quickly, but their growth usually slows down. Many keratoacanthomas shrink or even go away on their own over time without any treatment. But some continue to grow, and a few may even spread to other parts of the body. Their growth is often hard to predict, so many skin cancer experts consider them a type of squamous cell skin cancer and treat them as such.

Melanomas

These cancers develop from melanocytes, the pigment-making cells of the skin. Melanocytes can also form benign (non-cancerous) growths called *moles*. Melanoma and moles are discussed in our document *Melanoma Skin Cancer*.

Less common types of skin cancer

These less common types of skin cancer are different from keratinocyte cancers and melanomas and are treated differently. They include:

- Merkel cell carcinoma
- Kaposi sarcoma
- Cutaneous (skin) lymphoma
- Skin adnexal tumors (tumors that start in hair follicles or skin glands)
- Various types of sarcomas

Together, these types account for less than 1% of all skin cancers.

Pre-cancerous and pre-invasive skin conditions

These conditions may develop into skin cancer or may be very early stages of skin cancer.

Actinic keratosis (solar keratosis)

Actinic keratosis, also known as *solar keratosis*, is a pre-cancerous skin condition caused by too much exposure to the sun. Actinic keratoses are usually small (less than 1/4 inch across), rough or scaly spots that may be pink-red or flesh-colored. Usually they start on the face, ears, backs of the hands, and arms of middle-aged or older people with fair skin, although they can occur on other sun-exposed areas. People who have them usually develop more than one.

Actinic keratoses tend to grow slowly and usually do not cause any symptoms (although some might be itchy or sore). They sometimes go away on their own, but they may come back.

In some cases, actinic keratoses may turn into squamous cell cancers. Most actinic keratoses do not become cancers, but it can be hard sometimes for doctors to tell these apart from true skin cancers, so doctors often recommend treating them. If they are not treated, you and your doctor should check them regularly for changes that might be signs of skin cancer.

Squamous cell carcinoma in situ (Bowen disease)

Squamous cell carcinoma in situ, also called Bowen disease, is the earliest form of squamous cell skin cancer. “In situ” means that the cells of these cancers are still only in the epidermis and have not invaded the dermis.

Bowen disease appears as reddish patches. Compared with actinic keratoses, Bowen disease patches tend to be larger (sometimes over 1/2 inch across), redder, scalier, and sometimes crusted. Like actinic keratosis, it usually does not cause any symptoms, although it might be itchy or sore.

Like most other skin cancers (and actinic keratoses), the major risk factor is too much sun exposure. Bowen disease can also occur in the skin of the anal and genital areas. This is often related to sexually transmitted infection with human papilloma viruses (HPVs), the viruses that can also cause genital warts.

Bowen disease can sometimes progress to an invasive squamous cell skin cancer, so doctors usually recommend treating them. People who have these are also at higher risk for other skin cancers, so close follow-up with a doctor is important.

Benign skin tumors

Most tumors of the skin are benign (not cancerous) and rarely if ever turn into cancers. There are many kinds of benign skin tumors, including:

- Most types of moles (see our document *Melanoma Skin Cancer* for information on moles)
- Seborrheic keratoses: tan, brown, or black raised spots with a waxy texture or rough surface
- Hemangiomas: benign blood vessel growths often called strawberry spots or port wine stains
- Lipomas: soft tumors made up of fat cells
- Warts: rough-surfaced growths caused by a virus

What are the key statistics about basal and squamous cell skin cancers?

Cancer of the skin (including melanoma and basal and squamous cell skin cancers) is by far the most common of all types of cancer. According to one estimate, about 3.5 million basal and squamous cell skin cancers are diagnosed each year (occurring in about 2.2 million Americans, as some people have more than one). About 8 out of 10 these are basal cell cancers. Squamous cell cancers occur less often.

The number of these cancers has been increasing for many years. This is probably from a combination of better skin cancer detection, people getting more sun exposure, and people living longer.

Death from these cancers is uncommon. It’s thought that about 2,000 people die each year from non-melanoma skin cancers, and that this rate has been dropping in recent years. Most people who die are elderly and may not have seen a doctor until the cancer had already grown quite large. Other people more likely to die of skin cancer are those whose immune system is suppressed, such as those who have had organ transplants.

The exact number of people who develop or die from basal and squamous cell skin cancers each year is not known for sure. Statistics of most other cancers are known because they are reported to cancer registries, but basal and squamous cell skin cancers are not reported.

What are the risk factors for basal and squamous cell skin cancers?

A risk factor is anything that affects your chance 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 a person's age or family history, can't be changed.

But having a risk factor, or even many risk factors, does not mean that you will get the disease. And some people who get the disease may have few or no known risk factors. Even if a person with basal or squamous cell skin cancer has risk factors, it's often very hard to know how much those risk factors might have contributed to the cancer.

The following are known risk factors for basal cell and squamous cell carcinomas. (These factors don't necessarily apply to other forms of non-melanoma skin cancer, such as Kaposi sarcoma and skin lymphoma.)

Ultraviolet (UV) light exposure

Exposure to ultraviolet (UV) rays is thought to be the major risk factor for most skin cancers. Sunlight is the main source of UV rays. Tanning beds are another source of UV rays. People who get a lot of UV exposure from these sources are at greater risk for skin cancer.

While UV rays make up only 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 of skin cells. Skin cancers begin when this damage affects the DNA of genes that control skin cell growth.

There are 3 main types of UV rays:

- UVA rays age skin cells and can damage their DNA. These rays are mainly linked to long-term skin damage such as wrinkles, but are also thought to play a role in some skin cancers.
- UVB rays can directly damage skin cells' DNA, and are the main cause of sunburns. They are also thought to cause most skin cancers.
- UVC rays don't get through our atmosphere and therefore are not present in sunlight. They do not normally cause skin cancer.

Both UVA and UVB rays damage skin and cause skin cancer. UVB rays are a more potent cause of at least some skin cancers, but based on what is known today, there are *no* safe UV rays.

The amount of UV exposure a person gets depends on the strength of the rays, the length of time the skin is exposed, and whether the skin is protected with clothing or sunscreen.

People who live in areas with year-round, bright sunlight have a higher risk. For example, the risk of skin cancer is twice as high in Arizona compared to Minnesota. Spending a lot of time outdoors for work or recreation without protective clothing and sunscreen increases your risk.

Most skin cancers are probably caused by exposures that happened many years earlier. The pattern of exposure may also be important. For example, frequent sunburns in childhood may increase the risk for basal cell cancer many years or even decades later.

Having light-colored skin

The risk of skin cancer is much higher for whites than for African Americans or Hispanics. This is due to the protective effect of the skin pigment melanin in people with darker skin. Whites with fair (light-colored) skin that freckles or burns easily are at especially high risk. This is one of the reasons why Australia, where many people descend from fair-skinned immigrants from the British Isles, has the highest rate of skin cancer in the world.

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

Older age

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

Male gender

Men are about twice as likely as women to have basal cell cancers and about 3 times as likely to have squamous cell cancers of the skin. This is thought to be due mainly to higher levels of sun exposure.

Exposure to certain chemicals

Exposure to large amounts of arsenic increases the risk of developing skin cancer. Arsenic is a heavy metal 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 oil 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 that received the treatment. This is particularly a concern in children who have had radiation treatment for cancer.

Previous skin cancer

Anyone who has had a basal or squamous cell cancer has 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, although this risk is generally small.

Psoriasis treatment

Psoralens and ultraviolet light (PUVA) treatments given to some patients with psoriasis (a long-lasting 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 skin's ability to repair DNA damage caused by sun exposure. People with this disorder often develop many skin cancers starting in childhood.

Basal cell nevus syndrome (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 of the time this condition 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.

Reduced immunity

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 non-melanoma skin cancer, including squamous cell cancer and less common types such as Kaposi sarcoma and Merkel cell carcinoma.

For example, people who get organ transplants are usually given medicines that weaken their immune system to prevent their body from rejecting the new organ. This increases their risk of developing skin cancer. The rate of skin cancer in people who have had transplants can be as high as 70% within 20 years after the transplant. Skin cancers in

people with weakened immune systems tend to grow faster and are more likely to be fatal.

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

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

Human papilloma virus (HPV) infection

Human papilloma viruses (HPVs) are a group of more than 100 viruses that 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 of the HPV types, especially those that affect the genital and anal areas and around the fingernails, seem to be related to skin cancers in these areas.

Smoking

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

Do we know what causes basal and squamous cell skin cancers?

While many risk factors for basal and squamous cell skin cancers have been found, 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 from sunlight, as well as from man-made sources such as tanning beds.

UV rays can damage the DNA inside skin cells. DNA is the chemical in each of our cells that makes up our genes – the instructions for 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 help control when our cells grow, divide into new cells, and die. Genes that help cells grow, divide, and stay alive are called *oncogenes*. Genes that keep cell growth in check by slowing down cell division or causing 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. Changes in several different genes are usually needed for a cell to become cancerous.

Sometimes the DNA damage inside skin cells affects certain genes that control how and when the cells grow and divide. Usually the cells can repair the damage, but in some cases this results in abnormal DNA, which may be the first step on the path to cancer.

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

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

A gene often mutated in basal cell cancers is the "patched" (*PTCH*) gene, which is part of the "hedgehog" signaling pathway inside cells. This pathway is vital in development before birth and is important in some adult cells. *PTCH* is a tumor suppressor gene that normally helps keep cell growth in check, so changes in this gene can allow cells to grow out of control. People who have basal cell nevus syndrome, which is often inherited from a parent and results in many basal cell cancers, have an altered *PTCH* 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 likely to be 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 defect in an enzyme that repairs 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 the human papilloma virus (HPV) also involves DNA and genes. These viruses have genes that affect the 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 treatments to overcome or repair that damage.

Can basal and squamous cell skin cancers be prevented?

Not all basal and squamous cell skin cancers can be prevented, but there are things you can do that could help reduce your risk of getting skin cancer.

Limiting ultraviolet (UV) exposure

The most important way to lower your risk of basal and squamous cell skin cancers is to limit your exposure to UV rays. Practice sun safety when you are outdoors. Simply staying in the shade is one of the best ways to limit your UV exposure. If you are going to be in the sun, “Slip! Slop! Slap! ®… and Wrap” is a catch phrase that can help you remember some of the key steps you can take to protect yourself from UV rays:

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

Seek shade

An obvious but very important way to limit your exposure to UV light is to avoid being outdoors in direct sunlight too long. This is particularly important in the middle of the day between the hours of 10 am and 4 pm, when UV light is strongest. If you are unsure how strong the sun’s rays are, use the shadow test: if your shadow is shorter than you are, the sun’s rays are the strongest, and it is important to protect yourself.

Keep in mind that sunlight (and UV rays) can come through light clouds, can reflect off water, sand, concrete, and snow, and can reach below the water’s surface, so protect your skin whenever you are outdoors.

The UV Index: The amount of UV light reaching the ground depends on a number of factors, including the time of day, time of year, elevation, and cloud cover. To help people better understand the strength of UV light in their area on a given day, the National Weather Service and the US Environmental Protection Agency (EPA) have developed the UV Index. It gives people an idea of how strong the UV light is in their area, on a scale from 1 to 11+. A higher number means a higher chance of sunburn, skin damage, and ultimately skin cancers of all kinds. Your local UV Index should be available daily in your local newspaper, on TV weather reports, online (www.epa.gov/sunwise/uvindex.html), and on many smartphone apps.

Protect your skin with clothing

Clothes provide different levels of UV protection, depending on many factors. Long-sleeved shirts and long pants or skirts protect the most. Dark colors generally protect more than light colors. A tightly woven fabric protects better than loosely woven clothing. Dry fabric is generally more protective than wet fabric.

Be aware that covering up doesn't block out all UV rays. If you can see light through a fabric, UV rays can get through, too.

Some companies in the United States now make clothing that is lightweight, comfortable, and protects against UV exposure even when wet. These sun-protective clothes may have a label listing the ultraviolet protection factor (UPF) value – the level of protection the garment provides from the sun's UV rays (on a scale from 15 to 50+). The higher the UPF, the higher the protection from UV rays.

Newer products, which are used in the washing machine like laundry detergents, can increase the UPF value of clothes you already own. They add a layer of UV protection to your clothes without changing the color or texture. This can be useful, but it's not exactly clear how much it adds to protecting you from UV rays, so it's still important to follow the other steps listed here.

Wear a hat

A hat with at least a 2- to 3-inch brim all around is ideal because it protects areas often exposed to intense sun, such as the ears, eyes, forehead, nose, and scalp. A dark, non-reflective underside to the brim can also help lower the amount of UV rays reaching the face from reflective surfaces such as water. A shade cap (which looks like a baseball cap with about 7 inches of fabric draping down the sides and back) also is good, and will provide more protection for the neck. These are often sold in sports and outdoor supply stores.

A baseball cap can protect the front and top of the head but not the neck or the ears, where skin cancers commonly develop. Straw hats are not as protective as ones made of tightly woven fabric.

Use sunscreen

Use sunscreens and lip balms on areas of skin exposed to the sun, especially when the sunlight is strong (for example, between the hours of 10 am and 4 pm). Sunscreens with broad spectrum protection (against UVA and UVB rays) and with sun protection factor (SPF) values of 30 or higher are recommended. Use sunscreen even on hazy days or days with light or broken cloud cover because UV rays still come through.

Always follow directions when applying sunscreen. Ideally, a 1-ounce application (about a shot glass or a palmful of sunscreen) is recommended to cover the arms, legs, neck, and face of the average adult. Protection is greatest when sunscreen is used thickly on all sun-exposed skin. Sunscreens need to be reapplied at least every 2 hours to maintain protection. Sunscreens can wash off when you sweat or swim and then wipe off with a towel, so they might need to be reapplied more often – be sure to read the label. And don't forget your lips; lip balm with sunscreen is also available.

Some people use sunscreen because they want to stay out in the sun for long periods of time without getting sunburned. Sunscreen should not be used to spend more time in the sun than you otherwise would, as you will still end up with damage to your skin.

Remember that sunscreens are a filter– they do not block all UV rays. The sunscreen's SPF number is a measure of how long it would take you to get sunburned, compared to how long it would have taken if you were not using it. For example, if you would normally burn after only 5 minutes in the sun, using a product with an SPF of 30 would mean you would still get burned in 150 minutes. And that's assuming that you applied it as directed, which unfortunately many people do not.

Sunscreen can reduce your chance of actinic keratoses and squamous cell cancer, but there is no guarantee. If you stay in the sun a long time, you are at risk of developing skin cancer even if you have applied sunscreen.

Wear sunglasses

Wrap-around sunglasses with at least 99% UV absorption provide the best protection for the eyes and the skin area around the eyes. Look for sunglasses labeled as blocking UVA and UVB light. Labels that say "UV absorption up to 400 nm" or "Meets ANSI UV Requirements" mean the glasses block at least 99% of UV rays. If there is no label, don't assume the sunglasses provide any protection.

Avoid tanning beds and sunlamps

Many people believe the UV rays of tanning beds are harmless. This is not true. Tanning lamps give out UVA and usually UVB rays as well, both of 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.

If you want a tan, one option is using a sunless tanning lotion, which can provide the look without the danger. These lotions contain a substance called *dihydroxyacetone* (DHA). DHA interacts with proteins on the surface of the skin to give it a darker color. You do not have to go out in the sun for these to work. The color tends to wear off after a few days. These products can give skin a darker color (although in some people it may have a slight orange tinge), but if you use one you still need to use sunscreen and wear protective clothing when going outside. These tans do not protect against UV rays.

Some tanning salons offer DHA as a spray-on tan. A concern here is that DHA is approved for external use only and should not be inhaled or sprayed in or on the mouth, eyes, or nose. People who choose to get a DHA spray tan should make sure to protect these areas.

Protect children from the sun

Children need special attention, since they tend to spend more time outdoors and can burn more easily. Parents and other caregivers should protect children from excess sun exposure by using the steps above. It is important, particularly in parts of the world where it is sunnier, to cover your children as fully as is reasonable. You should develop the habit of using sunscreen on exposed skin for yourself and your children whenever you go outdoors and may be exposed to large amounts of sunlight. Children need to be taught about the dangers of too much sun exposure as they become more independent.

Babies younger than 6 months should be kept out of direct sunlight and protected from the sun with hats and protective clothing. Sunscreen may be used on small areas of exposed skin only if adequate clothing and shade are not available.

A word about sun exposure and vitamin D

Doctors are learning that vitamin D has many health benefits. It may even help to lower the risk for some cancers. Vitamin D is made naturally by your skin when you are in the sun. How much vitamin D you make depends on many things, including how old you are, how dark your skin is, and how strong the sunlight is where you live.

At this time, doctors aren't sure what the optimal level of vitamin D is. A lot of research is being done in this area. Whenever possible, it is better to get vitamin D from your diet or vitamin supplements rather than from sun exposure, because dietary sources and vitamin supplements do not increase risk for skin cancer, and are typically more reliable ways to get the amount you need.

For more information on how to protect yourself and your family from UV exposure, see our document *Skin Cancer: Prevention and Early Detection*.

Avoiding harmful chemicals

Exposure to certain chemicals, such as arsenic, can increase a person's risk of skin cancer. People can be exposed to arsenic from well water in some areas, pesticides and herbicides, some medicines (such as arsenic trioxide) and imported traditional herbal remedies, and in certain occupations (such as mining and smelting).

Checking your skin regularly

Checking your skin regularly may help you spot any new growths or abnormal areas and show them to your doctor before they even have a chance to turn into skin cancer. For more information, see the section "Can basal and squamous cell skin cancers be found early?"

Can basal and squamous cell skin cancers be found early?

Basal cell and squamous cell skin cancers can often be found early, when they are likely to be easier to treat.

Skin self-exam

You can play an important role in finding skin cancer early. Learn the patterns of moles, blemishes, freckles, and other marks on your skin so that you'll notice any changes.

It's important to check all over your skin, preferably once a month. Self-exams are best done in a well-lit room in front of a full-length mirror. Use a hand-held mirror for areas that are hard to see, such as the backs of your thighs.

All areas should be examined, including your palms and soles, scalp, ears, nails, and your back. (For a more thorough description of a skin self-exam, see our document *Skin Cancer: Prevention and Early Detection* and the booklet *Why You Should Know About Melanoma*.) Friends and family members can also help you with these exams, especially for those hard-to-see areas, such as your scalp and back.

Be sure to show your doctor any areas that concern you and ask your doctor to look at areas that may be hard for you to see.

Spots on the skin that are new or changing in size, shape, or color should be seen by a doctor promptly. Any unusual sore, lump, blemish, marking, or change in the way an area of the skin looks or feels may be a sign of skin cancer or a warning that it might occur. The skin might become scaly or crusty or begin oozing or bleeding. It may feel itchy, tender, or painful. Redness and swelling may develop.

Basal cell and squamous cell skin cancers can look like a variety of marks on the skin. The key warning signs are a new growth, a spot or bump that's getting larger over time, or a sore that doesn't heal within a couple of months. (See the next section, "Signs and symptoms of basal and squamous cell skin cancer," for a more detailed description of what to look for.)

Exam by a health care professional

As part of a routine cancer-related checkup, your doctor or other health care professional should check your skin carefully. He or she should be willing to discuss any concerns you might have about this exam.

Regular skin exams are especially important for people who are at high risk of skin cancer, such as people with reduced immunity (for example, those who have had an

organ transplant) or people with conditions such as basal cell nevus syndrome or xeroderma pigmentosum (XP). Talk to your doctor about how often you should have your skin examined.

Signs and symptoms of basal and squamous cell skin cancers

Skin cancers do not often cause bothersome symptoms until they have grown quite large. Then they may itch, bleed, or even hurt. But typically they can be seen or felt long before they reach this point.

Basal cell carcinomas usually develop on areas exposed to the sun, especially the head and neck, but they can occur anywhere on the body. They often appear as flat, firm, pale areas or small, raised, pink or red, translucent, shiny, pearly bumps that may bleed after a minor injury. They may have one or more abnormal blood vessels, a lower area in their center, and blue, brown, or black areas. Large basal cell carcinomas may have oozing or crusted areas.

Squamous cell carcinomas may appear as growing lumps, often with a rough, scaly, or crusted surface. They may also look like flat reddish patches in the skin that grow slowly. They tend to occur on sun-exposed areas of the body such as the face, ear, neck, lip, and back of the hands. Less often, they form in the skin of the genital area. They can also develop in scars or skin sores elsewhere.

Both of these types of skin cancer may develop as a flat area showing only slight changes from normal skin.

Sometimes people go to the doctor because they have a “shaving cut that just won’t heal.” Basal cell cancers, which are fragile, bleed easily and have been unmasked by shaving. A simple rule of thumb is that most shaving cuts heal within a week or so.

Other types of non-melanoma skin cancers are much less common, and may look different. It’s important to have new or changing skin growths, sores that don’t heal, or any other areas that concern you checked by your doctor.

How are basal and squamous cell skin cancers diagnosed?

Most skin cancers are brought to a doctor’s attention because of signs or symptoms a person is having.

If you have an abnormal area that might be skin cancer, your doctor will do exams and tests to find out if it is cancer or some other skin condition. If there is a chance the skin cancer may have spread to other areas of the body, other tests may be done as well.

Medical history and physical exam

Usually the first step is for your doctor to take your medical history. The doctor will ask when the mark on the skin first appeared, if it has changed in size or appearance, and if it is causing any signs or symptoms (pain, itching, bleeding, etc.). You may also be asked about past exposures to causes of skin cancer (including sunburns and tanning practices) and if you or anyone in your family has had skin cancer.

During the physical exam, the doctor will note the size, shape, color, and texture of the area(s) in question, and whether there is bleeding or scaling. The rest of your body may be checked for spots and moles that could be related to skin cancer.

The doctor may also feel the nearby lymph nodes, which are bean-sized collections of immune system cells under the skin in certain areas. Some skin cancers may spread to lymph nodes. When this happens, the lymph nodes may become larger and firmer than usual.

If you are being seen by your primary doctor and skin cancer is suspected, you may be referred to a dermatologist (a doctor who specializes in skin diseases), who will look at the area more closely.

Along with a standard physical exam, some dermatologists use a technique called *dermatoscopy* (also known as *dermoscopy*, *epiluminescence microscopy [ELM]* or *surface microscopy*) to see spots on the skin more clearly. The doctor uses a dermatoscope, which is a special magnifying lens and light source held near the skin. Sometimes a thin layer of alcohol or oil is used with this instrument. The doctor may take a digital photo of the spot.

When used by an experienced dermatologist, this test can improve the accuracy of finding skin cancers early. It can also often help reassure you if a spot on the skin is probably benign (non-cancerous) without the need for a biopsy.

Skin biopsy

If the doctor thinks that a suspicious area might be skin cancer, he or she will take a sample of skin from the area and have it looked at under a microscope. This is called a *skin biopsy*. If the biopsy removes the entire tumor, it’s often enough to cure basal and squamous cell skin cancers without further treatment.

There are different ways to do a skin biopsy. The doctor will choose one based on the suspected type of skin cancer, where it is on your body, its size, and other factors. Any

biopsy is likely to leave at least a small scar. Different methods may result in different scars, so ask your doctor about possible scarring before the biopsy is done. No matter which type of biopsy is done, it should remove as much of the suspected area as possible so that an accurate diagnosis can be made.

Skin biopsies are done using a local anesthetic (numbing medicine), which is injected into the area with a very small needle. You will probably feel a small prick and a little stinging as the medicine is injected, but you should not feel any pain during the biopsy.

Shave (tangential) biopsy

For a shave biopsy, the doctor first numbs the area with a local anesthetic. The doctor then shaves off the top layers of the skin with a small surgical blade. Usually the epidermis and the outer part of the dermis are removed, although deeper layers can be taken as well if needed. Bleeding from the biopsy site is then stopped by applying an ointment or a small electrical current to cauterize the wound.

Punch biopsy

A punch biopsy removes a deeper sample of skin. The doctor uses a tool that looks like a tiny round cookie cutter. Once the skin is numbed with a local anesthetic, the doctor rotates the punch biopsy tool on the skin until it cuts through all the layers of the skin, including the dermis, epidermis, and the upper parts of the subcutis. The sample is removed and the edges of the biopsy site are often stitched together.

Incisional and excisional biopsies

To examine a tumor that may have grown into deeper layers of the skin, the doctor may use an incisional or excisional biopsy. An incisional biopsy removes only a portion of the tumor. An excisional biopsy removes the entire tumor.

After numbing the area with a local anesthetic, a surgical knife is used to cut through the full thickness of skin. A wedge or sliver of skin is removed for examination, and the edges of the wound are stitched together.

Examining the biopsy samples

All skin biopsy samples are sent to a lab, where they are looked at under a microscope by a pathologist (a doctor trained in looking at tissue samples to diagnose disease). Often, the samples are sent to a dermatopathologist, a doctor who has special training in looking at skin samples.

Lymph node biopsy

It’s rare for basal or squamous cell cancer to spread beyond the skin, but if it does it usually goes first to nearby lymph nodes, which are bean-sized collections of immune cells. If your doctor feels lymph nodes near the tumor that are too large and/or too firm, a lymph node biopsy may be done to determine whether cancer has spread to them.

Fine needle aspiration biopsy

For a fine needle aspiration (FNA) biopsy, the doctor uses a syringe with a thin, hollow needle to remove very small tissue fragments. The needle is smaller than the needle used for a blood test. A local anesthetic is sometimes used to numb the area first. This test rarely causes much discomfort and does not leave a scar.

An FNA biopsy is not used to diagnose a suspicious skin tumor, but it may be used to biopsy large lymph nodes near a skin cancer to find out if the cancer has spread to them. FNA biopsies are not as invasive as some other types of biopsies, but they may not always provide enough of a sample to find cancer cells.

Surgical (excisional) lymph node biopsy

If an FNA does not find cancer in a lymph node but the doctor still suspects the cancer has spread there, the lymph node may be removed by surgery and examined. If the lymph node is near the surface of the body, this can often be done in a doctor’s office or outpatient surgical center using local anesthesia. It will leave a small scar.

How are basal and squamous cell skin cancers staged?

The stage of a cancer is a description of how widespread it is. For skin cancers this includes its size and location, whether it has grown into nearby tissues or bones, whether it has spread to the lymph nodes or any other organs, and certain other factors.

Because basal cell skin cancer is almost always cured before it spreads to other organs, it is seldom staged unless the cancer is very large. Squamous cell cancers have a greater (although still small) risk of spreading, so staging may sometimes be done, particularly in people who have a high risk of spread. This includes people with suppressed immune systems, such as those who have had organ transplants and people infected with HIV, the virus that causes AIDS.

The tests and exams described in the section “How are basal and squamous cell skin cancers diagnosed?” are the main ones used to help determine the stage of the cancer. In rare cases, imaging tests such as x-rays, CT scans, or MRI scans may be used as well.

The American Joint Committee on Cancer (AJCC) TNM system

A staging system is a standard way to sum up how far a cancer has spread. This helps members of the cancer care team determine a patient's prognosis (outlook) as well as the best treatment options.

The system most often used to stage basal and squamous cell skin cancers is the American Joint Commission on Cancer (AJCC) TNM system. The TNM system for staging contains 3 key pieces of information:

- **T** stands for **tumor** (its size, location, and how far it has spread within the skin and to nearby tissues).
- **N** stands for spread to nearby lymph **nodes** (bean-sized collections of immune system cells, to which cancers often spread first).
- **M** is for **metastasis** (spread to distant organs).

T categories

The possible values for T are:

TX: The main (primary) tumor cannot be assessed.

T0: No evidence of primary tumor.

Tis: Carcinoma in situ (tumor is still confined to the epidermis, the outermost skin layer).

T1: The tumor is 2 centimeters (cm) across (about 4/5 inch) or smaller and has no or only 1 high-risk feature (see below).

T2: Tumor is larger than 2 cm across, or is any size with 2 or more high-risk features.

T3: Tumor has grown into facial bones, such as the jaw bones or bones around the eye.

T4: Tumor has grown into other bones in the body or into the base of the skull.

High-risk features: These features are used to distinguish between some T1 and T2 tumors.

- Tumor is thicker than 2 millimeters (mm).
- Tumor has invaded down into the lower dermis or subcutis (Clark level IV or V).
- Tumor has grown into tiny nerves in the skin (perineural invasion).
- Tumor started on an ear or on non-hair-bearing lip.

- Tumor cells look very abnormal (poorly differentiated or undifferentiated) when seen under a microscope.

N categories

The possible values for N are:

NX: Nearby lymph nodes cannot be assessed.

N0: No spread to nearby lymph nodes.

N1: Spread to 1 nearby lymph node which is on the same side of the body as the main tumor and is 3 centimeters (cm) or less across.

N2a: Spread to 1 nearby lymph node which is on the same side of the body as the main tumor and is larger than 3 cm but not larger than 6 cm across.

N2b: Spread to more than 1 nearby lymph node on the same side of the body as the main tumor, none of which are larger than 6 cm across.

N2c: Spread to nearby lymph node(s) on the other side of the body from the main tumor, none of which are larger than 6 cm across.

N3: Spread to any nearby lymph node that is larger than 6 cm across.

M categories

The M values are:

M0: No spread to distant organs.

M1: Spread to distant organs.

Stage grouping

To assign an overall stage, the T, N , and M categories are combined in a process called *stage grouping*. The stages are described using the number 0 and Roman numerals from I to IV. In general, patients with lower stage cancers tend to have a better prognosis for a cure or long-term survival.

Stage 0	Tis, N0, M0
Stage I	T1, N0, M0
Stage II	T2, N0, M0
Stage III	T3, N0, M0

	T1 to T3, N1, M0
Stage IV	T1 to T3, N2, M0 Any T, N3, M0 T4, any N, M0 Any T, any N, M1

How are basal and squamous cell skin cancers treated?

This information represents the views of the doctors and nurses serving on the American Cancer Society's Cancer Information Database Editorial Board. These views are based on their interpretation of studies published in medical journals, as well as their own professional experience.

The treatment information in this document is not official policy of the Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor.

Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.

General treatment information

If you have been diagnosed with basal or squamous cell skin cancer, your doctor will discuss your treatment options with you. Depending on your situation, you may have different types of doctors on your treatment team. Many basal and squamous cell cancers (as well as pre-cancers) are treated by dermatologists – doctors who specialize in treating skin diseases. If the cancer is more advanced, you may be treated by another type of doctor, such as a surgical oncologist, medical oncologist, or radiation oncologist.

Based on the stage of the cancer and other factors, your treatment options may include:

- Surgery
- Other forms of local therapy
- Radiation therapy
- Systemic chemotherapy
- Targeted therapy

Fortunately, most basal cell and squamous cell carcinomas can be cured with fairly minor surgery or other types of local treatments.

It’s important to discuss all of your treatment options as well as their possible side effects with your treatment team to help make the decision that best fits your needs. If there is anything you do not understand, ask to have it explained. (See the section “What should you ask your doctor about basal and squamous cell skin cancers?” for some questions to ask.)

The next few sections describe the main types of treatment used for basal and squamous cell cancers, followed by descriptions of the most common approaches for treating actinic keratosis, Bowen disease, squamous cell carcinoma, and basal cell carcinoma.

Other skin cancers, such as melanoma, lymphoma of the skin, Merkel cell carcinoma, Kaposi sarcoma, and other sarcomas are treated differently and are discussed in separate documents.

Surgery for basal and squamous cell skin cancers

Many different kinds of surgery can be used for basal cell and squamous cell skin cancers. The options for surgery depend on how large the cancer is, where it is on the body, and the specific type of skin cancer. In most cases the surgery can be done in a doctor’s office or hospital clinic using a local anesthetic (numbing medicine). For skin cancers with a high risk of spreading, surgery sometimes will be followed by other treatments, such as radiation or chemotherapy.

Excision

This is similar to an excisional biopsy (described in the section called “How are basal and squamous cell skin cancers diagnosed?”), but in this case the diagnosis is already known. For this procedure, the skin is first numbed with a local anesthetic. The tumor is then cut out with a surgical knife, along with some surrounding normal skin. The remaining skin is carefully stitched back together, leaving a small scar.

Curettage and electrodesiccation

This treatment removes the cancer by scraping it with a curette (a long, thin instrument with a sharp looped edge on one end). The area is then treated with an electric needle (electrode) to destroy any remaining cancer cells. This process is often repeated once or twice during the same office visit. Curettage and electrodesiccation is a good treatment for superficial (confined to the top layer of skin) basal cell and squamous cell cancers. It will leave a small scar.

Mohs surgery (microscopically controlled surgery)

Mohs surgery is sometimes used when there is a high risk of the skin cancer coming back after treatment, when the extent of the skin cancer is not known, or when the goal is to

save as much healthy skin as possible, such as with cancers around the eye. It is done by a specially trained surgeon.

Mohs can often offer better outcomes than some other forms of surgery and other treatments. But it's also usually more complex, time-consuming, and expensive than other methods. In recent years, skin cancer experts have developed guidelines for when it's best to use this technique based on the type and size of skin cancer, where it is on the body, and other important features.

Using the Mohs technique, the surgeon removes a very thin layer of the skin (including the tumor) and then checks the outer edges of the sample under a microscope. If cancer cells are seen, the next layer is removed and examined. This is repeated until the skin samples are found to be free of cancer cells. This process is slow, often taking several hours, but it means that more normal skin near the tumor can be saved. This can help the area look better after surgery.

Lymph node surgery

If lymph nodes near a squamous or basal cell skin cancer are growing larger, doctors will be concerned that the cancer might have spread to these lymph nodes. One or more nodes may be biopsied (see the section "How are basal and squamous cell skin cancers diagnosed?"), or many nodes might be removed in a more extensive operation called a *lymph node dissection*. The nodes are then looked at under a microscope for signs of cancer. This type of operation is more involved than surgery on the skin, and usually requires general anesthesia (where you are asleep). You can learn more in our document *Lymph Nodes and Cancer*.

Lymphedema, a condition in which excess fluid collects in the legs or arms, is a possible long-term side effect of a lymph node dissection. Lymph nodes in the groin or under the arm are part of the lymph system, which normally helps fluid from the legs and arms drain back toward the heart. If the lymph nodes are removed, fluid may build up, causing these limbs to swell. If severe enough, it can cause skin problems and an increased risk of infections in the limb. Elastic stockings or compression sleeves can help some people with this condition. For more information, see our document *Understanding Lymphedema (For Cancers Other Than Breast Cancer).*

Skin grafting and reconstructive surgery

After removing large basal or squamous cell skin cancers, it may not be possible to stretch the nearby skin enough to stitch the edges of the wound together. In these cases, healthy skin may be taken from another part of the body and grafted over the wound to help it heal and to restore the appearance of the affected area. Other reconstructive surgical procedures can also be helpful in some cases.

Other forms of local therapy for basal and squamous cell skin cancers

Several techniques other than surgery can be used to treat basal and squamous cell skin cancers that have not spread to lymph nodes or other parts of the body. Some of these treatments are described as types of surgery since they destroy a targeted area of body tissue. But these techniques don't use scalpels or cut into the skin.

Cryosurgery (cryotherapy)

Cryosurgery is used most often for pre-cancerous conditions such as actinic keratosis and for small basal cell and squamous cell carcinomas.

For this treatment, the doctor applies liquid nitrogen to the tumor to freeze and kill the cells. This is often repeated a couple of times in the same office visit. After the dead area of skin thaws, it will swell, blister and crust over. The wound may take a month or two to heal and will leave a scar. The treated area may have less color after treatment.

Photodynamic therapy (PDT)

PDT can be used to treat actinic keratoses. But its exact role in treating basal and squamous cell skin cancers, if any, still needs to be determined.

This treatment uses a special liquid drug that is applied to the skin. The drug collects in the tumor cells over the course of several hours or days, where it is converted to a different chemical that makes the cells very sensitive to certain types of light. A special light source is then focused on the tumor(s), which kills the cells.

PDT can cause redness and swelling on the skin where it is used. Another possible side effect of PDT is that it can make a person's skin very sensitive to sunlight for some time, so precautions may be needed to avoid severe burns.

For more information on this technique, see our document *Photodynamic Therapy*.

Topical chemotherapy

Chemotherapy uses drugs that kill cancer cells. Topical chemotherapy means that an anti-cancer medicine is placed directly on the skin (usually in a cream or ointment) rather than being given by mouth or injected into a vein.

5-fluorouracil: The drug most often used in topical treatment of actinic keratoses, as well as some basal and squamous cell skin cancers, is 5-fluorouracil, or 5-FU (Efudex®, Carac®, Fluoroplex®, others). It is typically applied to the skin once or twice a day for several weeks.

When applied directly on the skin, 5-FU kills tumor cells near the skin's surface, but it cannot reach cancer cells that may have grown deeply into the skin or spread to other organs. For this reason, treatment with 5-FU generally is used only for pre-cancerous conditions such as actinic keratosis and for some very superficial skin cancers.

Because it is only applied to the skin, the drug does not spread throughout the body, so it doesn't cause the same side effects that can occur with systemic chemotherapy (treatment that affects the whole body). But it can make the treated skin red and very sensitive for a few weeks, which can be quite bothersome for some people. Other topical medicines can be used to help relieve this. 5-FU also increases the skin's sensitivity to sunlight, so treated areas must be protected from the sun to prevent sunburn for a few weeks after use of this cream.

A very small portion of people have a condition called *DPD deficiency*, which makes it hard for their bodies to break down and get rid of 5-FU. This can result in serious or even life threatening side effects. If you are applying 5-FU and have any reactions other than on your skin, call your doctor or nurse right away.

Diclofenac: A gel containing the drug diclofenac (Solaraze®) is sometimes used to treat actinic keratoses. This drug belongs to the non-steroidal anti-inflammatory drugs (NSAIDs), a group that includes pain relievers such as aspirin and ibuprofen. The gel is usually applied twice daily for 2 or 3 months. It may cause less severe skin reactions than 5-FU, but it also may take longer to work.

Ingenol mebutate: A newer gel used to treat actinic keratosis, ingenol mebutate (Picato®), might work more quickly than other topical gels. It is applied to the skin daily for 2 or 3 days. The gel can cause bothersome skin reactions, but these usually begin to go away within a week of starting treatment.

Immune response modifiers

Certain drugs can boost the body's immune system response against the cancer, causing it to shrink and go away.

Imiquimod (Zyclara®, others) is a cream that can be applied to actinic keratoses and some very early basal cell cancers. It is not a chemotherapy drug. Instead, it causes the immune system to react to the skin lesion and destroy it. It is typically applied at least a few times a week for several weeks, although schedules can vary. Like other topical gels, it can cause severe skin reactions in some people. It can also cause flu-like symptoms.

Interferon is a man-made version of an immune system protein. It can be injected directly into the tumor to boost the immune response against it. It may be used occasionally when surgery is not possible, but it may not be as effective as other treatments.

Laser surgery

This relatively new approach uses a beam of laser light to vaporize cancer cells. It's sometimes used for actinic keratosis, squamous cell carcinoma in situ (involving only the epidermis) and for very superficial basal cell carcinomas (those only on the surface of the skin). It is not yet known if this type of treatment is as effective as standard methods of treatment, and it is not widely used.

Chemical peeling

For this technique, the doctor applies a small amount of trichloracetic acid (TCA) or a similar chemical to the skin tumor, killing the tumor cells over the course of several days. This approach is sometimes used to treat actinic keratosis.

Radiation therapy for basal and squamous cell skin cancers

Radiation therapy uses high-energy rays (such as x-rays) or particles (such as photons, electrons, or protons) to kill cancer cells. The radiation is focused from outside the body onto the tumor.

When radiation therapy is used to treat cancers on the skin, it is often done with a type of radiation called *electron beam radiation*. It uses a beam of electrons that only penetrate as far as the skin. This helps limit the side effects to other organs and body tissues.

If a tumor is very large or is on an area of the skin that makes surgery difficult, radiation may be used as the primary (main) treatment instead of surgery. Primary radiation therapy is often useful for some patients who, because of poor general health, cannot have surgery. Radiation therapy can often cure small basal or squamous cell skin cancers and can delay the growth of more advanced cancers. Radiation is also useful when combined with other treatments.

In some cases, radiation can be used after surgery as an adjuvant (additional) treatment to kill any small areas of remaining cancer cells that may not have been visible during surgery. This lowers the risk of cancer coming back after surgery. Radiation may also be used to help treat skin cancer that has spread to lymph nodes or other organs.

Getting radiation treatment is much like getting an x-ray, but the radiation is stronger and aimed more precisely at the cancer. The procedure itself is painless. Each treatment lasts only a few minutes, although the setup time – getting you into place for treatment – takes longer.

Side effects of radiation can include skin irritation, redness, drying, and hair loss in the area being treated. With longer treatment, these side effects may get worse. After many years, new skin cancers sometimes develop in areas previously treated by radiation. For this reason, radiation usually is not used to treat skin cancer in young people. Radiation is

also not recommended for people with certain inherited conditions (such as basal cell nevus syndrome or xeroderma pigmentosum), who may be at higher risk for new cancers, or for people with connective tissue diseases (such as lupus or scleroderma), which radiation might make worse.

For more general information about radiation therapy, please see the “Radiation Therapy” section of our website or our document *Understanding Radiation Therapy: A Guide for Patients and Families*.

Systemic chemotherapy for basal and squamous cell skin cancers

Systemic chemotherapy (chemo) uses anti-cancer drugs that are injected into a vein or given by mouth. These drugs travel through the bloodstream to all parts of the body. Unlike topical chemotherapy, systemic chemotherapy can attack cancer cells that have spread to lymph nodes and other organs.

One or more chemo drugs may be used to treat squamous cell carcinoma that has spread. Chemo drugs such as cisplatin, doxorubicin, 5-fluorouracil (5-FU), topotecan, and etoposide are given intravenously (into a vein), usually once every few weeks. They can often slow the spread of these cancers and relieve some symptoms. In some cases, they may shrink tumors enough so that other treatments such as surgery or radiation therapy can be used.

Chemo drugs attack cells that are dividing quickly, which is why they work against cancer cells. But other cells in the body, such as those in the bone marrow (where new blood cells are made), the lining of the mouth and intestines, and the hair follicles, also divide quickly. These cells are also likely to be affected by chemo, which can lead to side effects.

The side effects of chemo depend on the type and dose of drugs given and the length of time they are taken. These side effects may include:

- Hair loss
- Mouth sores
- Loss of appetite
- Nausea and vomiting
- Diarrhea or constipation
- Increased risk of infection (from too few white blood cells)
- Easy bruising or bleeding (from too few blood platelets)

- Fatigue (from too few red blood cells)

These side effects usually go away once treatment is finished. Some drugs may have specific effects that are not listed above, so be sure to talk with your cancer care team about what you might expect in terms of side effects.

There are often ways to lessen these side effects. For example, drugs can be given to help prevent or reduce nausea and vomiting. Tell your medical team about any side effects or changes you notice while getting chemo so that they can be treated promptly.

For more general information about chemotherapy, please see the “Chemotherapy” section of our website, or our document *Understanding Chemotherapy: A Guide for Patients and Families*.

Targeted therapy for basal and squamous cell skin cancers

Doctors have found some of the gene changes that make skin cancer cells different from normal cells, and they have begun to develop drugs that attack these changes. These targeted drugs work differently from standard chemotherapy drugs. They may work sometimes when chemotherapy drugs don’t. They may also have less severe side effects. Doctors are still learning the best way to use these drugs to treat skin cancers.

An example of a targeted drug is vismodegib (Erivedge®), which can be used to treat some advanced or recurrent basal cell skin cancers. It is very rare for basal cell cancers to reach an advanced stage, but when they do, these cancers can be hard to treat. Most basal cell cancers have mutations (changes) in genes that are part of a cell signaling pathway called *hedgehog*. The hedgehog pathway is crucial for the development of the embryo and fetus and is important in some adult cells, but it can be overactive in basal cell cancers. Vismodegib targets a protein in this pathway.

Vismodegib is a pill, taken once a day. In people with basal cell cancers that have spread or come back after surgery and other local treatments, it has been shown to help shrink tumors in about a third of patients, although it’s not yet clear if it helps people live longer.

Side effects can include muscle spasms, joint pain, hair loss, fatigue, problems with taste, poor appetite and weight loss, nausea and vomiting, diarrhea, and constipation. Vismodegib can also cause women to stop having their periods for a time.

Because the hedgehog pathway affects fetal development, this drug should not be taken by women who are pregnant or could become pregnant. It is not known if it could harm the fetus if it is taken by a male partner. Anyone on this drug should use reliable birth control during and for some time after treatment.

Clinical trials for basal and squamous cell skin cancers

You may have had to make a lot of decisions since you've been told you have cancer. One of the most important decisions you will make is choosing which treatment is best for you. You may have heard about clinical trials being done for your type of cancer. Or maybe someone on your health care team has mentioned a clinical trial to you.

Clinical trials are carefully controlled research studies that are done with patients who volunteer for them. They are done to get a closer look at promising new treatments or procedures.

Clinical trials are one way to get state-of-the art cancer treatment. Sometimes they may be the only way to get some newer treatments. They are also the only way for doctors to learn better methods to treat cancer. Still, they are not right for everyone.

If you would like to learn more about clinical trials that might be right for you, start by asking your doctor if your clinic or hospital conducts clinical trials. You can also call our clinical trials matching service for a list of clinical trials that meet your medical needs. You can reach this service at 1-800-303-5691 or on our website at www.cancer.org/clinicaltrials. You can also get a list of current clinical trials by calling the National Cancer Institute's Cancer Information Service toll-free at 1-800-4-CANCER (1-800-422-6237) or by visiting the NCI clinical trials website at www.cancer.gov/clinicaltrials.

There are requirements you must meet to take part in any clinical trial. If you do qualify for a clinical trial, it's up to you whether or not to enter (enroll in) it.

You can get a lot more information on clinical trials in our document *Clinical Trials: What You Need to Know*. You can read it on our website or call us at 1-800-227-2345 to have it sent to you.

Complementary and alternative therapies for basal and squamous cell skin cancers

When you have cancer you might hear about ways to treat your cancer or relieve symptoms that your doctor hasn't mentioned. Everyone from friends and family to Internet groups and websites may offer ideas for what might help you. These methods can include vitamins, herbs, and special diets, or other methods such as acupuncture or massage, to name a few.

What exactly are complementary and alternative therapies?

Not everyone uses these terms the same way, and they are used to refer to many different methods, so it can be confusing. We use *complementary* to refer to treatments that are

used *along with* your regular medical care. *Alternative* treatments are used *instead of* a doctor's medical treatment.

Complementary methods: Most complementary treatment methods are not offered as cures for cancer. Mainly, they are used to help you feel better. Some methods that are used along with regular treatment are meditation to reduce stress, acupuncture to help relieve pain, or peppermint tea to relieve nausea. Some complementary methods are known to help, while others have not been tested. Some have been proven not to be helpful, and a few have even been found harmful.

Alternative treatments: Alternative treatments may be offered as cancer cures. These treatments have not been proven safe and effective in clinical trials. Some of these methods may pose danger, or have life-threatening side effects. But the biggest danger in most cases is that you may lose the chance to be helped by standard medical treatment. Delays or interruptions in your medical treatments may give the cancer more time to grow and make it less likely that treatment will help.

Finding out more

It is easy to see why people with cancer think about alternative methods. You want to do all you can to fight the cancer, and the idea of a treatment with few or no side effects sounds great. Sometimes medical treatments like chemotherapy can be hard to take, or they may no longer be working. But the truth is that most of these alternative methods have not been tested and proven to work in treating cancer.

As you consider your options, here are 3 important steps you can take:

- Look for "red flags" that suggest fraud. Does the method promise to cure all or most cancers? Are you told not to have regular medical treatments? Is the treatment a "secret" that requires you to visit certain providers or travel to another country?
- Talk to your doctor or nurse about any method you are thinking about using.
- Contact us at 1-800-227-2345 to learn more about complementary and alternative methods in general and to find out about the specific methods you are looking at. You can also read about them in the "Complementary and Alternative Medicine" section of our website.

The choice is yours

Decisions about how to treat or manage your cancer are always yours to make. If you want to use a non-standard treatment, learn all you can about the method and talk to your doctor about it. With good information and the support of your health care team, you may be able to safely use the methods that can help you while avoiding those that could be harmful.

Treating basal cell carcinoma

Basal cell skin cancer very rarely spreads to other parts of the body, although it can grow into nearby tissues if not treated. Several methods can be used to remove or destroy these cancers. The choice may depend on factors such as the tumor size and location, and the patient's age, general health, and preferences.

All of the treatment methods listed here can be effective. The chance of the cancer coming back (recurring) ranges from less than 5% for Mohs surgery to up to 15% or higher for some of the others, but this depends on the size of the tumor. Small tumors are less likely to recur than larger ones. Even if the tumor does recur, it can often still be treated effectively.

Surgery

Different types of surgery can be used to treat basal cell cancers.

Curettage and electrodesiccation: This is a common treatment for small basal cell carcinomas. It might need to be repeated to help make sure all of the cancer has been removed.

Excision: Excision (cutting the tumor out) is often used to remove basal cell carcinomas, along with a margin of normal skin.

Mohs surgery: Mohs surgery has the best cure rate for basal cell carcinoma. It's especially useful in treating large tumors, tumors where the edges are not well-defined, tumors in certain locations (such as on or near the nose, eyes, ears, forehead, scalp, fingers, and genital area), and those that have come back after other treatments. However, it's also usually more complex, time-consuming, and expensive than other methods.

Radiation therapy

Radiation therapy is often a good option for treating patients who might not be able to tolerate surgery and for treating tumors on the eyelids, nose, or ears – areas that can be hard to treat surgically. It's also sometimes used after surgery if it's not clear that all of the cancer has been removed.

Immune response modifiers, photodynamic therapy, or topical chemotherapy

These treatments are sometimes considered as options for treating very superficial tumors (tumors that have not extended too deeply under the skin surface). Close follow-up is needed because these treatments do not destroy any cancer cells that are deep under the surface.

Cryosurgery

Cryosurgery can be used for some small basal cell carcinomas but is not usually recommended for larger tumors or those on certain parts of the nose, ears, eyelids, scalp, or legs.

Cryosurgery can also be used to treat large tumors in one treatment session to relieve symptoms from the cancer. Side effects can include drainage of fluid from the site for 4 to 6 weeks and slow healing.

Targeted therapy for advanced basal cell cancers

In rare cases where basal cell cancer spreads to other parts of the body or can't be cured with surgery or radiation therapy, the targeted drug vismodegib (Erivedge™) can often shrink or slow the growth of the cancer. This drug is taken daily as a pill.

Treating squamous cell carcinoma of the skin

Most squamous cell skin cancers are found and treated at an early stage, when they can be removed or destroyed with local treatment methods. Small squamous cell cancers can usually be cured with these treatments – the recurrence rate is similar to that for basal cell cancers. Larger squamous cell cancers are harder to treat, and the chance of recurrence for fast-growing cancers can be as high as 50% for large, deep tumors.

In rare cases, squamous cell cancers may spread to lymph nodes or distant sites. If this happens, further treatment with radiation therapy and/or chemotherapy may be needed.

Surgery

Different types of surgery can be used to treat squamous cell skin cancers.

Excision: Cutting out the tumor, along with a small margin of normal skin, is often used to treat squamous cell carcinomas.

Curettage and electrodesiccation: This approach is sometimes useful in treating small, thin squamous cell carcinomas (less than 1 cm across), but it is not recommended for larger tumors.

Mohs surgery: Mohs surgery has the highest cure rate. It's especially useful for squamous cell carcinomas larger than 2 cm (about 4/5 inch) across or with poorly defined edges, for tumors that have come back after other treatments, for cancers that are spreading along nerves under the skin, and for cancers on certain areas of the face or genital area. This approach is typically more complex, time-consuming, and often more expensive than other types of surgery.

Radiation therapy

Radiation therapy is often a good option for patients with large cancers, especially in areas where surgery would be hard to do (such as the eyelids, ears, or nose), or for patients who may not be able to tolerate surgery. It's not used as much as an initial treatment in younger patients because of the possible risk of long-term problems.

Radiation is sometimes used after surgery (simple excision or lymph node dissection) if all of the cancer was not removed (if the surgical margins were positive), or if there is a chance that some cancer may remain.

Radiation can also be used to treat cancers that have come back after surgery and have become too large or deep to be removed surgically.

Cryosurgery

Cryosurgery is used for some early squamous cell carcinomas, especially in people who can't have surgery, but is not recommended for larger invasive tumors or those on certain parts of the nose, ears, eyelids, scalp, or legs.

Treating advanced squamous cell cancers

Lymph node dissection: Removing regional (nearby) lymph nodes is recommended for some squamous cell carcinomas that are very large or deeply invasive and in cases where the lymph nodes feel enlarged and/or hard. After the lymph nodes are removed, they are looked at under a microscope to see if they contain cancer cells. In some cases, radiation therapy might be recommended after surgery.

Systemic chemotherapy: Systemic chemotherapy is an option for patients with squamous cell cancer that has spread to lymph nodes or distant organs. In some cases it's combined with surgery or radiation therapy.

Treating actinic keratosis

Actinic keratosis is often treated because it can turn into squamous cell cancer. But because this risk is low, treatments are generally aimed at avoiding scars or other disfiguring marks as much as possible.

Actinic keratosis is commonly treated with either cryosurgery or topical creams or gels such as fluorouracil (5-FU), imiquimod, diclofenac, or ingenol mebutate. These treatments destroy the affected area of the epidermis, the outermost layer of the skin. Simply destroying the affected parts of the epidermis usually cures actinic keratosis.

Other localized treatments (shave excision, curettage and electrodesiccation, photodynamic therapy, laser surgery, chemical peeling) are also sometimes used.

Treating Bowen disease

Bowen disease (squamous cell carcinoma in situ) is usually treated by excision. Curettage and electrodesiccation, radiation therapy, topical fluorouracil (5-FU), and cryosurgery are other options. Laser surgery or topical therapy may be considered in special situations.

More treatment information for basal and squamous cell skin cancers

For more details on treatment options – including some that may not be addressed in this document – the National Comprehensive Cancer Network (NCCN) and the National Cancer Institute (NCI) are good sources of information.

The NCCN, made up of experts from many of the nation's leading cancer centers, develops cancer treatment guidelines for doctors to use when treating patients. These are available on the NCCN website (www.nccn.org).

The NCI provides treatment information by phone (1-800-4-CANCER) and on its website (www.cancer.gov). Detailed guidelines intended for use by cancer care professionals are also available on www.cancer.gov.

What should you ask your doctor about basal and squamous cell skin cancers?

As you cope with cancer and cancer treatment, you need to have honest, open discussions with your doctor. You should feel free to ask any question, no matter how small it might seem. Nurses, social workers, and other members of the treatment team may also be able to answer many of your questions. Here are some questions you might want to ask:

- What type of skin cancer do I have?
- Can you explain the different types of skin cancer?
- Has my cancer spread beneath the skin? Has it spread to lymph nodes or other organs?
- Are there other tests that need to be done before we can decide on treatment?
- Are there other doctors I need to see?
- How much experience do you have treating this type of cancer?
- What are my treatment options? What do you recommend? Why?
- Will I be okay if the cancer is just removed with no follow-up treatment?

- What are the risks or side effects that I should expect?
- Will I have a scar after treatment?
- What are the chances of my cancer coming back with the treatment options we have discussed? What would we do if that happens?
- How quickly do we need to decide on treatment?
- What should I do to be ready for treatment?
- What are my chances of developing another skin cancer?
- Should I take special precautions to avoid sun exposure? What are the most important steps I can take to protect myself from the sun?
- What type of follow-up will I need after treatment?
- Are any of my family members at risk for skin cancer? What should I tell them to do?

Along with these sample questions, be sure to write down some of your own. For instance, you might want more information about recovery times so you can plan your work or activity schedule. Or you may want to ask about second opinions or about clinical trials for which you may qualify. You can find more information about communicating with your health care team in our document *Talking With Your Doctor*.

What will happen after treatment for basal and squamous cell skin cancers?

For most people with basal or squamous cell skin cancers, treatment will remove or destroy the cancer. Completing treatment can be both stressful and exciting. You may be relieved to finish treatment, but find it hard not to worry about cancer growing or coming back. (When cancer comes back after treatment, it is called *recurrent cancer* or a *recurrence*.) This is a very common concern in people who have had cancer.

It may take a while before your fears lessen. But it may help to know that many cancer survivors have learned to live with this uncertainty and are leading full lives. Our document called *Living With Uncertainty: The Fear of Cancer Recurrence*, gives more detailed information on this.

For small number of people with more advanced cancers, it may never go away completely. These people may get regular treatment with radiation therapy, chemotherapy, or other treatments to try to help keep the cancer in check. Learning to live with cancer that does not go away can be difficult and very stressful. It has its own type of uncertainty. Our document *When Cancer Doesn’t Go Away* talks more about this.

Follow-up care

If you have completed treatment, your doctors will still want to watch you closely and will likely recommend that you examine your skin once a month. Family members and friends can also be asked to watch for new lesions in areas that are hard to see.

If skin cancer does recur, it is most likely to happen in the first 5 years after treatment. People who have had skin cancer are also at high risk for developing another one in a different location, so close follow-up is important. It's also very important to protect yourself from getting too much sun, which can increase your risk of new skin cancers.

You should have follow-up exams as advised by your doctor. Your schedule for follow-up visits will depend on the type of cancer you had and on other factors. Different doctors may recommend different schedules.

- For basal cell cancers, visits are often recommended about every 6 to 12 months.
- For squamous cell cancers, visits are usually more frequent – often every 3 to 6 months for the first few years, followed by longer times between visits.

During your follow-up visits, your doctor will ask about symptoms and examine you for signs of recurrence or new skin cancers. For higher risk cancers, such as squamous cell cancers that had reached the lymph nodes, the doctor may also order imaging tests such as CT scans. If skin cancer does recur, treatment options depend on the size and location of the cancer, what treatments you've had before, and your overall health.

Follow-up is also needed to check for possible side effects of certain treatments. This is the time for you to ask your health care team any questions and to discuss any concerns you might have. Almost any cancer treatment can have side effects. Some may last for a few weeks to several months, but others can be permanent. Tell your cancer care team about any symptoms or side effects that bother you so they can help you manage them.

Seeing a new doctor

At some point after your cancer diagnosis and treatment, you may find yourself seeing a new doctor who does not know about your medical history. It's important that you be able to give your new doctor the details of your diagnosis and treatment. Gathering these details during and soon after treatment may be easier than trying to get them at some point in the future. Make sure you have this information handy:

- A copy of your pathology report(s) from any biopsies or surgeries
- If you had surgery, a copy of your operative report(s)
- If you stayed in the hospital, a copy of the discharge summary that doctors prepare when patients are sent home

- If you had radiation therapy, a summary of the type and dose of radiation and when and where it was given
- If you had chemotherapy or targeted therapy, a list of your drugs, drug doses, and when you took them

It's also important to keep your health insurance. Tests and doctor visits cost a lot, and even though no one wants to think of their cancer coming back, this could happen.

Lifestyle changes to consider during and after treatment

You can't change the fact that you have had cancer. What you can change is how you live the rest of your life – making choices to help you stay healthy and feel as well as you can. This can be a time to look at your life in new ways. Maybe you are thinking about how to improve your health over the long term. Some people even start during cancer treatment.

Make healthier choices

For many people, a diagnosis of cancer helps them focus on their health in ways they may not have thought much about in the past. Are there things you could do that might make you healthier? Maybe you could spend less time in the sun, try to eat better, or get more exercise. Maybe you could cut down on alcohol, or give up tobacco. Even things like keeping your stress level under control might help. Now is a good time to think about making changes that can have positive effects for the rest of your life. You will feel better and you will also be healthier.

You can start by working on those things that worry you most. Get help with those that are harder for you. For instance, if you are thinking about quitting smoking and need help, call the American Cancer Society at 1-800-227-2345.

Can I lower my risk of cancer coming back or getting new skin cancers?

Most people want to know if there are specific lifestyle changes they can make to reduce their risk of cancer coming back.

People who have had skin cancer are at higher risk for developing another skin cancer. Because of this, it is important to limit your exposure to UV rays (from the sun or tanning beds – see the section "Can basal and squamous cell skin cancers be prevented?") and to continue to examine your skin every month for signs of possible new skin cancers. Seeing your doctor regularly for skin exams is also important. Skin cancers that are found early are typically much easier to treat than those found at a later stage.

Adopting healthy behaviors such as not smoking, eating well, being active, and staying at a healthy weight may also help, but no one knows for sure. However, we do know that

these types of changes can have positive effects on your health, including lowering your risk for many other types of cancer, as well as other diseases.

You can get more information in our document *Nutrition and Physical Activity During and After Cancer Treatment: Answers to Common Questions*.

What's new in research and treatment of basal and squamous cell skin cancers?

Research into the causes, prevention, and treatment of basal and squamous cell skin cancer is under way in many medical centers throughout the world.

Basic skin cancer research

Scientists have made a great deal of progress in recent years in learning how ultraviolet (UV) light damages the DNA inside normal skin cells, and how this might cause them to become cancerous. Researchers are working to apply this new information to strategies for preventing and treating skin cancers.

Public education

Most skin cancers can be prevented. The best way to reduce the number of skin cancers and the pain and loss of life from this disease is to educate the public about skin cancer risk factors, prevention, and detection. It is important for health care professionals and skin cancer survivors to remind others about the dangers of excess UV exposure (both from the sun and from man-made sources such as tanning beds) and about how easily they can protect their skin from UV radiation.

The American Academy of Dermatology (AAD) sponsors annual free skin cancer screenings throughout the country. Many local American Cancer Society offices work closely with AAD to provide volunteers for registration, coordination, and education efforts related to these free screenings. Look for information in your area about these screenings or call the American Academy of Dermatology for more information. Their phone number and website are listed in the "Additional resources for basal and squamous cell skin cancers" section of this document.

Preventing genital skin cancers

Squamous cell cancers that start in the genital region account for almost half of the deaths from this type of skin cancer. Many of these cancers may be related to infection with certain types of human papilloma virus (HPV), which can be spread through sexual

contact. Limiting the number of sexual partners a person has and using safer sex practices such as wearing condoms may therefore help lower the risk of some of these cancers.

In recent years, vaccines have been developed to help protect against infection from some types of HPV. The main intent of the vaccines has been to reduce the risk of cervical cancer, but they may also lower the risk of other cancers that might be related to HPV, including some squamous cell skin cancers.

Chemoprevention

Chemoprevention is the use of drugs to reduce cancer risk. This is likely to be more useful for people at high risk of skin cancers, such as those with certain congenital conditions (such as basal cell nevus syndrome), a history of skin cancer, or those who have received organ transplants, rather than for people at average risk of skin cancer.

Some of the most widely studied drugs so far are the retinoids, which are drugs related to vitamin A. They have shown some promise in reducing the risk of squamous cell cancers, but they can have side effects, including possibly causing birth defects. For this reason they are not widely used at this time, except in some people at very high risk. Further studies of retinoids are under way.

Other drugs are being looked at to reduce the risk of basal cell skin cancers in people at high risk. Targeted drugs called *hedgehog pathway inhibitors*, which affect the activity of genes such as *PTCH* and *SMO*, may help some people with basal cell nevus syndrome. The drug vismodegib (Erivedge), taken daily as a pill, has been shown to lower the number of new basal cell cancers and shrink existing tumors in people with this syndrome. The drug does have some side effects, including taste loss and muscle cramps, which can make it hard for some people to take every day. Further research on this and similar drugs is under way.

Treatment

Local treatments

Current local treatments work well for the vast majority of basal and squamous cell skin cancers. Still, even some small cancers can be hard to treat if they’re in certain areas. Newer forms of non-surgical treatment such as new topical drugs, photodynamic therapy, and laser surgery may help reduce scarring and other possible side effects of treatment. Studies are now under way to determine the best way to use these treatments, and to try to improve on their effectiveness.

Treating advanced disease

Most basal and squamous cell skin cancers are found and treated at a fairly early stage, but some may spread to other parts of the body. These cancers can often be hard to treat with current therapies such as radiation and chemotherapy.

Several studies are testing newer targeted drugs for advanced squamous cell cancers. Cells from these cancers often have too much of a protein called *EGFR* on their surfaces, which may help them grow. Drugs that target this protein, such as erlotinib (Tarceva), gefitinib (Iressa), and cetuximab (Erbitux) are now being tested in clinical trials. A drug that targets different cell proteins, known as dasatinib (Sprycel), is also being studied for advanced skin cancers.

It's very rare for basal cell cancers to reach an advanced stage, but when they do, these cancers can be hard to treat. Vismodegib, a drug that targets the hedgehog signaling pathway in cells, may help some people (see "Targeted therapy for basal and squamous cell skin cancers"). Other drugs that target this pathway are now being studied as well.

Additional resources for basal and squamous cell skin cancers

More information from your American Cancer Society

The following related information may also be helpful to you. These materials may be ordered from our toll-free number, 1-800-227-2345.

Skin cancer causes and prevention

A Parent's Guide to Skin Protection (also in Spanish)

Skin Cancer: Prevention and Early Detection

Sun Basics: Skin Protection Made Simple (information for children aged 8 to 14)

Ultraviolet (UV) Radiation

Living with cancer

After Diagnosis: A Guide for Patients and Families (also in Spanish)

Talking With Friends and Relatives About Your Cancer (also in Spanish)

Coping With Cancer in Everyday Life (also in Spanish)

Caring for the Patient With Cancer at Home: A Guide for Patients and Families (also in Spanish)

Distress in People With Cancer

Anxiety, Fear, and Depression

Living With Uncertainty: The Fear of Cancer Recurrence

When Your Cancer Comes Back: Cancer Recurrence

Understanding cancer treatments

Understanding Cancer Surgery: A Guide for Patients and Families (also in Spanish)

Understanding Chemotherapy: A Guide for Patients and Families (also in Spanish)

Understanding Radiation Therapy: A Guide for Patients and Families (also in Spanish)

Photodynamic Therapy

Clinical Trials: What You Need to Know

Cancer treatment side effects

Nausea and Vomiting

Anemia in People With Cancer

Fatigue in People With Cancer

Understanding Lymphedema (for Cancers Other Than Breast Cancer)

Work, insurance, and finances

In Treatment: Financial Guidance for Cancer Survivors and Their Families (also in Spanish)

Health Insurance and Financial Assistance for the Cancer Patient (also in Spanish)

Working During Cancer Treatment

Returning to Work After Cancer Treatment

National organizations and websites*

Along with the American Cancer Society, other sources of information and support include:

American Academy of Dermatology (AAD)
Toll-free number: 1-888-462-3376 (1-888-462-DERM)
Website: www.aad.org
Spot Skin Cancer website www.aad.org/spot-skin-cancer

> For information on skin cancer, a skin cancer risk assessment, a locator for free skin cancer screenings, and a dermatologist locator

Environmental Protection Agency (EPA)
Website: www.epa.gov/sunwise/

> Has free sun safety information and a UV Index app that you can check using your zip code

National Cancer Institute
Toll-free number: 1-800-422-6237 (1-800-4-CANCER)
TYY: 1-800-332-8615
Website: www.cancer.gov

> Offers accurate, up-to-date information about cancer to patients, their families, and the general public

Skin Cancer Foundation
Toll-free number: 1-800-754-6490 (1-800-SKIN-490)
Website: www.skincancer.org

> Has pictures and descriptions of skin cancers, information and educational materials, and newsletters

American Society of Dermatologic Surgery (ASDS)
Website: www.asds.net

> Has a Skin Cancer Self-Exam Kit and Journal, which can be printed from the website, "Skin Cancer Takes Friends" – a state-by-state guide to free skin cancer screenings (usually conducted May thru July), and a Dermatologic Surgeon Locator, you can search by zip code

**Inclusion on this list does not imply endorsement by the American Cancer Society.*

No matter who you are, we can help. Contact us anytime, day or night, for information and support. Call us at **1-800-227-2345** or visit www.cancer.org.

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Last Medical Review: 10/21/2013
Last Revised: 2/20/2014

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1-800-227-2345 or www.cancer.org