What You Don’t Know About the Dangers of Sun Damaged Skin

By Kimberly Haas

As we age, we start to see the effects of sun exposure that occurred years ago. Aging skin reacts differently to the sun and becomes increasingly susceptible to sunburns and additional damage. One reason is a decrease in the release of melanin, a compound that protects the skin against UV (ultraviolet) radiation.¹ Scientists have identified surprising new factors that make aging skin more vulnerable to sun exposure than young skin. In this article, we examine the reasons for these age-related skin changes, as well as ways to protect it from further damage and the development of cancer.
The incidence of skin cancer has increased dramatically over the recent decades. The ozone layer problem is partly to blame, as the depletion of this important layer of the earth’s atmosphere allows more ultraviolet radiation to reach us. We are also to blame.

Until the end of World War II, having a suntan was looked down upon by the upper classes as vulgar and people went to great lengths to protect themselves from the sun. After the war, however, tanned skin became thought of as healthy and fashionable, an image that still persists in some circles today. The longevity and prosperity that modern Americans enjoy have also contributed to skin cancer rates. In fact, the sharp rise in the number of people with melanoma (malignant skin cancer) has been attributed to the fact that many Americans now have enough disposable income to travel to warm locations during the winter—getting intense sun exposure at a time they never had before. Also, people are increasing their exposure at home because they have more time for recreational activities such as boating or skiing.

As a result, the incidence of melanoma has risen faster than any other type of cancer in developing countries over the past 50 years. Mortality from the disease is rising as well. According to the American Cancer Society, 54,200 Americans will be diagnosed with melanoma this year alone and 7,600 will die from the disease. Also this year, more than one million people will be diagnosed with one of the less dangerous types of skin cancer.

Although most sun damage occurs when we are young, the skin’s decreasing ability to protect itself against the sun as we age means that further damage can occur. Even people who’ve spent a lifetime in the sun can—and should—still take steps to protect their skin.

How the skin reacts to sunlight

Ultraviolet (UV) radiation is responsible for the changes that occur when skin is exposed to sunlight. Short-term changes include sunburn and tanned skin, while long-term changes include wrinkling, moles and skin cancers. UV light has many components, but only two main types reach the earth’s surface: UVA and UVB. The two types of light operate on different wavelengths and affect the skin in different ways. UVB, which has a shorter wavelength than UVA, affects only the upper layers of skin. It is responsible for most sunburns and the formation of initial DNA changes that can lead to skin cancer. However, the longer-wavelength UVA makes up a much greater portion of sunlight, penetrates into the lower layers of the skin and causes tanning. Newer research has found that UVA can also damage DNA and is thought to lower the immune response of the skin, making it less able to fend off early tumors.

When sunlight hits the skin, cells called melanocytes (located
between the outer and middle layers of the skin) begin to take action. Melanocytes continually release small amounts of the brown-black pigment called melanin into the skin; exposure to sunlight signals the melanocytes to produce more melanin. Melanin determines our normal skin color and attempts to protect our skin from severe sun damage.

Melanin is the body’s defense system against acute burns, says Sandra Read, M.D., a dermatologist in private practice in Washington, D.C. and at Georgetown University. “Pigment keeps skin tanned, but burned,” she says. “But this is an important distinction: you’re not getting an acute burn, but you’re still accumulating sun damage.”

As we age, our melanocytes begin to function less effectively. The density of active melanocytes in the skin is reduced by 10% to 20% every 10 years starting in our late 30s and 40s. (Melanocytes are also responsible for hair color, so their loss explains why 50% of people are gray by age 50.) Skin with a reduced number of melanocytes is less able to respond to sun exposure, so UV radiation is better able to damage the skin. An Australian study of 97 men age 50 or older found that melanocyte density decreases with advancing age. The researchers also found that the density of remaining melanocytes varies by site on the body. The highest densities were seen on the back and shoulders, followed by the arms and legs, then the lower back. This uneven distribution of melanocytes may help explain why melanoma—cancer of the melanocytes—is more common in these areas.¹

The loss of functioning melanocytes—and the impaired actions of the remaining ones—causes a wide range of skin changes, from merely cosmetic to life-threatening.

**Long-term effects of the sun**

In addition to photoaging (cosmetic skin changes caused by exposure to the sun, rather than by the passage of time), other non-serious consequences of sun exposure can occur, such as liver spots, actinic keratoses and moles.

Liver spots, which have nothing to do with the liver, should really be called age spots or photoaging spots (although the technical term is lentigines or lentigos). They are extremely common and occur when melanocytes cluster together under the skin and appear as light to dark brown—or nearly black—flat patches of pigment on the skin. Age spots usually have rounded edges, which make them look like large or exaggerated freckles. They appear mostly on the sun-exposed skin of people 40 and older. Age spots are not considered to be cancerous or precancerous. However, any age spot with uneven (rather than rounded) edges may really be a melanoma lesion and should be examined by a doctor.

A mole occurs when a group of melanocytes and surrounding tissue cluster together to form a growth on the skin. Moles, also called nevi (the singular form is nevus) vary in size and can be pink, tan, brown or flesh-colored. They can be either flat or raised, are usually round or oval and rough or smooth. Moles occur most often on the torso, but also can appear on the face, arms and legs; less common locations include on the scalp, under the nails, in the armpits or around the genitals.

Moles are very common—the average person has between 10 and 40 moles. Some are present since birth, most appear by age 20 and new moles can still appear up to age 40. Moles can change in appearance over time and some may even disappear. Experts do not think moles serve any purpose, but some can turn into melanomas. About one in every 10 people has at least one mole that appears abnormal, called a dysplastic nevus. Although the risk is still low, dysplastic nevi are more likely than normal nevi to become skin cancer.

It is important to know the location and appearance of your moles.² Any change in their appearance should be reported to your doctor, who may remove the mole or take a tissue sample (biopsy) to determine whether it is skin cancer.

Actinic keratoses, also called solar keratoses, usually begin to develop in middle age as a result of chronic sun exposure. However, they may also develop in younger people with very fair complexions. Between 11% and
26% of the population is estimated to have at least one actinic keratosis lesion. Actinic keratoses are dry, scaly lesions that can be either flat or raised, like a bump on the skin; they can be reddish-brown, yellowish-black or the color of the skin. Some actinic keratoses, especially those that are skin-colored, can be more easily felt than seen.

Although most people consider them unattractive, actinic keratoses themselves are considered harmless. However, approximately 10% of these untreated lesions develop into squamous cell carcinoma, a nonmalignant form of skin cancer. Actinic keratoses can be frozen off (cryotherapy), burned off (electrical cauterity) or removed surgically. Certain topical medications can also cause the lesion to peel off.

**Skin cancers**

The more serious consequences of sun exposure include basal cell carcinoma, squamous cell carcinoma and malignant melanoma.

Squamous cells are skin cells that make up most of the outer layer; basal cells are found at the bottom of the skin's outer layer (the epidermis). Cancer of either of these types of skin cells is known as a carcinoma. While melanoma is a cancer of the melanocytes, basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) are cancers of the keratinocyte—the skin cells that distribute the melanin released by melanocytes. While usually not fatal, BCC and SCC can spread to other parts of the body and cause serious health consequences.

Both BCC and SCC occur almost exclusively in skin that was exposed to the sun, usually in people with fair skin. They usually do not appear until adulthood, as they are the result of accumulative damage from UV radiation. If discovered and treated early, 95% of all BCC and SCC cases are cured.7

Basal cell carcinoma (BCC) is the most common type of skin cancer in the United States, diagnosed in 800,000 people each year. It has traditionally been seen most commonly in the elderly, but the age of onset is steadily decreasing. BCC tumors usually appear as small, fleshy bumps, often on the head or neck. They can, however, appear in other areas of the body as well (usually sun-exposed areas).7 BCC can often resemble other skin conditions such as psoriasis and eczema, so it is important to have any skin problem examined by a dermatologist.

BCC tumors grow slowly and rarely metastasize; however, if unchecked, they can grow downward into the bone and cause serious damage.7

SCC is the second most common skin cancer in the United States, affecting more than 200,000 people every year. Like BCC, it is usually caused by chronic exposure to sunlight and other sun damage is usually present in an area that develops SCC. However, SCC can also occur in areas of the skin that have been damaged by burns, scars or chemicals. People with medical conditions that produce chronic skin
inflammation or suppress the immune system are at increased risk for SCC. Occasionally it also occurs in skin that has not been exposed to the sun; the tendency to develop this condition may be hereditary.

SCC tumors appear as nodules or red, scaly patches of skin, most often on the rim of the ear and the lower lip. They can also appear as a wart-like growth that crusts and bleeds occasionally or open sores that won’t heal. Tumors can grow into masses that cover large areas of the body. Unlike BCC, SCC is capable of metastasizing to other areas of the body. Metastasis occurs only in a small percentage of cases, but if SCC spreads to other tissues and organs, it can be fatal.

Melanoma is the most common fatal skin cancer and it is also one of the most common skin cancers in young adults. Melanoma often occurs at a younger age than BCC or SCC because it is caused by intermittent intense exposures to UV radiation, as opposed to cumulative damage over a lifetime.

Melanoma occurs when melanocytes damaged by UV radiation begin to divide out of control. Keratinocytes (which are responsible for BCC and SCC) undergo the most damage when they are repeatedly exposed to low doses of UV radiation—for example, in people who develop a tan. Melanocytes, on the other hand, are most harmed by occasional exposures, such as the kind that cause a sunburn. These differences explain why BCC and SCC are usually found on chronically sun-exposed areas (such as the face, the forearms and the backs of the hands) while melanoma usually occurs on areas not often exposed to the sun (such as the back in men and the lower legs in women). Melanoma rarely occurs on the face, hands or forearms.

The risk of melanoma is doubled in people who have had five or more severe sunburns (especially burns that blistered) during adolescence. Fair-skinned people (especially those with freckles) are at the highest risk for melanoma and the risk for whites is also affected by latitude (the closer to the equator, the greater the risk).
people diagnosed with melanoma is 89%. However, the rate is 96% for those with localized melanoma; 60% for people with regional metastases; and 14% for those with distant metastases.

How to protect your skin

Since aging skin is especially vulnerable to the effects of UV radiation, it is important to prevent new damage from occurring. The easiest way to avoid UV radiation is to avoid sun exposure, especially between the midday hours, when UVB radiation is at its peak. However, UVA levels are high from sunrise to sunset and even avoiding direct sunlight does not protect us from all UV radiation. Half of our exposure to UVA radiation occurs when we are in the shade, so it's important to employ sun protection whenever you're going outside.

(Also, remember that sunlight is an important component in the body's production of vitamin D, so older adults who are avoiding sun exposure should drink vitamin-D fortified milk or take a vitamin D supplement to ensure good calcium absorption and help prevent osteoporosis.)

Two other simple steps can help prevent sun damage to your skin. Wear a long-sleeved shirt and long pants whenever possible and always wear a wide-brimmed hat to protect your head and neck from the sun.

Of course, sunscreen is an important step in protecting against UV damage. A recent study of more than 1,600 adults ages 25 to 74 in Australia found that daily sunscreen use helped minimize the development of actinic keratoses, which are associated with squamous cell carcinoma. After two years, the group that used sunscreen daily had 24% fewer actinic keratosis lesions (one fewer lesion per person) than the group that followed their normal sunscreen regimen.

There is other evidence that using sunscreen, even after previous UV damage, can help improve skin quality. However, it appears that many people are not using sunscreen correctly and may not realize it. Researchers at the University of Texas surveyed sunscreen use during one summer day at the beach. More than three quarters of the people who said they applied sunscreen that day left the beach with a sunburn. The eight people who did not burn said they reapplied sunscreen every one to two hours and also after swimming.

In addition to not applying sunscreen often enough, it appears that people just aren't using enough sunscreen during each application. The average adult needs an ounce of sunscreen (the amount that would fill a shot glass) to cover his or her body adequately. It's also important to apply sunscreen prior to or immediately upon sun exposure—a sunburn can occur in as little as 10 minutes in some extremely sunny areas.

Even if you apply sunscreen religiously, however, it's a good idea to limit your time in the sun. You may not be getting a sunburn, but UV radiation may still be causing DNA damage and suppression of the immune system.

References:
