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Skin Cancer



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Introduction

Skin cancer is the most common type of cancer in the United States. Therefore, health care professionals should possess insight into skin cancer in order to optimize patient care. This course provides insight into skin cancer, while reviewing skin cancer screening, treatment options, and treatment recommendations.

Section 1: Skin Cancer

A 58-year-old man presents to a health care facility for a routine examination. During the examination, a health care professional notes an irregular shaped mole on the patient's shoulder. The health care professional takes a closer look at the mole, and observes that the mole's edges seem jagged. Upon observing the mole's jagged edges, the health care professional begins to consider the possibility of skin cancer.

As skin cancer rates rise in the U.S., scenarios, like the one presented above, are becoming more common. As a result, health care professionals should possess insight into skin cancer to safely and effectively care for patients in need. With that in mind, this section of the course provides insight into skin cancer. The information found within this section of the course was derived from materials provided by the Centers for Disease Control and Prevention (CDC) unless, otherwise, specified (Centers for Disease Control and Prevention [CDC], 2022).

What is skin cancer?

Skin cancer may refer to the abnormal growth of skin cells.

Health care professionals should note the following: the skin is the body's largest organ; skin has several layers, but the two main layers are the epidermis (upper or outer layer of the skin) and the dermis (lower or inner layer of the skin); skin cancer begins in the epidermis, which is made up of the following three kinds of cells: squamous cells (the thin, flat cells that form the top layer of the epidermis); basal cells (the round cells under the squamous cells); melanocytes (the cells that make melanin, which are found in the lower part of the epidermis); melanin may refer to the pigment that gives skin its color.

What causes skin cancer?

Most cases of skin cancer are caused by overexposure to ultraviolet (UV) rays from the sun, tanning beds, or sunlamps.

Health care professionals should note that UV rays can damage skin cells, which can subsequently lead to skin cancer.

What are the risk factors for skin cancer?

Risk factors for skin cancer include the following: a lighter natural skin color; skin that burns, freckles, reddens easily, or becomes painful in the sun; blue or green eyes; blond or red hair; certain types of moles; a large number of moles; a family history of skin cancer; a personal history of skin cancer; older age (note: a mole may refer to a small growth on the skin that is usually pink, tan, or brown and has a distinct edge).

What are the signs of skin cancer?

A change in the skin is the most common sign of skin cancer (e.g., a new growth, a sore that doesn't heal, or a change in a mole).

Are there different types of skin cancer?

Yes. The three most common types of skin cancer include the following: basal cell carcinomas (BCCs), squamous cell carcinoma (SCC), and melanoma. Specific information regarding each type of skin cancer may be found below. The information found below was derived from materials provided by the Skin Cancer Foundation (Skin Cancer Foundation, 2022).

Basal cell carcinomas (BCCs)

- Basal cell carcinomas (BCCs) are abnormal, uncontrolled growths that arise from the skin's basal cells in the outermost layer of skin (epidermis).
- BCC is the most common form of skin cancer, with approximately 3.6 million cases diagnosed in the United States each year.
- BCCs are typically caused by the combination of intermittent, intense exposure and cumulative, long-term exposure to UV radiation from the sun.

- BCCs typically develop on skin areas exposed to the sun, especially the face, ears, neck, scalp, shoulders, and back.
- BCC risk factors include the following: UV exposure from the sun or indoor tanning beds; fair skin; history of skin cancer; male gender; over the age of 50; chronic infections.
- BCCs can look like open sores, red patches, pink growths, shiny bumps, scars or growths with slightly elevated, rolled edges and/or a central indentation; in patients with darker skin, about half of BCCs are pigmented (i.e., brown in color); BCCs can look quite different from one person to another; at times, BCCs may ooze, crust, itch or bleed.
- BCCs rarely spread beyond the original tumor site; however, BCC lesions can grow and become disfiguring and dangerous; untreated BCCs can become locally invasive, grow wide and deep into the skin and destroy skin, tissue, and bone; BCCs can metastasize (i.e., spread); BCCs can be fatal.

Squamous cell carcinoma (SCC)

- Squamous cell carcinoma (SCC) is an uncontrolled growth of abnormal cells arising from the squamous cells in the outermost layer of skin (epidermis).
- SCC is the second most common form of skin cancer; an estimated 1.8 million cases are diagnosed each year in the U.S.
- SCC incidence has increased up to 200 percent in the past three decades.
- SCC is caused by long-term exposure to UV radiation from the sun and tanning beds.
- SCCs are common on sun-exposed areas such as: the ears, face, scalp, neck, hands, and where the skin often reveals signs of sun damage.
- SCC risk factors include the following: UV exposure from the sun or indoor tanning beds; fair skin; history of skin cancer; male gender; over the age of 50; chronic infections; sun-sensitive conditions (e.g., xeroderma pigmentosum); human papillomavirus (HPV) (note: HPV may refer to a viral infection that commonly causes skin or mucous membrane growths [warts]).
- SCCs can appear as scaly red patches, open sores, rough, thickened or wart-like skin, or raised growths with a central depression; SCCs can also occur in other

areas of the body, including the genitals; at times, SCCs may crust over, itch, or bleed.

- SCCs can sometimes grow rapidly and metastasize if not detected and treated early; as many as 15,000 deaths occur from invasive SCC of the skin each year in the U.S.

Melanoma

- Melanoma is a cancer that develops from melanocytes, the skin cells that produce melanin pigment, which gives skin its color.
- In 2022, an estimated 197,700 new cases of melanoma are expected to occur in the U.S.; of those, 97,920 cases will be in situ (noninvasive), confined to the epidermis (the top layer of skin), and 99,780 cases will be invasive, penetrating the epidermis into the skin's second layer (the dermis).
- Melanoma is often triggered by the kind of intense, intermittent sun exposure that leads to sunburn; tanning bed use also increases risk for melanoma.
- There is a clear correlation between unprotected exposure to UV radiation and melanoma; UV rays from the sun and indoor tanning beds are a powerful attack on the skin and the primary risk factor for developing melanoma and other skin cancers; frequent severe sunburns in early childhood can especially increase melanoma risk.
- Melanoma risk factors include the following: UV exposure from the sun or indoor tanning beds; fair skin; weakened immune system; history of skin cancer; family history of skin cancer; moles (note: the more moles an individual has on his or her body, the higher the risk for melanoma; having large moles [e.g., larger than a tip of a pencil eraser], or any atypical moles, increases the risk for melanoma).
- If an individual's immune system is weakened as a result of medical treatments, including chemotherapy or immunosuppressive therapy (commonly used after an organ transplant), or if the individual has a medical condition such as lymphoma or HIV that compromises the immune system, his or her risk of developing melanoma is higher.
- People with fairer skin, especially those with red or blond hair, blue or green eyes, or skin that freckles or easily burns, have a higher melanoma risk.

- Previous skin cancer diagnoses also increase the risk for developing melanoma. If an individual had melanoma already, he or she has a risk for recurrence; individuals also have a risk for developing new melanomas, if they had BCC or SCC.
- Melanoma can run in families; about one in every 10 patients diagnosed with melanoma has a family member with a history of the disease; if one or more close biological relatives (e.g., parents, brothers, sisters, or children) had melanoma, an individual is at increased risk for melanoma.
- Moles that arise on the skin throughout life are not dangerous - however, people with many moles are at increased risk for developing melanoma; most melanomas develop in normal skin and it's less common for melanoma to develop in an existing mole - however, it can happen; about 20 - 30 percent of melanomas arise from existing moles.
- Dysplastic nevi increases the melanoma risk; dysplastic nevi may refer to an atypical mole; atypical moles have irregular features; an atypical mole can occur anywhere on the body.
- Health care professionals can effectively identify atypical moles by applying the ABCDE model to patient assessments. When applying the ABCDE model to patient assessments, health care professionals should consider the information found below.
 - **Asymmetry** - most melanomas are asymmetrical. When applying the ABCDE model to patient assessments, health care professionals should check moles for asymmetry (i.e., determine if the mole has an irregular shape with two parts that look different).
 - **Border** - most melanomas tend to have uneven and/or notched edges. When applying the ABCDE model to patient assessments, health care professionals should check the edges of moles (i.e., determine if the mole has irregular or jagged edges) (note: common moles tend to have more smoother, even borders).
 - **Color** - multiple colors are a warning sign. When applying the ABCDE model to patient assessments, health care professionals should check moles for different shades of white, blue, brown, tan, or black, as well as uneven coloring (note: benign moles are usually a single shade of brown).

- **Diameter and Dark** - it is a warning sign if a mole is the size of a pencil eraser (about 6 mm, or ¼ inch in diameter) or larger. When applying the ABCDE model to patient assessments, health care professionals should check moles for size and appearance.
- **Evolving** - evolving (i.e., changing moles) are a warning sign. When applying the ABCDE model to patient assessments, health care professionals should check moles for changes (e.g., is a mole changing in size, shape, color; is there any bleeding, itching, or crusting).
- Melanoma is the most dangerous of the three most common forms of skin cancer.

How is skin cancer detected?

Skin cancer can be detected by a health care professional during a routine exam or screening, and/or by self-examination (note: it is recommended that individuals receive annual skin exams/screening from a dermatologist). Health care professionals should provide patients with education on how to effectively complete a skin cancer self-examination. Specific information on skin cancer self-examination may be found below. The information found below was derived from materials provided by the American Cancer Society (American Cancer Society, 2019).

- Skin cancer self-examination should be carried out once per month.
- Regular skin self-exams are especially important for people who are at higher risk of skin cancer, such as: people with reduced immunity, people who have had skin cancer before, and people with a strong family history of skin cancer.
- A skin self-exam is best done in a well-lit room in front of a full-length mirror; individuals can use a hand-held mirror to look at areas that are hard to see, such as the backs of the thighs; a spouse, partner, or close friend or family member may be able to help with self-exams.
- The first time individuals examine the skin, they should spend time carefully going over the entire surface; they should learn the pattern of moles, blemishes, freckles, and other marks on the skin so they can notice any changes the next time they carry out the self-exam.
- One of the best times to conduct a skin self-exam is after a bath or shower.

- When conducting the self-examination, individuals should look for moles; blemishes; freckles; a new, expanding, or changing growth, spot, or bump on the skin; a sore that bleeds and/or doesn't heal after several weeks; a rough or scaly red patch, which might crust or bleed; a wart-like growth; a mole (or other spot on the skin) that's new or changing in size, shape, or color; a mole with an odd shape, irregular borders, or areas of different colors.
- If an individual observes something of note, interest, or concern during a self-examination or at any other time he or she should contact a health care professional.
- Individuals should follow the following steps to effectively complete a self-examination.
 - **Step 1: Face the mirror** - check the face, ears, neck, chest, and belly; check the underarm areas, both sides of the arms, the tops and palms of the hands, in between the fingers, and under the fingernails; use a comb or hair dryer to part the hair in order to check the scalp; women should lift their breasts to check the skin underneath.
 - **Step 2: Sit down** - check the front of the thighs, shins, tops of the feet, in between the toes, and under the toenails; use a hand mirror to look at the bottoms of the feet, the calves, and the backs of the thighs, first checking one leg and then the other.
 - **Step 2: Stand up** - use a hand mirror to check the buttocks, genital area, lower and upper back, and the back of the neck and ears (note: it may be easier for some individuals to look at their back in a wall mirror using a hand mirror).

How is skin cancer diagnosed?

Skin cancer is diagnosed by a health care professional based on the results of an examination and skin biopsy (note: the term skin biopsy may refer to the process of removing a sample of skin for testing to determine the presence of cancer).

What happens after a patient is diagnosed with skin cancer?

Depending on the type of skin cancer, staging typically occurs after a patient is diagnosed with skin cancer. Staging may refer to a process or system that is used to describe the extent of cancer in the body. Staging is especially important when a patient is diagnosed with melanoma. Specific information regarding melanoma staging may be found below. The information found below was derived from materials provided by the American Cancer Society (American Cancer Society, 2019).

- The staging system most often used for melanoma is the American Joint Committee on Cancer (AJCC) TNM system, which is based on the three key pieces of information found below.
 - **Tumor** - the extent of the main (primary) tumor (i.e., how deep has the cancer grown into the skin?). When staging melanoma, health care professionals typically try to determine tumor thickness (note: the thickness of the melanoma is called the Breslow measurement; in general, melanomas less than one millimeter (mm) thick (about 1/25 of an inch) have a very small chance of spreading; as the melanoma becomes thicker, it has a greater chance of spreading). Health care professionals also try to determine if the cancer ulcerated (note: ulceration is a breakdown of the skin over the melanoma; melanomas that are ulcerated tend to have a worse outlook).
 - **Nodes** - when staging melanoma, health care professionals typically try to determine if the cancer spread to nearby lymph nodes.
 - **Metastasis** - when staging melanoma, health care professionals typically try to determine if the cancer spread to a distant site (e.g., distant lymph nodes or distant organs) (note: melanoma can spread almost anywhere in the body, but the most common sites of spread are the lungs, liver, brain, bones, and the skin or lymph nodes in other parts of the body).
- Numbers or letters after T, N, and M provide more details about each of these factors. Higher numbers mean the cancer is more advanced. Specific melanoma stage descriptions may be found below.
 - **Stage 0** - the cancer is confined to the epidermis, the outermost skin layer (Tis); it has not spread to nearby lymph nodes (N0) or to distant parts of the body (M0); this stage is also known as melanoma in situ.

- **Stage I** - the tumor is no more than 2mm (2/25 of an inch) thick and might or might not be ulcerated (T1 or T2a); the cancer has not spread to nearby lymph nodes (N0) or to distant parts of the body (M0).
- **Stage II** - the tumor is more than 1 mm thick (T2b or T3) and may be thicker than 4 mm (T4); it might or might not be ulcerated; the cancer has not spread to nearby lymph nodes (N0) or to distant parts of the body (M0).
- **Stage IIIA** - the tumor is no more than 2 mm thick and might or might not be ulcerated (T1 or T2a); the cancer has spread to 1 to 3 nearby lymph nodes, but it is so small that it is only seen under the microscope (N1a or N2a); it has not spread to distant parts of the body (M0).
- **Stage IIIB** - there is no sign of the primary tumor (T0) AND: the cancer has spread to only one nearby lymph node (N1b) OR it has spread to very small areas of nearby skin (satellite tumors) OR to skin lymphatic channels around the tumor (without reaching the nearby lymph nodes) (N1c); it has not spread to distant parts of the body (M0) OR the tumor is no more than 4 mm thick and might or might not be ulcerated (T1, T2, or T3a) AND: the cancer has spread to only one nearby lymph node (N1a or N1b) OR it has spread to very small areas of nearby skin (satellite tumors) or to skin lymphatic channels around the tumor (without reaching the nearby lymph nodes) (N1c) OR it has spread to 2 or 3 nearby lymph nodes (N2a or N2b); it has not spread to distant parts of the body (M0).
- **Stage IIIC** - there is no sign of the primary tumor (T0) AND: the cancer has spread to 2 or more nearby lymph nodes, at least one of which could be seen or felt (N2b or N3b) OR it has spread to very small areas of nearby skin (satellite tumors) or to skin lymphatic channels around the tumor, and it has reached the nearby lymph nodes (N2c or N3c) OR it has spread to nearby lymph nodes that are clumped together (N3b or N3c); it has not spread to distant parts of the body (M0).

OR the tumor is no more than 4 mm thick, and might or might not be ulcerated (T1, T2, or T3a) AND: the cancer has spread to very small areas of nearby skin (satellite tumors) or to skin lymphatic channels around the tumor, and it has reached nearby lymph nodes (N2c or N3c) OR the cancer has spread to 4 or more nearby lymph nodes (N3a or N3b), or it has spread

to nearby lymph nodes that are clumped together (N3b or N3c); it has not spread to distant parts of the body (M0).

OR the tumor is more than 2 mm but no more than 4 mm thick and is ulcerated (T3b) OR it is thicker than 4 mm but is not ulcerated (T4a); the cancer has spread to one or more nearby lymph nodes AND/OR it has spread to very small areas of nearby skin (satellite tumors) or to skin lymphatic channels around the tumor (N1 or higher); it has not spread to distant parts of the body.

OR the tumor is thicker than 4 mm and is ulcerated (T4b) AND: the cancer has spread to 1 to 3 nearby lymph nodes, which are not clumped together (N1a/b or N2a/b) OR it has spread to very small areas of nearby skin (satellite tumors) or to skin lymphatic channels around the tumor, and it might (N2c) or might not (N1c) have reached 1 nearby lymph node; it has not spread to distant parts of the body (M0).

- **Stage IIID** - the tumor is thicker than 4 mm and is ulcerated (T4b) AND: the cancer has spread to 4 or more nearby lymph nodes (N3a or N3b) OR it has spread to nearby lymph nodes that are clumped together (N3b); it has spread to very small areas of nearby skin (satellite tumors) or to skin lymphatic channels around the tumor, AND it has spread to at least 2 nearby lymph nodes, or to lymph nodes that are clumped together (N3c) OR it has not spread to distant parts of the body (M0).
- **Stage IV** - the tumor can be any thickness and might or might not be ulcerated (any T); the cancer might or might not have spread to nearby lymph nodes (any N); it has spread to distant lymph nodes or to organs such as the lungs, liver, or brain (M1).

Can skin cancer be prevented?

Yes, skin cancer can be prevented. Specific information regarding skin cancer prevention may be found below.

- As previously mentioned, most skin cancers are caused by too much exposure to UV rays; to help prevent skin cancer, individuals should protect their skin from UV rays from the sun, and avoid artificial sources of UV exposure, such as tanning beds and sunlamps.

- Protection from UV rays is important all year round, not just during the summer; UV rays can reach the body on cloudy and cool days, and they can reflect off of surfaces like water, cement, sand, and snow; in the continental U. S., UV rays are strongest from 10 a.m. to 4 p.m. daylight saving time (9 a.m. to 3 p.m. standard time).
- Individuals can protect themselves from UV rays by the following methods: stay in the shade; wear clothing that covers the arms and legs; wear a hat with a wide brim to shade the face, head, ears, and neck; wear sunglasses that wrap around and block both UVA and UVB rays; use a broad spectrum sunscreen with a sun protection factor (SPF) of 15 or higher.
- When using sunscreen, individuals should note the following: individuals should put on a broad spectrum sunscreen that blocks both UVA and UVB rays and has an SPF of 15 or higher before they go outside; individuals should put a thick layer of broad spectrum sunscreen on all exposed skin; sunscreen works best when combined with other options (e.g., wearing a hat); sunscreens are assigned a SPF, which is a number that rates how well they block UV rays - higher numbers indicate more protection; reapply sunscreen every two hours and after swimming, sweating, or toweling off; individuals should check the sunscreen's expiration date, sunscreen without an expiration date has a shelf life of no more than three years; sunscreen is not recommended for babies who are six months old or younger; the U.S. Food and Drug Administration (FDA) recommends keeping infants out of the sun during midday and using protective clothing if they have to be in the sun.

Section 1 Summary

Skin cancer may refer to the abnormal growth of skin cells. Most cases of skin cancer are caused by overexposure to UV rays from the sun, tanning beds, or sunlamps. The three most common types of skin cancer include: BCCs, SCC, and melanoma. Fortunately, skin cancer can be prevented, and detected through self-examinations and screenings by a health care professional. Health care professionals should help patients detect and prevent skin cancer.

Section 1 Key Concepts

- Most cases of skin cancer are caused by overexposure to UV rays from the sun, tanning beds, or sunlamps.
- A change in the skin is the most common sign of skin cancer.
- BCC is the most common form of skin cancer.
- SCC is the second most common form of skin cancer.
- Melanoma is the most dangerous of the three most common forms of skin cancer.
- It is recommended that individuals receive annual skin exams from a dermatologist.
- Skin cancer self-examination should be carried out once per month.
- The staging system most often used for melanoma is the American Joint Committee on Cancer (AJCC) TNM system.
- Skin cancer can be prevented.

Section 1 Key Terms

Skin cancer - the abnormal growth of skin cells

Epidermis - the upper or outer layer of the skin

Dermis - the lower or inner layer of the skin

Squamous cells - the thin, flat cells that form the top layer of the epidermis

Basal cells - the round cells under the squamous cells

Melanocytes - the cells that make melanin, which are found in the lower part of the epidermis

Melanin - the pigment that gives skin its color

Mole - a small growth on the skin that is usually pink, tan, or brown and has a distinct edge

Basal cell carcinomas (BCCs) - abnormal, uncontrolled growths that arise from the skin's basal cells in the outermost layer of skin

Squamous cell carcinoma (SCC) - an uncontrolled growth of abnormal cells arising from the squamous cells in the outermost layer of skin

Human papillomavirus (HPV) - a viral infection that commonly causes skin or mucous membrane growths

Melanoma - a cancer that develops from melanocytes

Dysplastic nevi - an atypical mole

Skin biopsy - the process of removing a sample of skin for testing to determine the presence of cancer

Staging - a process or system that is used to describe the extent of cancer in the body

Ulceration - a breakdown of the skin over the melanoma

Section 1 Personal Reflection Question

How can health care professionals effectively educate patients about self-examinations?

Section 2: Treatment

Skin cancer can be treated. This section of the course will review treatment options for skin cancer, while focusing on the treatment for melanoma, by stage.

Skin Cancer Treatment

Treatment for skin cancer is different for each person; if an individual was diagnosed with skin cancer, the treatment will depend on the type of skin cancer he or she has, how big and deep it is, and if it has spread to other parts of the body; some individuals may get one type of treatment, while other individuals might need more than one type of treatment; specific skin cancer treatment options include: surgery, radiation therapy, local or topical treatments, chemotherapy (chemo), immunotherapy, and targeted therapy (American Cancer Society, 2021). Specific information regarding the aforementioned skin cancer treatment options may be found below. The information

found below was derived from materials provided by the American Cancer Society (American Cancer Society, 2021).

- Surgery is often used to treat skin cancer. Surgery may be done to remove the cancer. Surgery depends on the type of skin cancer, how big it is, and where it is. Often wide excision surgery is used to remove cancer. Wide excision surgery may refer to a surgical procedure that involves removing the entire cancerous area, along with some normal, healthy tissue to ensure that all of the cancer is removed from an individual. The most common side effects of surgery include: pain, infection, and having a scar at the site of the surgery.
- Radiation therapy uses high-energy rays (e.g., x-rays) to kill cancer cells. Radiation can be used to treat cancer that's just on the skin or that has spread to other parts of the body. The most common side effects of radiation therapy include: skin changes; hair loss where the radiation is given; fatigue; the skin may become red, swollen, flaky, or darker.
- Local or topical treatments, such as, freezing, light therapy, lasers, or topical chemo may be used to treat some cancers. Local treatments are mostly used to treat basal and squamous cell skin cancers. Each treatment has different side effects.
- Chemo uses modifications to treat cancer. Typically, chemo is administered into a vein in the arm, or it may be administered by mouth as a pill or capsule. Side effects may vary depending on the type of chemo administered to a patient.
- Immunotherapy helps the immune system target cancer cells. Immunotherapy may be administered into a vein in the arm, or it may be administered by mouth as a pill or capsule. Side effects of immunotherapy may include: fatigue, stomach pain, cramps, fever, chills, and rashes (note: side effects are usually mild but can be severe).
- Targeted therapy typically involves medications. Targeted therapies, as the name indicates, target cancer cells, while causing less harm to normal cells; changing the way cancer cells grow, divide, or repair themselves. Targeted therapies may be administered into a vein in the arm, or it may be administered by mouth as a pill or capsule. Targeted therapies may cause different side effects depending on the medication used.

- Health care professionals should note that some patients with skin cancer may require or prefer newer treatment options that require involvement in a clinical trial.
- Treatment of melanoma depends on the location and stage of the cancer. Specific treatment options for each stage of melanoma may be found below. The information found below was derived from materials provided by the American Cancer Society (American Cancer Society, 2022).
 - **Stage 0 melanoma** - stage 0 melanoma is typically treated by surgery (e.g., wide excision) to remove the melanoma and a small margin of normal skin around it. The removed sample is then sent to a lab to be looked at with a microscope. If cancer cells are seen at the edges of the sample, a second, wider excision of the area may be done. Health care professionals should note the following: some patients may require imiquimod cream (Zyclara) or radiation therapy instead of surgery; for melanomas in sensitive areas (e.g., on the face) Mohs surgery or imiquimod cream may be used if the surgery may lead to disfigurement (note: Mohs surgery may refer to a microscopically controlled surgery used to treat both common and rare types of skin cancer).
 - **Stage I melanoma** - stage I melanoma is typically treated by surgery (e.g., wide excision). Some patients may require a sentinel lymph node biopsy (SLNB) to look for cancer in nearby lymph nodes, especially if the melanoma is stage IB or has other characteristics that make it more likely to have spread. If the SLNB does not find cancer cells in the lymph nodes, then no further treatment is required, although close follow-up is still important. If cancer cells are found on the SLNB, a lymph node dissection (the removal of all lymph nodes near the cancer) might be recommended; another option might be to watch the lymph nodes closely by getting an ultrasound of the nodes every few months. If the SLNB found cancer, adjuvant (additional) treatment with immune checkpoint inhibitors or targeted therapy drugs (if the melanoma has a BRAF gene mutation) might be recommended to try to lower the chance the melanoma will come back. Other drugs or perhaps vaccines might also be options as part of a clinical trial.
 - **Stage II melanoma** - stage II melanoma is typically treated by surgery (e.g., wide excision). Some patients may require a SLNB to look for cancer in

nearby lymph nodes. If a SLNB is done and does not find cancer cells in the lymph nodes, then sometimes no further treatment is required, but close follow-up is still important. For certain stage II melanomas, the immune checkpoint inhibitor pembrolizumab (Keytruda) might be given after surgery to help reduce the risk of the cancer returning. If the SLNB finds that the sentinel node contains cancer cells (which changes the cancer stage to stage III), then a lymph node dissection (where all the lymph nodes in that area are surgically removed) might be done right away. Adjuvant treatment with immune checkpoint inhibitors or targeted therapy drugs (if the melanoma has a BRAF gene mutation) might be recommended to try to lower the chance the melanoma will come back. Other drugs or perhaps vaccines might also be options as well as part of a clinical trial. In other cases where the SLNB finds cancer, the lymph nodes might be watched closely with an ultrasound of the nodes every few months, instead of doing a lymph node dissection right then.

- **Stage III melanoma** - stage III melanoma typically requires surgery. Surgical treatment for stage III melanoma usually requires wide excision of the primary tumor as in earlier stages, along with lymph node dissection. After surgery, adjuvant treatment with immune checkpoint inhibitors or with targeted therapy drugs (for cancers with BRAF gene changes) may help lower the risk of the melanoma coming back. Other drugs or perhaps vaccines may also be recommended as part of a clinical trial to try to reduce the chance the melanoma will come back. Another option is to give radiation therapy to the areas where the lymph nodes were removed, especially if many of the nodes contain cancer. If melanoma tumors are found in nearby lymph vessels in or just under the skin (known as in-transit tumors), they are removed, if possible. Other options might include: injections of the T-VEC vaccine (Imlygic), Bacille Calmette-Guerin (BCG) vaccine, or interleukin-2 (IL-2) directly into the melanoma; radiation therapy; or applying imiquimod cream. For melanomas on an arm or leg, another option might be isolated limb perfusion or isolated limb infusion (infusing just the limb with chemotherapy). Other possible treatments might include: targeted therapy drugs (for melanomas with a BRAF or C-KIT gene change), immunotherapy, or chemotherapy. Some patients with stage III melanoma may require newer treatment options that require involvement in a clinical trial.

- **Stage IV melanoma** - stage IV melanoma can often be removed by surgery or treated with radiation therapy. Metastases in internal organs are sometimes removed, depending on how many there are, where they are, and how likely they are to cause symptoms. Metastases that cause symptoms but cannot be removed may be treated with radiation, immunotherapy, targeted therapy, or chemotherapy. The treatment of widespread melanomas has changed in recent years as newer forms of immunotherapy and targeted drugs have been shown to be more effective than chemotherapy. Immunotherapy drugs called checkpoint inhibitors are typically the first drugs tried, especially in people whose cancer cells do not have BRAF gene changes. These drugs can shrink tumors for long periods of time in some people. Options might include: pembrolizumab (Keytruda) or nivolumab (Opdivo); nivolumab combined with relatlimab (Opdualag); nivolumab or pembrolizumab, plus ipilimumab (Yervoy). Combinations of checkpoint inhibitors might be more effective, although they're also more likely to result in serious side effects. In about half of all melanomas, the cancer cells have BRAF gene changes. If a BRAF gene change is found, treatment with newer targeted therapy drugs, typically a combination of a BRAF inhibitor and a MEK inhibitor, might be a good option. Immune checkpoint inhibitors such as pembrolizumab or nivolumab might be another option, as well as a combination of targeted drugs plus the immune checkpoint inhibitor atezolizumab (Tecentriq). A small portion of melanomas have changes in the C-KIT gene. These melanomas might be helped by targeted drugs such as imatinib (Gleevec) and nilotinib (Tasigna). Immunotherapy, using interleukin-2 (IL-2), can help a small number of patients with stage IV melanoma live longer, and it might be tried if immune checkpoint inhibitors are not effective. Higher doses of IL-2 seem to be more effective, but they can also have more severe side effects, so they might need to be given in the hospital. Chemotherapy can help some patients with stage IV melanoma, but other treatments are usually tried first. Dacarbazine (DTIC) and temozolomide (Temodar) are the chemo drugs used most often, either by themselves or combined with other drugs. Even when chemotherapy shrinks stage IV skin cancers, the cancer usually starts growing again within several months. It is important to carefully consider the possible benefits and side effects of any recommended treatment before starting it. Health care professionals should note the following: stage IV melanoma is often hard to treat with

current treatment options; patients may want to think about taking part in a clinical trial; many studies are now looking at new targeted drugs, immunotherapies, chemotherapy drugs, and combinations of different types of treatments.

- Treatment of melanoma that comes back after initial treatment depends on the stage of the original melanoma, what treatments a patient received, where the melanoma comes back, and other factors.
- Melanoma might come back in the skin near the site of the original tumor, sometimes even in the scar from the surgery; these local (skin) recurrences are treated with surgery similar to what would be recommended for a primary melanoma (e.g., SLNB); depending on the results of the SLNB, other treatments might be recommended.
- If melanoma recurs in nearby lymph vessels or just under the skin (known as in-transit recurrence), it should be removed, if possible; other options include: injections of the T-VEC vaccine (Imlygic), Bacille Calmette-Guerin (BCG) vaccine, or interleukin-2 (IL-2) directly into the melanoma; radiation therapy; or applying imiquimod cream. For melanomas on an arm or leg, another option might be isolated limb perfusion or isolated limb infusion (infusing just the limb with chemotherapy); other possible treatments might include targeted therapy (for melanomas with a BRAF or C-KIT gene change), immunotherapy, or chemotherapy.
- If nearby lymph nodes weren't all removed during the initial treatment, the melanoma might come back in these lymph nodes; lymph node recurrence is treated by lymph node dissection if it can be done, sometimes followed by adjuvant treatments, such as radiation therapy and/or immunotherapy or targeted therapy (for cancers with BRAF gene changes). If surgery is not an option, radiation therapy or systemic treatment (immunotherapy, targeted therapy, or chemo) may be used.
- Melanoma can also come back in distant parts of the body; almost any organ can be affected; most often, the melanoma will come back in the lungs, bones, liver, or brain; treatment for these recurrences is generally the same as for stage IV melanoma; melanomas that recur on an arm or leg may be treated with isolated limb perfusion/infusion chemotherapy; melanoma that comes back in the brain can be difficult to treat; single tumors can sometimes be removed by surgery;

radiation therapy to the brain (stereotactic radiosurgery or whole brain radiation therapy) may be used; systemic treatments (immunotherapy, targeted therapy, or chemo) might also be tried. Health care professionals should note that patients with recurrent melanoma may want to think about taking part in a clinical trial in order to receive the newest treatment option available.

Section 2 Summary

Treatment options for skin cancer include: surgery, radiation therapy, local or topical treatments, chemotherapy (chemo), immunotherapy, and targeted therapy. Health care professionals should note that surgery is often the first option used to treat skin cancer. Finally, health care professionals should note that the treatment of melanoma depends on the location and stage of the cancer.

Section 2 Key Concepts

- Treatment options for skin cancer include: surgery, radiation therapy, local or topical treatments, chemotherapy (chemo), immunotherapy, and targeted therapy.

Section 2 Key Terms

Wide excision surgery - a surgical procedure that involves removing the entire cancerous area, along with some normal, healthy tissue to ensure that all of the cancer is removed from an individual

Mohs surgery - a microscopically controlled surgery used to treat both common and rare types of skin cancer

Lymph node dissection - the removal of all lymph nodes near the cancer

Section 2 Personal Reflection Question

What factors should health care professionals consider when treating a patient with skin cancer?

Conclusion

Skin cancer is the most common type of cancer in the United States. If left undetected, skin cancer can metastasize, and cause serious health complications. Fortunately, skin cancer can be detected and treated. Health care professionals should work to screen patients for skin cancer, so those affected may receive treatment.

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