

CHAPTER

21

## The Integumentary System

### Learning Objectives

---

After completing this chapter, you should be able to:

- 21.1 Define and spell the terms for this chapter.
- 21.2 List and describe the functions of the skin.
- 21.3 Identify the location of each layer of skin.
- 21.4 Describe the function of each layer of skin.
- 21.5 Describe the functions of accessory organs of the skin.
- 21.6 Differentiate between basal cell carcinoma, squamous cell carcinoma, and malignant melanoma.
- 21.7 Describe how the integumentary system changes between childhood and older adulthood.
- 21.8 Identify pathology associated with the integumentary system.
- 21.9 Describe various forms of skin care treatments that are used to reverse the signs of aging.

## Case Study

Julie Yeung is a 29-year-old patient of Pearson Physicians Group. Julie, of Italian descent, and her husband, Lou, of Chinese descent, have not been successful conceiving a child. She has recently been diagnosed with an ovarian disorder known as polycystic ovarian syndrome. Today, she is seeing Dr. Miller for increased dark-hair growth on her face and chin.

## Terms to Learn

acne vulgaris	folliculitis	rosacea
alopecia	furuncle	scabies
bacteremic	herpes simplex	sebaceous glands
basal cell carcinoma	herpes zoster	seborrheic dermatitis
benign	hirsutism	sebum
callus	impetigo	squamous cell carcinoma
carbuncle	keloid	sudoriferous glands
cellulitis	keratin	tinea capitis
contact dermatitis	lunula	tinea corporis
corn	malignant	tinea cruris
decubitus ulcer	malignant melanoma	tinea pedis
dermis	matrix	urticaria
dysplastic nevus	melanin	verrucae
eczema	melanocytes	vesicles
epidermis	pediculosis	vittiligo
erythema	psoriasis	

**W**eighing more than 6 pounds and covering more than 3,000 square inches, the skin is the largest organ of the human body. Skin and its accessory structures constitute the integumentary system. Accessory structures of the integumentary system include hair, nails, sebaceous (oil) glands, and sudoriferous (sweat) glands.

## FUNCTIONS OF THE INTEGUMENTARY SYSTEM

The skin works in multiple ways to provide homeostasis for the body. The five main functions of the integumentary system are protection, regulation, sensation, absorption, and secretion. By providing these functions, the integumentary system, along with the other body systems, can maintain the internal conditions that are essential to the function of the body.

### Protection

Intact skin serves as a protective barrier to the internal structures and compartments of the body. The skin prevents harmful agents (such as bacteria, viruses, and pollution) from entering the body. Cuts and abrasions, which open the skin causing it not to be intact, allow harmful microbes to enter the body. The skin guards the body against the sun's ultraviolet rays by producing a protective pigmentation called melanin. Vitamin D, which is essential to the body, is also produced by the skin.

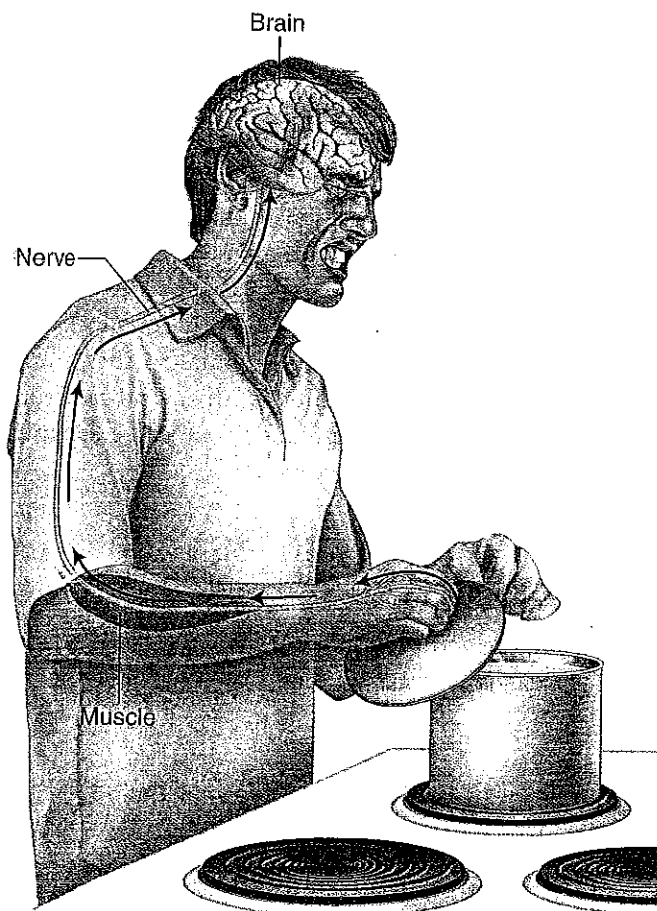
### Regulation

The skin also helps regulate body temperature. When body temperature rises and requires cooling, the blood vessels in the skin dilate and bring more blood to the surface of the skin where heat from the blood is more easily released. While this is occurring, the body's sweat glands begin to secrete sweat that evaporates to cool the body.

If the body needs to conserve heat, the blood vessels in the skin will constrict, moving heat-carrying blood away from the skin and circulating it to the muscles and internal vital organs to keep them warm. Both the constriction and the dilation of blood vessels in the skin are reflex actions initiated by the nervous system. The regulation of body temperature is an example of how the integumentary system and the nervous system work together to maintain homeostasis.

## Sensory Reception

The skin contains millions of microscopic nerve endings that act as sensory receptors. Again, the integumentary system and the nervous system work together, in this case for the function of sensation. Each nerve ending is specialized to provide a specific type of sensory reaction. Sensory reactions include responses to pressure, traction, heat, cold, pain, and more. The nerve endings and their sensory receptors send information to the cerebral cortex of the brain. When the message reaches the brain, an appropriate response is triggered. For example, if the hand touches a hot pan and senses heat and pain, a message is sent to the brain, which sends back a signal to remove the hand from the hot pan (Figure 21-1).



**FIGURE 21-1** The integumentary and nervous systems work together to recognize specific sensations, such as heat and pain.

## Absorption

Absorption is another function of the skin. Transdermal (through-the-skin) medications take advantage of this capability of the skin to absorb substances. Transdermal drugs are often administered by placing medicated patches on various parts of the body. Placement is chosen based on the most effective location to deliver the specific medication. Examples of transdermal medications are those intended to prevent motion sickness and those that provide hormonal therapy, including birth control patches. Another form of transdermal medication is a medicated paste. For example, nitroglycerin paste is applied to the chest to regulate certain heart conditions.

Both transdermal patches and medicated pastes have time-release properties that allow the medications to be absorbed through the skin and into the bloodstream slowly, at a desired rate, rather than all at once.

It is important to note that the medical assistant who administers or applies a transdermal medication should always wear protective gloves. The gloves act as a protective barrier to prevent the medication intended for the patient from entering the medical assistant's bloodstream.

## Secretion

The skin contains millions of sudoriferous glands, which secrete perspiration, or sweat, and sebaceous glands, which secrete oil for lubrication. Perspiration is composed mostly of water with small amounts of salt and other chemical compounds. If the secretions are allowed to accumulate, especially around body hair in the axillary region, bacteria will begin to grow, creating body odor. Sebaceous glands produce sebum, which acts to protect the body from dehydration and the possible absorption of harmful substances. Both sudoriferous and sebaceous glands are discussed as accessory organs of the skin later in this chapter.

## STRUCTURES OF THE SKIN

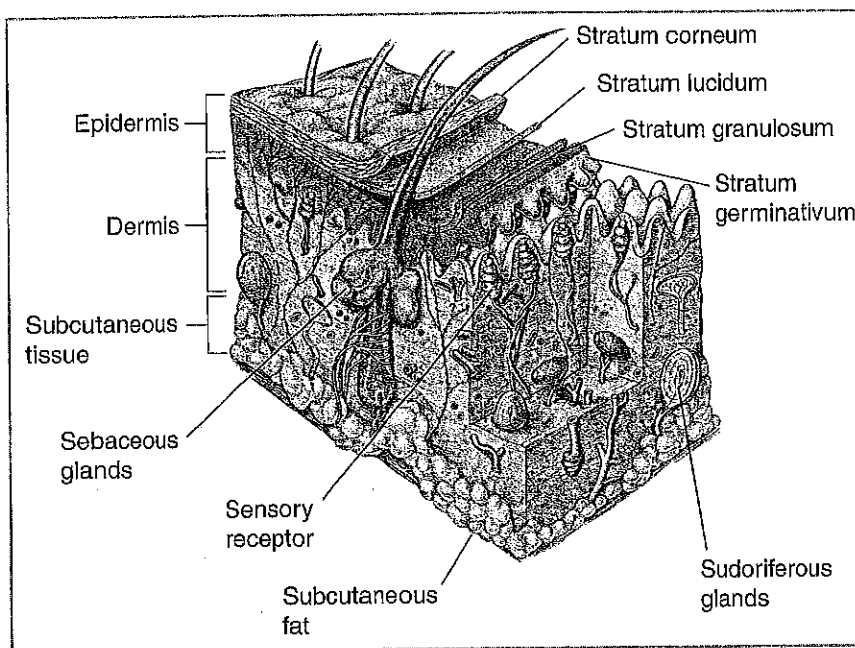
The skin is composed of three layers: the epidermis, the dermis, and the subcutaneous layer (Figure 21-2).

### The Epidermis

The **epidermis** is divided into four layers or strata: the stratum corneum, stratum lucidum, stratum granulosum, and stratum germinativum.

#### *Stratum Corneum*

The stratum corneum, the outermost layer of skin, consists of dead cells filled with the protein **keratin**. Keratin works to firm and strengthen the skin. The stratum corneum forms a



**FIGURE 21-2** The integument: the epidermis, the dermis, subcutaneous tissue, and its appendages.

protective covering for the body. The thickness of the layer varies based on the body part that is being covered, some layers being thicker than others. For example, consider the soles of the feet and the palms of the hands. Because of the ongoing pressure on their surfaces, the soles of the feet and the palms of the hands have thicker layers than do the surfaces of areas such as the eyelids or forehead.

### ***Stratum Lucidum***

The stratum lucidum is a translucent layer lying directly beneath the stratum corneum. In thinner skin, this layer is often absent. Cells in this layer are either dead or dying.

### ***Stratum Granulosum***

The stratum granulosum consists of several layers of living cells that are in the process of becoming part of the stratum lucidum and stratum corneum. These cells are actively becoming keratinized, or hardened, after they lose their nuclei.

### ***Stratum Germinativum***

The stratum germinativum contains several layers of living cells that are still capable of mitosis, or cell division. This layer, occasionally referred to as the mucosum, is most responsible for the regeneration of the epidermis. If this layer is damaged, as from a severe burn, the skin is unable to regenerate itself, and skin grafting must be done. This layer also contains the **melanocytes**, the cells that produce **melanin**. Melanin is the pigment that gives the skin its color. The varying amounts of melanin that may be produced allow

individuals to have varying shades of skin tones. The absence of melanin in the skin, hair, and eyes is an inherited disorder known as albinism.

## **The Dermis**

The **dermis** is the middle layer of the skin and is often referred to as the “true skin.” It is composed of connective tissue containing nerves and nerve endings, blood vessels, sebaceous and sweat glands, hair follicles, and lymph vessels. The dermis is further divided into two layers: the papillary layer and the reticular layer.

- The papillary layer is the thin upper layer of the dermis adjacent to, or attached to, the bottom part of the epidermis. It is made up of loose connective tissue with fingerlike projections (the **papillae**) that extend into

the epidermis. Papillae form the ridges that are fingerprints.

- The reticular layer is the thicker lower layer of the dermis. It consists of dense connective tissue that supports blood vessels and nerves as well as hair roots, sebaceous and sudoriferous glands, and nails.

## **The Subcutaneous Layer**

The subcutaneous layer is the innermost layer of the skin. Subcutaneous tissue is composed of loose connective tissue with small lobes of fat. Subcutaneous tissue helps support, nourish, insulate, and cushion the skin. It contains larger blood vessels and nerves than those found in the dermis. Medical assistants must be familiar with the subcutaneous layer of the skin, because many medications are administered here via subcutaneous injection.

## **ACCESSORY STRUCTURES OF THE SKIN**

The accessory structures of the skin include the hair, nails, sebaceous glands, and sudoriferous or sweat glands.

### **Hair**

The visible portion of hair is the shaft. The root of the hair is embedded within the follicle. A loop of capillaries enclosed in connective tissue is the hair papilla. The papilla is found at the base of each hair follicle. The pilomotor muscle is attached to the side of each follicle. Contraction

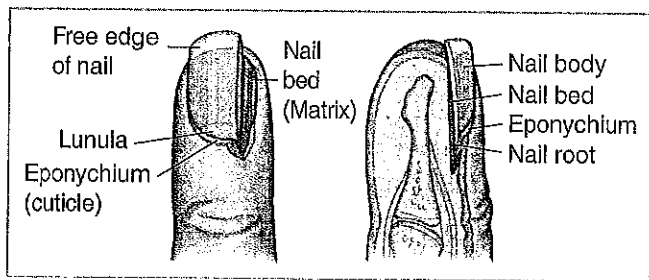


FIGURE 21-3 The fingernail, an appendage of the integument.

of the pilomotor muscle causes goose bumps, or the sensation of the hair standing on end. This may be the result of an emotional reaction or may be the skin's attempt at self-warming. With the exception of the palms of the hands and the soles of the feet, the entire body is covered by a very thin layer of hair.

Hairs that surround the eyes, ears, and nose act as a protective barrier, filtering out foreign particles and preventing their entrance into the sensory organs.

## Nails

Fingernails and toenails are horny cell structures of the epidermis and are composed of hard keratin. A nail consists of the body, the root, and the **matrix**, or nail bed (Figure 21-3). The **lunula** is the crescent-shaped white area at the base of the nail. Average nail growth is about 1 mm (0.04 in.) per week. A lost fingernail may take 3½ to 5½ months to regrow, whereas a lost toenail may take as long as 6 to 8 months to regrow. Nail growth may be adversely affected by disease, nutritional deficiencies, and hormonal insufficiencies.

## Sebaceous Glands

Located in the dermis, the **sebaceous glands**, or oil glands, secrete **sebum**. Sebum is made of fat and the debris of dead fat-producing cells. The function of sebum is to protect and waterproof hair and skin. The endocrine system regulates the amount of secretion of the sebaceous glands, which also varies with age, pregnancy, and puberty.

Sebaceous glands can usually be found in hair-covered areas where they are contained in hair follicles but can also be found in the hairless areas of the lips, eyelids, penis, labia minora, and nipples. At the hairless areas, sebum rises to the surface through ducts. The sebaceous glands of a fetus in utero secrete **vernix caseosa**, a "waxy" or "cheesy" white substance found coating the skin of the newborn baby.

## Sudoriferous Glands

Predominant in the palms of the hands and the soles of the feet, **sudoriferous glands**, or sweat glands, occur in nearly all

regions of the skin. Sweat glands are coiled, ball-shaped structures that are located in the dermis or subcutaneous layers. Sweat glands secrete perspiration, which helps to cool the body by evaporation. It is estimated that the body loses 0.5 L of fluid per day via sweat.

## COMMON PATHOLOGY OF THE INTEGUMENTARY SYSTEM

Skin is vulnerable to many disorders because it is the most exposed of all the body systems. Skin disorders have multiple signs. There are common and specific skin lesions that may evidence specific diseases or disorders. A skin lesion is simply any part of the skin that does not resemble the surrounding skin, or a variation in the skin. Many skin lesions are **benign** in origin, meaning they are noncancerous. A variety of common skin lesions are shown and described in Figure 21-4.

Common diagnostic methods and tests used to identify and treat the pathological conditions discussed in this section are described in Table 21-1.

## Skin Cancer

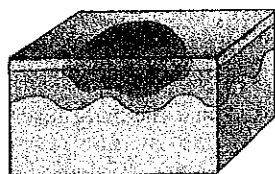
The most common of all cancers, skin cancer affects more than one million people each year in the United States. These cancers occur when normal skin cells undergo a change during which they grow and multiply without normal controls. Those with lighter and fairer skin, as well as natural blondes and redheads, are more prone to skin cancer.

As the abnormal cells multiply, they form a mass called a tumor. As a result of their uncontrolled growth, **malignant** (cancerous) tumors encroach on neighboring tissues, especially lymph.

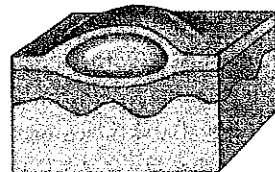
Like many cancers, skin cancers start as precancerous lesions that can develop into cancer because of the quick reproduction of abnormal cells and skin changes. Health care professionals often refer to these changes as dysplasia. One example of this is a **dysplastic nevus**, or an abnormal mole. People with dysplastic nevi often have a lot of them, perhaps one hundred or more. They are usually irregular in shape, with notched or fading borders. Dysplastic nevi may be either flat or raised, and the surface may be smooth or rough ("pebbly").

The three major types of skin cancers are:

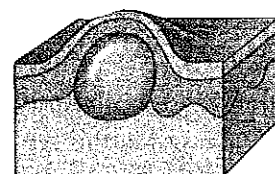
- Basal cell carcinoma
- Squamous cell carcinoma
- Malignant melanoma



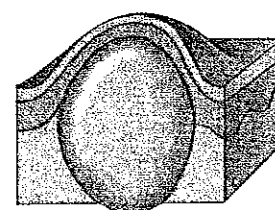
A macule is a discolored spot on the skin; freckle.



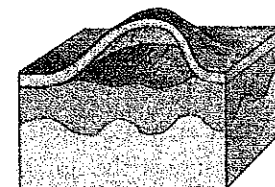
A wheal is a localized, evanescent elevation of the skin that is often accompanied by itching; urticaria.



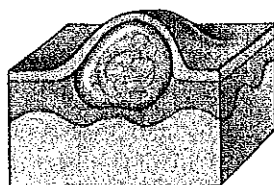
A papule is a solid, circumscribed, elevated area on the skin; pimple.



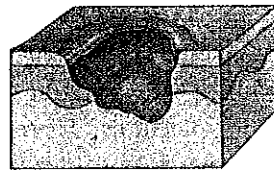
A nodule is a larger papule; acne vulgaris.



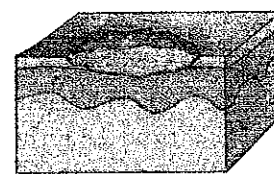
A vesicle is a small fluid filled sac; blister. A bulla is a large vesicle.



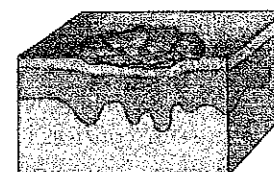
A pustule is a small, elevated, circumscribed lesion of the skin that is filled with pus; varicella (chickenpox).



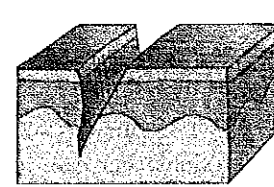
An erosion or ulcer is an eating or gnawing away of tissue; decubitus ulcer.



A crust is a dry, serous or seropurulent, brown, yellow, red, or green exudation that is seen in secondary lesions; eczema.



A scale is a thin, dry flake of cornified epithelial cells; psoriasis.



A fissure is a crack-like sore or slit that extends through the epidermis into the dermis; athlete's foot.

**FIGURE 21-4** A skin lesion may be harmless and benign or evidence of an illness or disorder.

### Basal Cell Carcinoma

**Basal cell carcinoma**, the most common form of skin cancer, is a malignant tumor most often caused by overexposure to the sun and ultraviolet rays. It may often appear as a change in the skin, such as a growth, irritation, or sore that does not heal or as a change in a wart or mole. Though the nose is the

most common site, it also occurs on the head, neck, back, chest, or shoulders.

**Signs and Symptoms.** Signs of basal cell carcinoma can vary and may include skin changes such as the following:

- Firm, pearly bump with visible and spider-like tiny blood vessels (telangiectasias)
- Red, tender, flat spot that bleeds easily
- Small, fleshy bump with a smooth, pearly appearance, often with a depressed center
- Smooth, shiny bump that may look like a mole or cyst
- Scarlike patch of skin, especially on the face, that is firm to the touch
- Bump that itches, bleeds, crusts over, and then repeats the cycle and has not healed in three weeks
- Change in the size, shape, or color of a wart or mole

**Treatment.** Because basal cell carcinoma usually grows and progresses slowly, it often can be detected and successfully treated in its early stages of development. The most common treatment is surgery to destroy or remove the entire skin growth, including a margin of cancer-free tissue surrounding the growth. Another treatment option is a type of surgery called Mohs micrographic surgery, originally known as chemosurgery. This microscopically controlled surgery removes the cancerous lesion one layer at a time until the tumor is completely removed. Mohs surgery is highly effective, with cure rates higher than 90 percent. Additionally, cryosurgery and laser surgery are treatment options for basal cell carcinoma. Cryosurgery uses freezing as a mechanism to kill the cancer cells, whereas laser surgery uses a beam of light to destroy the cells that make up the tumor. Overall treatment for skin cancer varies, depending on the size and location of the cancer as well as the age and overall health of the patient.

### Squamous Cell Carcinoma

**Squamous cell carcinoma** is a malignant tumor that affects the middle layer of the skin. Changes to an existing wart, mole, or other skin lesion could indicate this form of skin cancer as may the development of a new growth that ulcerates and does not heal well. Squamous cell carcinoma has a

**TABLE 21-1 | Procedures and Diagnostic Tests Related to the Integumentary System**

Procedure/Test	Description
Adipectomy	Surgical removal of fat.
Biopsy	Removal of a piece of tissue by syringe and needle, knife, punch, or brush to examine under a microscope as an aid to diagnosis.
Cauterization	Destruction of tissue with a caustic chemical, electrical current, freezing, or hot iron.
Chemobrasion	Abrasion of skin using chemicals; also called chemical peel.
Cryosurgery	Use of extreme cold to freeze and destroy tissue.
Curettage	Removal of superficial skin lesions with a curette or scraper.
Debridement	Removal of foreign material or dead tissue from a wound.
Dermatoplasty	Transplantation of skin or skin grafting. May be used to treat large birthmarks (hemangiomas) and burns.
Electrocautery	Destruction of tissue with an electric current.
Exfoliative Cytology	Scraping cells from tissue and then examining them under a microscope.
Frozen Section	Taking a thin piece of tissue from a frozen specimen for rapid examination under a microscope. Often performed during a surgical procedure to detect cancer.
Fungal Scrapings (FS)	Scrapings taken with a curette from lesions, placed on a growth medium, and examined under the microscope to identify fungal growth.
Incision and Drainage (I&D)	Making an incision to create an opening for the drainage of material, such as pus.
Laser Therapy	Removal of skin lesions and birthmarks using a laser that emits intense heat and power at close range. The laser converts frequencies of light into one small beam.
Lipectomy	Surgical removal of fat.
Marsupialization	Creation of a pouch to promote drainage by surgically opening a closed area, such as a cyst.
Needle Biopsy	Use of a sterile needle to remove tissue for examination under a microscope.
Rhytidectomy	Surgical removal of excess skin to eliminate wrinkles. Commonly referred to as a facelift.
Skin Grafts	Transfer of skin from a normal area to cover another site. Used to treat burn victims and after some surgical procedures.
Sweat Test	Test performed on sweat to determine the level of chloride. Increased skin chloride occurs in some diseases, such as cystic fibrosis.
Tzanck Test	Microscopic examination of a small piece of tissue that has been surgically scraped from a pustule. The specimen is placed on a slide and stained; then the type of viral infection causing the pustule can be identified.

high cure rate if it is detected and treated early, but neglect can allow the cancer to spread, causing great disability or even death. Along with exposure to sunlight and ultraviolet rays (including those from tanning beds), risk factors include genetic predisposition (skin cancers are more common in those who have light-colored skin, blue or green eyes, and blond or red hair), chemical pollution, and overexposure to X-rays or other forms of radiation. Exposure to arsenic, which may be present in some herbicides, presents another risk for development of skin cancers.

**Signs and Symptoms.** Similar to basal cell carcinoma, signs of squamous cell carcinoma include any skin lesion, growth, or bump that is small, firm, reddened, nodular, coned, or

flat in shape. Squamous cell carcinoma also presents as a lesion whose surface is scaly or crusted. Squamous cell carcinoma may be located on the face, ears, neck, hands, or arms. Occasionally, the growth may occur on the lip, mouth, tongue, or genitals.

**Treatment.** The treatment for squamous cell carcinoma varies with the tumor's size, depth, location, and how much it has spread or metastasized. Surgical removal of the tumor, which includes removal of the skin around the tumor (wide excision), is often recommended. Microscopic shaving (Mohs micrographic surgery) may remove small tumors. Cryosurgery and laser surgery are also used in the treatment of squamous cell carcinoma. Skin grafting may be needed



## Professionalism The Life Span



### The Child

- In children, skin conditions can be acute or chronic, local or systemic, and some can be congenital (inherited). Age-related skin conditions include milia (the white pimples occurring in newborns) and acne (red pustules occurring in puberty).
- Skin infections in children present as systemic infections with symptoms such as fever and malaise. Because the sebaceous glands do not produce sebum until the child is about 8 to 10 years old, a child's skin is drier and chaps more easily. For that reason, it is important to teach children good hygiene and skin care habits at an early age.

### The Older Adult

- As a person ages, the papillae grow less dense, and the skin becomes looser. Less collagen and fewer elastic fibers are present in the upper dermis, and the skin loses its elastic tone, causing wrinkles to occur more easily. The occurrence of premalignant and malignant skin lesions may also increase with aging, especially on the nose, eyelids, and cheeks. Among skin cancers found in older adults, 80 percent are basal cell carcinomas.
- By age 50, approximately half of adults have some gray hair. The scalp hair continues to thin in men and women as aging progresses, and the hair becomes dry and brittle. The nails may flatten and become more discolored, dry, and brittle.

if wide areas of skin are removed. The tumor may also be reduced in size by radiation treatments. Chemotherapy tends to be minimally effective; however, it can be used if surgery and radiation fail.

### Malignant Melanoma

Originating in the melanin-producing melanocytes of the skin, **malignant melanoma** develops when the melanocytes do not respond to the normal control mechanisms of cellular growth. This often occurs in the melanocytes of a preexisting mole. The abnormal cell growth within the mole may then invade nearby structures or spread to other organs in the body (metastasis), invading and compromising the function of those structures or organs (Figure 21-5).

**Signs and Symptoms.** Malignant melanomas are usually diagnosed by using the ABCDE rule (Table 21-2), which is an excellent way of identifying changes of significance in a mole. This ABCDE method means checking the mole for the following: asymmetry, border irregularity, color variegation, diameter greater than 6 mm (0.24 in.), and elevation above surrounding tissue.

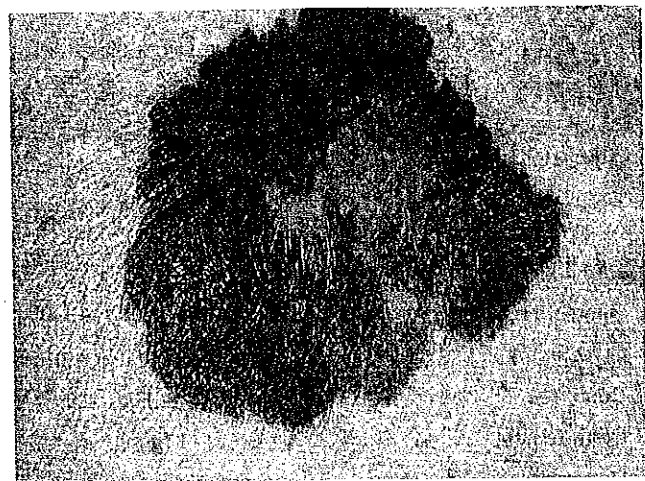


FIGURE 21-5 Melanoma.

The Glasgow 7-point scale also identifies signs and symptoms of melanoma. The symptoms and signs (see the following list) can occur anywhere on the skin, including the palms of the hands, soles of the feet, and nail beds. In this scheme, change is emphasized along with size. Bleeding and sensory changes occur relatively late. The Glasgow 7-point scale includes:

- Change in size
- Change in shape
- Change in color
- Inflammation
- Crusting and bleeding
- Sensory change
- Diameter greater than 7 mm (0.28 in.)

**Treatment.** The key to successful treatment of melanoma is early diagnosis. Patients identified with localized, thin,

TABLE 21-2 | The ABCDEs of Melanoma Changes in a Mole

<b>A—Asymmetry</b>	The mole does not have two halves that match each other.
<b>B—Border</b>	The border is ragged, notched, or blurred together.
<b>C—Color</b>	Color is uneven; shades of black, brown, or tan are present; areas of white, red, or blue may be present.
<b>D—Diameter</b>	There may be a change in size, and the mole is typically greater than 6 mm in diameter.
<b>E—Elevation</b>	The mole sits above the surrounding tissue.



small lesions nearly always survive. For those with advanced lesions, the outlook is poor in spite of progress in systemic therapy.

## Acne Vulgaris

**Acne vulgaris** (acne) is a common skin condition that occurs when oil and dead skin cells clog the skin's pores (Figure 21-6). It most often affects teens, with more than 85 percent of them developing at least a mild form of this condition. This occurs because of hormonal changes and the fact that the skin becomes oilier during the teenage years. Some women of childbearing age also develop acne before their menstrual cycle, again because of the hormonal changes occurring in the body. Whereas mild acne is merely annoying, severe acne can lead to emotional and physical scars.

**Signs and Symptoms.** The skin blemishes of acne vulgaris are often red and swollen because the blocked follicles that occur with acne provide an environment in which bacteria can multiply rapidly, causing inflammation. With mild cases of acne, only whiteheads and blackheads may be present. At times, these may develop into an infection in the skin pore (pimple). Severe acne can mean hundreds of pimples or sores that can cover the face, neck, chest, and back. Cystic lesions are pimples that are large and deep. These lesions are often painful and can leave scars on the skin.

**Treatment.** The severity of acne will determine the most useful and beneficial treatment. Treatment could include lotions or gels applied to blemishes or sometimes entire areas of skin, such as the chest or back (topical medications) and oral antibiotics. Sometimes the health care provider will combine treatments to get the best results and to avoid the development of bacteria that are resistant to antibiotics.

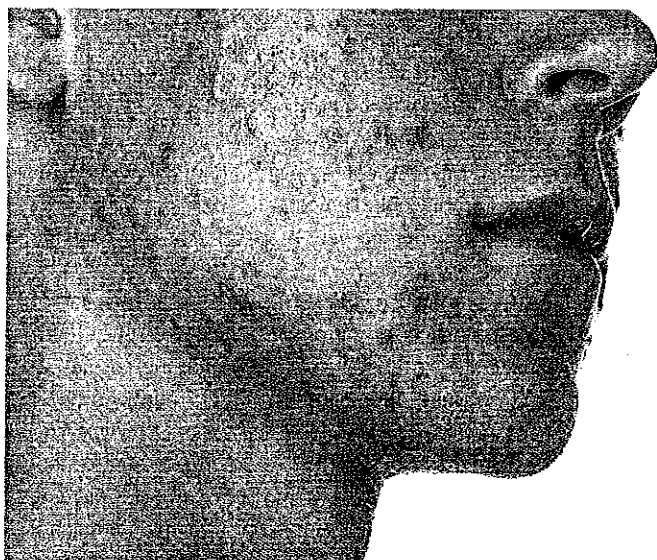


FIGURE 21-6 Acne vulgaris.

## Alopecia

**Alopecia** is baldness or loss of hair. The most common form is male-pattern baldness, also known as androgenic alopecia. Women may also experience alopecia. Alopecia areata is another type of hair loss, involving patches of baldness that may come and go. Alopecia areata affects about 1 in 100 people, mostly teenagers and young adults (Figure 21-7). Alopecia can be an inherited disorder, or it can be caused by hormonal changes, nutritional deficiencies, and stress. Additionally, alopecia is a common side effect of chemotherapy; a treatment for cancer.

**Signs and Symptoms.** Alopecia areata causes patches of baldness that are about the size of a large coin. They usually appear on the scalp but can occur anywhere on the body, including the beard, eyebrows, and eyelashes. There are usually no other symptoms.

**Male-pattern baldness, androgenic alopecia, is hereditary.** It is called male-pattern baldness because it tends to follow a set pattern. The first stage is usually a receding hairline, followed by thinning of the hair on the crown and temples. When these two areas meet in the middle, a horseshoe shape of hair remains around the back and sides of the head. Eventually the person may be completely bald. Women's hair gradually thins with age, but women tend to lose hair only from the top of the head. This usually becomes more noticeable after menopause.

**Treatment.** Drugs and lotions are available that can be rubbed on the scalp to treat male- and female-pattern baldness. However, these do not work for everyone and effects are not long lasting. Shampoos and formulas are available for improving circulation to the scalp, and some people try herbal treatments. Hair transplants are also used to help the appearance of hair loss, although these treatments can be expensive and often are not covered by medical insurance.

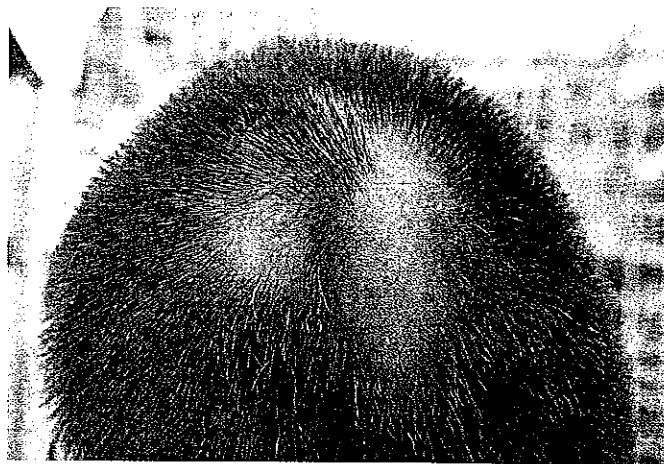


FIGURE 21-7 Alopecia.

Unfortunately, hair loss can lead to problems with confidence and self-esteem.

## Cellulitis

**Cellulitis** is an acute, spreading bacterial infection below the surface of the skin. A cut, an abrasion, or an ulceration may precede cellulitis, because it commonly appears at a break in the skin. It can also be a result of local trauma, such as an animal bite. Very rarely is cellulitis caused by the **bacteremic** spread of infection (i.e., bacteria arriving from a distant source via the bloodstream). Risk factors for cellulitis include diabetes and impairment of the immune system. Cellulitis is not contagious, because it is an infection of the skin's deeper layers: the dermis and subcutaneous tissue. The epidermis provides a cover over the infection.

**Signs and Symptoms.** Cellulitis is characterized by **erythema** (redness), warmth, swelling, and pain. Fever, chills, and enlarged lymph nodes may also accompany this infection (Figure 21-8).

**Treatment.** Topical and oral antibiotics are administered for treatment of cellulitis. Commonly, penicillin-based antibiotics are used because they are most effective against staphylococcus (staph) infections that cause cellulitis. If the patient is allergic to penicillin or culture tests indicate staph is not the cause of infection, other antibiotics will be prescribed. In severe cases of cellulitis, IV antibiotics might be required.

## Contact Dermatitis

**Contact dermatitis** is an allergic reaction caused by the skin coming in contact with an irritating substance. Causes of contact dermatitis often include exposure to poison ivy (Figure 21-9), poison oak, lotions, detergents, other chemicals, or nickel, which is a metal commonly used in jewelry or jean snaps.

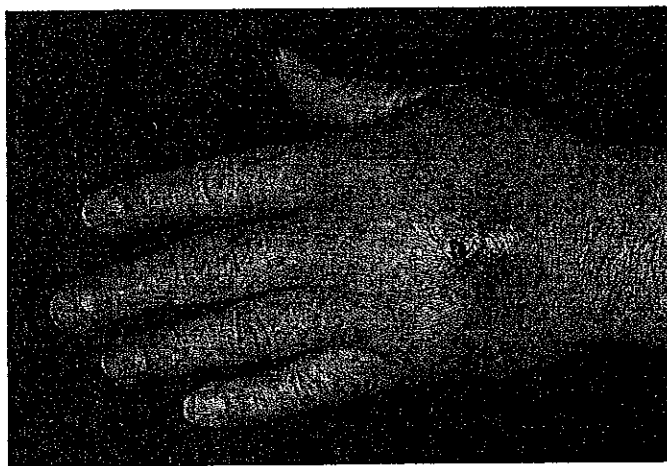


FIGURE 21-8 Cellulitis.

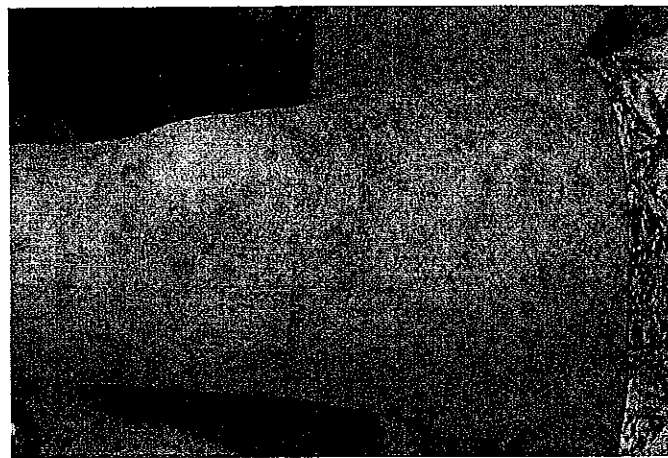


FIGURE 21-9 Contact dermatitis resulting from poison ivy.

**Signs and Symptoms.** With contact dermatitis, the obvious response is red, irritated skin, but **vesicles** (small blisters) and rash may also result. Oftentimes, itching and pain may be present. Serious allergic reactions may result in urticaria, or hives.

**Treatment.** This form of an allergic reaction is mostly treated with antihistamines (antiallergy medicines) and topical corticosteroid creams to reduce the inflammation. Widespread or excessively uncomfortable reactions may also be treated with systemic corticosteroids (oral medications) that help to further decrease the inflammation caused by the allergic reaction.

## Calluses and Corns

Calluses and corns are excessive growths of the stratum corneum layer of the epidermis. They often occur on the hands

### Professionalism

### Cultural Considerations



In many cultures, modesty is very important, and being sure that a patient is properly draped is a major consideration. The medical assistant can always ask the patient if the medical team should know anything regarding special draping, and who needs to be present during the examination. Always be very respectful of the patient's rights and need for modesty.

Some cultures may use special tattoos or marks as part of their heritage, and it is important to be respectful of these marks because they may have special meaning to the patient. Being judgmental about such adornments is never acceptable. If a patient has body piercings, they may require special attention because of the potential for infection. Always note any swelling or redness around a piercing site, and report it to the physician in a professional manner without doing or saying anything to embarrass the patient.

and feet. Both calluses and corns can be caused by physical bone deformities; however, they also can be caused by such other factors as ill-fitting shoes and unprotected hands during manual labor.

**Signs and Symptoms.** A **callus** is an area of thickened skin that does not have an identifiable border. It may appear grayish-yellow, brown, or even red. It may cause no pain, or it may produce tenderness, throbbing, or burning. A **corn**, on the other hand, has a distinct border with various textures. Corns appear most often on the feet. Though corns may be hard or soft, they are generally painful.

**Treatment.** Treatment becomes necessary when corns or calluses become burdensome or painful. Although patients with diabetes must be treated by a podiatrist to decrease the chance of infection and maximize wound healing, most other patients can treat corns and calluses by themselves. Placing a bandage on the corn or callus to reduce friction is beneficial, as is applying lotions or creams to soften the rough and hardened corns or calluses.

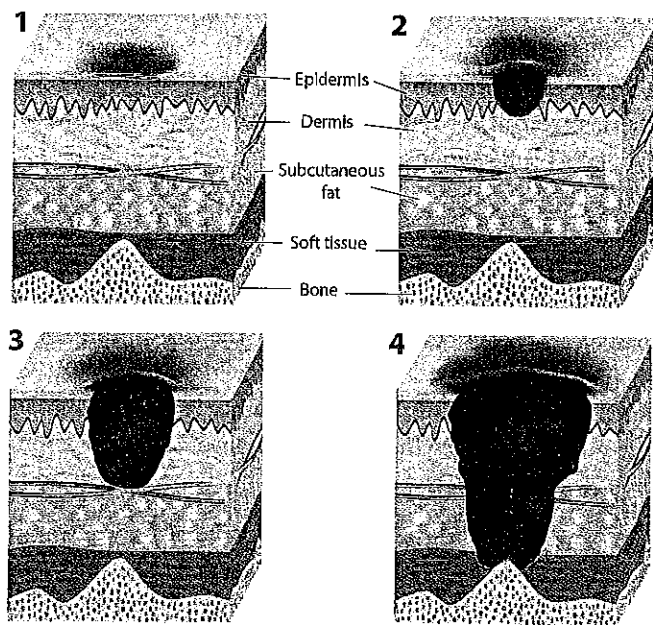
## Decubitus Ulcer

A **decubitus ulcer**, also called a pressure sore or bedsore, is an area of skin and tissue that breaks down. Such ulcers typically occur when constant pressure is maintained on a specific area of the skin, such as on the coccyx. The constant pressure on the area decreases the blood supply, causing death to the affected tissue. Patients who have been lying in bed for too long without being repositioned or patients who are in wheelchairs may be susceptible to these skin conditions. In addition to the coccyx, common locations for a decubitus ulcer include hips, sacrum, heels, ankles, shoulders, back, and the back of the head.

**Signs and Symptoms.** Signs of decubitus ulcers vary with their stages (Figure 21-10). According to the National Pressure Ulcer Advisory Panel, the following are the four stages of decubitus ulcers:

- **Stage I**—A reddened area on the skin that does not blanch (turn white) when pressed. This is an early stage, and if the pressure is kept off the area, healing may occur.
- **Stage II**—The skin has a blister or an open sore. The area around the site may be red and irritated.
- **Stage III**—The skin breakdown looks like a crater with damage to the tissue below the skin.
- **Stage IV**—The wound becomes so deep that damage occurs to the tissues beneath the initial ulcer, including damage to bone and muscle.

## Stages of Pressure Sores



**FIGURE 21-10** Pressure sores, or decubitus ulcers, occur from tissue breakdown caused by constant pressure.

**Treatment.** Treatment of decubitus ulcers begins with relieving pressure through the use of support surfaces and repositioning. Support surfaces may include special pillows or cushions that are water- or air-filled. Foam cushions and sheepskin pads are also used. Repositioning the patient to relieve pressure from the sore spot must be routine. Decubitus ulcers are typically debrided (i.e., cleaned of all toxins and then medicated and covered with special dressings to help in healing). Protecting the wound from any further injury is essential to protect the patient from infections, systemic sepsis, and other serious complications.

## Eczema

**Eczema**, or atopic dermatitis, is a chronic skin condition caused by an allergic-type reaction of the skin. Though there is no known definitive cause, heredity tends to play a role. For those afflicted with eczema, typically a family history of allergies and eczema is present. Eczema is common during infancy and childhood and often disappears in adulthood.

**Signs and Symptoms.** Common signs include areas of red and swollen skin caused by itching, scaling, and rashes. Adults may also suffer from chronic episodes of eczema.

**Treatment.** Treatment depends on the stage, or appearance, of the lesions that have formed on the skin. Lesions may be dry, scaly, or have a “weeping” appearance. Weeping lesions are treated with mild soaps and dressings, whereas severe cases and dry scaly lesions may be treated with mild antiitch

lotions or low-potency topical corticosteroids. Very severe cases may require treatment with systemic corticosteroids and topical immunomodulators (TIMs). Sometimes short periods of time in a tanning bed are useful to dry up lesions, but this treatment should only be approached while under a physician's supervision.

## Furuncles and Carbuncles

A **furuncle**, or boil, is an abscess of a hair follicle and the adjacent subcutaneous tissues. A **carbuncle** is a collection of furuncles. The microbe involved in the disease process is usually *Staphylococcus aureus* (staph), which normally lives harmlessly on the skin. When an opening in the integument invites the microbes into the subcutaneous tissue, painful furuncles grow.

**Signs and Symptoms.** Furuncles can be red to purple in appearance and are generally painful. The area surrounding the furuncle tends to become tender to the touch. The center is generally white or yellow and is filled with pus. Carbuncles can be anywhere from the size of a pea to the size of a golf ball and are similar in color to furuncles.

**Treatment.** The customary treatment for these disorders is incision and drainage followed by application of an antibiotic. Patients must be taught not to squeeze furuncles because that will cause the microbes to spread. Handwashing is the best prevention for the spreading of microbes.

## Folliculitis

An infection or inflammation of the hair follicles is known as **folliculitis**. Although folliculitis can occur anywhere body hair is present, it most often appears in areas that become irritated by shaving or the rubbing of clothes or where follicles and pores are blocked by oils and dirt. Common sites of folliculitis include the face, scalp, armpits, and legs (Figure 21-11).

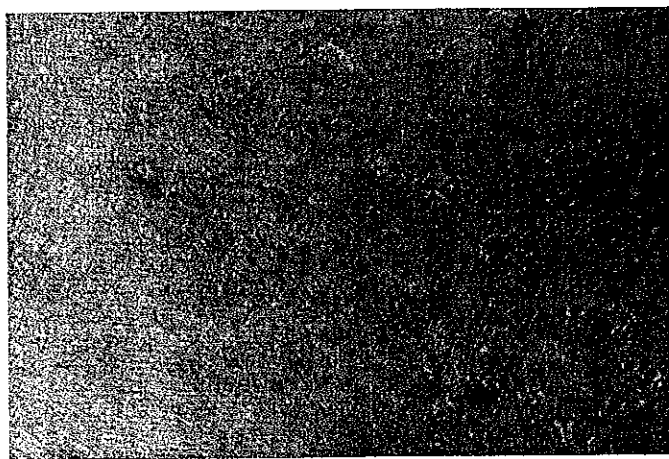


FIGURE 21-11 Folliculitis.

**Signs and Symptoms.** General signs of folliculitis include a reddened rash; raised, red, often pus-filled lesions around hair follicles (pimples); pimples that eventually crust over and occur in areas of a high concentration of hair follicles, such as the face (especially in men's beards and moustaches), armpits, scalp, and groin; and itching at the site of the rash and pimples.

**Treatment.** Treating folliculitis generally involves minimizing damage to hair follicles by avoiding clothing that will rub against the skin, shaving with an electric razor instead of a blade razor, and keeping the skin clean, using soap and water and skin cleansers. Treatment of folliculitis usually includes application of antibiotic ointments.

## Herpes Simplex

**Herpes simplex** primarily affects the mouth or the genital area. There are two strains of herpes simplex viruses:

- Herpes simplex virus type 1 (HSV-1) usually affects the face, including the lips and mouth (Figure 21-12). Acquired during childhood, it is the most common herpes simplex virus. HSV-1 is characterized by lesions inside the mouth or on the lips, including fever blisters and cold sores.
- Herpes simplex virus type 2 (HSV-2) is sexually transmitted. Oral and genital lesions are common. Some people do not display any signs or symptoms. However, left untreated, the virus can also lead to complications such as meningoencephalitis (infection of the lining of the brain and the brain itself) or an infection of the eye. Cross-infection of type 1 and 2 viruses may occur from oral-genital contact.

The herpes virus can infect a fetus and cause congenital abnormalities. A newborn born vaginally to a mother with an active genital herpes infection is highly susceptible to the virus.



FIGURE 21-12 Blisters caused by HSV-1.

**Signs and Symptoms.** Outbreaks of herpes simplex seem to coincide with lack of rest, high stress, exposure to the sun, and even menstruation. General signs and symptoms of herpes simplex include the following:

- Mouth sores
- A burning or tingling sensation followed by the development of genital lesions
- Blisters or ulcers on the mouth, lips, gums, or genitalia
- Fever blisters/cold sores
- Fever—may be present especially during the first episode
- Lymph node enlargement in the neck or groin

**Treatment.** There is no cure for the herpes virus; it will always remain in a person's body. During times of nonactive inflammation, the virus lies dormant. Mild cases of herpes simplex may not require any form of treatment. With HSV-1, the cold sore will generally disappear within two weeks. Over-the-counter medicated lip balms and salves can be helpful to ease the symptoms and speed healing. As treatment for HSV-2, prescription antiviral medications may help expedite healing and lessen the number of outbreaks. Dietary and nutritional supplements may also prove to be helpful, but they should be used only under the direct supervision of a physician.

## Herpes Zoster

**Herpes zoster**, which is also known as shingles, is a viral infection that causes a painful rash. It is caused by the varicella zoster virus, which also causes chickenpox. Once a person has been infected with chickenpox, the virus lies dormant in the nerves. After the virus reactivates, it is diagnosed as shingles or herpes zoster. Herpes zoster is transmitted through direct contact with the fluid inside the red blisters. Before the development of blisters, the person afflicted with the virus is not contagious.

**Signs and Symptoms.** Herpes zoster can be very painful. Often along with pain, a burning, tingling, and itchy feeling may be experienced. A red rash with fluid-filled blisters begins to develop, and numbness or sensitivity in an affected part of the body may also occur. In serious conditions, the skin can remain painful and sensitive to the touch; this is known as postherpetic neuralgia. Most of these symptoms occur on one side of the body, wrapping around from the back to the sternum, following the path of the nerve where the virus had been dormant. Headache, fever, and chills are also common symptoms.

Early treatment can help shorten a shingles infection and reduce the risk of complications, but prevention by vaccination (Zostavax) is ideal.

**Treatment.** Oral antiviral medications are generally prescribed, preferably within 48 to 72 hours of the first sign of the rash. Corticosteroids are sometimes prescribed to reduce swelling and pain. If the pain is severe—particularly if the patient develops postherpetic neuralgia—the health care provider may prescribe oral analgesics or a skin patch that contains a pain-relieving medication.

## Hirsutism

**Hirsutism** is a condition of thick abnormal hair growth that affects men and women, though women are more commonly affected by and diagnosed with the disorder. Often with this skin disorder, women have a pattern of hair growth that is typically found on males.

**Signs and Symptoms.** Women will develop thick and dark hair growth. Common areas for the excessive hair growth include the face and chest. It is common for women of certain cultural descent, such as those from the Mediterranean region, to naturally have darker and more hair growth than lighter, fairer-skinned women. However, hirsutism is often linked to endocrine disorders, such as problems with the ovaries or adrenal glands.

**Treatment.** Treatment consists of removing the unwanted hair through shaving, plucking, waxing, or using depilatory creams. Electrolysis and laser hair removal are more permanent forms of hair removal; however, they are more costly. Physicians may also prescribe medications that block androgen hormones, helping to decrease the amount of hair growth. These medications may take six to eight months to begin working.

## Impetigo

**Impetigo** is a skin infection caused by bacteria. It is most common in children and is very contagious. Impetigo can originate in intact skin but also can be secondary to a preexisting skin condition or trauma.

**Signs and Symptoms.** Impetigo is characterized by round, crusted, oozing spots that grow larger day by day (Figure 21-13). It may affect the skin anywhere on the body but commonly occurs in the area around the nose and mouth. A honey-colored crust often develops from blisters that burst and ooze fluid.

**Treatment.** The treatment for impetigo varies, depending on the severity. Mild cases of impetigo often resolve through the use of mild cleansing, removal of crust formations, and

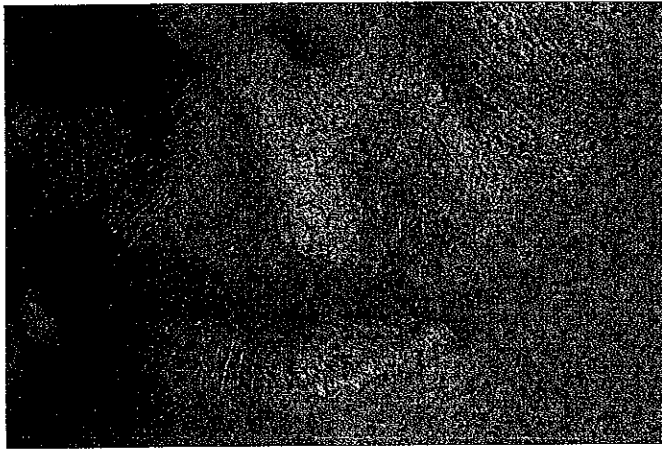


FIGURE 21-13 Impetigo.

topical antibiotic ointment. More severe cases of impetigo may require the use of oral antibiotics.

### Keloids

A **keloid** is a type of skin lesion that can appear following a surgery or injury; however, keloids also sometimes appear spontaneously after minor inflammation. Keloids can grow and extend past the original site of injury. This separates them from hypertrophic scars, which are similar to keloids but remain confined to the area of injury. Burns and piercings have also been known to produce keloids.

**Signs and Symptoms.** These unsightly skin blemishes can appear thickened and raised and red or pink in color (Figure 21-14). These skin lesions also have a dome-like appearance. Keloids tend to be itchy and bothersome, as well as tender to the touch.

**Treatment.** Various treatments are available for keloids. Some of the most common include cortisone injections, surgery,

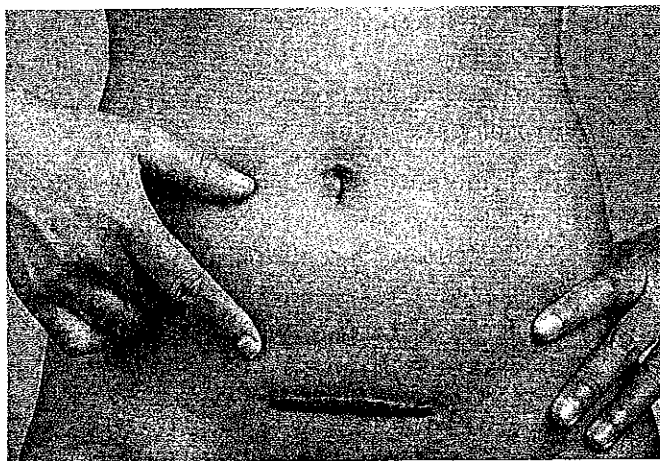


FIGURE 21-14 Keloid.

and laser removal. Additional forms of treatment include cryosurgery, interferon injections, and application of silicone sheets.

### Pediculosis

**Pediculosis** is an infestation of lice in the form of eggs, larvae, or adult lice. Under suitable conditions of exposure, anyone may become louse-infested, as pediculosis is easily transmitted from person to person during direct contact. It is not caused by uncleanliness, which is a common myth. Forms of pediculosis include *Pediculus humanus capitis* (head louse), *Pediculus humanus corporis* (body louse), and *Phthirus pubis* (pubic louse). Head lice are commonly found in school and institutional settings. They are often transmitted with the sharing of hats, combs, or clothing. Body lice generally reside along the seams of clothing. This form of lice is commonly found in places that are both crowded and unsanitary. Pubic lice, also known as crabs, are usually sexually transmitted.

**Symptoms.** The most common symptom of all forms of lice is itching. Head lice tend to cause itching around the back of the head or around the ears. Itching surrounding the genitals is an indicator of pubic lice. Body lice tend to travel to the body to feed on skin and then return to clothing.

**Treatment.** Prescription and nonprescription medications are available for the treatment of pediculosis. Pyrethrin-based medicated shampoos and cream rinses do not require a prescription, whereas Lindane-based shampoos do.

Nit combs are also available to help remove nits (lice eggs) from hair. To ensure that nits have not survived, retreatment after seven to ten days is recommended.

### Psoriasis

**Psoriasis** affects an estimated 7.5 million Americans. Though it can develop at any age, psoriasis develops most commonly between ages 30 and 50. This condition has genetic and autoimmune characteristics. Psoriasis is thought

## Professionalism The Workplace



Patients with integumentary problems may have diseases that are contagious to the personnel in the medical office. Although all medical offices must practice standard precautions to prevent disease transmission, it is especially important that the medical assistant wear gloves when touching the skin of patients with contagious illnesses. Increased sanitization practices might also be required for exam tables and other surfaces that might come in contact with highly contagious skin conditions.



to be caused by a buildup of dead skin cells that, rather than shedding off, pile and form scaly patches. Though it can be unsightly, psoriasis is not contagious.

**Signs and Symptoms.** Psoriasis is characterized by episodes of redness, itching, and thick, dry, silvery scales on the skin. Joint pain may also accompany this condition. Its onset can be gradual or abrupt. Flare-ups have been attributed to infections, obesity, and lack of sunlight, as well as sunburn, stress, poor health, and cold climate. When the case is severe and widespread, large quantities of fluid can be lost, causing dehydration and severe secondary infections that can be serious.

**Treatment.** The extent and severity of psoriasis determines the course of treatment. Treatment involves analgesics, sedatives, intravenous fluids, retinoids, and antibiotics. Mild cases are treated at home with topical medications such as prescription or nonprescription dandruff shampoos, cortisone or other corticosteroid creams, and antifungal medications. Severe lesions may require hospitalization for proper treatment.

## Rosacea

**Rosacea** is a disorder that primarily affects the facial skin, often characterized by flare-ups and periods of remission. This condition affects an estimated fourteen million Americans—and most of them do not know they have it.

**Signs and Symptoms.** Signs of rosacea include redness on the cheeks, nose, chin, or forehead. Other signs include small visible blood vessels on the face, bumps on the face, and watery or irritated eyes. Over time, the redness becomes ruddier and more persistent.

**Treatment.** Therapies and medications are available to treat the symptoms associated with rosacea such as topical

antibiotic or cortisone-based creams. Currently, a cure is not available for rosacea. Avoiding extreme temperatures and temperature changes, reducing alcohol intake, and the use of sunscreen can help prevent or mitigate rosacea outbreaks.

## Scabies

**Scabies** is a highly contagious disorder of the skin. It is caused by the human or scabies itch mite. Scabies is spread by direct personal contact, such as by shaking hands, or by indirect contact, like sharing infected articles such as clothing, bedding, or towels. Common among schoolchildren, roommates, and sexual partners, scabies is usually found where people are crowded together.

**Signs and Symptoms.** As the female lays her eggs, a very small zigzag blister marks her trail. It is fairly difficult to see this; however, symptoms and signs such as intense itching and a red rash around the area are more obvious. The sides of the fingers, backs of the hands, wrists, heels, elbows, armpits, inner thighs, and waistline are common locations for scabies (Figure 21-15).

**Treatment.** Since Roman times, sulfur has been used as a scabicide. Sulfur is most often used in a cream or ointment with a 6 to 10 percent concentration. Corticosteroids and antihistamines are often used to relieve itching.

## Seborrheic Dermatitis

**Seborrheic dermatitis** is an inflammatory condition of sebaceous or oil glands caused by an increase in sebum. This disorder is most common in infants and children and is frequently known as cradle cap.

**Signs and Symptoms.** Some of the classic signs and symptoms of seborrheic dermatitis include yellow or white scales that attach to the hair shaft, thick or patchy crusts on the scalp, itching, soreness, and dandruff.

## Professionalism The Law



Because examination of the skin often requires that clothes be removed, be very careful to ensure that plenty of sheets are available for draping the patient, so that only the area being examined can be seen and the patient is otherwise covered. This protects the patient's right to privacy and confidentiality during the examination. Be sure that the door to the exam room is completely closed, and never permit anyone else to enter unless the patient is completely covered. To help the patient feel comfortable, follow your facility protocols regarding assisting the physician during a skin examination.

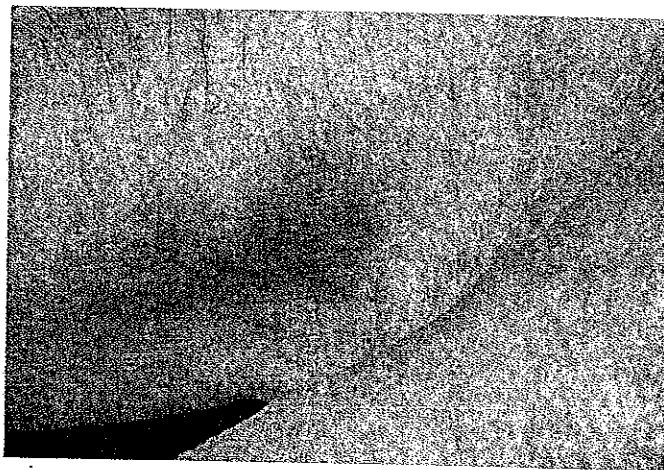


FIGURE 21-15 Scabies.



**Treatment.** This form of dermatitis is treated with medicated low-strength creams. Although there is no prevention, shampooing the scalp daily with medicated shampoo can alleviate the problem by reducing the amount of oil on the surface of the scalp.

## Tinea

Tinea is any of several fungal infections of the skin. **Tinea corporis**, sometimes called ringworm, is not actually a worm but an integumentary disorder. Caused by a fungus, it can appear anywhere on the body. If the fungus is on the head, it is called **tinea capitis**. On the foot, it is known as **tinea pedis**, or athlete's foot. When found in the genital area, it is referred to as **tinea cruris**, more commonly referred to as jock itch. Elsewhere on the body, the fungus is called tinea corporis (Figure 21-16).

**Signs and Symptoms.** Tinea usually presents in the form of a ring, often with itchy, red, scaly patches.

**Treatment.** Tinea is treated with antifungal creams or oral antifungal agents. Over-the-counter medication is available, but if the infection is severe, a prescription medication may be required.

## Urticaria

**Urticaria**, also known as hives, is a red, raised, severely itchy rash caused by acute hypersensitivity to medications, food, or environmental stimuli (Figure 21-17). The major concern related to urticaria is that it can obstruct the airway by causing airway constriction, which occurs with a severe allergic reaction termed *anaphylaxis*. Because of the possibility of airway constriction, ask patients about allergies before an injection and observe after an injection or allergy test for wheezing or other indication of breathing problems for the length of time the physician specifies.



FIGURE 21-16 Tinea corporis.

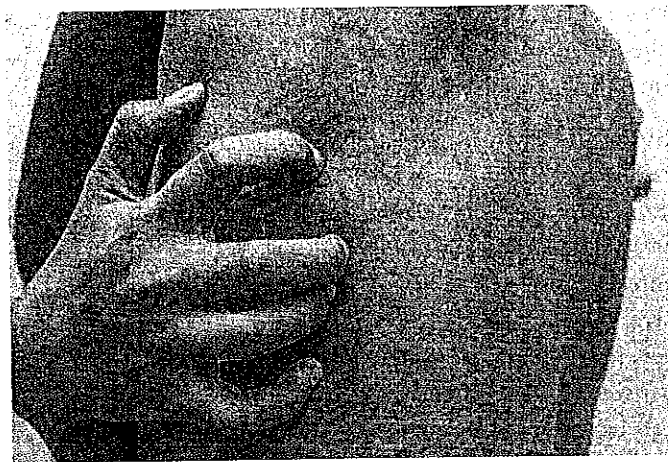


FIGURE 21-17 Urticaria (hives).

**Signs and Symptoms.** Signs include localized areas of pink, itchy, swollen patches of skin. It is common for burning or stinging sensations also to be felt. Hives may vary in size from the diameter of a pencil eraser to the diameter of a cereal bowl. Many times, the hives may overlap, forming even larger areas of irritation and swelling.

**Treatment.** Treatment consists of removing the causative allergens and treating with antihistamine and, in severe cases, epinephrine.

## Vitiligo

**Vitiligo**, also known as leukoderma, is a disorder that causes white patches and large areas of decreased pigmentation to form on the skin. These patches form from the destruction of melanocytes, the cells that produce melanin for pigmentation. This disease is often linked to immune system disorders, such as Addison's disease or pernicious anemia. Vitiligo also affects those with thyroid disorders.

**Signs and Symptoms.** Vitiligo is marked by the early or premature graying or whitening of body hair or by the depigmentation of skin or mucous membranes. When the skin is affected, it generally begins to appear on the neck, armpits, elbows, genitals, hands, or knees.

**Treatment.** The treatment of vitiligo is aimed at evening skin tone and color. This may be done by cosmetic, medical, or surgical means. Using sunscreen and avoiding tanning help make the depigmentation less noticeable. Makeup and self-tanning lotions may also be used to even out the skin tone. Medical treatments may include the use of topical corticosteroid therapy as well as a form of topical ultraviolet therapy. Skin grafting as well as a form of tattooing called micropigmentation may also be successful.

## Professionalism



While in a professional environment, courtesy and manners are essential to the medical assistant's practice. Unless instructed to do otherwise, always call adult patients (especially older adults) by Mr., Mrs., or Ms. Saying "Please" and "Thank you" also helps to establish you as a courteous, caring professional. Never address any patient with endearments such as "honey" or "sweetie." Although some individuals may find this cute, many others will find it demeaning. Convey an attitude of being caring, professional, and sincere. Speak in full sentences, using complete words and avoiding slang, and your patients will know that you are a professional.

### Verrucae (Warts)

Warts, or **verrucae**, are infections caused by viruses in the human papillomavirus (HPV) family. There are at least 60 types of HPV viruses. Warts can grow on all parts of the body, including the skin, the inside of the mouth, the genitals, and the rectal area. A common wart is the plantar wart, which is always located on the soles of the feet.

**Signs and Symptoms.** The appearance and texture of a wart varies based on its location. Warts may appear grainy, fleshy, and varied in color from flesh-toned to red, pink, or white. Warts may also appear as raised or flat skin lesions. The size of a wart can vary from 1 mm to 1 cm. At times, plantar warts may cause pain in the heel or soles of the feet.

**Treatment.** Depending on the size, location, and type of wart, various treatments are available. Over-the-counter medicines containing salicylic acid are available. A physician may perform cryotherapy, which freezes the wart; generally, liquid nitrogen is used in this procedure. Physicians may also prescribe various prescription medications. In severe cases, minor surgery may be an option.

## SKIN CARE TREATMENTS

Advancing medical technology and the desire to capture a youthful skin radiance and appearance have led to the surging popularity of medical skin care treatments. Many of the procedures that are discussed next are performed by trained and experienced professionals in a dermatologist's office or in a medical spa setting. Along with researching these procedures, patients should always use discretion when choosing a health care professional who specializes in this area of expertise. Often, after many of these procedures, patients are instructed to reduce sun exposure for

specified periods of time, depending on the type of treatment performed.

It is important to note that because many of these procedures are considered cosmetic (to improve appearance) rather than medical (to treat a condition or disease), they might not be covered by a patient's medical insurance and the patient may have to pay for these procedures from their own funds.

### Botox

Botox is a popular procedure that is indicated for reducing wrinkle lines. Most often, botox is used for frown lines, forehead lines, and wrinkles around the eyes, which are commonly referred to as crow's feet. A very small, diluted amount of the toxin *Clostridium botulinum* is injected into the wrinkle lines. This toxin causes wrinkles to relax and soften, thereby diminishing their visibility. For maintenance, this procedure is usually repeated every four to six months. Side effects of the treatment include headaches, bruising, and eyelid drooping, all of which are temporary.

### Chemical Peel

A chemical peel is a type of chemical surgery that uses various acid concentrations to remove old and damaged layers of skin cells. A chemical peel can be performed at one of three levels.

- **Light chemical peel**—The purpose of this peel is to reduce the size of pores, make the skin appear softer, and produce more coloring in the skin. During a light chemical peel, only the top layer of the skin is stripped. The procedure is completed in about an hour and leaves a mild redness to the skin, which disappears as time progresses.
- **Medium chemical peel**—The purpose of a medium chemical peel is to reduce wrinkles. It results in much smoother skin than the light chemical peel can produce. The medium peel results in the top layer and some underlying cells being stripped, causing collagen and elastin to be stimulated. Recovery from a medium chemical peel can last up to 10 days because of the peeling, swelling, and redness that occur after the treatment.
- **Deep chemical peel**—This is an aggressive treatment that can affect the layers of skin down to the dermal layer. This procedure is aimed at reducing all signs of aging in all but certain areas of the face. With this level of chemical peel, skin conditions such as pigmentation disorders and precancerous lesions can be removed. The healing process involves

considerable pain, often felt up to 12 hours post surgery. Analgesic medications are required. It may take weeks for additional peeling, swelling, and redness to subside.

### Laser Resurfacing

Laser resurfacing is one of the newer treatments available to reduce the signs of aging. Short, pulsed laser beams vaporize damaged or troublesome areas of the skin. Full-face laser resurfacing takes approximately one to two hours, whereas a partial-face resurfacing takes 30 to 45 minutes. The resurfacing results in the stimulation and production of new collagen and skin cells, which results in younger and tighter-looking skin. Immediately following the procedure, antibiotic ointment and sterile dressings are applied to reduce the incidence of infection. The patient returns to the office one to three days after the procedure to have the sterile dressings removed. Analgesics are prescribed for pain relief. Complete healing following laser resurfacing takes approximately 10 to 21 days.

### Microdermabrasion

During microdermabrasion, the top layer of dead skin cells is removed to provide the skin with a rejuvenated look. Tiny crystals work with abrasion and suction devices to produce healthier-looking skin. This noninvasive and non-chemical approach is appealing to many patients who do not wish to pursue more aggressive skin-freshening treatments. Candidates for microdermabrasion include those who wish to erase signs of aging, including fine lines,

wrinkles, and sun-damaged skin. As with other skin care treatments, it is important to find qualified professionals to perform this procedure.

### SUMMARY

The integumentary system is composed of the skin and accessory organs. The skin is the largest organ of the body and serves protective, regulatory, sensory reception, absorptive, and secretory functions.

The skin provides many protective functions for the body, including preventing infection and preserving the internal environment. Skin also helps to promote optimum temperature levels. The protective function of the skin is supported by several layers: the epidermis (stratum corneum, stratum lucidum, stratum granulosum, stratum germinativum) and the dermis. Accessory organs that support the skin are the hair, nails, sebaceous glands, and sudoriferous glands.

The large integumentary system is prone to disorders. Several types of skin cancer can develop: basal cell carcinoma, squamous cell carcinoma, and melanoma. Other disorders include acne vulgaris, alopecia, cellulitis, contact dermatitis, corns and calluses, decubitus ulcers, eczema, furuncles and carbuncles, folliculitis, herpes simplex and herpes zoster, impetigo, keloids, pediculosis, psoriasis, rosacea, scabies, seborrheic dermatitis, tinea, urticaria, vitiligo, and verrucae.

New techniques in skin care treatments help reverse the signs of aging, including wrinkles and sun damage. Some of the more common treatments include chemical peels, laser resurfacing, and microdermabrasion.

## 21 CHAPTER REVIEW

### COMPETENCY REVIEW

1. Define and spell the terms for this chapter.
2. What is the primary organ of the integumentary system?
3. Name the four accessory structures of the integumentary system.
4. Name the five functions of the skin.
5. Name the three layers of the skin.
6. What is the protein substance in the dead cells of the outer layer of skin that strengthens and firms the skin?
7. Name the four layers of the epidermis.
8. What is the name of the crescent-shaped area of the nail?
9. What is the name of the cell that gives pigment or color to the skin?
10. What are the ABCDEs of skin cancer?