ASSISTING IN DERMATOLOGY

SCENARIO

Dr. Sam Lee is a dermatologist who employs several medical assistants in his busy private practice. Melissa Bouman, CMA (AAMA), has worked for Dr. Lee since graduating from a medical assisting program last year. Melissa works as a clinical specialist whose primary responsibilities are to perform telephone screening, prepare patients for procedures, and assist Dr. Lee as needed. To fulfill her responsibilities in the dermatology practice, Melissa must be familiar with common diseases and disorders that affect the skin, assist with dermatologic procedures, and be prepared to reinforce patient education about the treatment and prevention of dermatologic conditions.

While studying this chapter, think about the following questions:

- What is the basic anatomy and physiology of the integumentary system?
- What are the common diseases and disorders that affect the integumentary system?
- How can Melissa determine the difference between the levels of burn injuries?
- Why is it important that Melissa understand the concepts of staging and grading of malignant tumors?
- What are the primary malignancies of the skin?
- What dermatologic procedures should Melissa be prepared to perform?

LEARNING OBJECTIVES

1. Define, spell, and pronounce the terms listed in the vocabulary.
2. Apply critical thinking skills in performing the patient assessment and patient care.
3. Explain the major functions of the skin.
4. Diagram the anatomic structures of the skin.
5. Compare various skin lesions and give examples of each.
6. Describe typical integumentary system infections.
7. Differentiate among various inflammatory and autoimmune integumentary disorders.
8. Recognize thermal injuries to the skin.
9. Compare the characteristics of benign and malignant neoplasms.
10. Explain the grading and staging of malignant tumors.
11. Conduct patient education on the warning signs of cancer.
13. Define the ABCDE rule for identifying a malignant melanoma.
14. Summarize allergy testing procedures.
15. Explain dermatologic procedures performed in the ambulatory care setting.
16. Correctly obtain an exudate sample from a wound for laboratory analysis.
VOCABULARY

alopecia (al-o-pe'-'se-uh) Partial or complete lack of hair.
anaplastic Relating to an alteration in cells to a more primitive form; a term that describes cancer-producing cells.
bilirubin (bih-luh-roo'-bin) An orange pigment in bile; its accumulation leads to jaundice.
cryosurgery The technique of exposing tissue to extreme cold to produce a well-defined area of cell destruction.
debridement The removal of foreign material and dead, damaged tissue from a wound.
dermabrasion A procedure in which revolving wire brushes or sandpaper is used to remove superficial scars; it typically is performed to reduce acne scars.
electrodesiccation The destruction of cells and tissue by means of short high-frequency electrical sparks.
exacerbation An increase in the seriousness of a disease, marked by greater intensity of the signs and symptoms.
excoriated Skin that has been injured by scratching; abraded.
glomerulonephritis (glo-me'r-yoo-loh-nih-friz'-eh-tus) Inflammation of the glomerulus of the kidney.

hyperplasia An increase in the number of normal cells.
jaundice A yellow discoloration of the skin and mucous membranes caused by deposits of bile pigments; the deposits occur because of excess bilirubin in the blood.
keloid A raised, firm scar formation caused by overgrowth of collagen at the site of a skin injury.
keratin A very hard, tough protein found in the hair, nails, and epidermal tissue.
keratinocytes The skin cells that synthesize keratin.
leukoderma A lack of skin pigmentation, especially in patches.
opaque Not translucent or transparent; murky.
petechiae (peh-te-'ke-uh) Small, purplish hemorrhagic spots on the skin.
Raynaud's phenomenon Intermittent attacks of ischemia of the extremities; it results in cyanosis, numbness, tingling, and pain.
teratogen (te-rah'-tuh-jen) Any substance that interferes with normal prenatal development, resulting in a developmental abnormality.

The skin is the largest organ of the human body. In an average-size adult, it covers a total area of about 20 square feet. Forming the outer boundary of the body, the skin performs several essential functions: it acts as a barrier to protect vital internal organs from infection and injury; it helps dissipate heat and regulate body temperature; and it synthesizes vitamin D when exposed to ultraviolet (UV) light. In addition, the various sensory receptors present throughout the skin enable it to respond to such sensations as heat, cold, pain, and pressure.

The specialty of dermatology deals with the skin and its accessory structures—the hair, nails, and sweat glands, and the subcutaneous tissue that lies beneath the skin. A physician who specializes in dermatology is called a dermatologist.

ANATOMY AND PHYSIOLOGY

The integumentary system is composed of the skin and its accessory organs. Each square inch of the skin contains millions of cells, numerous specialized nerve endings, hair follicles, muscles, sweat glands to cool the body, and sebaceous glands, which release sebum, an oily substance that lubricates the skin. These diverse structures and glands are nourished by a permeating, elaborate network of blood vessels. The thickness of human skin varies markedly on different parts of the body, ranging from fairly thin over protected areas, such as the eyelids, to very thick over areas subject to abrasion, such as the palms of the hands and the soles of the feet.

Skin is composed of three layers: the epidermis, the thin, uppermost layer; the dermis, the thicker layer beneath that makes up about 90% of the skin mass and often is referred to as the true skin; and the subcutaneous layer, which is composed primarily of fatty, or adipose, tissue (Figure 38-1).

Epidermis

New skin cells, called keratinocytes, are found in the basal cell layer of the epidermis and migrate upward over about 4 weeks. As the cells move toward the surface, they grow flatter and scallier, eventually losing their nuclei and changing into dead skin cells that contain an inert protein called keratin. Keratin makes up the outermost layer of the epidermis and forms a protective barrier across the surface of the skin that helps control water loss from the body. Ultimately, the outermost keratin layer sloughs off as a result of washing and friction. Hair and nails, which are also composed of keratin, are products of the epidermis.

About 95% of the cells in the epidermis are keratinocytes. The other 5% of epidermal cells are pigmented cells, or melanocytes. Melanin is a protein manufactured in the body that gives coloring to the skin and also protects the body from ultraviolet (UV) radiation. Skin coloring is determined not by the total number of melanocytes, which is relatively constant for all races, but rather by the rate at which these cells produce melanin. The amount of melanin produced depends on genetics and exposure to UV light. Individuals with albinism, an inherited recessive trait, are unable to produce melanin, so they have white hair and skin and lack pigment in the iris. Because they have no protection from UV light, they must stay out of the sun.

Dermis

The underlying dermis is a thick layer of connective tissue that contains collagen and elastin fibers as well as water and jellylike materials that make the skin compressible. Collagen fibers help prevent tearing of the skin, and elastin is a flexible fiber that makes the skin resilient. Distributed throughout the dermis are blood vessels, lymph vessels, muscle cells, hair follicles, and sebaceous and sweat glands. The two types of sweat glands are eccrine
glands, which excrete sweat through skin pores to release heat or create sweat in response to stress, and apocrine glands, which open into hair follicles and are located in specific areas, including the axilla, scalp, face, and genitalia. Sweat is odorless when excreted; bacterial action results in odor.

A variety of microorganisms, called normal or resident flora, are found on the skin and may increase the risk of integumentary system infections. Healthcare workers are encouraged to sanitize their hands before and after each procedure to prevent transient microbes picked up throughout the day from becoming resident flora. If transient microorganisms are not destroyed and/or removed by good hand sanitization techniques, they eventually become part of the individual's resident flora. Sensory receptors for the nervous system that detect pain, temperature, pressure, or texture also are located in the dermis.

### Subcutaneous Layer

The subcutaneous layer contains fat cells, which provide insulation and serve as a depository for reserve calories. It also contains blood vessels, nerves, and the base of the appendages of the skin. Subcutaneous tissue is distributed unevenly; and as the human body ages, it thins considerably, which can make administering injections or drawing blood more difficult in aging patients. This loss of subcutaneous tissue is one reason elderly people are unable to compensate for changes in temperature, so they are colder when temperatures drop and hotter when temperatures rise. Aging skin also is very fragile; it is easily traumatized and damaged by items such as the tourniquets used for drawing blood and bandage adhesives. The medical assistant must be very careful to avoid injuring the skin of an elderly person.

### Diseases and Disorders

Skin is continuously exposed to the environment and may be affected by a wide range of disorders, including infections, inflammatory processes, allergic reactions, and tumors. Many skin problems resolve spontaneously, others can be managed with drug therapy, and still others, such as tumors, large cysts, or moles, may require surgical intervention.

### Skin Lesions

Skin lesions can be caused by a systemic problem, such as an allergic reaction to medication, or they may develop from a localized infection. When communicating with the physician, documenting in the patient's chart, or doing telephone screening, always use correct medical terminology to describe skin lesions, such as, "The patient reports a widespread maculopapular rash across anterior trunk" rather than, "The patient has a red raised rash on his stomach."

When you gather details from the patient about the characteristics of lesions, some questions you should consider include the following:

- What is the color, elevation, and texture of the lesion?
- Is there any pain or pruritus (itching)? If pruritus is present, is the area excoriated or inflamed?
- Is there any drainage? If so, what are its characteristics?
- What is the exact anatomic location of the lesion? Have there been changes over time?

Primary lesions are those that appear immediately. Macules, papules, plaques, nodules, cysts, wheals, and pustules all are primary lesions. Secondary lesions are the result of alterations in a primary lesion. Examples of secondary lesions include scales, crusts, fissures, erosions, ulcerations, and scars (Figure 38-2). For instance, vesicles from a partial-thickness burn are primary lesions, but if the blisters break and ulcerations form, healing ends in a scar. Ulceration and scar formation are secondary lesions.

### Infections

**Bacterial Infections**

**Impetigo.** Impetigo is a common, superficial infection, caused by streptococci or Staphylococcus aureus, that usually affects children. Initially, impetigo looks like small vesicles on the face,
**PRIMARY LESIONS**

**MACULE**
Flat area of color change (no elevation or depression)
*Example: Freckles*

**PAPULE**
Solid elevation less than 0.5 cm in diameter
*Example: Allergic eczema*

**NODULE**
Solid elevation 0.5 to 1 cm in diameter. Extends deeper into dermis than papule
*Example: Mole*

**TUMOR**
Solid mass—larger than 1 cm
*Example: Squamous cell carcinoma*

**PLAQUE**
Flat elevated surface found on skin or mucous membrane
*Example: Thrush*

**WHEAL**
Type of plaque. Result is transient edema in dermis
*Example: Intradermal skin test*

**VESICLE**
Small blister—fluid within or under epidermis
*Example: Herpesvirus infection*

**BULLA**
Large blister (greater than 0.5 cm)
*Example: Burn*

**PUSTULE**
Vesicle filled with pus
*Example: Acne*

**SECONDARY LESIONS**

**SCALES**
Flakes of cornified skin layer
*Example: Psoriasis*

**CRUST**
Dried exudate on skin
*Example: Impetigo*

**FISSURE**
Cracks in skin
*Example: Athlete’s foot*

**ULCER**
Area of destruction of entire epidermis
*Example: Decubitus (pressure sore)*

**SCAR**
Excess collagen production after injury
*Example: Surgical healing*

**ATROPHY**
Loss of some portion of the skin
*Example: Paralysis*

**FIGURE 38-2** Different types of skin lesions.
especially around the nose and mouth, that quickly enlarge and rupture, excreting a honey-colored exudate. The exudate forms crusty lesions, and beneath the crust, the area is inflamed and moist (Figure 38-3). Pruritus accompanies the infection, and scratching helps spread the lesions at the site. Impetigo is contagious, and the bacteria are transmitted by direct contact with the drainage, whether at other sites or with other children through the sharing of toys and touching. Consistent hand washing is required to help break the chain of infection. It also is important to keep personal items that may be contaminated, such as washcloths, linens, and drinking glasses, away from other members of the family. If the areas of infection are limited, topical treatment with an antibiotic ointment may be effective. However, impetigo caused by streptococci may result in glomerulonephritis; therefore, more involved infections may require treatment with oral antibiotics.

**CRITICAL THINKING APPLICATION 38-1**

Mrs. Allio called the office because she is concerned that her children have been exposed to a child in the neighborhood who was diagnosed with impetigo. She tells Melissa that her 3-year-old woke up this morning with blisters around his mouth. Dr. Lee prescribes polymyxin-bacitracin-neomycin (Neosporin) ointment to be applied three times daily to the affected areas. What should Melissa tell Mrs. Allio about preventing the spread of the infection to her other children?

**Acne.** *Acne vulgaris* typically begins at puberty and is caused by a number of factors, including inherited predisposition, hormonal fluctuations, exposure to heat and humidity, and the use of oily creams (Figure 38-4). Acne is a disorder of the hair follicle and sebaceous gland unit. It develops when sebum, which reaches the skin surface through the hair follicles, stimulates the follicle walls, causing a more rapid shedding of skin cells. The cells and sebum stick together and form a plug that promotes the growth of staphylococcal organisms in the follicles. The result is the formation of comedones (blackheads), pimples, pustules, or larger abscesses at the site.

Antiacne medications include topical tretinoin gel (Retin-A) or antibacterial creams, such as benzoyl peroxide. Oral antibiotics, such as tetracycline and erythromycin, at a maintenance dose of 250 mg once or twice daily, can be prescribed to control comedones and pustules. Severe cystic acne can be treated with isotretinoin (Accutane), but this drug is a strong teratogen and should never be prescribed for pregnant women or women who are not using contraceptives. The use of oral contraceptives may reduce acne outbreaks as well. Dermabrasion can be performed to remove the scars that form from extreme cases of acne vulgaris.

*Acne conglobata* is a severe form of acne that typically occurs later in life and results in lesions across the back, buttocks, thighs, face, and chest. Abscesses or cysts may form between affected sites, and healing frequently results in keloid formation. This type of acne requires more aggressive treatment with systemic corticosteroids (e.g., prednisone), oral antibiotics, oral retinoids (Accutane), and dermabrasion or debridement to treat excessive scarring.

**Rosacea.** Rosacea is a chronic disease seen most frequently in women between the ages of 30 and 60. It causes inflammation and pustule formation and begins as freque: flushing across the nose, forehead, cheeks, and chin. As the condition progresses, capillaries of the face dilate and are visible across affected areas as small, red, edematous lines; these are accompanied by eye inflammation and photosensitivity. Over time, the face appears red, eye inflammation is more apparent, and painful nodules and pustules form. Men with rosacea may develop rhinophyma, a large, inflamed, bulbous nose caused by hyperplasia of sebaceous nasal tissue (Figure 38-5). Individuals with rosacea eventually may develop an obvious thickening of the skin across the forehead, nose, cheeks, and chin. The condition is treated with topical antibiotics and, as symptoms progress, with oral antibiotics, such as tetracycline, erythromycin, or doxycycline. Antibiotics help treat the pustule formation but do not affect the redness and flushing, which may be the patient’s greatest concern.

**Furuncles and Carbuncles.** A furuncle, or boil, is a localized staphylococcal infection that begins as an inflammation of a hair follicle (folliculitis) or a skin gland. The affected area is raised,
inflamed, and painful and eventually may produce purulent drainage. A carbuncle is a collection of furuncles that have joined to form a large infected area that may drain through multiple sites or form an abscess. Both infections are treated with oral antibiotics, frequent cleansing of the area, application of an antibacterial ointment and, in some cases, surgical incision and drainage of the purulent material.

Cellulitis. Cellulitis, also called erysipelas, is an acute infection of the skin and subcutaneous tissue caused by staphylococci or streptococci. It begins from a small cut, as a result of a skin injury, or develops at the site of a furuncle or ulcer. The area surrounding the site becomes inflamed, edematous, and painful with red streaks along the lymph vessels that lead from the infection. The condition is treated with oral antibiotics. Warm compresses applied locally aid healing, and analgesics may be needed to relieve discomfort. Cellulitis must be treated with caution, because a systemic infection can develop if the lymph glands become involved.

Fungal Infections (Dermatophytoses)

Fungal, or mycotic, infections, such as tinea pedis (athlete's foot) (Figure 38-6, A), tinea cruris (jock itch) (Figure 38-6, B), and tinea corporis (ringworm) (Figure 38-6, C), are extremely common. These pathogens, which tend to live off dead tissue in the keratin layer of the epidermis, the hair, or the nails, cause almost no inflammation in the underlying skin. The fungus invades the skin where it has been damaged or is consistently moist. All of these lesions are pruritic and are characterized by a distinct border with scaling areas that have a clear center. Secondary bacterial infections may occur with excoriation.

The physician typically diagnoses a fungal infection by the way the skin looks and the patient's complaints of pruritus. The skin may be scraped to obtain cells for examination under a microscope, and sometimes the physician may order a skin culture, for which a suspicious area is swabbed or scraped using sterile technique and the sample is sent to the laboratory for analysis. Treatment consists of topical antifungal agents, such as clotrimazole (Lotrimin), ketoconazole (Nizoral), econazole (Spectazole), or nystatin (Mycostatin). Antibiotics may be necessary if a secondary infection occurs. Because mycotic infections thrive in dark, moist areas, the patient should be advised to keep...
the site clean and dry and to wear loose clothing if possible. All types of dermatophytes can become chronic infections if not managed carefully.

*Tinea unguium,* or onychomycosis, is a fungal infection of the toenails and fingernails. Unlike athlete's foot, which occurs on the skin's surface, nail fungus lives in the nail bed and the nail plate. The nail provides the fungus with an extremely well-protected place to live, which is why nail fungus may be especially difficult to treat. The primary sign of nail fungus is the appearance of the nail, which turns yellow, white, or opaque (Figure 38-7). The texture also changes, and the nail becomes thick and brittle. If the fungus has been present for a long time, the nail can become twisted or distorted. The most effective treatment for nail fungus is oral terbinafine hydrochloride (Lamisil), which inhibits the production of fungal cells. However, the drug must be taken for 6 weeks to treat fungal infection of a fingernail and 12 weeks for infection of a toenail, and it carries the risk of liver complications.

**Viral Infections**

**Warts.** Warts, or verrucae, are caused by the human papilloma virus (HPV). Infection with HPV results in hyperplasia of the epidermis and a raised, cauliflower-like appearance. Verrucae can develop anywhere, but the most common sites are the fingers or the soles of the feet (plantar warts). (Genital warts are addressed in Chapter 40.) Most warts resolve over time, but they can be treated with topical chemicals, excised surgically, vaporized with lasers, or removed with cryosurgery.

**Herpes Simplex (Cold Sores).** Cold sores or fever blisters are caused by the herpes simplex virus type 1 (HSV-1). The initial infection may be asymptomatic or may cause painful ulcers along the gum lines of the mouth or on the lips. After the primary infection, the virus remains dormant in the trigeminal nerve and can be reactivated by exposure to the sun or to cold; by the presence of another infection, such as an upper respiratory infection; or when the patient is under stress. The patient reports a feeling of burning, tingling, or numbness before the eruption of vesicles. The blisters heal in 2 to 3 weeks, but the process may be speeded up by the use of topical antiviral drugs, such as acyclovir (Zovirax) or penciclovir cream (Denavir), or with oral antivirals, including Zovirax or valacyclovir (Valtrex). If applied at the first indications of a cold sore, the topical antiviral creams can limit the duration and severity of the outbreak.

**Herpes Zoster (Shingles).** Herpes zoster is an acute inflammatory disorder characterized by highly painful vesicular eruptions on the trunk of the body and occasionally on the face (Figure 38-8). The lesions develop on one side of the body and follow the course of the peripheral nerve, or dermatome, that has been infected by the varicella virus, the same virus that causes chickenpox. If the virus is not completely destroyed by the immune system, it lies dormant in a dorsal root ganglion and is reactivated in later years. The cause of this reactivation is unclear, although it appears to be related to stress, immune system problems, and aging.

The onset of the disorder usually is marked by pain along the nerve pathway, and lesions appear in approximately 3 days. The inflammation lasts 10 days to 5 weeks. The patient is diagnosed by the characteristic pattern of painful lesions, and the diagnosis may be confirmed by isolating the virus in cell cultures. The condition also can be detected by the presence of varicella zoster antibodies in the blood.

Treatment focuses on promoting patient comfort with analgesic and antipruritic medications. Corticosteroid medications (prednisone) and antiviral drugs, including topical or oral acyclovir (Zovirax) and oral famciclovir (Famvir) or valacyclovir (Valtrex), also can be prescribed. One of the most serious complications of herpes zoster is postherpetic neuralgia, which causes chronic pain after resolution of the initial outbreak and may require treatment with a combination of medications, including topical capsaicin (Aplagard) lotion, capsaicin cream (Zostrix), topical lidocaine (Xylocaine), narcotics, a tricyclic antidepressant (e.g., Elavil or Tofranil), and anticonvulsants (including Dilantin, Tegretol, and Neurontin).

Two vaccines are available that may help prevent shingles. The chickenpox (varicella virus) vaccine (Varivax) is given to babies 12 to 18 months old and to older children and adults who have not had the chicken pox; this vaccine reduces the risk and severity
of both chickenpox and shingles. A new varicella-zoster vaccine (Zostavax) is recommended for all adults over age 60, regardless of whether they have had shingles. This vaccine does not guarantee protection against shingles, but it can reduce the duration and severity of the outbreak, and it helps prevent postherpetic neuralgia.

Other Infections

Scabies and Pediculosis. The itch mite (which causes scabies) and lice (which cause pediculosis) are the two most common parasites that infest human beings. Scabies mites are tiny organisms, barely visible to the eye, that burrow into the epidermis (Figure 38-5). Pediculosis can be caused by three different types of lice: head lice (Pediculus humanus capitis; Figure 38-10, A), body lice (Pediculus humanus corporis), and pubic lice (Phthirius pubis; Figure 38-10, B). Both scabies and lice infestations are highly contagious. The diagnosis of scabies may require scraping the skin at an inflamed area and examining the mites under a low-power microscope. Lice can be seen on the hair shafts. Patients describe symptoms of intense itching, possibly a body rash, and a sensation of something crawling on the skin. Treatment consists of ridding the body of the parasite, controlling the pruritus, and disinfecting the home environment to prevent reinfection.

Scabies is treated with a single application of 5% permethrin cream (Elimite) or crotamiton (Eurax) all over the body, from the neck down. Because the medication should be left on for a minimum of 8 hours, it is typically applied before bedtime. The treatment must be repeated in 7 to 10 days to destroy the nits (eggs). If a secondary infection occurs, antibiotics may also be prescribed. All family members and other individuals who have had direct personal contact with the infected person must be treated. Lindane lotion (Kwell) should be used only if permethrin treatment has failed, because it carries the risk of neurotoxicity, including seizures in children.

CDC RECOMMENDATIONS FOR THE TREATMENT OF LICE

The Centers for Disease Control and Prevention (CDC) have established the following recommendations for treating lice:

1. Apply a lice medication (e.g., Nix, Rid, Ovide, Lindane). Do not use cream rinse or a conditioner before applying the medication. Do not rewash the hair for 1 to 2 days after treatment.
2. After the treatment, check the hair and use a nit comb to remove nits and lice every 2 to 3 days. Continue to check for 2 to 3 weeks to make sure all lice and nits are gone. Head lice survive less than 1 to 2 days, and nits die within 1 week if they are not on a person.
3. Retreatment is recommended after 9 to 10 days to kill any surviving hatched lice before eggs are produced.
4. The following measures should be taken to prevent reinfection:
   - Machine wash in hot water and dry on high heat: all clothing, bed linens, and other items worn or used for 2 days before treatment; dry clean items that cannot be washed or seal all exposed items in a plastic bag for 2 weeks.
   - Sock combs and brushes in hot water for 5 to 10 minutes.
   - Vacuum floors and furniture.

Seborrheic Dermatitis

Seborrheic dermatitis is one of the most common chronic inflammatory conditions of the sebaceous glands. It alters the amount and quality of the sebum, resulting in dry or moist, greasy-appearing scales and yellowish crusts on the scalp, eyebrows, eyelids, and sides of the nose, behind the ears, and in the middle of the chest. The disease has many different forms, including cradle cap in infants and dandruff in adults. Seborrheic dermatitis of the scalp can be treated with tar- or sulfur-based shampoos; inflammations of the skin usually are treated with topical corticosteroids, such as triamcinolone diacetate ( Aristocort), betamethasone valerate (Valisone), or fluocinolone acetonide (Synalar). Seborrheic keratosis (age spots) are characterized by benign, slightly raised, tan to black lesions that occur with aging.

Contact Dermatitis

Contact dermatitis is an acute inflammatory response to a skin irritant or exposure to a substance that causes an allergic reaction. An individual who is allergic to latex gloves or who has been
exposed to poison ivy shows the signs and symptoms of contact dermatitis. The patient complains of redness (erythema), edema, pruritus, and vesicles. The patient should be encouraged to wash the affected area immediately after exposure to remove the irritant if possible. Medical treatment includes application of a corticosteroid cream or the use of oral corticosteroid medications (e.g., prednisone or methylprednisolone [Medrol]) if the symptoms are severe.

**Eczema (Atopic Dermatitis)**

Eczema is an idiopathic inflammatory skin disease that tends to occur in patients with a family history of allergies. In young children it may be caused by food allergies, and in older children stress or temperature extremes can trigger flare-ups. The condition usually improves and may disappear as the child ages. Eczema is characterized by a vesicular rash on the face, neck, and elbows and behind the knees and ears. It causes pronounced pruritus that, if left untreated, results in excoriation of the affected area from constant scratching.

Eczema is diagnosed with a comprehensive family history and examination of the skin. The patient may be asked to investigate possible allergens by making a list of all items that might be responsible for the outbreak, or the physician may recommend allergy testing. The goal of treatment is to reduce the frequency and number of eruptions and to relieve the pruritus so that affected areas do not become excoriated. The primary inflammation is treated with topical corticosteroids and oral antihistamines (e.g., diphenhydramine [Benadryl], cetirizine [Zyrtec], or fexofenadine [Allegra]) to control itching. The physician may recommend controlled exposure to sunlight or UV rays to prevent and treat outbreaks. Inflamed plaques indicate a secondary staphylococcal infection, which should be treated with an oral antibiotic.

**Psoriasis**

Psoriasis is a chronic skin disease that produces discrete pink or red lesions covered by silvery scales (Figure 38-11). The disease may begin at any age, although most patients develop the problem before age 40. The lesions are not infectious, and the disease is characterized by periodic flare-ups throughout life. Psoriasis is caused by an autoimmune reaction that speeds up the maturation rate of skin cells. Normal skin cells mature, die, and are shed every 28 to 30 days, but in patients with psoriasis, cells mature in 3 to 6 days, and instead of sloughing off the surface of the skin, they build up and form the classic psoriasis silvery patch.
The affected skin is dry, cracked, and encrusted. Lesions may appear on the scalp, chest, buttocks, and extremities.

Outbreaks of psoriatic plaques are associated with triggers that the patient may be able to identify and therefore avoid, such as infections (e.g., strep throat); an injury to the skin or a bug bite; stress; cold weather; smoking and heavy alcohol consumption; and certain medications, such as lithium for mood disorders or beta blockers for hypertension. Psoriasis is diagnosed by observation of the skin, a careful patient history (a familial link has been established), and/or a skin biopsy. Treatment is palliative, because the disease has no cure. Exposure to UV light may slow cell production, and coal tar preparations help relieve irritation when applied to affected areas. The physician also may order a combination of therapies, including methotrexate; a retinoid, such as acitretin (Soriatane); the immunosuppressant cyclosporine (Neoral); low-dose antihistamines; and oatmeal baths to promote patient comfort. A recently developed approach uses excimer laser treatments that localize high-intensity wavelengths of UV light to targeted plaques, reducing both cell production and inflammation.

**Systemic Lupus Erythematosus**

Systemic lupus erythematosus (SLE) is a chronic autoimmune inflammatory disease of the connective tissue. The cause is unknown, though women are nine times more likely to develop the disease than men. It can affect any connective tissue in the body but typically causes inflammatory changes in the skin, joints, muscles, and kidneys. SLE usually involves more than one organ, and the patient experiences periods of exacerbation and remission. A diagnostic characteristic of the disease is a butterfly-shaped rash that stretches from one cheek across the nose to the other cheek (Figure 38-12). Other integumentary system symptoms include erythematous patches and plaques, alopecia, and photosensitivity.

The prognosis for SLE depends on organ involvement; patients who develop renal, cardiovascular, or neurologic complications have a poor prognosis. Treatment includes the use of nonsteroidal antiinflammatory drugs (NSAIDs), including ibuprofen (Advil), diclofenac (Voltaren), and etodolac (Lodine), or controlled low doses of corticosteroids (prednisone) when needed. Serious cases are treated with cytotoxic drugs (cyclophosphamide [Cytoxan]) and antimarial drugs, such as hydroxychloroquine (Plaquenil) or chloroquine hydrochloride (Aralen), and oral corticosteroids (prednisone) as needed to control inflammatory reactions.

**Scleroderma**

Collagen is a fibrous protein that forms the body's connective tissues, including the skin. Scleroderma is caused by an overproduction and accumulation of collagen in the body's tissues. It is a chronic, progressive, autoimmune disease that causes generalized inflammation of blood vessels throughout the body, leading to the narrowing and destruction of smaller arteries and ultimately fibrotic circulatory changes. Scleroderma also causes destruction of the connective tissue lining and the formation of scar tissue in all the major organs, including the gastrointestinal system, heart, lungs, and kidneys. Integumentary system symptoms include fibrous changes in the skin that result in sclerosis (hardening) of the skin, edema, pallor, pigmentation, and fixation to subcutaneous tissues. These same sclerotic changes can occur in any organ in the body. Raynaud's phenomenon may be the first symptom of the disease. The cause of scleroderma is unknown, but it usually occurs in middle-aged women.

The disease has no cure and no specific treatment. Drugs are used to treat the inflammation and circulatory symptoms of the disease, and analgesics are prescribed for pain. Physical therapy helps maintain muscle strength, but the prognosis is poor. Patients with scleroderma usually die as a result of cardiac, pulmonary, or renal involvement.

**Thermal Injuries**

Skin can be damaged and injured by exposure to moderately high or low temperatures over an extended period. It also can be injured in a relatively short time when exposed to very high or low temperatures. The most common thermal injuries are burns, which are classified as superficial thickness (first degree), partial thickness (second degree), or full thickness (third degree), depending on the depth of the wound (Figure 38-13). With severe burns, all three types commonly are seen in the same location: superficial burns along the edges, partial-thickness burns with vesicles closer to the center, and full-thickness burns at the center of the area.

**Superficial-Thickness (First-Degree) Burn**

A superficial-thickness burn affects only the epidermis, is erythemic (red), blanches with pressure, and is painful but does not have blisters at the site. A mild sunburn and a steam burn without vesicle formation are examples of superficial burns.

**Partial-Thickness (Second-Degree) Burn**

A partial-thickness burn destroys the entire epidermal layer and varying depths of the dermis and causes blister formation and subcutaneous edema and pain. The danger of infection in the
blistered area also is a concern. If a burn is deep enough, some destruction of the hair follicles and the sebaceous glands may occur.

### Treatment of Minor Burns

Because burns damage the natural protection of the skin, preventing infection at the site is a primary concern. Superficial-thickness burns typically heal on their own within a week, as long as they are kept clean and infection does not occur. Medical treatment of partial-thickness burns includes gentle cleansing of the site with a bactericidal solution and debridement of broken blisters or dead skin. Intact blisters should be left alone. Partial-thickness burns may be treated with a thin layer of silver sulfadiazine cream and application of a nonadherent, multilayered dressing for several days to 1 week. The patient's tetanus immunization status should be reviewed, and a tetanus injection should be given if needed. The physician also may order analgesics to relieve pain. Patients with partial-thickness burns (those reporting blisters at the site of the burn) should be seen by the physician for treatment.

### Critical Thinking Application 38-3

Thomas Rangose, a 66-year-old patient, calls the office to report a burn on his right hand and forearm. He fell while passing the stove and burned himself on the hot surface. Mr. Rangose tells Melissa that the area is very red and painful and has blisters in the center. He wants to break the blisters and put butter on the burn. Should Mr. Rangose be seen by Dr. Lee? What should Melissa tell him about how to care for the burn?

### Patient Education for Burn Care

- **Warning signs of infection** include fever, malaise, inflammation, swelling, increased pain, odor, and drainage from the burn area. Any of these should be reported to the physician immediately.
- **Review wound care with the patient**, including gentle cleansing with bactericidal solution (e.g., providone-iodine solution [Betadine]) and covering the wound with an antibiotic ointment (silver sulfadiazine) so that the dressing does not stick to the burn.
- The patient should eat a high-calorie, high-protein diet to maintain weight and promote healing.

### Full-Thickness (Third-Degree) Burn

A full-thickness burn destroys all layers of the skin and may involve underlying fat, muscle, nerves, blood supply, and bone. The area appears charred or white and has a firm, leathery texture. The patient feels no pain, because nerve endings have been destroyed. Full-thickness burns have the potential to cause major complications, including dehydration, circulatory collapse, respiratory distress, and septic shock. Treatment of major burns includes maintaining the patient's airway, replacing fluids, preventing infection, and administering oxygen. Debridement of affected tissue and skin grafts are required for wound healing. Depending on the extent of the burns, the patient may be hospitalized in an intensive care unit or a specialty burn unit.
Burns also are classified according to the percentage of body surface involved, based on the Rule of Nines (see Chapter 36).

**Cold Injuries**

Cold injuries usually are less severe than burns, but prolonged exposure to cold temperatures can result in infection, gangrene, amputation and, in severe situations, death. Frostbite is caused by exposure to subfreezing temperatures. Damage occurs at the level of the capillaries, which become permanently dilated and unable to regulate local blood flow. The signs and symptoms of superficial frostbite include burning, tingling, numbness, and a white or grayish color of the skin. With deep frostbite, blisters form and the area is hard, mottled, edematous, and blue or gray after thawing.

The extent of injury is determined by visual examination and based on the history of the exposure. Treatment consists of warming the area with immersion in warm water (100° to 106°F [38° to 41°C]). The affected site should never be rubbed, because that increases cellular destruction. Vital signs should be monitored and the physician’s orders followed explicitly.

**Benign and Malignant Neoplasms**

A neoplasm is an abnormal growth or tumor that may be either benign or malignant. Table 38-1 outlines the differences between benign and malignant tumors. Invasion and metastasis are the principal criteria used to distinguish between cancerous and non-cancerous tumors. Benign masses are encapsulated, and although they may increase in size, they remain confined within a shell; malignant tumors, on the other hand, invade and take over surrounding tissues. Local invasion of surrounding tissue occurs when malignant cells break through the basement membrane that separates epithelial cells from connective tissue. Here the cancerous cells can invade blood and lymph vessels, which carry the malignant cells to organs throughout the body. Patients diagnosed with carcinoma in situ have a malignant tumor that is confined to the original site of growth without invasion of the basement membrane. Patients with regional spread have evidence of malignant cells in surrounding tissues but no evidence of lymph node involvement. Patients with distant spread, or metastasis, show positive lymph node involvement locally and the development of secondary tumors in other organs, including the lungs, liver, brain, or bones.

Malignant tumors are classified according to their grade and stage. A biopsy sample of the tumor is obtained and sent to a pathologist. The pathologist examines the cells under a microscope and grades the sample according to its histologic, or cellular, classification of differentiation. Differentiation is the process normal cells go through to mature. Immature, or primitive, cells never mature and are classified as anaplastic, or cancerous. Therefore, the more poorly differentiated the cells (i.e., the less they look like normal cells), the more likely it is that the tissue is cancerous. If the physician receives a grading report that indicates anaplastic cancerous cells, the next step is to determine whether the cancerous cells have spread from the original site; this is called staging the tumor. With staging, a physical examination and diagnostic tests (e.g., bone, liver, or positron emission tomography [PET] scans) are done to determine the degree of tumor spread to a secondary location. The size and depth of the primary tumor, the degree of lymph node involvement, and the presence of metastatic spread determine whether the patient has carcinoma in situ (i.e., a tumor localized to the organ of origin), direct spread beyond the primary organ, lymph node metastasis, or confirmed secondary tumor growth in a distant metastatic site. Grading and staging determine the extent of malignant involvement, which allows the physician to plan the appropriate treatment.

Three methods are used to obtain a small piece of tissue for examination under a microscope. In an excision biopsy, such as removal of a mole, the entire lesion may be removed for analysis. A punch biopsy involves removal of a small section from a designated location in the lesion; the center usually is the optimum site. This is done with a scalpel-like circular punch instrument if the lesion is on the surface of the skin, as with a mole (Figure 38-14), or a large-gauge needle and syringe unit is used to aspirate cells and fluid from a suspicious area, such as in a breast biopsy. A shave biopsy is performed with a scalpel by cutting or shaving off the growth or lesion just above the skin line. This method is used to biopsy a possible squamous cell carcinoma lesion. The medical assistant may help the physician perform these procedures.

The protocol for the treatment of cancer depends on the staging, grading, and type of carcinoma. Possible treatments include surgical removal of the tumor, radiation therapy, chemotherapy, hormone therapy, and immune system boosters. These approaches may be used singly or in combination and usually are determined by an oncologist, who is a specialist in the study and treatment of cancer.

### TABLE 38-1 Differences Between Benign and Malignant Tumors

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>BENIGN TUMOR</th>
<th>MALIGNANT TUMOR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cellular structure</strong></td>
<td>Same as surrounding tissue</td>
<td>Anaplastic changes and poor cellular differentiation</td>
</tr>
<tr>
<td><strong>Type of growth</strong></td>
<td>Encapsulated mass that expands over time</td>
<td>Infiltrates and metastasizes; distant spread through the bloodstream or lymph system to other body tissues and organs can occur</td>
</tr>
<tr>
<td><strong>Rate of growth</strong></td>
<td>Usually slow, rarely fatal</td>
<td>May be slow, rapid, or very rapid; almost always fatal if left untreated</td>
</tr>
<tr>
<td><strong>Destruction of localized tissue</strong></td>
<td>None</td>
<td>Commonly, ulceration and necrosis of surrounding tissue</td>
</tr>
</tbody>
</table>

**ASSISTING WITH A TISSUE BIOPSY**

1. Assemble the necessary supplies for the procedure.
2. Prepare the patient with proper gowning, draping, and positioning and make sure the patient understands the procedure.
3. Confirm that the physician has obtained the patient’s informed consent.
4. Prepare the site of the biopsy according to office protocol.
5. Assist the physician as needed, using appropriate personal protective equipment according to Standard Precautions.
6. Label the sample container and prepare it for transport to the testing laboratory. Remember to include laboratory request forms.
7. Clean the procedure area, properly dispose of all waste materials, and disinfect and sterilize equipment used in the procedure.
8. Sanitize your hands and document the procedure, including the patient education provided on biopsy site care.

### CANCER'S SEVEN WARNING SIGNS

The initial letters of the warning signs spell out the word CAUTION. Any of these warning signs should be reported to the physician immediately. Early detection and self-examination are crucial to cancer survival.

- Change in bowel or bladder habits
- A sore that does not heal
- Unusual bleeding or discharge
- Thickening or a lump in the breast or elsewhere
- Indigestion or difficulty in swallowing
- Obvious change in a wart or mole
- Nodding cough or hoarseness

### Neoplasms of the Skin

Neoplasms of the skin may be benign or malignant. Examples of benign tumors include birthmarks and moles (nevi). However, a tumor may be benign but have a predisposition to be cancerous, which means that it can change from a benign state to a malignant one. Whenever a neoplasm is discovered, the physician usually performs a biopsy of the lesion to establish the type of cells involved.

Three cancerous lesions of the skin can occur: basal cell carcinoma, squamous cell carcinoma, and malignant melanoma. Basal cells line the deepest layer of the epidermis. Basal cell carcinoma is very slow growing and the most frequently seen form of skin cancer. The most common sites are areas of the body exposed to the sun, such as the face and forearms. The typical basal cell carcinoma appears as a small, pearly, dome-shaped nodule with small, visible blood vessels called telangiectasia. However, it also can appear as a persistent sore that does not heal and that has a reddish, irritated appearance (Figure 38-15).

Squamous cell carcinoma grows rapidly and is more serious because it has a tendency to metastasize. It appears as a firm, red nodule with visible scales, and it may ulcerate and form a crust (Figure 38-16). Patients typically report both basal and squamous cell skin cancers as sores that persist and never heal.

Malignant melanoma develops from a change in a mole. Sunburns increase the risk of melanoma, and individuals with more moles than average (more than 100) are also at greater risk. Individuals with congenital nevi (moles present at birth) are more likely to develop a melanoma. Additional risk factors include an inability to tan, light or red hair, fair skin, the family history, and the number of childhood sunburns. Many forms of melanoma occur, but all are pigmented lesions (usually brown, tan, blue, red, black, or white) that are asymmetric (i.e., have irregular borders) and usually are larger than 6 mm (Figure 38-17). The staging of the disease depends on the depth of the mass, not on the surface size of the mole. The incidence of malignant melanoma has doubled in the past 10 years, and the disease causes more deaths than all other skin diseases. Melanomas often recur or metastasize within 5 years of diagnosis. The patient should be routinely examined for at least 10 years after removal of a melanoma.

All skin cancers are diagnosed by the appearance of the lesions, with confirmation through biopsy. Treatment depends on the type, level of invasion, and location of the mass. The physician may choose to remove the tumor surgically or eradicate it with cryosurgery, electrodessication, or application of chemothera-
by layer; this minimizes the chance of regrowth and reduces scar formation.

The National Cancer Institute has stated that the best way to prevent skin cancer is to protect the skin from the sun, starting at an early age. People of all ages should do the following:

- Stay out of the midday sun (10 AM to 4 PM).
- Use protection against UV rays reflected off water and snow.
- Use protection against UV rays even on cloudy days, which exposure can still occur.
- Wear protective clothing and a wide-brimmed hat when in the sun and protect the eyes with sunglasses.
- Use a sunscreen that filters both UVB and UVA rays with a sun protection factor (SPF) of at least 15.
- Avoid using artificial sun lamps and tanning beds.

**Early Warning Signs of Malignant Melanoma: ABCDE Rule**

If a mole displays any of the following characteristics, a dermatologist should examine it immediately.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Asymmetry One half of the mole does not match the other half.</td>
</tr>
<tr>
<td>B</td>
<td>Border The edges of the mole are blurred or irregular.</td>
</tr>
<tr>
<td>C</td>
<td>Color The mole is not the same color throughout and has shades of tan, brown, black, red, white, or blue.</td>
</tr>
<tr>
<td>D</td>
<td>Diameter The mole is larger than 6 mm, about the size of a pencil eraser.</td>
</tr>
<tr>
<td>E</td>
<td>Elevation A mole that once was flat against the skin now is raised and elevated.</td>
</tr>
</tbody>
</table>

**Dermatologic Procedures**

The integumentary system can reflect both internal and external reactions and disease processes. The skin holds information about the body's circulation, nutritional status, and signs of systemic diseases. It also acts as a mirror, reflecting aging changes that occur in all organs of the body. For many people, self-esteem is linked to a youthful appearance, and dermatologic conditions may be very threatening to feelings of self-worth. As you prepare patients for a dermatologic examination, allow them to express their anxieties. The impairments that most frequently bring a patient to the dermatologist's office are cosmetic disfigurements caused by a skin disease, pain and pruritus, and interference with sensations or movements.

**Assisting with a Dermatologic Examination**

During a dermatologic examination, the physician inspects the entire body, beginning with the scalp and continuing to the soles of the feet, including the genital area. Inspection of the skin is followed by detailed examination of suspicious areas through palpation, discopy, and special tests. A discopy is a glass plate held firmly against the skin to permit observation of changes produced in underlying areas when pressure is applied. Inspection may include the use of a magnifying lens and a bright light.
to examine a suspicious lesion or growth closely. The dermatologist frequently asks the medical assistant to take photographs of moles and/or chart specific measurements and locations of suspicious lesions. These are placed in the chart for comparison when the patient returns for follow-up visits.

In the physical examination, concerns about the integumentary system include abnormal coloring, such as cyanosis, pallor, erythema, leukoderma, or excessive brown patches. Jaundice may indicate an increase in the level of bilirubin in the blood. Decreased pigmentation is found in vitiligo, an acquired loss of melanin characterized by blotchy white patches on the skin. Lesions, ulcers, and bruises may be the result of pathologic conditions. Localized red or purple changes may be the result of vascular neoplasms, birthmarks, or subcutaneous hemorrhages (petechiae and ecchymoses). Palpation helps confirm findings of the inspection. Therefore inspection and palpation are interrelated in confirming the diagnosis of an integumentary system disorder. Palpated findings may include the skin's texture or elasticity or the presence of edema or a neoplasm.

Gowning and draping of a patient for a skin examination depend on the area to be examined. Remember to expose the area adequately but also to protect the patient's privacy. Try to make the patient as comfortable as possible and offer support when it is needed.

Skin Testing for Allergies
Skin testing to detect allergies requires either percutaneous application or intradermal injection of a small amount of antigen (or groups of antigens) and later examination of the test sites for a visible reaction. The larger the localized skin reaction, the more profound the patient's allergic response to the tested allergen.

Percutaneous Test. A percutaneous, or scratch, test may be performed on the forearm, upper arm, or back. The back is favored in young children because of the large area of skin available. It also is easier to immobilize the child in this position. The skin surface is labeled or numbered in rows 1½ to 2 inches apart, and a small amount of allergen is placed on the skin, which is then scratched or pricked to place the allergen just under the skin surface. Many allergists use a plastic device that is dipped in the designated allergens and lightly pressed into the skin so that the prick and allergen deposition occur at the same time. Seventy or more tests may be done at one time. It is essential to follow a pattern so that the site of each allergen can be easily identified. This type of allergy testing is used for allergic rhinitis, asthma, and detection of food allergies.

A reaction usually occurs within 10 to 30 minutes of exposure to the allergen. If the reaction is positive, a wheal (hive) forms at the site of the scratch (Figure 38-18). Interpretation of the test should always be based on a comparison of this reaction with that of the control, which is a scratch with a plain base fluid free of any allergy-producing extract.

The interpretation, or reading, of the skin tests is performed by the physician or a trained technician. Reactions commonly are graded from 2 to 4. No precise definition of a reaction can be given, and the intensity of the response may vary among individuals. However, as a general rule, a 2 reaction implies a wheal that is definitely larger than that of the control. A larger wheal is interpreted as a 3, whereas the presence of pseudopods (fingerlike extensions around the periphery of the wheal) may be read as a 4. If a strong reaction occurs, the allergen extract should be carefully wiped off to prevent any further exposure. Erythema around the wheal usually is disregarded in the interpretations. Frequently, large or significant reactions are accompanied by local itching. Patients should remain in the office for at least 30 minutes after completion of the test in case a delayed systemic allergic response occurs.

GUIDELINES FOR ALLERGEN SKIN TESTING

- The patient should stop taking all antihistamines or allergy medications 3 to 10 days before testing to prevent false-negative results.
- Recommended sites for injection or application of the allergen are the anterior forearm, the upper arm, and the back.
- Allergen sites must be specifically labeled and spaced approximately 1½ to 2 inches apart.
- If the patient shows signs of anaphylaxis, notify the physician immediately and prepare emergency supplies. Allergy testing should be performed only when the physician is on site.
- Skin testing may cause a mild systemic allergic response, resulting in rhinitis, wheezing, and sneezing. The patient should contact the physician if a more severe reaction occurs.

Intradermal (Intracutaneous) Test. The intradermal test is more sensitive than the percutaneous test and usually is used to diagnose allergies to penicillin and insect venom, such as in bee stings. Extracts are injected into the intradermal layer of the skin in doses of 0.1 to 0.2 mL. This method also is used for the tuberculin (purified protein derivative [PPD]) test and the Valley Fever coccidioidomycosis test. When intradermal injections are used for allergy testing, 10 to 15 allergens may be tested at one
time on each arm. The reaction time is identical to that of the scratch test; however, the antigen is more dilute.

**Radioallergosorbent Test.** The radioallergosorbent test (RAST) measures the level of antibodies created when a sample of the patient's blood is mixed with allergens in the laboratory. The RAST is easier to perform than skin testing, because it requires a single venipuncture. Although skin testing remains the preferred method of diagnosing hypersensitivity, the RAST may be indicated when the patient cannot stop antihistamine medications, if a skin disorder makes accurate interpretation of skin test results difficult, or if skin test results are negative but the patient's signs and symptoms support further investigation.

**CRITICAL THINKING APPLICATION 38-4**

A new employee in the practice asks Melissa's help in understanding the different methods of testing for allergies. What should Melissa tell her about the various skin tests performed in the office and the venipuncture RAST test?

**Treatment of Allergies**

The classic treatment of allergies is to encourage the patient to avoid known or suspected allergens. Unfortunately, this is not always possible, so the physician may prescribe antihistamine medications, such as fexofenadine hydrochloride (Allegra), or over-the-counter medications, including Zyrtec or Claritin, for relief of allergy symptoms. Another option is the use of immunotherapy, a series of injections in which minute doses of known allergens are administered subcutaneously over time to desensitize the patient's immune system and ultimately develop a resistance to the immune response. This usually requires weekly or bimonthly injections over several years. Some patients are cured, whereas others have only a minor reduction in allergic symptoms. Immunotherapy is controversial, because it is an expensive, invasive, and potentially dangerous treatment with unpredictable results. It is recommended only for patients with severe allergic symptoms that are not relieved by antihistamine medications.

If you are responsible for administering allergen injections, you must take great care to dispense the correct dose of each allergen; administer each subcutaneous injection in a separate site; accurately document the procedure and the exact location of each injection; record any local or systemic reactions; and observe the patient for at least 20 to 30 minutes after the injections to detect possible systemic allergic responses, including urticaria, wheezing, or hypotension. If the patient shows any localized or systemic reactions, the physician should be notified.

**Obtaining a Wound Specimen for Culture**

A wound culture specimen is obtained so that a microscopic analysis of the organisms at the site of a lesion can be performed to determine the causative infectious agent. The physician may order a culture if the wound is inflamed or has purulent drainage or if the patient has a fever. Aerobic cultures are performed to detect organisms that grow in the presence of oxygen and are usually found on the superficial surfaces of the wound. Anaerobic cultures check for the presence of organisms that require little or no oxygen and appear in deeper wound sites or areas that have a poor blood supply, such as ulcers or compound fractures (Procedure 38-1). Wound culture results help the physician prescribe the most effective antibiotic for the infection.

**Appearance Modification Procedures**

**Chemical Peel (Chemexfoliation).** Topical agents are used in chemical peels to minimize or remove minor skin features, such as acne scars, hyperpigmentation, and fine wrinkles. Agents used for chemical peels include tretinoin cream 0.05% to 0.1% concentration (Retin-A), alpha hydroxy acid, trichloroacetic acid, or phenol (carbolic acid). During application, care must be taken to prevent the solution from entering the eyes. The use of chemical exfoliating agents may cause the skin to appear inflamed and dry with crusting and edema. The patient may complain of stinging and burning at the beginning of the treatment regimen. The patient should avoid sun exposure for the length of treatment and use a sunscreen with a minimum SPF of 15 because photophobia (light sensitivity) is a typical side effect of treatment.

**Dermabrasion.** A dermabrader is a handheld device that mechanically evens the layers of dermal tissue. It is effective in the treatment of scars from acne vulgaris. Either topical anesthetics (e.g., eutectic mixture of local anesthetics and lidocaine) or locally injected anesthetics are used for the procedure. Besides the dermabrader, the dermatologist may use a variety of wire brushes, abrasive discs, or other devices to smooth scar tissue. Standard Precautions must be followed, including the use of face and eye guards, to prevent aerosol or splatter contamination from the wound. The patient should be educated about wound care, signs of infection, and the presence of photophobia for 6 to 12 months after the procedure.

**Laser Resurfacing (Photothermolysis).** Laser therapy may be used for fine lines and wrinkles, pigmented areas, shallow scars, and tattoo removal. Typically, the patient is instructed to prepare the site 3 to 6 weeks before the procedure with tretinoin (Retin-A), alpha hydroxy solutions, or bleaches. Laser procedures are performed with the patient under local, regional, or general anesthesia. During the procedure, it is extremely important that both the patient and all personnel wear the type of eye protection recommended by the laser manufacturer. After the procedure, cool packs are applied to help reduce swelling, and topical antibiotic ointment is used to prevent infection. The treated area appears inflamed and edematous and can take up to 2 weeks to heal; it can take as long as 6 months for the inflammation to fade.

**Botulinum Intractions.** Botulinum is a strong neurotoxin (a substance toxic to nerves) produced by Clostridium botulinum, a bacterium that causes food poisoning. Two strains of the botulism bacterium are used in dermatologic procedures for appearance modification. Botulinum treatments involve injection of the substance around the eyes, mouth, and forehead. The toxin interferes with nervous stimulation, which temporarily paralyzes the muscles of the face that cause wrinkles to form. It also smooths out the skin and makes it look younger and fresher. The effects are short term, so treatments must be repeated every 3 to 4 months, and some patients complain of an inability to show facial expression because of muscle paralysis.
PROCEDURE 38-1

Obtain Specimens for Microbiologic Testing: Collect a Wound Specimen for Testing and/or Culture

GOAL: To obtain an adequate sample for culture without contaminating the specimen.

EQUIPMENT and SUPPLIES

- Sterile culture kit containing tube, swabs, and transport medium (for swabbing)
- Sterile culture kit containing syringe and transport medium (for aspirating)
- Laboratory requisition
- Sterile gauze squares
- Recommended wound-cleansing solution
- Sterile dressing
- Gloves
- Biohazard container
- Face guard
- Patient’s record

PROCEDURAL STEPS

1. Sanitize your hands, gather supplies (Figure 1), and put on gloves and face protection.
   PURPOSE: To follow Standard Precautions.
2. Remove the dressing from the wound and dispose of it in a biohazard waste container.
   PURPOSE: To ensure infection control.
3. Observe the wound and make note of the color, odor, and amount of exudate present.
   PURPOSE: To note this information in the patient’s record.

4. Swabbing: Remove the swab from the culture kit, insert it into the wound, and saturate it with the exudate. If necessary, use more than one swab, properly labeling each container, to obtain exudates from the entire wound. If preparing an anaerobic culture, place the specimen in the culture tube as quickly as possible to prevent oxygen exposure and possible destruction of microbes.

5. Aspirating: Remove the syringe from the kit, insert the tip into the wound exudate, and draw back the plunger, drawing the exudate up into the syringe.

6. Place the swab into the culture tube and crush the transport medium ampule, which is in the transport tube, by squeezing the walls of the transport tube slightly or place the exudate-filled syringe directly into the transport tube (Figure 2).

7. Label the culture tube accurately. Include on the laboratory slip the patient’s recent antibiotic therapy, the wound site, and the suspected organism.

8. Clean the wound as ordered by the physician and apply a sterile dressing to the area (see Chapter 57 for the sterile dressing procedure).

9. Clean the area and dispose of all waste materials in a biohazard waste container. Remove your gloves and sanitize your hands.
   PURPOSE: To ensure infection control.

10. Place the culture tube in the laboratory collection area. Document the procedure and all wound data in the patient’s record.
    PURPOSE: A procedure is not done until it is recorded.

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CLOSING COMMENTS

Patient Education

The field of dermatology offers medical assistants many opportunities and topics for patient education. Skin care products are advertised in the newspaper, on billboards, in magazines, and on television. Consult the dermatologist for whom you work and get approval of skin care products the office can recommend to patients. Sometimes companies that manufacture skin care products will provide samples if contacted and informed that the office recommends a certain product to patients. Patients enjoy receiving samples and encouragement to try a new skin care technique.

Another area of patient education involves the potentially dangerous effects of sunlight and tanning beds. Obtain literature showing how UV rays cause premature aging and may cause cancerous lesions later in life. You can explain the meaning of the sun protective factor in sun-tanning lotions. Tanning beds should be avoided, especially by individuals with a skin disorder.
and those taking medications that cause photophobia. Providing patients with information about the warning signs of cancer also is a vital part of patient education in a dermatology practice.

### Legal and Ethical Issues

Working in a dermatology practice, you will hear many patients express concern about skin disorders. Allowing patients to express their concerns and using therapeutic listening techniques are always helpful; however, be careful when offering encouragement about the course and outcome of treatment. No treatment can restore youth. The improvement achieved may be slow and gradual. Keep encouragement on a positive level. Compliment the patient on small improvements, but remember that it is the physician’s role to explain potential treatment outcomes.

### SUMMARY OF SCENARIO

Melissa enjoys her work with Dr. Lee, and she recognizes that she needs to keep up with new developments in the field of dermatology. She has learned the importance of giving patients accurate information while conducting telephone screening and always asks questions or concerns to Dr. Lee. Melissa especially enjoys the patient education aspects of working for a dermatologist, including teaching patients the importance of using sunscreen, controlling sun exposure, and checking for the warning signs of cancer. Melissa also has learned how to assist Dr. Lee with dermatologic procedures, including performing allergy skin testing, obtaining wound cultures, and assisting with biopsies, chemical peels, dermabrasions, and laser resurfacing.

### SUMMARY OF LEARNING OBJECTIVES

1. Define, spell, and pronounce the terms listed in the vocabulary.
   - Spelling and pronouncing medical terms correctly bolster the medical assistant’s credibility. Knowing the definition of these terms promotes confidence in communication with patients and co-workers.

2. Apply critical thinking skills in performing the patient assessment and patient care.
   - Completing the Critical Thinking Application exercises throughout the chapter can help the student medical assistant become more adept at critical analysis of real-life situations.

3. Explain the major functions of the skin.
   - The skin acts as a barrier to protect vital internal organs from infection and injury. It also helps dissipate heat and regulate body temperature, and it synthesizes vitamin D when exposed to UV light. In addition, various sensory receptors all over the skin enable the body to respond to heat, cold, pain, and pressure.

4. Diagram the anatomic structures of the skin.
   - The skin is made up of three layers: the epidermis, which is the thin, uppermost layer; the dermis, which is the thicker layer beneath that makes up approximately 90% of the skin mass; and the subcutaneous layer, which is primarily fatty or adipose tissue.

5. Compare various skin lesions and give examples of each.
   - Figure 38-2 shows different types of skin lesions. The diagnosis of skin lesions is based on the color, level of elevation, and texture of the lesion; whether pruritus, excoriation, pain, or drainage is present; and whether the lesion is a primary or secondary growth.

6. Describe typical integumentary system infections.
   - Integumentary system infections include bacterial infections, such as impetigo, acne vulgaris, furuncles, carbuncles, and cellulitis; fungal infections, including a variety of tinea growths; viral infections, which cause warts, herpes simplex, and herpes zoster outbreaks; and scabies or pediculosis infections.

7. Differentiate among various inflammatory and autoimmune integumentary disorders.

8. Recognize thermal injuries to the skin.
   - The most common thermal injuries are burns, which are classified as superficial, partial-thickness, or full-thickness burns, depending on the depth of the wound. The most important concern in the treatment of burns is the prevention of infection. Cold injuries usually are less severe than burns, but prolonged exposure can result in infection, gangrene, amputation, and death.

9. Compare the characteristics of benign and malignant neoplasms.
   - Benign masses are encapsulated, whereas malignant tumors invade and take over surrounding tissues. Local invasion of surrounding tissue occurs when malignant cells break through the basement membrane that separates epithelial cells from connective tissue. This allows the cancerous cells to invade blood and lymph vessels, and blood and lymph then can carry the malignant cells to organs throughout the body.

10. Explain the grading and staging of malignant tumors.
    - Grading is the histologic, cellular classification of a tumor. More poorly differentiated the cells from the tumor are, the closer the biopsy sample is to an anaplastic cancerous mass. Staging involves using physical examination and diagnostic tests (such as bone or liver scans) to determine the presence and spread of malignant tumors.

11. Conduct patient education on the warning signs of cancer.
    - The warning signs of cancer include any change in bowel or bladder habits; a sore that does not heal; unusual bleeding or discharge; a thickening or lump in the breast or elsewhere; indigestion or difficulty swallowing; an obvious change in a wart or mole; or a nagging cough or hoarseness. Any of these warning signs should be reported to the physician immediately. Early detection and self-examination are crucial to cancer survival.

Three cancerous lesions of the skin occur: basal cell carcinoma, which is very slow growing and the most frequently seen form of skin cancer; squamous cell carcinoma, which grows rapidly and is more serious because it has a tendency to metastasize; and melanomas, which are pigmented lesions that are asymmetric, have irregular borders, and usually are larger than 6 mm. Treatment depends on the type of lesion, the level of invasion, and the location. The physician may surgically remove the tumor or destroy it with cryosurgery, electrodesiccation, laser treatment, or the application of chemothapeutic agents.

13. Define the ABCDE rule for identifying a malignant melanoma.
The ABCDE rule includes examination of the site for any of the following: asymmetry, irregular border, change in color, increase in the diameter and elevation. If a mole displays any of these characteristics, a dermatologist should check it immediately.

14. Summarize allergy testing procedures.
Allergy testing is done by exposing the patient to suspected allergens, either through a scratch on the skin or an intradermal injection, and then observing the exposure site to see whether a localized allergic reaction develops. The patient must be off antihistamine drugs for several days before testing. The sites for allergen exposure are the upper arms, anterior forearms, and back. A physician must be present in the facility while allergy testing is being done because of the potential for local or systemic allergic reactions in sensitized individuals.

15. Explain dermatologic procedures performed in the ambulatory care setting.
Dermatologic procedures include allergy skin testing that can be done with scratch or intradermal tests; drawing blood for a RAST test; treating allergies with immunotherapy; performing a wound culture; and assisting with appearance modification procedures, including chemical peels, dermabrasion, and laser resurfacing.

16. Correctly obtain an exudate sample from a wound for laboratory analysis.
Procedure 38-1 summarizes the steps for collecting a wound sample for culture.

**CONNECTIONS**

Study Guide Connection: Go to the Chapter 38 Study Guide. Read and complete the activities.

Evolve Connection: Go to the Chapter 38 link at evolve.elsevier.com/kian to complete the Chapter Review and Chapter Quiz. Peruse other resources listed for this chapter to increase your knowledge of Assisting in Dermatology.