12 SKIN DISEASES PRIMARY CARE

CORE CONCEPTS

- Recognize the location and roles of the three layers of skin.
- Identify and treat common skin diseases.
- Discuss conditions that may affect a soldier's duty performance.

INTRODUCTION

The skin is the largest organ of the body; if laid out flat it would cover approximately 20 square feet. The skin is a multipurpose organ that protects us from the elements by helping to regulate body temperature and gives us the sensation of touch, heat, and cold. It also provides a barrier that helps keep pathogens, chemicals, and other undesirable substances from entering the body.

ANATOMY AND PHYSIOLOGY OF THE SKIN

The skin incorporates three layers (Figure 12-1). The **epidermis** is the thin outer layer, consisting mostly of dying and dead cells that shed constantly and are replaced from beneath by new cells. The epidermis has no blood vessels, so the dermis must supply its nutrition. The **dermis** is a thick layer of connective tissue below the epidermis. Rich in blood supply and nerve endings, it contains hair follicles and sebaceous glands that secrete oil to lubricate the epidermis. The **subcutaneous** tissue is beneath the dermis and contains fat, sweat glands, and hair follicles. The subcutaneous tissue provides insulation, cushioning, and a reserve energy source.

Note: Elevations and depressions in the epidermis and dermis form fingerprints. These patterns of ridges and grooves are hereditary and unique to each individual.

The skin protects underlying tissues from dehydration and injury. It regulates body temperature by controlling heat loss. In cold weather, blood vessels in the skin constrict to help conserve heat. In hot weather, they dilate and bring more blood to the skin surface, allowing the release of heat into the air. The skin is the site of many nerve endings, and it provides a place for the temporary storage of fat, glucose, water, and salts. Its properties allow it to absorb certain drugs and other chemicals.

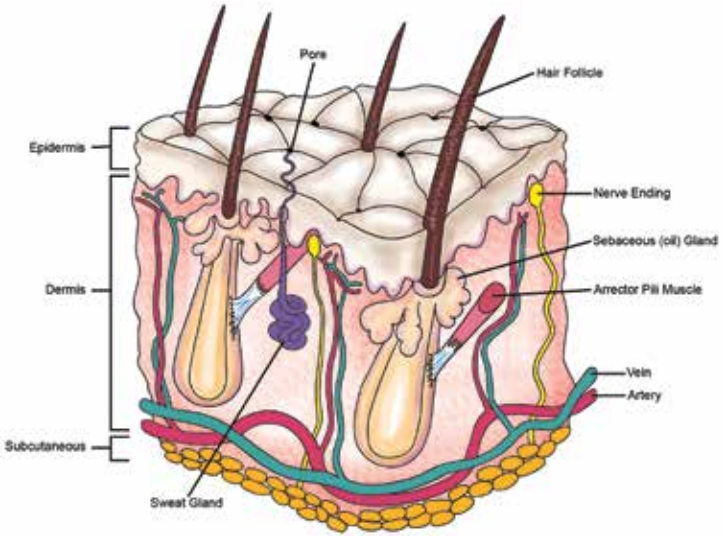

Figure 12-1. Anatomy of the skin.

PHYSICAL EXAMINATION OF THE SKIN

To examine the skin, first expose the area to be inspected. If the skin condition is on an extremity,

Figure 12-2. Step 1. Expose the affected area.

Figure 12-3. Step 2. Compare the affected arm to unaffected arm for symmetry or visible differences.

Figure 12-4. Step 3. Palpate the skin, noting moisture, temperature, and turgor.

inspect both extremities for symmetry or differences (Figure 12-2). Inspect the skin for any change in appearance such as color, uniformity, thickness, and lesions (Figure 12-3). Next, palpate the skin (Figure 12-4). Note moisture, temperature, and **turgor** (also known as skin elasticity and hydration). When checking for turgor, the skin should move easily when pinched and should immediately return to its original position when released. If the tent from pinching remains in the skin, evaluate the patient for dehydration. A common mistake is to test turgor on the back of a patient's hand; the looseness and thinness of the skin in that area make the results unreliable.

Note the anatomical location, distribution, grouping, size, shape, type, color, and drainage of any skin lesions. Identify skin lesions as follows:

- **Macule.** A small (<1 cm), flat lesion colored white, brown, red, or purple. A patch is a large macule greater than 1 cm (Figure 12-5). Common examples include freckles, flat moles, and tattoos.
- **Papule.** A solid, raised lesion smaller than 1 cm (Figure 12-6). A plaque is a papule or group of papules larger than 1 cm. Examples include warts, some moles (nevi), and some types of skin cancer.
- **Nodule.** A solid, raised lesion larger than 1 to 2 cm, situated deeper in the dermis (Figure 12-7). Skin can be moved over the lesion. Larger nodules (> 2 cm) are called tumors. Examples include cysts and lipomas.
- **Vesicle.** An elevated lesion containing serous fluid that is smaller than 1 cm (Figure 12-8). Examples include **contact dermatitis**, physical trauma, and sunburn.
- **Bulla.** An elevated lesion containing serous fluid that is larger than 1 cm (Figure 12-9). Examples include contact dermatitis, physical trauma, frostbite, and sunburn.
- **Pustule.** A superficial and elevated lesion that is larger than 1 cm and contains pus (Figure 12-10). Pustules result from infection. Examples include **impetigo**, acne, and **folliculitis**.
- **Wheal.** A transient, elevated lesion caused by localized **edema** (swelling) (Figure 12-11). Allergic reactions to certain drugs; insect stings and bites; and sensitivity to cold, heat, pressure, or sunlight commonly cause wheals. They are also called hives.
- **Crust.** A lesion (scab) consisting of dried serum, blood, or pus (Figure 12-12). Crusting occurs in many inflammatory and infectious diseases, such as impetigo.

Figure 12-5. A macule is circled in this photograph. The macules coalesced into larger lesions. Reproduced from Gentry RH. Bacterial skin diseases. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:307,Fig 13-12.

Figure 12-7. These scalp nodules are caused by parasitic roundworms. Reproduced from Keeling JH III. Tropical parasitic infections. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:278,Fig 12-33.

Figure 12-9. These bullae formed after significant radiation exposure. Reproduced from Bennion SD, David-Bajar K. Cutaneous reactions to nuclear, biological, and chemical warfare. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:79,Fig 5-10.

Figure 12-11. Wheals, also known as hives, are caused by localized edema. Reproduced from Sperling L. Skin diseases associated with excessive heat, humidity, and sunlight. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:45,Fig 3-4.

Figure 12-6. An erythematous (reddened) papule. Adapted from Gentry RH. Bacterial skin diseases. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:294,Fig 13-5.

Figure 12-8. Vesicles are characteristic lesions of herpes simplex. Adapted from Becker LE, James WD. Historical overview and principles of diagnosis. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:12,Fig 1-18.

Figure 12-10. This pustule contains pus and blood cells. Reproduced from Gentry RH, Bacterial skin diseases. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:303,Fig 13-10.

Figure 12-12. Crusted candidiasis caused by an opportunistic Candida organism. Reproduced from Fitzpatrick JE. Superficial fungal skin diseases. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:439,Fig 17-26.

VIRAL SKIN DISEASES

Herpes Simplex

Herpes simplex is an infection caused by the herpes simplex virus (**HSV**). It has one or many clusters of small vesicles filled with clear fluid on slightly raised (inflamed) and **erythematous** (reddened) bases (Figure 12-13). The fluid inside the vesicles is extremely contagious. The lesions may appear anywhere on the skin or mucosa, but are most common around the mouth, on the lips ("fever blisters"), and in the genital area. Two different viral types, HSV 1 and HSV 2, cause herpes simplex infections. Both types produce identical patterns of infection. Asymptomatic carriers shed the virus and spread the disease.

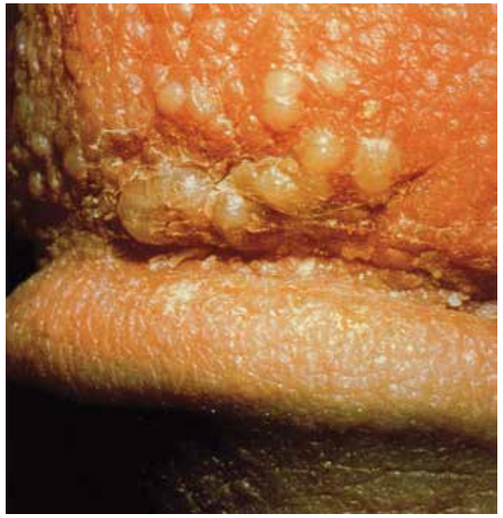

Figure 12-13. Herpes simplex lesions. Reproduced from Benson PM. Sexually transmitted diseases. In: James WD, ed. Military Dermatology. Borden Institute; 1994:526,Fig 19-26b.

Symptoms include tingling, discomfort, and itching followed by the appearance of small, tense vesicles as described above. Single clusters of vesicles vary in size. The vesicles persist for a few days and then begin to dry, forming a thin, yellowish crust or ulcer. Primary (initial) infection is generally the most severe, with fever, **lymphadenopathy,** and urinary symptoms (if the outbreak is genital). Recurrent infection is common. Local skin trauma or systemic stressors (eg, fatigue, illness) may reactivate the virus. It is common to see HSV recurrences in a field or combat environment. A herpetic whitlow is an HSV infection of the fingers, resulting in the inoculation of HSV through a skin break. These are more common in healthcare workers. Symptoms include swelling and pain over the lesions on the finger.

Healing generally occurs 8 to 12 days following onset of symptoms. Individual herpetic lesions usually heal completely, but recurrent lesions at the same site may cause atrophy and scarring.

Patients should avoid sexual intercourse while genital lesions are present; however, viral shedding may occur even if the patient is symptom free. Discuss condom usage with all genital herpes patients. Use antiviral medications (eg, acyclovir) for initial outbreaks, recurrent infections, and suppressive therapy. Treat secondary bacterial infections with systemic antibiotics. Medications reduce the symptoms of the infection, but do not destroy the virus. HSV is a recurrent illness without a cure at this time. Refer patients with herpes simplex infections to a medical officer (MO) for treatment.

Herpes Zoster (Shingles)

Herpes zoster is an infection caused by the chickenpox virus (varicella-zoster virus). Signs and symptoms include pain, tenderness, and itching along the site of the future rash. This usually precedes the rash by 2 to 3 days. Crops of vesicles then characteristically appear on an erythematous base. The patient may also experience headache, fever, and chills. Pain may be severe and narcotic analgesics may be required. The rash occurs most often in the thoracic or lumbar region and is usually unilateral (only on one side). Lesions typically continue to form for about 3 to 5 days. Crusting occurs by days 7 to 10 (Figure 12-14), and lesions resolve by days 14 to 21.

Figure 12-14. Herpes zoster is commonly known as shingles. Reproduced from O'Neill PE. Common skin diseases. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:578,Fig 20-30b.

Treat herpes zoster with antiviral medications. Patients may find locally applied wet compresses soothing. Refer herpes zoster patients to an MO.

Warts

Different viruses cause different types of warts, which commonly occur in children and young adults. Most warts resolve spontaneously; others may last a lifetime, if untreated. At least 55 strains of human papillomavirus cause warts. At least three types of human papillomavirus cause venereal warts and cervical cancer.

Warts are transmitted by contact and commonly appear at the site of minor trauma, on the hands, around the fingernails (from nail biting), on the bottom of the feet, and on genitals (Figure 12-15). The virus may also penetrate normal, intact skin. Some types of warts respond to a single treatment, while others may be resistant. Be sure to explain to patients that most warts require several treatments. Topical wart medications and liquid nitrogen freezing are the best methods for initial treatment.

Figure 12-15. Warts. Reproduced from Benson PM. Sexually transmitted diseases. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:534,Fig 19-35.

Check on Learning

1. What are the signs and symptoms of the herpes simplex virus? How do they differ from the signs and symptoms of herpes zoster?

BACTERIAL SKIN DISEASES

Everyone has bacteria on their skin that do not cause disease. The number and type of bacteria vary in relation to the anatomic site, environmental factors (eg, heat, humidity), general hygiene, and the individual's underlying health. Combat medics likely will see many bacterial skin infections at sick call because they are among the most common disabling skin infections that occur during wartime and field exercises. Reasons for this include crowded living conditions, irregular bathing habits, skin irritation from rough clothing and equipment, and minor trauma from abrasions and insect bites. Treat bacterial skin infections aggressively. They can spread rapidly, particularly in a field or combat environment.

Note: Most superficial skin infections merely produce discomfort and are responsible for large numbers of outpatient visits. However, complications of secondary bacterial infections may require hospitalization. Approximately 10% of medical evacuations out of Vietnam were due to serious dermatological disorders.

Cellulitis

Cellulitis is an acute bacterial infection of the dermis and subcutaneous tissues (Figure 12-16). It may arise from the entry of bacteria through the skin (eg, via a laceration or puncture wound) or as an extension from an abscess. Cellulitis causes serious concern because the infection can spread to the lymphatic and blood systems, which can result in **sepsis** (systemic infection) and **bacteremia** (blood infection).

Figure 12-16. Cellulitis is usually inflamed and without palpable edges. There may be skin scaling on the surface in severe cases. Reproduced from Gentry RH. Bacterial skin diseases. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:294,Fig 13-6.

Cellulitis is more common in the lower extremities. The major findings are local redness, tenderness, and enlarged regional lymph nodes. The skin around the infected site is hot, red, and edematous. Cellulitis with chills or fever suggests that bacteremia is present. Occasionally, local abscesses form, requiring incision and drainage.

Refer patients with cellulitis to an MO for treatment. If an MO is not present, evacuate the patient on a priority basis. Oral antibiotic therapy to cover streptococci and staphylococci is required as first-line outpatient therapy. For severe infections (eg, head and neck cellulitis, cellulitis with fever or chills, or large areas of infection) that require hospitalization, intravenous antibiotics are used. Immobilizing and elevating the affected area will help reduce edema. One way to monitor the infection and see whether it is resolving is to circle the red area; when the patient returns on a follow-up visit, check that the redness is still inside the lines. Document your findings on each follow-up visit.

Impetigo

Impetigo is a superficial bacterial skin infection that occurs most frequently on exposed parts of the body, especially on the face, hands, neck, and extremities (Figure 12-17). Risk factors include crowded living conditions, neglected minor wounds, and poor hygiene. Impetigo consists of pea-sized papules that become vesicular and rupture, leaving honey-colored crusts. The majority of cases have regional lymphadenopathy. Constitutional symptoms (eg, fever, chills) are absent.

Refer patients with impetigo to an MO for antibiotic treatment. Impetigo is extremely contagious. Avoid contact with the patient's towels, clothing, and linen to prevent spread of infection.

Figure 12-17. This thick, yellow crust is typical of impetigo. Reproduced from Gentry RH. Bacterial skin diseases. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:293,Fig 13-1.

Cutaneous Abscesses

Because the skin provides a strong barrier against pathogenic bacteria, skin infections and abscesses often occur in an area of injured skin. Most patients with cutaneous abscesses complain of a localized area of pain and swelling. The abscess begins as a deep, tender, red papule that becomes **fluctuant** (movable or compressible) (Figure 12-18). The patient may or may not have cellulitis, but usually will not have a fever.

Figure 12-18. A cutaneous abscess, caused in this case by leishmaniasis. Reproduced from Keeling JH III. Tropical parasitic infections. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:259,Fig 12-5.

The primary treatment for an abscess is incision and drainage. An abscess is not ready for drainage until the overlying skin has thinned and the mass is fluctuant. Warm compresses will help localize the infection. Under aseptic conditions, an MO will incise the fluctuant area and thoroughly drain the pus. Then loosely pack the abscess cavity with a gauze wick and remove it 24 to 48 hours later. Continue follow-up wound care on the drained abscess cavity until the wound closes. Local heat helps resolve tissue inflammation. Consider giving antibiotics following incision and drainage.

Note: Wet-to-dry dressings require moist packing that "dries" between dressing changes. Dead cells stick to the packing when it is removed, thus debriding the wound. The packing should not dry completely; if it does, change dressings more often. During dressing changes, remove the packing, irrigate the wound, and replace the packing. Continue this process until the wound closes (usually 1–3 weeks).

Folliculitis

Folliculitis is the inflammation of a hair follicle caused by infection, chemical irritation, or minor physical injury (eg, shaving, abrasions). Signs and symptoms include a superficial pustule or inflammatory nodule surrounding a hair follicle (Figure 12-19). The condition may follow or accompany other skin infections. Chronic, low-grade irritation or inflammation without significant infection may occur when stiff hairs emerge from the follicle, curve, and reenter the skin. This is called pseudofolliculitis barbae, or "razor bumps."

Refer patients to an MO for treatment. Use topical or oral antibiotics to treat folliculitis. If necessary, use a laser to remove hair permanently.

Figure 12-19. Folliculitis may have numerous causes such as infection or minor injury. Reproduced from Fitzpatrick JE. Superficial fungal skin diseases. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:445,Fig 17-40.

Bites

One million to three million humans sustain animal bites annually in the United States. Dog bites represent 70% to 90% of all bites; cat bites represent 7% to 20% and have a higher incidence of infection. Human and rodent sources make up the remainder of bites.

Note: Dog bites cause a crushing injury. Their rounded teeth and strong jaws create pressure that can damage deeper structures such as bones, vessels, muscles, and nerves. Cat bites usually cause puncture wounds that allow bacteria to penetrate into deeper tissues. A cat tooth often ends up as a foreign body within the wound.

The extremities are involved in 75% of bite cases, often occurring when victims handle or attempt to avoid an animal. Head and neck injuries are the next most common. Bites on the hands have a higher risk of infection because of poor blood supply and because hand anatomy makes adequate wound cleansing more difficult. In general, the better the blood supply, the easier the wound is to clean, thus lowering the risk of infection.

Describe wounds in terms of size, location, and type. Include diagrams of the wound in the patient's chart (objective section of the **SOAP** note) for follow-up visits. If the wound is infected, describe lymph node enlargement and diagram the extent of the cellulitis (if present).

All bite injuries are potentially dangerous and can cause significant infection. To treat a bite wound, first wash the area with warm, soapy water. Irrigate the wound with soapy water using a needle catheter and syringe (preferably a large syringe) to provide adequate pressure. Flush punctures with a minimum of 200 mL of soapy water. All animal bites are tetanus prone; provide tetanus prophylaxis as indicated. Use systemic antibiotics to treat bite wounds. Bacteria that normally infect bite wounds are resistant to many antibiotics, but are generally sensitive to penicillin. The type of antibiotic given depends on the type of animal involved and how long it has been since the bite occurred.

Review postexposure prophylaxis guidelines for rabies. Rabies is a rare but fatal viral disease. Rabies exposure is defined as an open bite or wound that has contacted the body fluids of a wild or rabid animal. Among wild animals, skunks, raccoons, foxes, and bats are common rabies transmitters. Rabies rarely infects rabbits and rodents. Unprovoked attacks by any animal should raise suspicion for rabies exposure. This has been a common threat to deployed soldiers due to the large number of feral cats and dogs found in Iraq and Afghanistan.

In human bite cases, check for transmission of human immunodeficiency virus, hepatitis B, and hepatitis C. Commonly, soldiers receive cuts on the knuckles after an altercation, which may be overlooked or assessed as a minor injury. Human bite injuries mandate immediate referral to a medical provider to avoid misdiagnosis that can have catastrophic consequences.

Refer all bite wounds to an MO for assessment and treatment. Closely monitor all bite wounds.

Check on Learning

2. Why are bacterial infections common in a military environment?
3. Cellulitis most commonly occurs on what part of the body?
4. What is the treatment for cellulitis?
5. What information should be included when describing bite wounds?

CONTACT DERMATITIS

Contact dermatitis is skin inflammation caused by exposure to irritants or allergens. One of the most frequent disorders requiring both inpatient and outpatient therapy during military conflicts is dermatitis caused by contact with environmental or work-related materials. Under wartime conditions, inadequate facilities may limit personal hygiene and exposure to common chemical irritants and allergens may be prolonged. Contact dermatitis may be caused by exposure to topical medications; plants (eg, poison oak, ivy, or sumac); chemicals used in manufacturing shoes and clothing, metal compounds, dyes, and cosmetics; and rubber and latex in gloves or condoms. Photodermatitis occurs after a patient using photosensitizers (eg, aftershave lotions, sunscreens, and antibiotics) is exposed to sunlight. Perfumes, personal hygiene products, and jewelry metals (eg, copper, silver, and nickel) can also cause contact dermatitis.

The signs and symptoms of contact dermatitis range from transient redness to severe swelling with bullae. Poison oak, ivy, or sumac exposure shows characteristic linear streaks. The fluid inside the vesicle or bulla is not infectious. Pruritus (intense itching) and vesiculation are common. Dermatitis is typically limited to the site of contact but may later spread. Vesicles and bullae may rupture, ooze, and crust, and secondary bacterial infections may occur. As inflammation subsides, scaling and some temporary skin thickening may occur. Continued exposure to the causative agent, such as irritation from or allergy to a topical drug, excoriation (tearing or wearing away skin through scratching), or a bacterial infection may perpetuate the dermatitis.

When gathering the history, note the patient's occupation, hobbies, household duties, vacations, clothing, topical drug use, current medications, cosmetics, hygiene products, and spouse's activities. The site of the initial lesion is often an important clue about the cause of the dermatitis; for example, hand dermatitis may result from lotions, jewelry, soaps, detergents, or rubber or latex gloves. Unless the causative agent is identified and removed, treatment will be ineffective. Refer patients who have allergies to medications such as sulfa drugs or other antibiotics to an MO. They will stop or change the patient's medication. Patients with photodermatitis should avoid photosensitizing chemicals and exposure to sunlight.

Administer an oral corticosteroid for 7 to 14 days in extensive cases of dermatitis, in limited cases involving facial inflammation, or as the mission dictates. Topical corticosteroids are not helpful in the blistering phase, but once the dermatitis is less acute, apply topical corticosteroid creams, ointments, or sprays.

Antihistamines are ineffective in suppressing allergic contact dermatitis but help with itchiness. Antihistamines for soldiers in the field may not be appropriate, since they make most people drowsy and increase risk for heat injury. Counsel patients to avoid scratching the rash because of the risk of spreading it, and refer them to an MO for treatment.

Note: Prior to deployment, educate soldiers on the flora, fauna, and chemical and industrial irritants that are common to the area of operations.

Check on Learning

6. State four likely causes of contact dermatitis.
7. What types of questions would be helpful to ask to determine if a patient has contact dermatitis?

FUNGAL SKIN DISEASES

Fungal infections are common on the feet and body. They may be pruritic (itchy) or asymptomatic, and occasionally, tenderness and inflammation occur. Humans usually transmit superficial fungal infections, but

exposure to fungi that inhabit the soil and infest local wild animals is more common in combat operations.

Superficial skin infections are named according to their anatomical location. Common infections include:

- **tinea corporis** (body), also known as "ringworm";
- **tinea pedis** (feet), also known as "athlete's foot";
- **tinea capitis** (scalp), also known as "ringworm of the scalp"; and
- **tinea cruris** (groin), also known as "jock itch."

Tinea corporis is a fungal infection that has an erythematous plaque with central clearing and well-defined, usually raised margins (Figure 12-20). These typically appear on the body in a ring shape that looks as though a worm is under the skin, hence the common name "ringworm." Intense inflammation with or without pustules may be present.

Figure 12-20. Tinea corporis is most commonly seen on the neck, trunk, and buttocks. Reproduced from Fitzpatrick JE. Superficial fungal skin diseases. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:429,Fig 17-7.

Most skin infections respond well to topical antifungal preparations. Cases that do not clear with topical therapy or those with widespread involvement require 2 weeks of oral antifungal therapy. Keep affected areas clean and dry.

Tinea pedis is the most common superficial fungal infection. Infections typically begin in the web spaces of the toes and may later involve the bottom surface of the foot (Figure 12-21). Toe web lesions are often macerated (softened) and have scaling borders. They may be vesicular or they may become dry and scaly, eventually cracking and bleeding. Acute flare-ups, manifesting with many vesicles and bullae, are common during warm weather. Tinea pedis commonly recurs. Secondary bacterial infection, cellulitis, and lymphangitis are complications of tinea pedis.

Figure 12-21. Tinea pedis, or athlete's foot, is an intensely itchy fungal infection commonly seen in military members. Reproduced from Fitzpatrick JE. Superficial fungal skin diseases. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:431,Fig 17-11.

Treat minor foot infections with topical agents. Good foot hygiene is essential. Toes and feet must be dried after bathing; macerated skin gently debrided; and a bland, drying, antifungal powder such as miconazole applied. Taking boots off and letting feet dry out several times a day are helpful, as are frequent sock changes**.**

Tinea capitis mainly affects children. It is contagious and may become epidemic. Signs and symptoms include persistent, low-grade inflammation. Alopecia

Figure 12-22. Tinea capitis is sometimes seen in military dependent children, but it may occur in individuals of all ages. Reproduced from Fitzpatrick JE. Superficial fungal skin diseases. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:427,Fig 17-1.

Figure 12-23. Tinea cruris, or jock itch, usually has a ringlike border. Reproduced from Fitzpatrick JE. Superficial fungal skin diseases. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:430,Fig 17-9.

(hair loss) may occur, with characteristic black dots on the scalp that result from broken hairs (Figure 12-22). Use oral antifungal therapy rather than topical treatment. Refer patients with alopecia or scalp infections to an MO for treatment.

Tinea cruris fungal infection occurs almost exclusively in men. Typically, a ringed lesion extends from the skin fold between the scrotum and upper thigh (Figure 12-23). One or both sides may be affected. The infection may be extremely itchy and may produce pain (due to friction) on walking or running. Recurrence is common because fungi may repeatedly infect susceptible individuals. Flare-ups occur more often during summer, due to heat and humidity of the skin area. Tight clothing and obesity tend to favor growth of the organisms. Cotton briefs often stay damp, which can also encourage organism growth.

As in tinea corporis, topical therapy with a cream or lotion is often effective. Instruct patients to keep the area as clean and dry as possible. They should switch to boxer-style underwear or stop wearing underwear until the infection is under control.

BLISTERS, CORNS, AND CALLUSES

Blisters

Heat, moisture, and friction on skin may cause blisters. Less commonly, exposure to certain chemicals may cause blisters as well (Figure 12-24). Blister formation requires a thick and immobile epidermis. First, a tear occurs within the epidermis, forming a space between the layers while leaving the surface intact. Then fluid seeps into the space. The soles of the feet and the palms of the hands are the most common areas affected because they rub against shoes and equipment and the epidermis is thick. Blisters form more easily in warm conditions and on moist skin rather than on dry or soaked skin.

Blisters on the feet may be a minor medical problem, but for soldiers, blisters are not trivial. Blister treatment occupies a great deal of sick call time for both combat medics and the individual soldiers engaged in self aid.

Note: Cellulitis is a complication associated with friction blisters. One study found that 84% of cellulitis cases in a recruit population were caused by friction blisters, with an average loss of 8 duty days per patient.[1]

To prevent blisters, minimize friction. For the feet, this begins with proper boot selection. Socks can decrease friction between the feet and boots. Choose socks made of a material that helps move moisture away from the foot, such as wick-away fabrics. Layer socks to minimize friction forces. Counsel patients to change socks frequently and allow their feet, socks, and boots to dry before donning. Small, intact blisters that do not cause discomfort do not require treatment. To protect the blister roof, cover it with a small bandage. Drain intact large or painful blisters without removing the roof. To do this, first clean the blistered area with soap and water, then lance the bottom of the blister with a sterile needle or scalpel and allow the blister to drain. Treat blisters with small tears the same as those that were intentionally punctured. Use fine

Figure 12-24. Blisters shown here were caused by chemical mustard exposure. Reproduced from Bennion SD, David-Bajar K. Cutaneous reactions to nuclear, biological, and chemical warfare. In: James WD, ed. *Military Dermatology*. Borden Institute; 1994:96,Fig 5-27.

Figure 12-25. A corn, often seen on the dorsal surface of fingers or toes. Photograph by Marionette. Reproduced from Wikimedia Commons. https://commons.wikimedia.org/w/index.php?curid=6101151

Figure 12-26. A callus on the hand.

scissors and carefully unroof blisters with larger tears. Clean the base with soap and water. Apply antibiotic ointment and cover the blister with a bandage. For added protection, surround the unroofed blister with doughnut-shaped moleskin and a bandage.

Note: If possible, do not remove the skin from a blister. The skin acts as a natural dressing to protect underlying tissue.

Corns and Calluses

Corns and calluses differ primarily in where they occur. Corns appear on the bony areas on top of toes or on the skin between the toes (Figure 12-25). They feel hard to the touch, are tender, and have a roundish appearance. Calluses commonly appear on the ball or heel of the foot or on the big toe, but can appear any place on the body that sustains continued pressure or irritation (Figure 12-26).

To prevent corns and calluses, make certain boots and shoes fit properly. Treat small corns with extra padding. Doughnut-shaped moleskin is very effective for relieving pressure. An MO may shave off the upper layers of corns and calluses.

Check on Learning

8. Describe the treatment for friction blisters.
9. What type of preventive medicine counseling can minimize blister occurrence in a unit?
10. When inspecting the skin, what types of findings are you looking for?
11. What is a vesicle?
12. What are some common causes of pustules?

SUMMARY

The skin is the largest and one of the most vital organs of the body. It helps regulate body temperature and keep bacteria out. Skin is subject to damage, injury, and infection. Many viruses, fungi, and bacteria can cause problems requiring medical intervention. What could appear to be a minor skin irritation can quickly turn into cellulitis, which can range from minor irritation to a fatal condition, if not properly treated.

KEY TERMS AND ACRONYMS

Bacteremia. Bacteria circulating in the blood.
Cellulitis. An acute bacterial infection of the dermis and subcutaneous tissues.
Contact dermatitis. A skin inflammation caused by exposure to irritants (eg, poison oak) or allergens (eg, medications).
Dermis. The layer of skin lying immediately under the epidermis.
Edema. Swelling due to extra fluid in cells or intercellular spaces.
Epidermis. The outermost layer of the skin.
Erythematous. Redness of the skin caused by dilatation and congestion of the capillaries. It is often a sign of inflammation or infection.
Fluctuant. Movable or compressible.
Folliculitis. Inflammation of a hair follicle caused by infection, chemical irritation, or minor physical injury (eg, shaving, abrasions).
HSV. Herpes simplex virus.
Impetigo. A superficial bacterial skin infection that occurs most frequently on exposed parts of the body, especially on the face, hands, neck, and extremities.
Lymphadenopathy. Enlarged lymph nodes or any disease process involving the lymphatic system.
Sepsis. A systemic inflammatory response to pathogens or toxins in the blood.
SOAP. Subjective, objective, assessment, and plan.
Subcutaneous. Beneath the skin.
Turgor. Flexibility of the skin.

CHECK ON LEARNING ANSWERS

1. What are the signs and symptoms of the herpes simplex virus? How do they differ from the signs and symptoms of herpes zoster?

   Herpes simplex starts with tingling, discomfort, and itching that occur prior to breakout. During the initial breakout, fever, lymphadenopathy, and urinary symptoms occur (genital breakouts only). Herpes zoster can cause severe pain, tenderness, and itching prior to the breakout and fever, chills, and headache can occur.

2. Why are bacterial infections common in a military environment?

   Mission or training demands may result in irregular bathing habits, irritation from rough clothing and equipment, minor trauma from abrasions and insect bites, and crowded living conditions.

3. Cellulitis most commonly occurs on what part of the body?

   The lower extremities.

4. What is the treatment for cellulitis?

   Must be referred to an MO. Treat with oral antibiotics. For severe cases, IV antibiotics may be required.

5. What information should be included when describing bite wounds?

   Size, location, and type.

6. State four likely causes of contact dermatitis.

   Any four of the following: common chemical irritants and allergens, topical medications, plants (eg, poison oak, ivy, or sumac), chemicals used in manual compounds, dyes, cosmetics, and rubber and latex in gloves or condoms.

7. What types of questions would be helpful to ask to determine if a patient has contact dermatitis?

   Have they been exposed to something out of the ordinary? Did they change soap, laundry detergents, etc?

8. Describe the treatment for friction blisters.

   Clean with soap and water, lance the bottom of the blister with a sterile needle or scalpel, and allow the blister to drain. Surround the unroofed blister with moleskin for added protection.

9. What type of preventive medicine counseling can minimize blister occurrence in a unit?

   Make certain boots fit properly and counsel soldiers to change socks frequently and keep their feet clean.

10. When inspecting the skin, what types of findings are you looking for?

    Color, uniform appearance, thickness, symmetry, and presence of any lesions.

11. What is a vesicle?

    An elevated lesion containing serous fluid that is smaller than 1 cm. Vesicles are commonly caused by contact dermatitis.

12. What are some common causes of pustules?

    Impetigo, acne, and folliculitis.

REFERENCES

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