Anatomy, Physiology, & Disease

An Interactive Journey for Health Professionals

Chapter 8

The Integumentary System:

The Protective Covering

PEARSON

Anatomy, Physiology, and Disease: An Interactive Journey for Health Professionals
Bruce J. Colbert, Jeff E. Ankney, and Karen T. Lee

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Introduction

- Integumentary system protects body from environmental damage
- Skin forms protective barrier, shielding body from elements and pathogens, as well as performing several other vital functions
- Skin is essential to well-being, helps to regulate body temperature, and contains many accessory organs such as nail, hair, and glands

Learning Objectives

- Discuss the functions of the integumentary system
- List and describe the layers of the skin
- Explain the healing process of skin
- Describe the structure and growth of hair and nails

Learning Objectives (cont'd)

- Explain how the body regulates temperature through the integumentary system
- Describe various skin diseases, causative agents, and their related treatments

Pronunciation Guide

Click on the megaphone icon before each item to hear the pronunciation.

Alopecia	(al-oh-PEE-she-ah)
Apocrine	(APP oh crin)
Carotene	(CARE eh teen)
Corium	(CORE ee um)
Ecchymosis	(ek ee MOH sis)
Eccrine	(EKK rin)
Epidermis	(ep ih DER miss)
Epithelial cells	(ep ih THEE lee al)

Pronunciation Guide (cont'd)

Click on the megaphone icon before each item to hear the pronunciation.

Keratin	(KAIR ah tin)
Keratinization	(KAIR ah tin eye ZAY shun)
Lesion	(LEE zhun)
Lunula	(LOO nyoo lah)
Melanin	(MELL an in)
Melanocytes	(mell AN oh sights)
Pustule	(PUS tyool)
Sebaceous gland	(see BAY shuss)
Seborrheic keratosis	(SEB oh REE ik KERR ah TOH sis)

Pronunciation Guide (cont'd)

Click on the megaphone icon before each item to hear the pronunciation.

Sebum	(SEE bum)
Scabies	(SKAY beez)
Squamous cells	(SKWAY muss sells)
Stratum corneum	(STRAY tum core NEE um)
Subcutaneous fascia	(sub cue TAY nee us FAY she ah)
Tinea	(TIN e ah)
Vesicles	(VES ih koolz)

System Overview

- Integumentary system is comprised of skin and its accessory components including hair, nails, and associated glands

System Overview (cont'd)

- Integumentary system performs several vital functions:
  - Protection from pathogens
  - Balances fluid levels
  - Stores fatty tissue for energy supply
  - Produces vitamin D (with help from sun)
  - Provides sensory input
  - Helps to regulate body temperature

The Skin

- Largest organ, weighing approximately 20 pounds and covering area about 20.83 square feet on an adult
- Cross section of skin reveals three layers:
  - Epidermis
  - Dermis
  - Subcutaneous Fascia

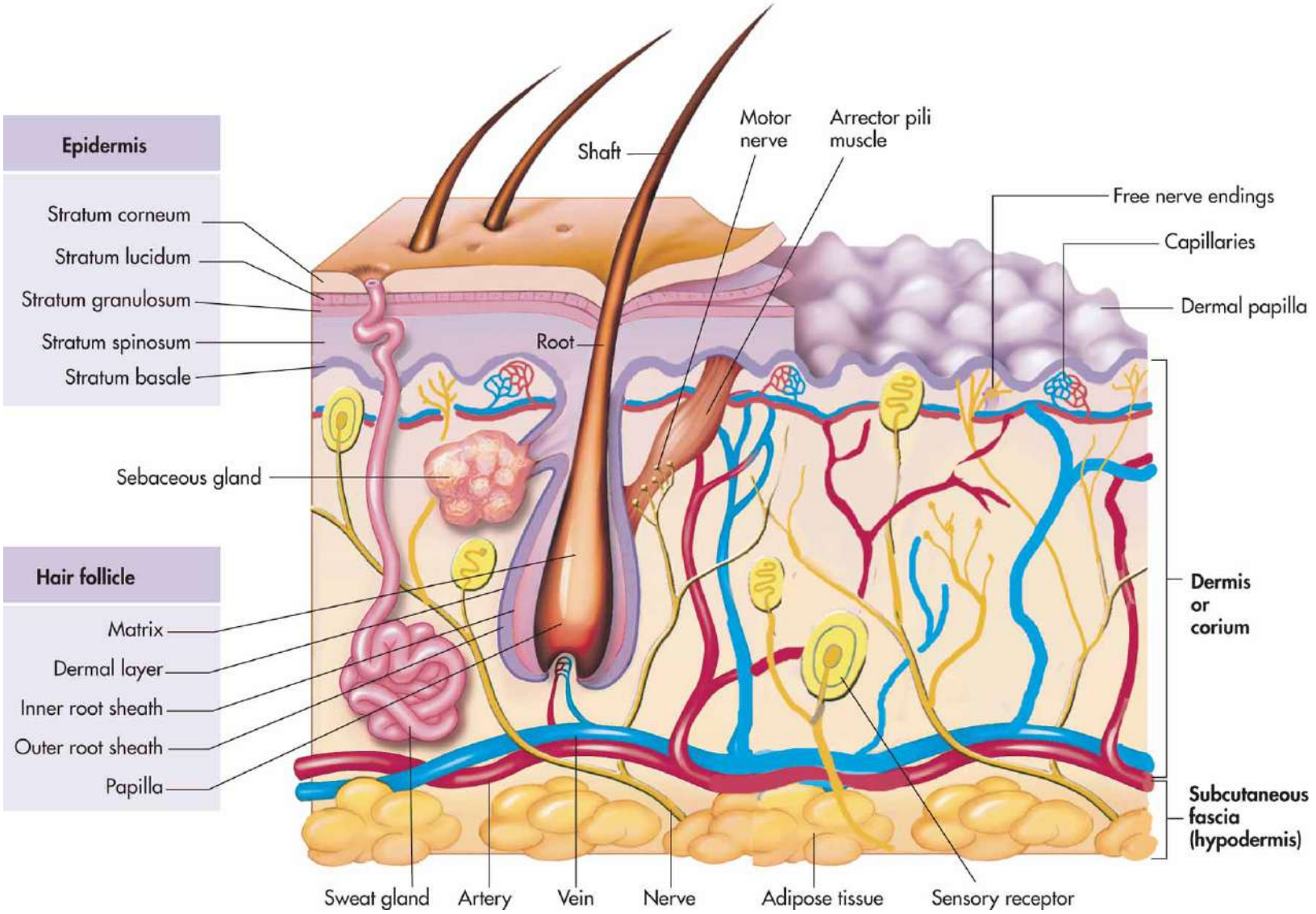


Figure 8-1 The three layers of the skin.

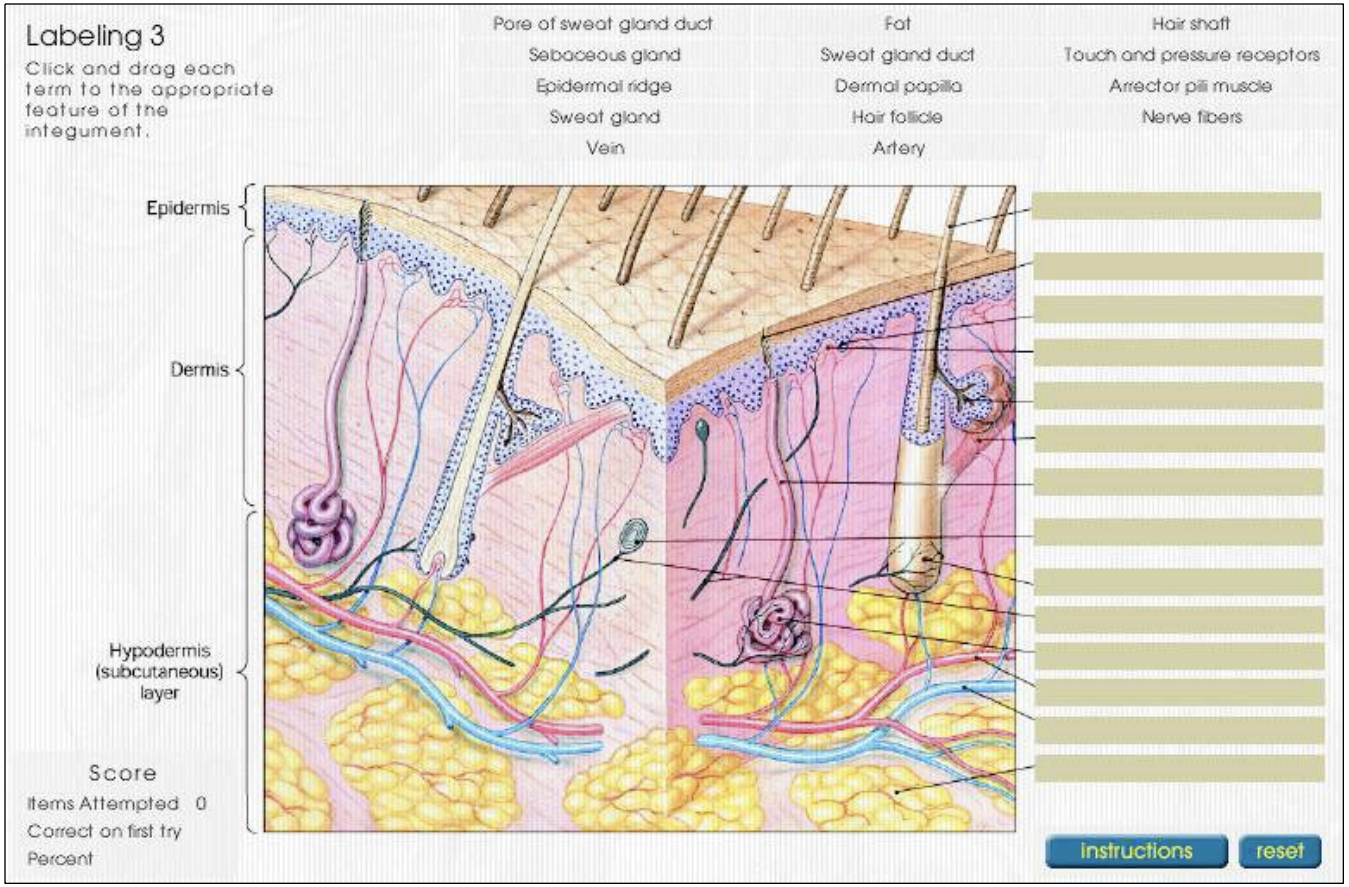
Epidermis

- Layer of skin we see on the outside; made up of five or six even smaller layers of tissue
- There are no blood vessels or nerve endings in this layer
- Cells on surface are constantly shedding, being replaced with new cells that grow and arise from deeper region called stratum basale every 2–4 weeks

Epidermis (cont'd)

- Outermost layer is layer of dead cells, called stratum corneum, which are flat, scaly, keratinized epithelial cells
- You slough off 500 million cells every day, or about 1½ pounds of dead skin a year, allowing for rapid repair in case of injuries

Integumentary System Exercise



Click here to view an interactive labeling exercise on the features of the integumentary system.

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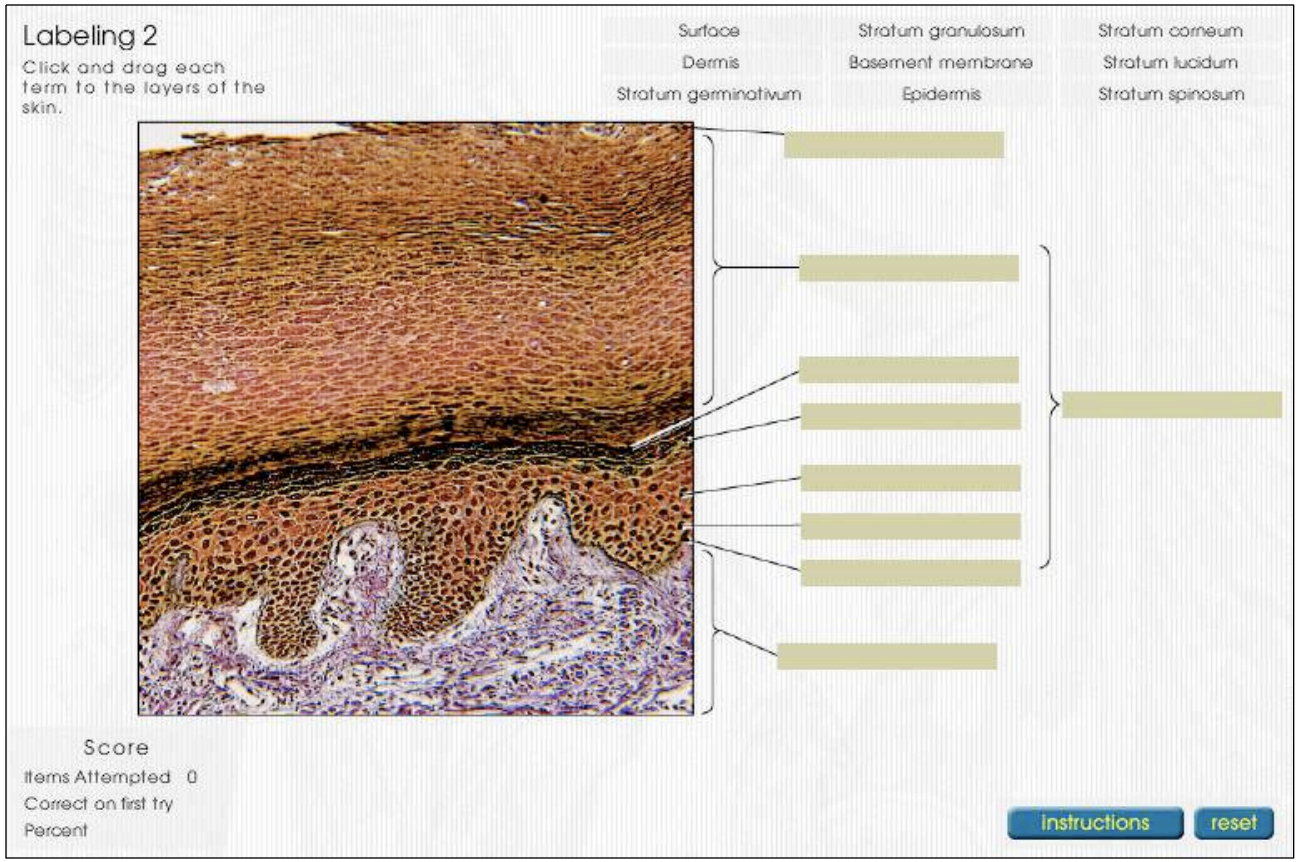
Skin Features Exercise



Click here to view an interactive labeling exercise of the features of the skin.

Pathology Connection: Skin Color and Disease

- Color of skin can indicate disease
  - Yellow skin (jaundice) may indicate liver disease
    - In liver disease, body can't break down bilirubin
    - Buildup of bilirubin gives skin yellow color
    - Yellowish color may also be seen in whites of eyes
  - Bronze color may indicate adrenal gland disease; malfunctioning adrenal glands can cause skin to produce excessive melanin
  - Bruised skin could indicate skin, blood, or circulatory problems

Dermis

- Layer below, or inferior, to epidermis is thicker dermis layer
- Contains the following:
  - Capillaries
  - Collagenous/elastic fibers
  - Involuntary muscles
  - Nerve endings
  - Lymph vessels
  - Hair follicles
  - Sudoriferous glands (sweat)
  - Sebaceous glands (oil)

Dermis (cont'd)

- Small "fingers" of tissue project from surface and anchor layer to epidermal layer
- Finger and toe prints arise from this layer
- Nerve fibers allow you to sense what is happening in your environment

Dermis (cont'd)

- Vasodilation of capillaries in this layer cause blushing
- Collagen and elastic fibers allow for elasticity of skin, preventing tearing with movement; allow skin to return to normal shape during periods of rest; older people lose some elasticity, leading to wrinkles

Sudoriferous Glands

- Two main types of sudoriferous, or sweat, glands
  - Apocrine sweat glands secrete at hair follicles in groin and anal region as well as armpits; become active around puberty and are believed to act as sexual attractants
  - Eccrine glands are found in greater numbers on palms, feet, forehead, and upper lip; are important in regulation of temperature

Sudoriferous Glands

- Body has 3 million sweat glands
- Sweat has no odor, but bacteria degrades substances in sweat over time into chemicals that give off strong smells commonly known as body odors

Sweat and Sebaceous Glands

- Sebaceous glands play important role by secreting oil, or sebum
- Sebum keeps skin from drying out and (due to its acidic nature) helps destroy some pathogens on skin's surface

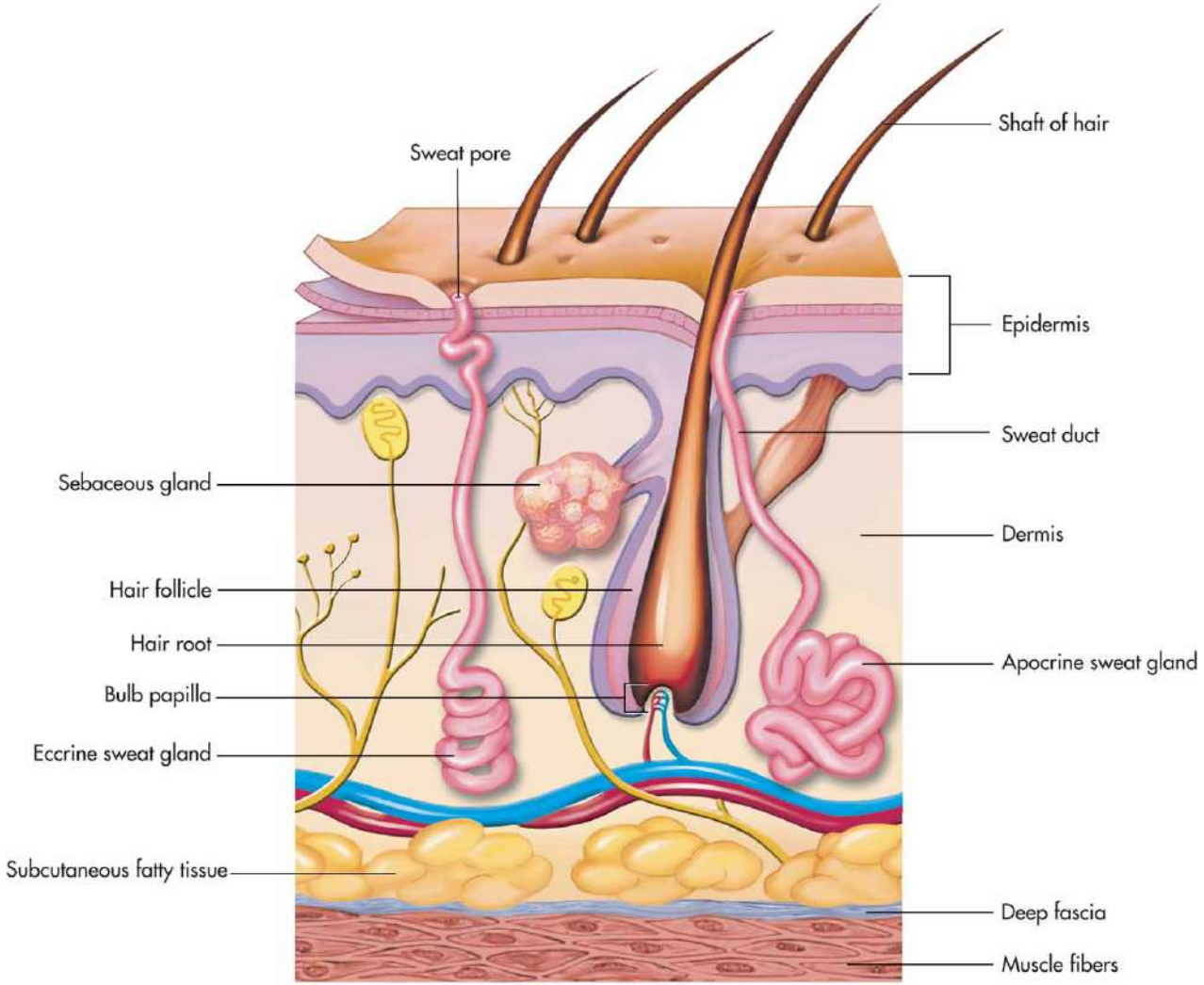


Figure 8-2 Sweat and sebaceous glands.

Subcutaneous Fascia

- Innermost layer of skin is subcutaneous fascia, or hypodermis
- Composed of elastic and fibrous connective tissue and fatty tissue
- Lipocytes, or fat cells, produce fat needed to provide padding to protect deeper tissues of body and act as insulation for temperature regulation
- Fascia attaches to muscles of body

Pathology Connection: Herpes

- Lifelong viral infection that produces clusters of small fluid-filled sacs (vesicles/blisters)
- Signs and symptoms usually come and go; stress and other diseases can temporarily decrease immunity, and lead to symptom flare

Pathology Connection: Herpes

- Types of herpes
  - Herpes varicella
    - Also known as chickenpox
    - Can be spread by airborne particles or direct contact
    - Vesicles can be found on face, trunk, and extremities
    - Vesicles associated with intense itching

Pathology Connection: Herpes (cont'd)

- Herpes zoster
  - Also known as shingles
  - Develops when dormant chickenpox virus re-activates
  - Causes extremely painful blisters/rashes that follow course of a sensory nerve
  - Symptoms develop when stress, disease, trauma, or aging prevent immune system from keeping virus in check

Pathology Connection: Herpes (cont'd)

- Herpes simplex type 1
  - Causes "cold sores" or "fever blisters" around mouth or nose
  - Commonly develops after common cold or fever

Pathology Connection: Herpes (cont'd)

- Herpes simplex type 2
  - Causes genital herpes
  - Spread by direct contact
  - Most contagious when in active stage; however, can be spread during remission

Figure 8-3 Herpes types. a) Shingles.

Figure 8-3 Herpes types. b) typical cold sores or fever blisters.

Pathology Connection: Human Papilloma Virus (HPV)

- Causes warts (verruca); hypertrophy of keratin cells in skin; types of warts
  - Common warts
    - Usually found on children's hands and fingers
    - Spread by scratching and direct contact
    - Often disappear on their own
  - Plantar warts
    - Found on sole of foot
    - Tend to grow inward
      - Have relatively smooth appearance on surface
      - Can cause pain when walking
      - Treatment: removal by surgery or freezing

Figure 8-4 Examples of warts. a) Common wart

Figure 8-4 Examples of warts. b) plantar wart.

Pathology Connection: Human Papilloma Virus (HPV) (cont'd)

- Genital warts
  - Sexually transmitted, and highly contagious
  - Some types of HPV have been associated with cervical cancer
  - Recently developed vaccine may help prevent cervical cancer associated with certain types of HPV

Pathology Connection: Fungal Infections

- Tinea:
  - General term for fungal skin infections
  - Usually located in warm, moist regions of body
  - Signs and symptoms: cracking, weeping, and itching skin

Pathology Connection: Fungal Infections (cont'd)

- Types of tinea
  - Tinea Pedis (athlete's foot)
    - Fungal infection of foot
    - Spread by direct contact with contaminated surfaces (like locker room floors)
    - Most commonly develops in warm, moist area between toes
  - Tinea cruris (jock itch)
    - Fungal infection of groin and scrotal areas
    - Mainly affects men
    - Aggravated by increased perspiration, and tight fitting shorts/pants/undergarments

Pathology Connection: Fungal Infections (cont'd)

- Tinea corporis (ringworm)
  - Fungal infection of smooth skin on arms, legs and body
  - Appearance: red, ring-shaped structure with pale center
  - THERE IS NO ACTUAL WORM involved
- Tinea unguium
  - Fungal infection under finger or toenails
  - If untreated, results overgrown and thick nails with white/brittle appearance

Figure 8-5 Examples of fungal infections. a) Athlete's foot (tinea pedia)

Figure 8-5 Examples of fungal infections. b) Nail fungus (tinea unguium).

Pathology Connection: Bacterial Infections

- Cellulitis
  - Infection of skin and subcutaneous tissue
  - Caused by Staphylococcus
  - Source of infection often wound of some kind

Pathology Connection: Bacterial Infections (cont'd)

- Lyme disease
  - Bacterial infection spread by deer tick bites
  - Signs and symptoms:
    - "Bull's eye" rash: red circle with lighter center; often very first presenting sign of infection; appears few days to several weeks following tick bite
    - Flu-like symptoms, fever, and chills
    - Malaise
    - Joint inflammation

Pathology Connection: Bacterial Infections (cont'd)

- Lyme disease
  - If untreated, can lead to neurological, cardiovascular problems, arthritis
  - Diagnosis: blood test can confirm presence of infection

How Skin Heals

- Everyone has skin injuries from time to time
- If skin is punctured and wound damages blood vessels, wound fills with blood; blood contains substances that cause clotting; top part of clot exposed to air hardens to form scab, nature's band-aid, forming barrier and preventing pathogens from entering

How Skin Heals

- Next, white blood cells enter and destroy any pathogens, while fibroblasts come and begin pulling edges of wound together; basale layer hyper-produces cells for repair of wound

How Skin Heals (cont'd)

- If wound is deep, scar, composed of collagen fibers, develops; scars don't contain any accessory organs or nerve endings; stitches, adhesive strips (butterflies), or special glue reduce scarring

How Skin Heals (cont'd)

- Note, wound ideally starts to heal from inside out; this aids in preventing pathogens from becoming trapped between healed surface and deeper layer of skin where they could develop into pocket of infection

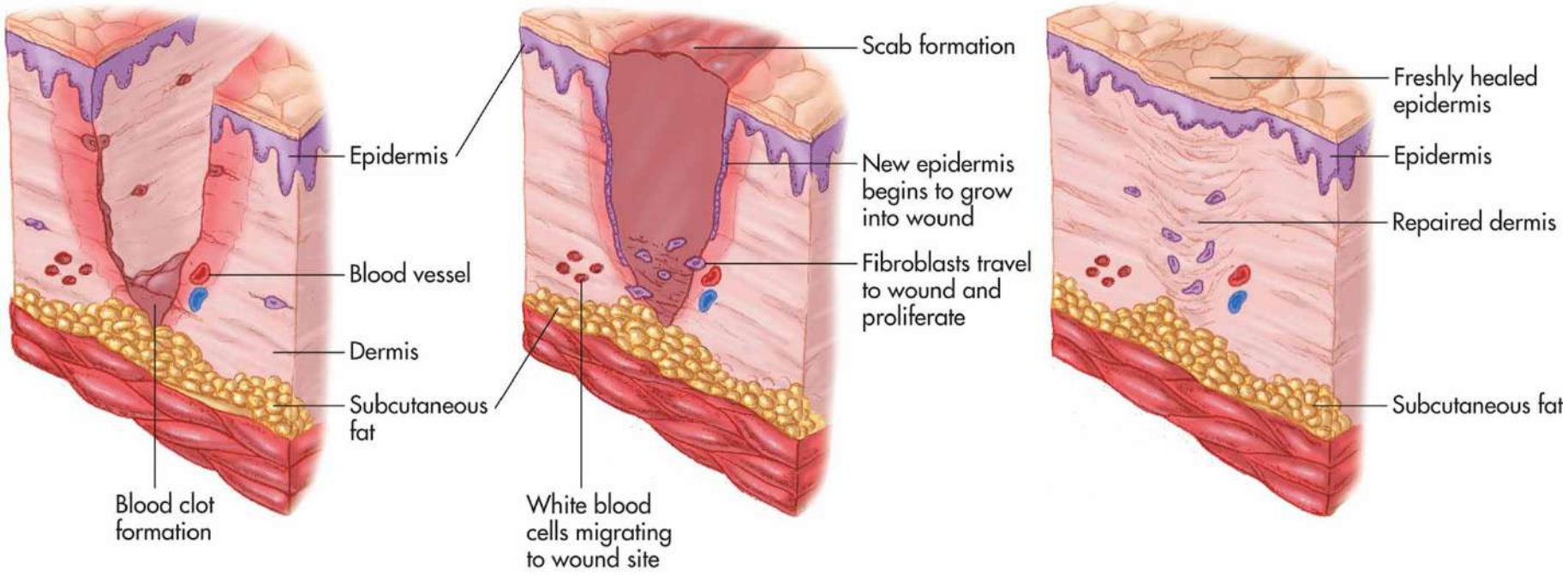
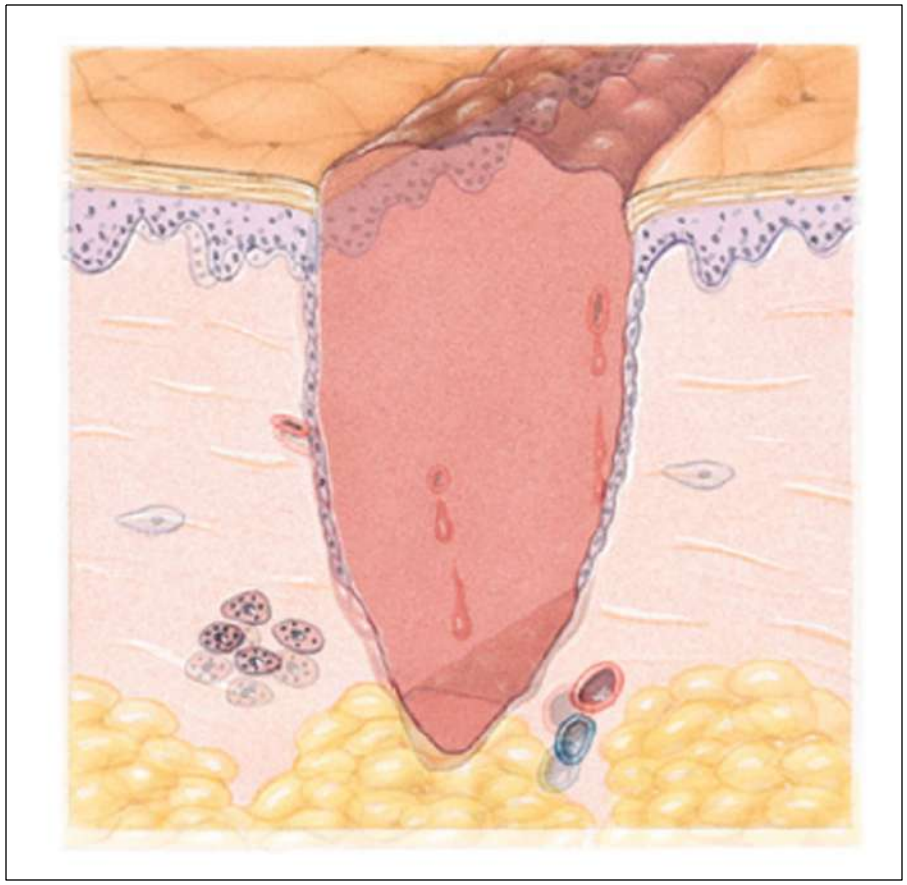


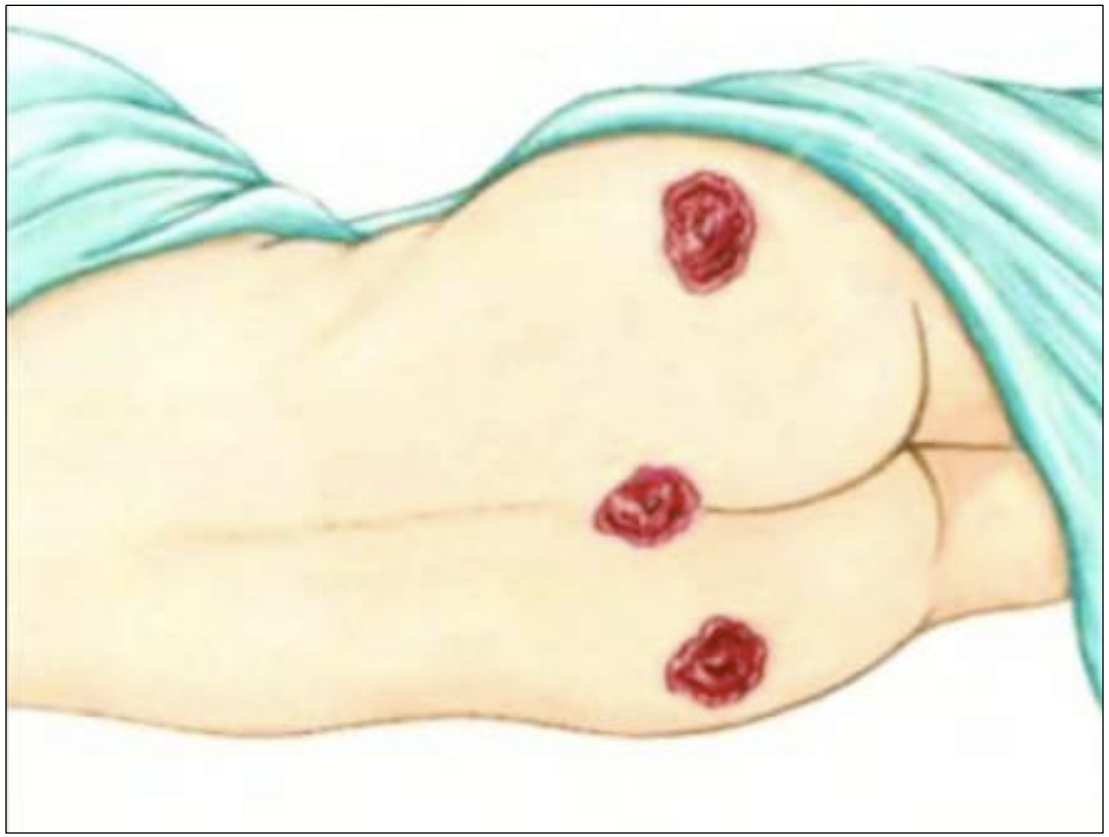
Figure 8-6 Wound repair.

Wound Repair Animation



Click here to view an animation on the topic of Wound Repair.

Decubitus Ulcers Video



Click here to view a video on the topic of decubitus ulcers.

Pathology Connection: Burns

- Can be caused by heat, chemicals, electricity, or radiation
- Two factors affect assessments of damage:
  - Depth
  - Amount of area damaged

Pathology Connection: Burns (cont'd)

- Depth of burn relates to layer or layers of skin affected by burn
- First degree burns damage only outer layer, or epidermis
  - Symptoms include redness and pain, but no blister
  - Pain subsides in 2–3 days; there is no scarring
  - Complete healing takes about one week

Pathology Connection: Burns (cont'd)

- Second degree burns involve entire depth of epidermis and portion of dermis
  - Symptoms include redness, pain, and blistering
  - Extent of blistering dependent on depth of burn
  - Blistering extends after initial burn
  - Blisters heal within 10–14 days if there are no complications, with deeper second degree burns taking 1–3½ months
  - Scarring in second degree burns is common

Pathology Connection: Burns (cont'd)

- Third degree burns affect all three layers of skin
  - Surface of burn has leathery feel and will range in color from black, brown, tan, red, or white
  - Patient feels no pain because pain receptors are destroyed
  - Also destroyed are sweat and sebaceous glands, hair follicles, and blood vessels

Pathology Connection: Burns (cont'd)

- Fourth degree burns are worst burns
  - Penetrate bone and cause bone damage
- Rule of nines used to estimate extent of area damaged by burns

Pathology Connection: Burns (cont'd)

- Body divided into following regions, each given percentage of body surface area value:
  - Head and neck: 9%
  - Each upper limb: 9% (2 x 9 = 18%)
  - Front of trunk: 18%
  - Back of trunk and buttocks: 18%
  - Front of legs: 18%
  - Back of legs: 18%
  - Perineum (including anus and urogenital region): 1%

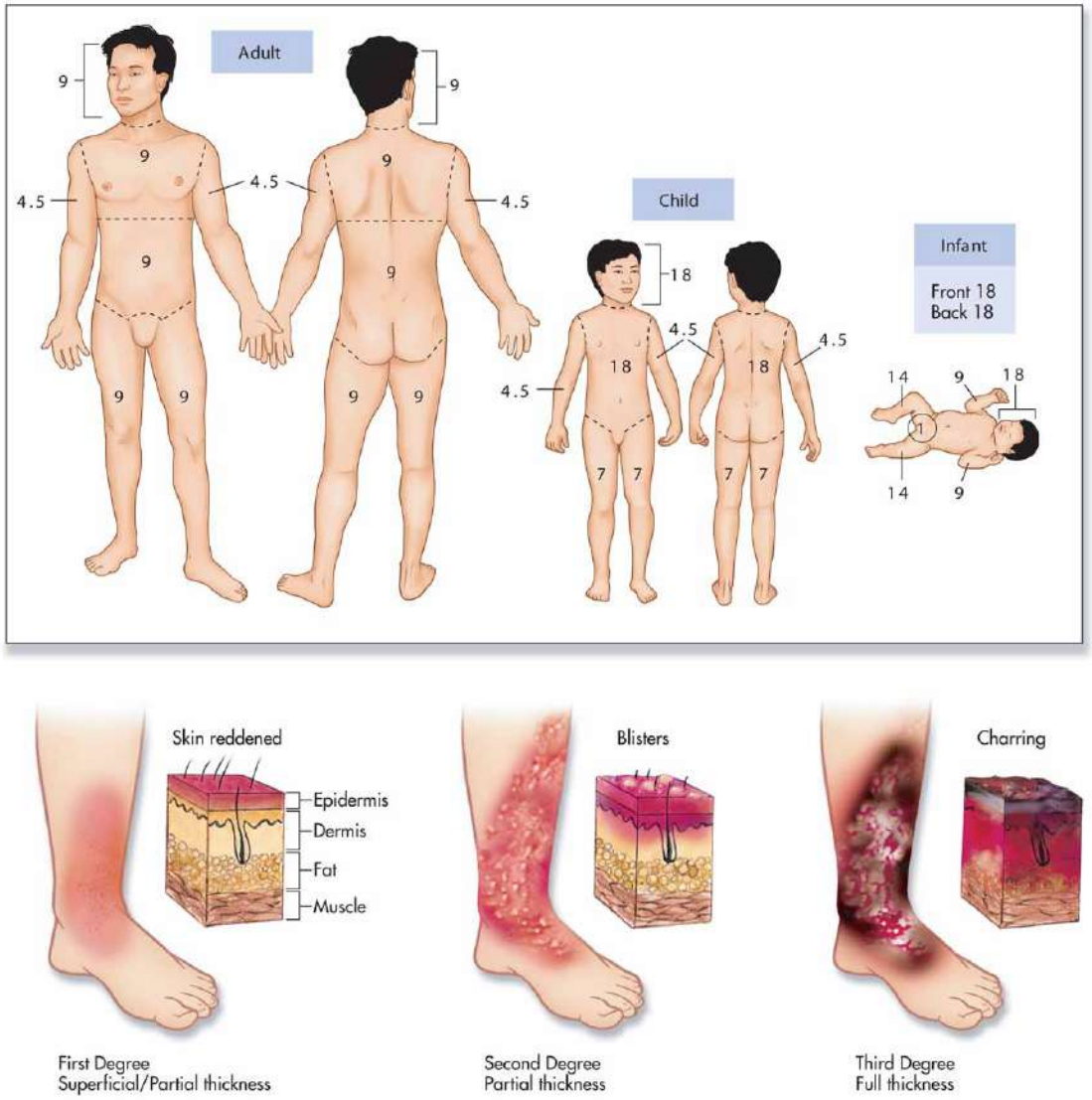


Figure 8-8 Assessing the degree of the burn.

Burn Care Video

Click here to view a video on the topic of burn care.

Pathology Connection: Burns (cont'd)

- Clinical concerns for burn victims relate to functions of skin already discussed, including:
  - Bacterial infections
  - Fluid loss
  - Heat loss

Pathology Connection: Burns (cont'd)

- Severe burns require healing steps at intensity level body can't manage on its own
- Damaged skin must be removed as soon as possible and skin grafting must be started

Pathology Connection: Burns (cont'd)

- Autografting is using patient's own skin, while heterografting is required if patient suffered large area of burn and has little healthy skin to graft

Pathology Connection: Burns (cont'd)

- Grafting requires many trips to OR because large areas can't be done all at once and often grafts don't "take"
- It is possible to grow sheets of skin tissue in laboratory from patient cells or utilization of synthetic materials

Nails

- Specialized epithelial cells originating from nail root form nails
- As cells grow out and over nail bed, they become keratinized forming substance similar to horns on a bull
- Cuticle is fold of tissue that covers nail root
- Portion that we see is called nail body
- Nails normally grow 1 mm every week

Nails (cont'd)

- Pink color of nail comes from vascularization of tissue under nails, while white half-moon shaped area, or lunula is result of thicker layer of cells at base

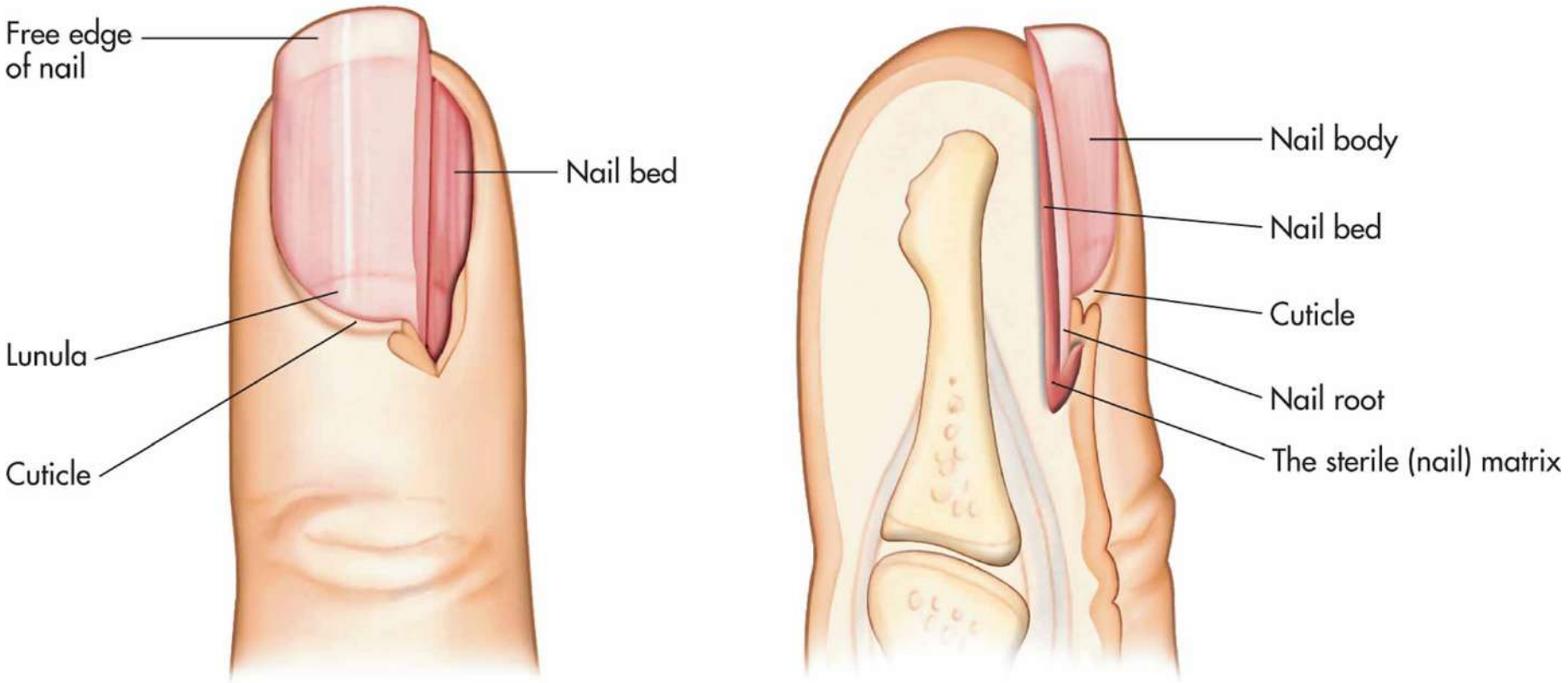


Figure 8-9 Structures of the fingernail.

Hair

- Body hair is normal and serves important purposes
- Helps to regulate body temperature and functions as sensor to help detect things on skin such as bugs or cobwebs
- Eyelashes help to protect eyes from foreign objects while hair in nose helps filter out particulate matter

Hair

- Visible hair composed of fibrous protein called keratin
- Hair you see is called shaft with root extending down into dermis to follicle

Hair (cont'd)

- Follicle is formed by epithelial cells with rich source of blood provided by dermal blood vessels
- Cells divide and grow in base of follicle, older cells are pushed away and die, so shaft of hair is comprised of dead cells
- Shaving or cutting hair doesn't make it grow quicker or thicker

Hair (cont'd)

- There is a sebaceous gland associated with each hair follicle, secreting sebum that coats hair follicle and works its way to skin's surface to prevent drying of hair, acting as anti-bacterial, and lubricating hair shaft
- Sebum production decreases with age, explaining why older people have drier skin and more brittle hair

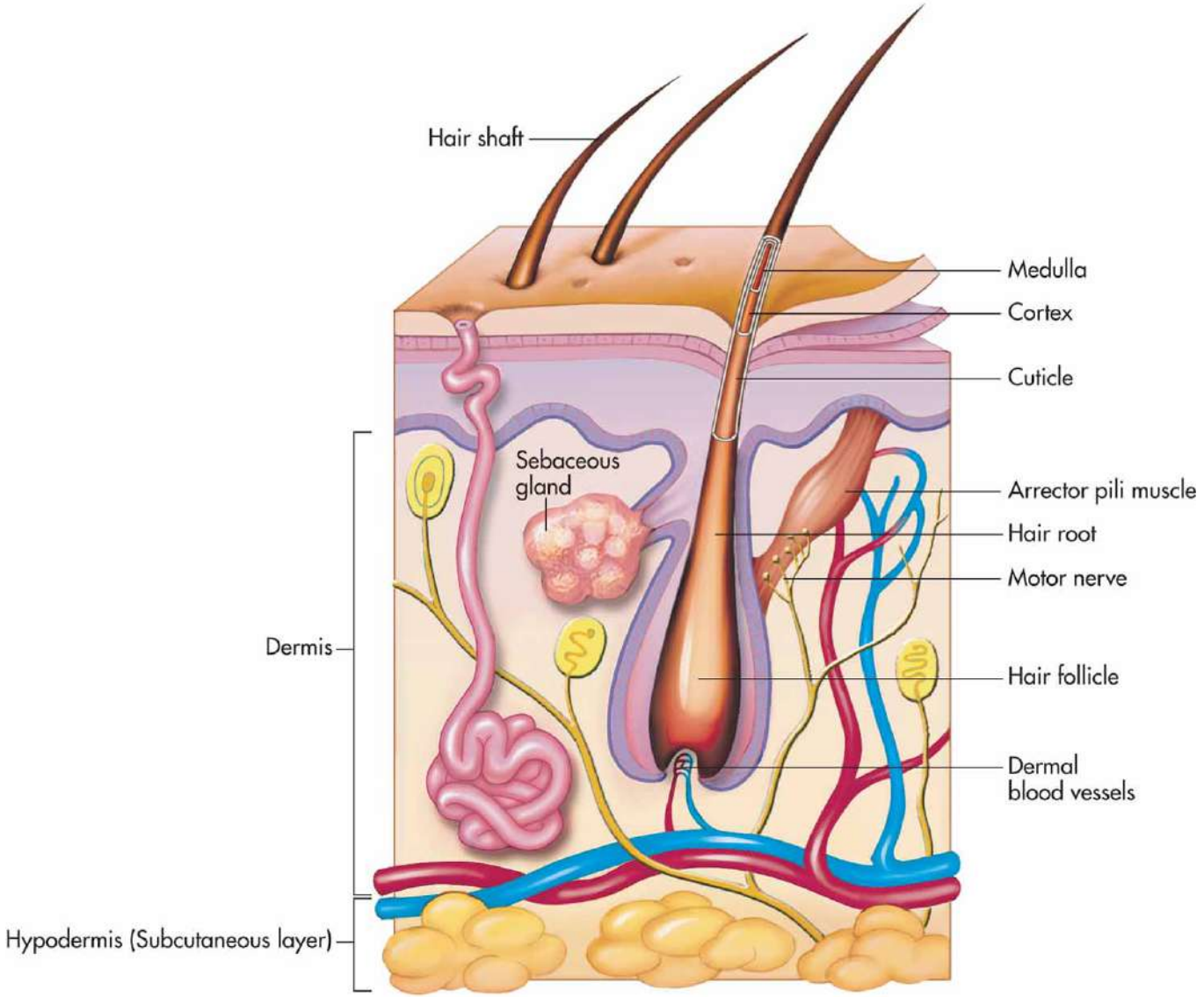
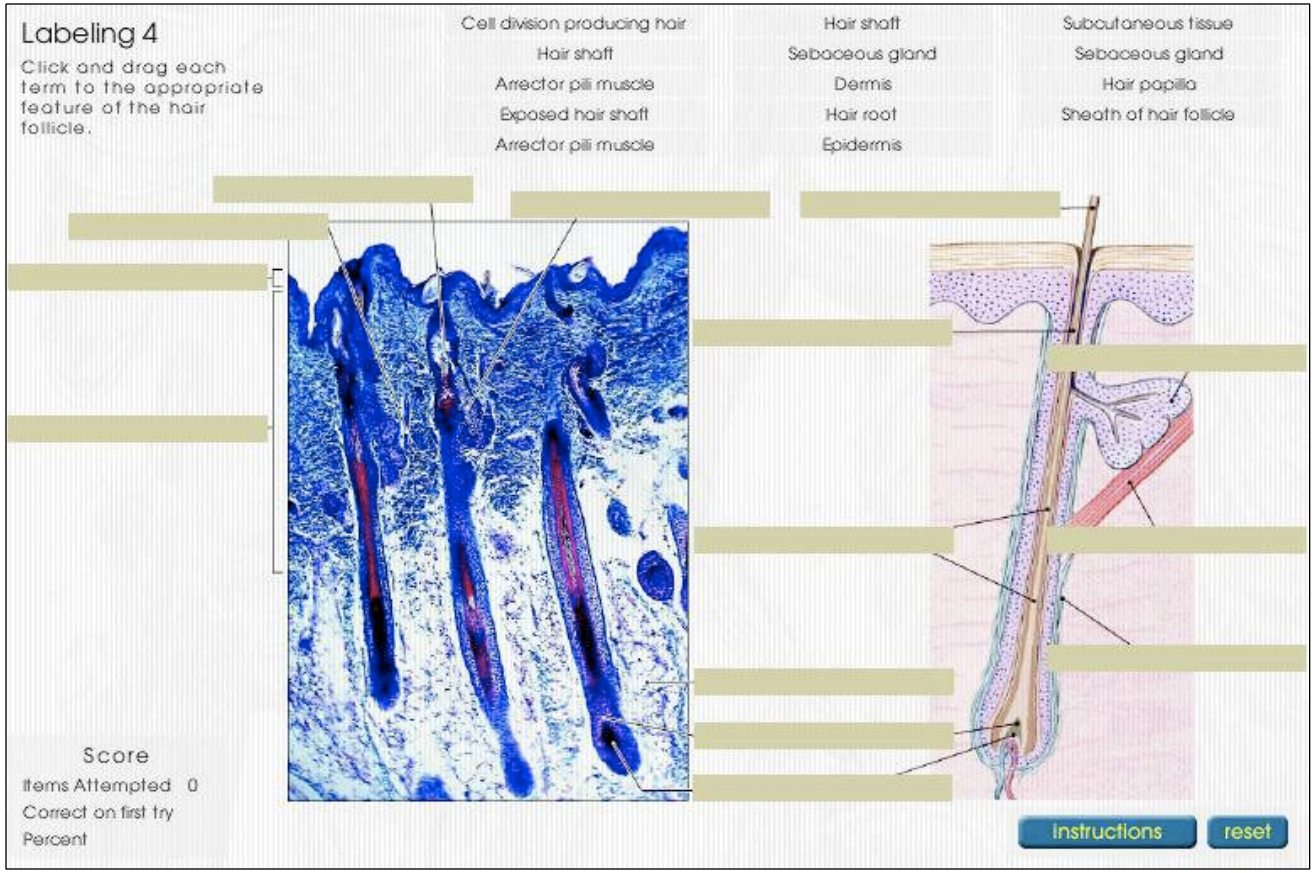


Figure 8-10 Diagram of a hair follicle.

Hair Exercise



Click here to complete an interactive labeling exercise of the hair.

Hair Color and Texture

- Hair color is dependent on amount and type of melanin you produce
- The more melanin, the darker your hair
- White hair occurs in absence of melanin
- Red hair is result of hair that has melanin with iron in it
- Flat hair shafts produce curly hair, while round hair shafts produce straight hair

Hair Color and Texture (cont'd)

- **Alopecia** is term for any type of hair loss and can be acute or chronic
  - Some forms, such as male pattern baldness, do not represent a disease, but are inherited traits
  - Hair loss can also be a result of chemotherapy for cancer treatments, hormonal imbalance, scale infections, severe emotional or physical stress, or side effects of other medications

Pathology Connection: Lice

- Tiny insect parasites that live on scalp/skin
- Lice infestation is called pediculosis
- Lice spread by direct contact with infested person or infested objects (hair brushes, etc).

Pathology Connection: Lice (cont'd)

- Types of lice
  - Head lice: extremely common; checked for in schools
  - Body lice: result of poor personal hygiene and can carry disease
  - Pubic lice: spread through sexual contact; also known as "crabs"

Pathology Connection: Lice (cont'd)

- Treatments for lice
  - Bathing or shampooing with medicated shampoo; shampoo eliminates lice and their eggs (called "nits")
  - Thorough cleaning of all bedding, towels, clothing, hats, combs and hairbrushes (alternatively, these items can be discarded)

Pathology Connection: Scabies (cont'd)

- Tiny mite that burrows into skin to lay eggs
- Transmitted via direct contact with infected individual
- Mites typically lodge in folds of skin (wrist, underarms, groin, under breasts, etc)
- Symptoms: intense itching, vesicles, and pustules

Pathology Connection: Scabies (cont'd)

- Without treatment, cycle develops:
  - Eggs are laid under skin
  - Eggs hatch in 3-5 days and young mature in 2-3 weeks
  - Mites mate and start process over again
- Treatment: specially formulated cream is applied to skin

Figure 8-11a Examples of lice.

Figure 8-11b Example of scabies.

Temperature Regulation

- Integumentary system plays major role in regulation of body's temperature
- Part of regulation of temperature is accomplished by changes in size of blood vessels
  - Vasodilation exposes heated blood to external cooling air
  - Vasoconstriction keeps cooling of blood to minimum when it's cold outside

Temperature Regulation (cont'd)

- Sweat glands excrete water onto skin's surface, allowing cooling through evaporation; requires adequate hydration to continue to produce sweat
- By the time you feel thirsty you're already dehydrating; you can potentially secrete 12 liters of sweat in a 24 hour period

Temperature Regulation (cont'd)

- Shivering causes muscle activity that produces heat to warm you when you're cold
- Hairs on skin stand erect when arrector pili muscles contract; known as goose bumps; these hairs create dead space insulating you from cooler surroundings, like a goose down jacket

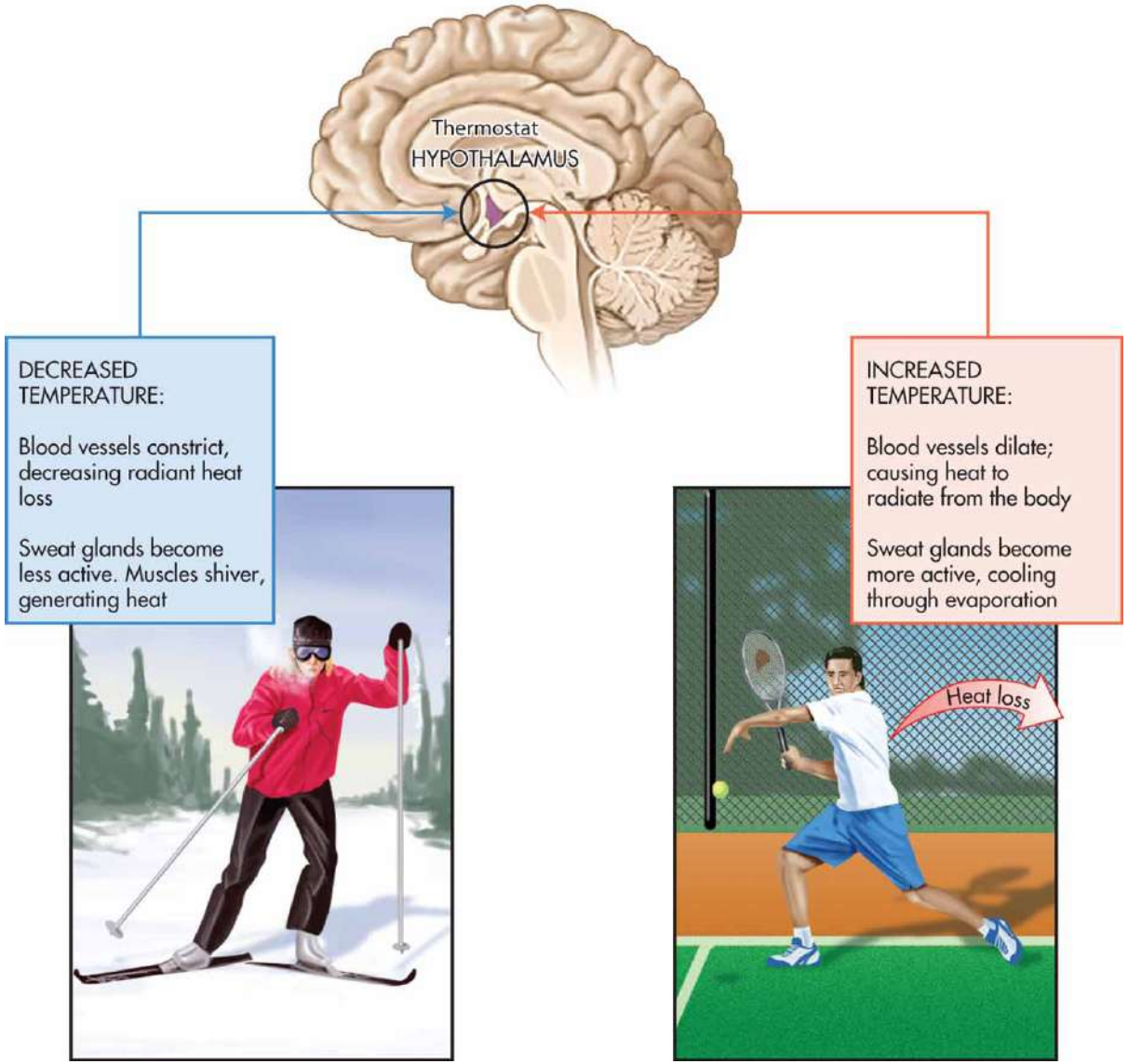


Figure 8-12 Integumentary regulation of body temperature.

Pathology Connection: Skin Lesions

- Pathologically altered piece of tissue
- Types of lesions include
  - Macule: discolored spot on skin
  - Wheal (urticaria): localized evanescent elevation of skin that is often accompanied by itching
  - Papule: solid, elevated area on skin
  - Nodule: larger papule
  - Vesicle: small fluid filled sac (blister)

Pathology Connection: Skin Lesions (cont'd)

- Types of lesions include
  - Bulla: large vesicle
  - Pustule: pus-filled lesion
  - Ulcer: eating or gnawing away of tissue
  - Crust: dry, serous, brown, yellow red or green exuadation
  - Scale: think, dry flack of cornified epithelial cells
  - Fissure: crack-like slit that extends through epidermis into dermis

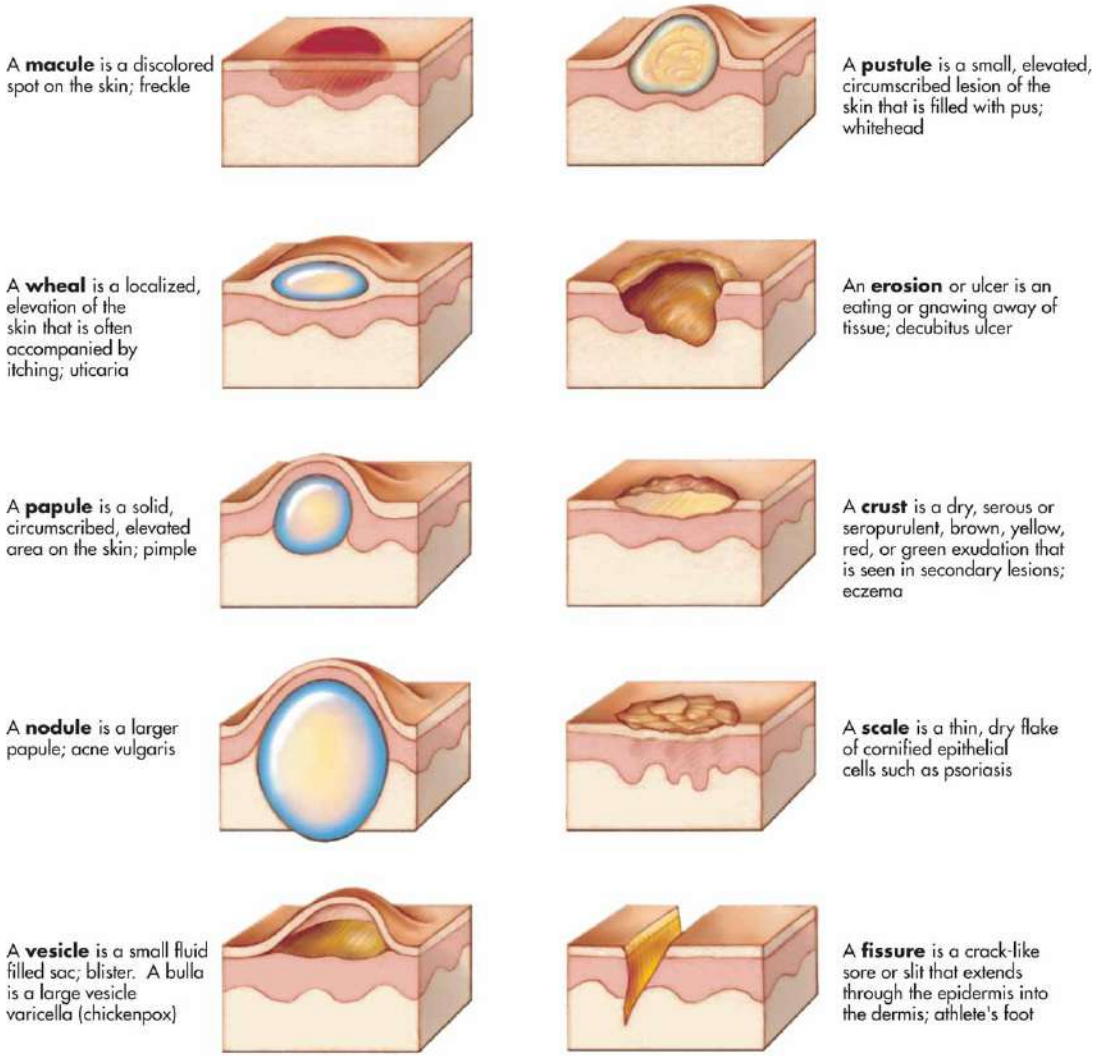


Figure 8-13 Various types of skin lesions.

Diseases of the Integumentary System

- Abrasion
  - Etiology: mechanical removal of skin tissue
  - Signs and symptoms: loss of skin surface integrity, redness, swelling, inflammation
  - Diagnostic tests: visual examination
  - Treatment: proper cleansing technique, removal of any foreign matter, antiseptic, bandage if necessary

Diseases of the Integumentary System (cont'd)

- Acne
  - Etiology: metabolic condition, allergies, various drugs or endocrine disorders are possible causative agents
  - Signs and symptoms: inflammation of hair follicles/sebaceous glands especially on face, neck, chest, upper back/shoulders; can form blackheads, cysts, nodules, pustules, and pimples

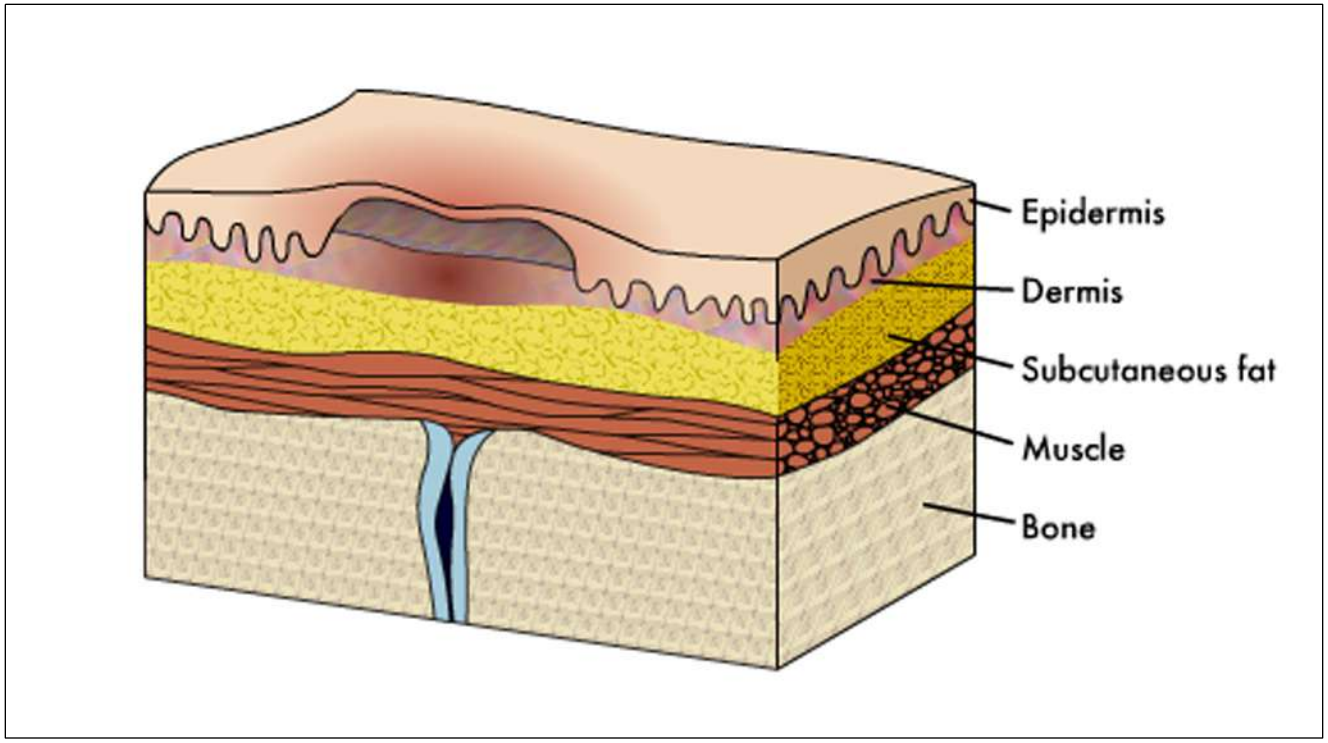
Diseases of the Integumentary System (cont'd)

- Acne
  - Diagnostic tests: visual examination
  - Treatment:
    - Mild: proper cleansing techniques and OTC treatments
    - Severe: proper cleansing techniques including prescribed medications, antibiotics, steroids and/or all-trans retinoic acid (tretinoin)

Diseases of the Integumentary System (cont'd)

- Decubitus ulcer (pressure ulcers; bedsores)
  - Etiology: tissue injury resultant of unrelieved pressure placed upon a specific area
  - Signs and symptoms: red, inflamed, crater-like lesion usually located over bony prominence
  - Diagnostic tests: visual inspection, culturing of site for infection
  - Treatment: preventative measures such as turning and padding important; treat infection of the sore

Pressure Sore Animation



Click here to view an animation on the topic of pressure sores.

Decubitus Ulcer Video

Click here to view a video on the topic of decubitis ulcers.

Diseases of the Integumentary System (cont'd)

- Boil (furuncle)
  - Etiology: staphylococcus bacteria
  - Signs and symptoms: inflammation, localized encapsulated pus filled lesion, painful affected site; carbuncles are a large abscess composed of several furuncles
  - Diagnostic tests: visual examination, site culture

Diseases of the Integumentary System (cont'd)

- Boil (furuncle)
  - Treatment: proper antiseptic cleansing techniques, antibiotics, application of warm moist heat, depending on severity, may require draining

Diseases of the Integumentary System (cont'd)

- Burns (thermal)
  - Etiology: heat or radiation or varying intensities and duration
  - Signs and symptoms: depending on intensity and duration: reddening of affected surface, penetrating additional skin layers as severity increases. Color is dependent on the severity with a deepening red, to black
  - Diagnostic tests: visual examination
  - Treatment: dependent upon severity

Diseases of the Integumentary System (cont'd)

- Cellulitis
  - Etiology: bacteria (streptococcus and staphylococcus)
  - Signs and symptoms: inflammation of skin and subcutaneous tissue, red and swollen, painful
  - Diagnostic tests: visual examination, site culture
  - Treatment: antibiotics (oral or intravenously, dependant on the severity)

Diseases of the Integumentary System (cont'd)

- Contusion (bruise)
  - Etiology: blunt force or some form of skin injury without the skin surface breaking
  - Signs and symptoms: pain, swelling, discoloration
  - Diagnostic tests: visual inspection; imaging may be needed to check for more severe injury
  - Treatment: cold applications, firm bandage to impede swelling, elevation when possible, heat application, massage

Diseases of the Integumentary System (cont'd)

- Dermatitis (contact)
  - Etiology: contact with allergen (extreme range of potential agents including, soaps, cosmetics, metals, drugs, plastics, etc.)
  - Signs and symptoms: small, reddish lesions to larger vesicles, weepy and crusted areas, itching possible
  - Diagnostic tests: visual examination
  - Treatment: avoidance of causative agent; medication to decrease inflammatory process

Diseases of the Integumentary System (cont'd)

- Eczema
  - Etiology: genetic predisposition to allergies (in infants it may include reaction to milk/dairy products, other foods), stress
  - Signs and symptoms: skin inflammation, redness, vesicles, scales, crusting, pustules
  - Diagnostic tests: visual examination, history
  - Treatment, no true cure: treat symptoms; eliminate offending food, reduce stress, topical cortiosteroidal creams, skin moisturizers, antihistamines

Eczema Video

Click here to view a video on the topic of eczema.

Diseases of the Integumentary System (cont'd)

- Folliculitis
  - Etiology: bacteria (usually staphylococcus)
  - Signs and symptoms: small pustules that form around base of hair follicle
  - Diagnostic tests: visual examination, site culture
  - Treatment: proper daily cleansing with antiseptic cleanser, oral antibiotics (chronic or severe cases)

Diseases of the Integumentary System (cont'd)

- Herpes
  - Etiology: Herpes family of viruses
  - Signs and symptoms: clusters of fluid filled vesicles in patterns specific to condition, skin inflammation, rash, pain related to involved sensory nerve; remains dormant until immunosupression
  - Diagnostic tests: visual examination, site culture
  - Treatment: antiviral drugs, usually self-limiting

Diseases of the Integumentary System (cont'd)

- Hives (urticaria)
  - Etiology: allergic reaction to external agent such as bee stings, plants, temperature extremes, sunlight, or internal agents such as foods, food additives, medication, antibiotics, or specific disease conditions
  - Signs and symptoms: itchy wheals surrounded by red inflamed area; can cover most of body

Diseases of the Integumentary System (cont'd)

- Hives (urticaria)
  - Diagnostic tests: visual examination, patient history
  - Treatment: antihistamines, allergen avoidance

Diseases of the Integumentary System (cont'd)

- Keloid
  - Etiology: tissue trauma or surgical incision
  - Signs and symptoms: overproduction of collagen during tissue repair often creating larger structure than original scar/traumatized area
  - Diagnostic tests: visual inspection
  - Treatment: surgical removal, but there is a great potential for keloids to grow back

Figure 8-7 Examples of keloids.

Diseases of the Integumentary System (cont'd)

- Lyme disease
  - Etiology: tick bite containing a specific spirochetal bacterium
  - Signs and symptoms: "Bull's eye" macule/papule at site of tick bite, flu-like symptoms, stiff neck, swollen lymph node(s), joint aches, fever, headache, persistent sore throat, dry cough; possible neurologic, cardiac, and arthritic complications if left undiagnosed/untreated

Diseases of the Integumentary System (cont'd)

- Lyme disease
  - Diagnostic tests: visual examination, blood test, patient history
  - Treatment: vaccine, antibiotics, treat secondary conditions; repeat infection is possibility

Diseases of the Integumentary System (cont'd)

- Malignant melanoma
  - Etiology: occurs in melanocytes, excessive exposure to the sun
  - Signs and symptoms: brown or black irregular patch that appears suddenly. A color or size change in a prexisiting wart or mole may also be an indication
  - Diagnostic tests: biopsy
  - Treatment: surgical removal and the surrounding area; chemotherapy

Skin Cancer Video

Click here to view a video on the topic of skin cancer.

Diseases of the Integumentary System (cont'd)

- Pediculosis (lice)
  - Etiology: lice infestation
  - Signs and symptoms: lice and nits (egg deposits)
  - Diagnostic tests: visual inspection
  - Treatment: proper cleansing techniques with medicated soap/shampoo, cleaning of all clothing, bedding, towels, combs, etc. to remove infestation

Diseases of the Integumentary System (cont'd)

- Psoriasis
  - Etiology: possible genetic basis with attacks triggered by emotional stress, illness, sunlight, or skin damage
  - Signs and symptoms: red skin with silvery patches, rapid replacement of epidermal cells, dry cracking skin with crusting, can be painful; common to have periods of remission then exacerbation; may be arthritic component

Diseases of the Integumentary System (cont'd)

- Psoriasis
  - Diagnostic tests: visual examination, patient history
  - Treatment: supportive, skin applications to deal with symptoms; medications: steroids, ultraviolet light

Diseases of the Integumentary System (cont'd)

- Scabies
  - Etiology: mites
  - Signs and symptoms: elevated, grayish-white lines (burrows), vesicle and pustule formation (due to bite, feces, ova of offending mite), intense itching
  - Diagnostic tests: visual inspection
  - Treatment: proper cleaning technique, application of medicated cream, all infected individuals must be treated to prevent re-infection

Diseases of the Integumentary System (cont'd)

- Seborrheic keratosis
  - Etiology: unknown agent(s) causing benign overgrowth of epithelial cells
  - Signs and symptoms: well defined, warty-scaled lesion that can present in variety of colors from yellow to brown
  - Diagnostic tests: visual inspection, laboratory examination
  - Treatment: scraping (curettage), or freezing

Diseases of the Integumentary System (cont'd)

- Tinea, types
  - Tinea barbae (barber's itch, affects face)
  - Tinea capitis (affects scalp)
  - Tinea corporis (ringworm, affects body)
  - Tinea cruris (jock itch, affects groin)
  - Tinea pedis (athlete's foot, affects feet)
  - Tinea unguium (affects nails)

Diseases of the Integumentary System (cont'd)

- Ringworm
  - Etiology: fungi
  - Signs and symptoms: case dependent; red ring-shaped patches (mimicking worm), red inflamed skin, cracked and weeping area(s), itch, discoloration of affected nails
  - Diagnostic tests: visual examination, microscopic examination, site culture
  - Treatment: maintain clean dry condition of affected area, antifungal medication (topical or systemic)

Diseases of the Integumentary System (cont'd)

- Warts (common, plantar, genital)
  - Etiology: viruses
  - Signs and symptoms: raised, rubbery, scaly growths of varying sizes and colors
  - Diagnostic tests: visual examination
  - Treatment: chemical or physical removal

Figure 8-14 Various types of integumentary conditions. (a) Urticaria (hives). *(Courtesy of Jason L. Smith, MD.)*

Figure 8-14 (continued) Various types of integumentary conditions. (b) Malignant melanoma. *(Source: Biophoto Associates/Photo Researchers, Inc.)*

Figure 8-14 (continued) Various types of integumentary conditions. (c) Erythema infectiosum (fifth disease). *(Courtesy of Jason L. Smith, MD.)*

Figure 8-14 (continued) Various types of integumentary conditions. (d) Acne. *(Courtesy of Jason L. Smith, MD.)*

Figure 8-14 (continued) Various types of integumentary conditions. (e) Poison ivy (dermatitis). *(Courtesy of Jason L. Smith, MD.)*

Figure 8-14 (continued) Various types of integumentary conditions. (f) Herpes simplex. *(Courtesy of Jason L. Smith, MD.)*

Figure 8-14 (continued) Various types of integumentary conditions. (g) Burn, second degree. *(Courtesy of Jason L. Smith, MD.)*

Pharmacology Corner

- Transdermal patches
  - Placed on skin in morning and left in place for 24 hours (or more)
  - Allows medication to be slowly absorbed over time
  - Examples of common transdermal patches
    - Nicotine (for smoking cessation)
    - Nitroglycerine (a heart medication)
    - Birth control

Pharmacology Corner (cont'd)

- Topical creams
  - For skin irritation: mild preparations stop itching; more powerful preparations containing corticosteroids work as local anti-inflammatory agents; because cream is not fully absorbed into bloodstream, systemic side effects are minimal
  - Antifungal: treat fungal infections like ring worm and athlete's foot

Pharmacology Corner (cont'd)

- Topical creams
  - Anti-viral: used to treat herpes and other viral skin conditions
  - Antibiotic: used to treat bacterial infection; can also be used to prevent wound from becoming infected

Pharmacology Corner (cont'd)

- Medicated shampoos: useful in treating lice and dandruff (excessive dry scalp with sloughing skin)

Intradermal Drugs Video

Click here to view a video on the topic of intradermal drugs.

Subcutaneous Injections Video

Click here to view a video on the topic of subcutaneous injections.

Snapshots from the Journey

- Skin is largest organ; it acts as barrier to infection and injury; helps to keep you from drying out; stores fat; synthesizes and excretes vitamin D; regulates body temperature; provides minor excretory function in elimination of water, salts, and urea; and provides sensory input

Snapshots from the Journey

- Skin is composed of 3 layers, constantly recreating itself; glands secrete oil to moisturize, waterproof, and control body temperature
- Burns assessed by depth of burn and area covered
- Nails are protective devices composed of dead material
- Hair (also dead material) aids in controlling body temperature

Case Study

- A 27-year-old female presents to her doctor's office with complaints of red, itching, and oozing skin for the past 2 days.

Case Study (cont'd)

- Physical exam and history reveal a well-nourished, white female who is otherwise in good health, has no known allergies, normal vital signs, pupils are normal and reactive, has good reflexes, normal breath sounds, liquid filled vesicles, and scabbing on both legs from the top of her sock lines to the bottom of her shorts, and new vesicles have formed around her eyes

Case Study (cont'd)

- The patient states that she returned from a primitive camping and hiking vacation in Virginia two days ago
- Based on the case study information, what do you think the diagnosis is?
- What caused the vesicles to begin to form around her eyes?

Case Study: Ray's Story

- Family education will play an important role for Ray, our quadriplegic, once he gets home. Although proper ventilator care will be crucial for his survival, why do you think skin care is so important? How will Ray's inability to move potentially cause skin problems? Discuss areas of concern and potential problems involving Ray's integumentary system. What education/training might be important for members of Ray's family?

Case Study: Maria's Story

- Maria, our 35 year old diabetic, has been developing a series of integumentary system problems over the past several years. Diabetes can, in some ways, be considered a vascular disease. Research the effects of diabetes as it relates to the integumentary system

Case Study: Maria's Story (cont'd)

- How and why does diabetes affect wound healing? Why is there a high incidence of toe and leg amputations in the diabetic population? What preventative care measures can be taken to ensure good health of the diabetic's integumentary system?

Emergency Medical Technicians Video

Click here to view a video on the topic of emergency medical technicians.

Nursing Video

Click here to view a video on the topic of nursing.