Integumentary System
Ch. 22
Dr. Thorson
Upon completion of this lesson, students should be able to:

1. Define and spell the terms to learn for this chapter.
2. List and describe the functions of the skin.
3. Discuss the layers of the epidermis.
Lesson Objectives

Upon completion of this lesson, students should be able to:

4. Discuss the layers of the dermis.
5. List and discuss the accessory structures of the skin.
Critical Thinking Question

1. What functions does the integumentary system serve?
Functions of the Integumentary System

- Protection
- Regulation
- Sensation
- Absorption
- Secretion
Functions of the Integumentary System

• Protection
  • Intact skin serves as protective barrier to internal structures and compartments of body
  • Skin prevents harmful agents from entering the body
  • Skin guards body against the sun’s ultraviolet rays by producing a protective pigmentation called melanin
  • Vitamin D also produced by the skin
Critical Thinking Question

1. What are different ways that this protective function can be compromised?
Functions of the Integumentary System

• Regulation
  • When body temperature rises and requires cooling, blood vessels in the skin dilate and bring more blood to the surface where heat from blood is more easily released
  • Body’s sweat glands begin to secrete sweat that evaporates to cool the body
Functions of the Integumentary System

- Regulation
  - If body needs to conserve heat, blood vessels in skin will constrict, moving heat-carrying blood away from skin and circulating it to muscles and internal vital organs to keep them warm
  - Both constriction and dilation of blood vessels in skin are reflex actions initiated by nervous system
Functions of the Integumentary System

• Sensory Reception
  • Integumentary and nervous system work together
  • Nerve endings and sensory receptors send information to cerebral cortex of brain
Functions of the Integumentary System

- Sensory Reception
  - Appropriate response triggered
    - Pressure
    - Traction
    - Heat
    - Cold
    - Pain
The integumentary and nervous systems work together to recognize specific sensations, such as heat and pain.
1. What happens to pain detection with a burn?
Functions of the Integumentary System

• Absorption
  • Transdermal (through-the-skin) medications take advantage of this ability of skin to absorb substances
  • Transdermal drugs often administered by placing medicated patches on various parts of the body
Functions of the Integumentary System

• Secretion
  • Sudoriferous glands secrete perspiration, or sweat
  • Sebaceous glands secrete oil for lubrication
  • Perspiration composed of water with small amounts of salt and other chemical compounds
Structure of the Skin

- Skin composed of three layers
  - Epidermis
  - Dermis
  - Subcutaneous layer
Structure of the Skin

• Dermis
  • Middle layer of skin referred to as “true skin”
    • Connective tissue containing nerves and nerve endings
    • Blood vessels
Structure of the Skin

- Dermis
  - Middle layer of skin referred to as “true skin”
    - Sebaceous and sweat glands
    - Hair follicles
    - Lymph vessels
  - Further divided into two layers: papillary layer and reticular layer
Structure of the Skin

- Subcutaneous Layer
  - Innermost layer of skin
  - Composed of subcutaneous tissue
  - Tissue helps support, nourish, insulate, and cushion the skin
Accessory Structures of the Skin

- Hair
  - Visible portion of hair is the shaft
  - Root embedded within the follicle
  - Papilla found at base of each hair follicle
  - Pilomotor muscle attached to side of each follicle
  - With exception of the palms of the hands and soles of the feet, entire body is covered by a very thin layer of hair
Accessory Structures of the Skin

• Nails
  • Fingernails and toenails horny cell structures of epidermis composed of hard keratin
  • Nail consists of body, root, matrix (nail bed)
  • Lunula is crescent-shaped white area at the base of the nail
Accessory Structures of the Skin

• Nails
  • Average nail growth about 1 mm per week
  • Nail growth adversely affected by disease and hormonal insufficiencies
The fingernail, an appendage of the integument.

- Free edge of nail
- Lunula
- Eponychium (cuticle)
- Nail bed
- Nail body
- Eponychium
- Nail root
- Nail root
Accessory Structures of the Skin

- Sebaceous Glands
  - Oil glands
  - Secrete sebum
  - Function of sebum is to protect and waterproof hair and skin
  - Endocrine system regulates amount of secretion of sebaceous glands
Accessory Structures of the Skin

- Sudoriferous Glands
  - Predominant in the palms of the hands and soles of the feet
  - Sweat glands coiled, ball-shaped structures located in dermis or subcutaneous layers
  - Secrete perspiration, which helps to cool body by evaporation
The Life Span

• The Child
  • Skin conditions can be acute or chronic, local or systemic, and congenital
  • Age-related skin conditions include milia (white pimples in newborns) and acne
  • Skin infections present as systemic infections with symptoms such as fever and malaise
The Life Span

• The Child
  • Child’s skin drier and chaps more easily
  • Teach children good hygiene and skin care habits
The Life Span

• The Older Adult
  • Papillae grow less dense
  • Skin becomes looser
  • Less collagen and fewer elastic fibers present in upper dermis
The Life Span

• The Older Adult
  • Skin loses its elastic tone, causing wrinkles to occur more easily
  • Occurrence of premalignant and malignant skin lesions increase with aging
The Life Span

• The Older Adult
  • Among skin cancers found in older adults, 80 percent are basal cell carcinomas
  • By age 50, approximately half of adults have some gray hair
The Older Adult

- Scalp hair continues to thin in men and women as aging progresses
- Hair becomes dry and brittle
- Nails may flatten and become discolored, dry, and brittle
Common Disorders of the Integumentary System

- Skin Cancer
  - Most common of all cancers
  - Affects more than one million people each year in the United States
  - Those with lighter and fairer skin more prone to skin cancer
Common Disorders of the Integumentary System

- Skin Cancer
  - Occurs when normal skin cells undergo a change during which they grow and multiply without normal controls
  - As the cells multiply, they form a mass called a tumor
  - As a result of their uncontrolled growth, malignant (cancerous) tumors encroach on neighboring tissues, especially lymph
Common Disorders of the Integumentary System

• Basal Cell Carcinoma
  • Most common form of skin cancer
  • Malignant tumor most often caused by overexposure to sun and ultraviolet rays
  • Often appear as change in skin, such as a growth, irritation, or sore that does not heal or as a change in a wart or mole
Common Disorders of the Integumentary System

- Basal Cell Carcinoma
  - Nose most common site
  - Also head, neck, back, chest, or shoulders
Common Disorders of the Integumentary System

• Basal Cell Carcinoma
  • Firm, pearly bump with visible and spiderlike tiny blood vessels (telangiectasias)
  • Red, tender, flat spot that bleeds easily
  • Small, fleshy bump with a smooth, pearly appearance, often with depressed center
  • Smooth, shiny bump that may look like a mole or cyst
Common Disorders of the Integumentary System

- Basal Cell Carcinoma
  - Scarlike patch of skin, especially on face, that is firm to the touch
  - Bump that itches, bleeds, crusts over, and then repeats cycle and has not healed in 3 weeks
  - Change in size, shape, color of wart or mole
Common Disorders of the Integumentary System

• Basal Cell Carcinoma
  • Most common treatment is surgery to destroy or remove the entire skin growth
  • Mohs micrographic surgery (originally known as chemosurgery)
    • Microscopically controlled surgery to remove skin cancer very effective with cure rates higher than 90 percent
Common Disorders of the Integumentary System

• Squamous Cell Carcinoma
  • Malignant tumor affects middle layer of skin
  • Changes to existing wart, mole, or other skin lesion
  • Development of new growth that ulcerates and does not heal well
**Common Disorders of the Integumentary System**

- Squamous Cell Carcinoma
  - High cure rate if detected and treated early
  - Neglect can allow cancer to spread, causing great disability or even death
Common Disorders of the Integumentary System

- Squamous Cell Carcinoma
  - Risk factors
    - Exposure to sunlight
    - Genetic predisposition
    - Chemical pollution
    - Overexposure to X-rays or other forms of radiation
    - Exposure to arsenic
Common Disorders of the Integumentary System

- Squamous Cell Carcinoma
  - Skin lesion
  - Growth or bump that is small, firm, reddened, nodular, coned, or flat in shape
  - Lesion whose surface scaly or crusted
Common Disorders of the Integumentary System

• Squamous Cell Carcinoma
  • Located on face, ears, neck, hands, arms
  • Occasionally, growth may occur on lip, mouth, tongue, or genitals
Common Disorders of the Integumentary System

• Squamous Cell Carcinoma
  • Surgical removal of the tumor, which may include removal of the skin around the tumor
  • Microscopic shaving (Mohs micrographic surgery) may remove small tumors
Common Disorders of the Integumentary System

- Squamous Cell Carcinoma
  - Cryosurgery and laser surgery
  - Grafting may be needed if wide areas of skin are removed
  - Radiation treatments
Common Disorders of the Integumentary System

- Malignant Melanoma
  - Originates in melanocytes of the skin
  - Develop when melanocytes do not respond to normal control mechanisms of cellular growth
Common Disorders of the Integumentary System

• Malignant Melanoma
  • Often occurs in preexisting mole
  • May then invade nearby structures or spread to other organs in body (metastasis)
  • Diagnosed by using ABCDE rule
The ABCDEs of Melanoma Changes in a Mole

- A–Asymmetry
  - Mole does not have two halves that match each other
- B–Border
  - Border is ragged, notched, or blurred together
The ABCDEs of Melanoma Changes in a Mole

• **C–Color**
  • Color is uneven; shades of black, brown, or tan present; may be areas of white, red, or blue present

• **D–Diameter**
  • May be a change in size and mole typically greater than 6 mm in diameter

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

- Malignant Melanoma
  - Change in size
  - Change in shape
  - Change in color
  - Inflammation
  - Crusting and bleeding
  - Sensory change
  - Diameter greater than 7 mm (0.28 in.)
Common Disorders of the Integumentary System

- Malignant Melanoma
  - Key to successful treatment is early diagnosis
  - Patients identified with localized, thin, small lesions nearly always survive
  - For those with advanced lesions, outlook poor in spite of progress in systemic therapy
Melanoma.
Common Disorders of the Integumentary System

• Cellulitis
  • Acute, spreading bacterial infection below surface of skin
  • Cut, abrasion, ulceration, local trauma may precede cellulitis
  • Risk factors include diabetes and impairment of immune system
  • Not contagious
Cellulitis.
Common Disorders of the Integumentary System

• Cellulitis
  • Signs and symptoms
    • Erythema (redness), warmth, swelling, pain
    • Fever, chills, enlarged lymph nodes may accompany this infection
  • Treatments
    • Antibiotics, such as derivatives of penicillin, that are most effective against staph infections
Common Disorders of the Integumentary System

- Contact Dermatitis
  - Allergic reaction caused by skin coming in contact with irritating substance
  - Causes include exposure to poison ivy, poison oak, nickel (especially on jewelry or jean snaps), lotions, detergents, or other chemicals
Contact dermatitis resulting from poison ivy.
Common Disorders of the Integumentary System

- Contact Dermatitis
  - Signs and symptoms
    - Red and irritated skin
    - Vesicles (small blisters) and rash may appear
    - Itching and pain may be present
    - Serious allergic reactions may result in urticaria or hives
Common Disorders of the Integumentary System

• Contact Dermatitis
  • Treatments
    • Antihistamines (antiallergy medicines)
    • Topical corticosteroid creams reduce inflammation
    • Systemic corticosteroids (oral medications)
Common Disorders of the Integumentary System

- **Decubitus Ulcers**
  - Also called pressure sores or bedsores
  - Area of skin and tissue that breaks down
  - Typically occur when constant pressure is maintained on a specific area of the skin
Common Disorders of the Integumentary System

• Decubitus Ulcers
  • Constant pressure on area decreases blood supply causing death to affected tissue
  • Common locations include hips, heels, ankles, shoulders, back, back of the head
Common Disorders of the Integumentary System

• Decubitus Ulcers
  • Treatment begins with relieving pressure
  • Special pillows, cushions, sheepskin pads frequently used to ensure there is no pressure on area
Common Disorders of the Integumentary System

- Decubitus Ulcers
  - Repositioning must be routine
  - Typically debrided (cleaned of all the toxins, and then medicated and covered with special gauze dressings to help in healing)
Common Disorders of the Integumentary System

• Decubitus Ulcers
  • Protecting wound from any further injury is essential to protect the patient from:
    • Infections
    • Systemic sepsis
    • Other serious complications
Common Disorders of the Integumentary System

• Eczema
  • Called atopic dermatitis
  • Chronic skin condition caused by an allergic-type reaction on the skin
  • Heredity tends to play a role
Common Disorders of the Integumentary System

- Eczema
  - Common during infancy and childhood and often disappears in adulthood
  - Signs and symptoms: red and swollen skin caused by itching, scaling, and rashes
Common Disorders of the Integumentary System

- Eczema
  - Depends on stage, or appearance, of lesions
  - Lesions may appear dry or scaly, as well as have a “weeping” appearance
Common Disorders of the Integumentary System

• Eczema
  • Weeping lesions treated with mild soaps and dressings
  • Severe cases and dry scaly lesions may be treated with mild, anti-itch lotions or low-potency topical corticosteroids
Common Disorders of the Integumentary System

- Eczema
  - Very severe cases may require systemic corticosteroids and topical immunomodulators (TIMs)
  - Sometimes short periods of time in a tanning bed are useful to dry up lesions
Common Disorders of the Integumentary System

• Herpes Simplex
  • Primarily affects mouth or genital area
  • Herpes simplex virus type 1 (HSV-1) usually affects the face, including lips and mouth
Common Disorders of the Integumentary System

- Herpes Simplex
  - Acquired during childhood, it is most common herpes simplex virus
  - Characterized by lesions inside mouth or on lips, including fever blisters and cold sores
Blisters caused by HSV-1
Common Disorders of the Integumentary System

- Herpes Simplex
  - Herpes simplex virus type 2 (HSV-2) is sexually transmitted
  - Oral and genital lesions common
Common Disorders of the Integumentary System

• Herpes Simplex
  • Some people do not display any signs or symptoms
  • Left untreated, virus can lead to complications such as meningoencephalitis or infection of the eye
Common Disorders of the Integumentary System

• Herpes Simplex
  • Mouth sores
  • Burning or tingling sensation followed by genital lesions
  • Blisters or ulcers occurring on mouth, lips, gums or genitalia
Common Disorders of the Integumentary System

• Herpes Simplex
  • Fever blisters/cold sores
  • Fever may be present especially during first episode
  • Lymph node enlargement in neck or groin
Common Disorders of the Integumentary System

• Herpes Simplex
  • No cure for herpes virus; it will always remain in a person’s body
  • Mild cases may not require any form of treatment
  • With HSV-1, cold sore will generally disappear within two weeks
  • With HSV-2, antiviral medications may help expedite healing and lessen number of outbreaks
Common Disorders of the Integumentary System

- Herpes Zoster
  - Also known as shingles
  - Viral infection that causes painful rash
  - Caused by varicella zoster virus
Common Disorders of the Integumentary System

• Herpes Zoster
  • Once a person has been infected with chickenpox, virus lies dormant in the nerves
  • After virus reactivates, it is diagnosed as shingles or herpes zoster
  • Herpes zoster can be very painful
Common Disorders of the Integumentary System

• Herpes Zoster
  • Pain, burning, tingling, itchy feeling may be experienced
  • Red rash with fluid-filled blisters begins to develop
Common Disorders of the Integumentary System

• Herpes Zoster
  • Numbness or sensitivity in affected part of body may occur
  • In serious conditions, skin can remain painful and sensitive to the touch (postherpetic neuralgia)
Common Disorders of the Integumentary System

- Herpes Zoster
  - Most symptoms occur on one side of the body, wrapping around from the back to the sternum, following the path of the nerve where the virus had been dormant
  - Headache, fever, chills
Common Disorders of the Integumentary System

• Herpes Zoster
  • Early treatment can help shorten a shingles infection and reduce risk of complications
  • Oral antiviral medications prescribed within 48 to 72 hours of first sign of rash
Common Disorders of the Integumentary System

- Herpes Zoster
  - Corticosteroids sometimes prescribed in order to reduce swelling and pain
  - When pain is severe, oral analgesics or a skin patch that contains pain-relieving medication may be required
Common Disorders of the Integumentary System

• Impetigo
  • Skin infection caused by bacteria
  • Most common in children
  • Very contagious
  • Can originate in intact skin but also secondary to preexisting skin condition or trauma
Impetigo.
Common Disorders of the Integumentary System

- Impetigo
  - Signs and symptoms
    - Round, crusted oozing spots that grow larger day by day; commonly occurs around nose and mouth
    - Honey-colored crust often develops from blisters that burst and ooze fluid
Common Disorders of the Integumentary System

• Impetigo
  • Treatment
    • Mild cases through mild cleansing, removal of crust formations, topical antibiotic ointment
    • Severe cases may require use of oral antibiotics
Common Disorders of the Integumentary System

- Psoriasis
  - Affects an estimated 7.5 million Americans
  - Develops commonly between ages 30-50
  - Condition has genetic and autoimmune characteristics
Common Disorders of the Integumentary System

- Psoriasis
  - Thought to be caused by a buildup of dead skin cells
  - It is not contagious
Common Disorders of the Integumentary System

• Psoriasis
  • Episodes of redness, itching, thick dry scales on skin
  • Onset can be gradual or abrupt
  • Flare ups attributed to infections, obesity, lack of sunlight, sunburn, stress, poor health, cold climate
Common Disorders of the Integumentary System

• Psoriasis
  • When case is severe and widespread, large quantities of fluid can be lost, causing dehydration and severe secondary infections that can be serious
Common Disorders of the Integumentary System

- Psoriasis
  - Analgesics, sedation, intravenous fluids, retinoids, and antibiotics
  - Mild cases treated at home with topical medications (prescription or nonprescription dandruff shampoos, cortisone or other corticosteroids, antifungal medications)
  - Severe lesions may require hospitalization for proper treatment
A scale is a thin, dry flake of cornified epithelial cells; psoriasis
Common Disorders of the Integumentary System

• Scabies
  • Highly contagious disorder of skin
  • Caused by the human or scabies itch mite
  • Spread by personal contact, such as shaking hands, or by direct contact with infected articles such as clothing, bedding, or towels
Common Disorders of the Integumentary System

- Scabies
  - Common among schoolchildren, roommates, and sexual partners
  - Usually found where people are crowded together
Common Disorders of the Integumentary System

- Scabies
  - Very small zigzag blister
  - Intense itching and red rash occurs around the area
  - Sides of the fingers, backs of the hands, wrists, heels, elbows, armpits, inner thighs, and waist line common locations for scabies
Scabies
Common Disorders of the Integumentary System

- Scabies
  - Treatment
    - Sulfur in lotion or cream with 6 to 10 percent concentration
    - Corticosteroids and antihistamines often used to relieve itching
Common Disorders of the Integumentary System

- Urticaria
  - Known as hives
  - Red, raised, severely itchy rash caused by acute hypersensitivity to medications, food, or environmental stimuli
Common Disorders of the Integumentary System

• Urticaria
  • It can obstruct airway by causing airway constriction
  • Important to observe all patients after injection or allergy tests
Urticaria (hives)
wheal

A wheal is a localized, evanescent elevation of the skin that is often accompanied by itching; urticaria
Common Disorders of the Integumentary System

• Urticaria
  • Localized areas of pink, itchy swollen patches of skin
  • Burning or stinging sensations may be felt
  • May vary in size from diameter of a pencil eraser to diameter of a cereal bowl
Urticaria

- Many times, the hives may overlap, forming even larger areas of irritation and swelling
- Treatment consists of removing the causitive allergens and treating with antihistamine and, in severe cases, epinephrine