

Integumentary System

Chapter 22

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Introduction

- Skin is largest and heaviest organ of body (7% of body weight)
- Houses receptors for touch, heat, cold, movement, and vibration
- No other body system is more easily exposed to infections, disease, pollution, or injury than skin
 - No body system is as strong

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Anatomy

- Skin
- Hair
- Nails
- Skin glands

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Physiology

- Protection
- Absorption
- Sensation
- Body temperature regulation
- Excretion
- Vitamin D synthesis
- Immunity

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Structure of the Skin

- Two major regions:
 - Epidermis
 - Dermis
- Classified as a cutaneous membrane

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Epidermis

- Outer region
- Composed of epithelial tissue
- Relatively avascular
 - Nutrients provided by tissue fluids

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Keratinocytes

- Produce keratin and secrete lipid substance that creates waterproof layer between epidermal cells
- Keratinocytes make up more than 90% of epidermal cells
- Mucous membrane lacks keratinization of epidermal cells

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Melanocytes

- Produce melanin (pigment)
 - Contributes to skin color
- Also found in hair, iris, and retina
- Protect from effects of UV radiation

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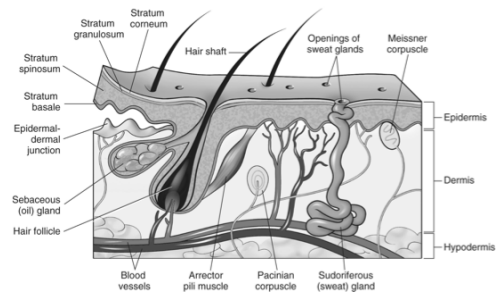
Dendritic Cells

- Trigger immunologic reactions
- Originate in bone marrow
- Migrate to deep layers of epidermis in early life

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Skin Structures and Regions



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Epidermal Growth

- Surface cells are replaced by cell division in stratum basale
 - Cells push upward from stratum basale
 - Die and become keratinized
 - Eventually desquamate (fall away)

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Epidermal-Dermal Junction

- Region between epidermis and dermis
- Connected and separated by basement membrane
- Provides support for epidermis and nutrient exchange

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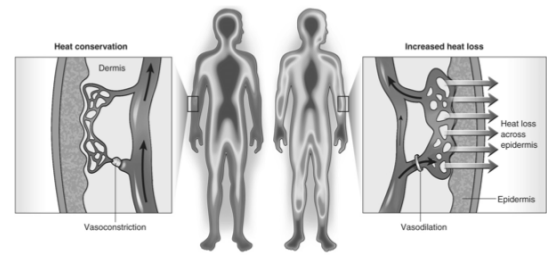
Dermis

- Contains:
 - Blood vessels
 - Nerve receptors
 - Hair follicles and muscles
 - Skin glands
 - Connective tissue: Composed mainly of collagen and elastin

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Heat Conservation and Loss



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Dermal Growth and Repair

- Does not continually shed and regenerate
- When injured, fibroblasts quickly reproduce and begin forming a scar
- If overstretched, elastic fibers may weaken and tear
 - Results in atrophy (stretch mark)

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Hypodermis

- Consists of:
 - Loose connective tissue
 - Fat or adipose
 - Receptors
 - Blood vessels
- Superficial fascia is beneath hypodermis

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Skin Color

- Ranges from almost black to nearly colorless
- Determined by:
 - Pigment
 - Blood flow
 - Hormones
- Skin color is an indicator of illness or health

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Mole Assessment

- Abnormal moles may be malignant melanomas
- Characteristics are:
 - **Asymmetry:** They are asymmetrical
 - **Border:** Edges are uneven
 - **Color:** They are different shades of brown or black
 - **Diameter:** Larger than ¼ inch in diameter
 - **Evolving:** Evolve or change over a period of time

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Skin Color and Health

- Hyperemia
 - Increased blood flow
- Ischemia
 - Lack of blood flow
- Pallor: Paleness of skin
- Jaundice: Gives yellow-gold color to skin and eyes from increased levels of bilirubin

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Hair

- Keratinized filaments arising from follicles in dermis
 - Follicles: Pouchlike structures
- Main function is protection of skin and body orifices
- Also function in sense of touch
 - Receptor is stimulated each time hair moves

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Hair

- Hair covers most of the entire body
- Heavier concentrations of hair are found in the axillae, on the scalp, on external genitalia, and above eyes and eyelids
- Men have extra growth on face and chest
- Genetics determine most hair characteristics
- Color originates from brown, yellow, and black pigments

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Arrector Pili

- Muscles attached to hair follicles
- Contract to pull hair shaft upright
 - May occur when cold or experiencing fright or anxiety
 - Skin may dimple, causing goose bumps (flesh)

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Skin Glands: Sebaceous (Oil) Glands

- Secrete sebum
- Connected to hair follicles by small ducts
 - Mildly antibacterial and antifungal
 - Lubricates hair and epidermis
 - Overproduction can make skin appear oily
 - Underproduction makes skin appear dry

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Skin Glands: Sudoriferous (Sweat) Glands

- Secrete sweat or perspiration
- Primary functions:
 - Regulate body temperature
 - Eliminate wastes
- Mammary glands (breasts) are modified sweat glands

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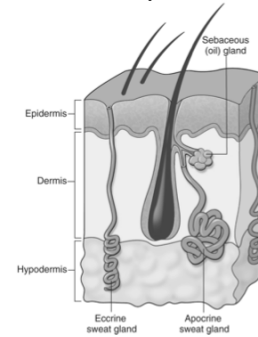
Skin Glands: Sudoriferous (Sweat) Glands

- Eccrine
 - Most numerous
 - Help with temperature regulation
- Apocrine
 - Located in axilla, anogenital region, and areola of breast
 - Opens into hair follicles; larger than eccrine glands
 - Begin to function during puberty

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Eccrine and Apocrine Glands



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Nails

- Compact keratinized cells forming thin hard plates on distal surfaces of fingers and toes
- Main functions:
 - Protection
 - Use as a tool

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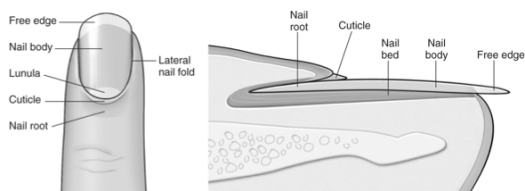
Parts of the Nail

- Nail body: Largest and most visible part
- Nail root: Nail production
- Nail bed: Skin beneath the nail
- Lateral nail folds: Edges of nail that meets skin at the sides of the nail
- Cuticle: Tough ridge of skin that grows over the nail
- Lunula: Crescent-shaped white area at nail base
- Free edge: Distal end that is trimmed as a result of nail growth

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Nail



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Touch and Skin Receptors

- Touch is an amalgamation of many sensations
 - Receptors detect pressure, movement, heat, and cold
- Warns body of danger or injury
- Information from receptors located in the skin travel toward the postcentral gyrus
- Skin regions with most receptors are complex and sensitive

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Meissner Corpuscle

- Also called *tactile corpuscle*
- Detects light pressure and low-frequency vibration
- Makes fine, tactile discriminations
 - Reading Braille, feeling textures
- Most numerous on hairless skin

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Merkel Disk and Krause Corpuscle

- Merkel disks
 - Adapt slowly; made up of two cell types: Tactile epithelial cell and tactile disk
- Krause corpuscles
 - Detect light pressure, low-frequency vibration, and textural sensations
 - Widely distributed in mucous membrane

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Pacinian Corpuscle

- Responds quickly to stimuli
- Has wide receptive fields
 - Detects sensations over wider area of body
- Located in deep dermal layers

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Ruffini Corpuscle

- Detects deep or continuous pressure and stretching of skin
- Adapts slowly and permits us to stay in contact with grasped objects
- Contributes to local and general relaxation

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Thermoreceptor and Hair Root Plexus

- Thermoreceptors
 - Detect changes in temperature
- Hair root plexus
 - Detects hair movement; wrapped around hair follicles

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