

## Chapter 4- Skin and Body Membranes

- I. Body membranes
  - A. Functions of body membranes
    1. Cover body surfaces
    2. Line body cavities
    3. Form protective sheets around organs
- II. Classification of body membranes
  - A. Epithelial membranes
    1. Cutaneous membranes
    2. Mucous membranes
    3. Serous membranes
  - B. Connective tissue membranes
    1. Synovial membranes
- III. Cutaneous membrane
  - A. Cutaneous membrane = skin
    1. Dry membrane
    2. Outermost protective boundary
  - B. Superficial epidermis is composed of keratinized stratified squamous epithelium
  - C. Underlying dermis is mostly dense connective tissue
- IV. Mucous membranes
  - A. Surface epithelium type depends on site
    1. Stratified squamous epithelium (mouth, esophagus)
    2. Simple columnar epithelium (rest of digestive tract)
  - B. Underlying loose connective tissue (lamina propria)
  - C. Lines all body cavities that open to the exterior body surface
  - D. Often adapted for absorption or secretion
- V. Serous membranes
  - A. Surface is a layer of simple squamous epithelium
  - B. Underlying layer is a thin layer of areolar connective tissue
  - C. Lines open body cavities that are closed to the exterior of body
  - D. Serous membranes occur in pairs separated by serous fluid
    1. Visceral layer covers the outside of organ
    2. Parietal layer lines a portion of the wall of ventral body cavity
  - E. Specific serous membranes
    1. Peritoneum
      - a. Abdominal cavity
    2. Pleura
      - a. Around lungs
    3. Pericardium
      - a. Around heart
- VI. Connective tissue membrane
  - A. Synovial membrane
    1. Connective tissue only
    2. Lines fibrous capsules surrounding joints
    3. Secretes a lubricating fluid
- VII. Integumentary system
  - A. Skin (cutaneous membrane)

- B. Skin derivatives
    1. Sweat glands
    2. Oil glands
    3. Hair
    4. Nails
- VIII. Skin structure
- A. Epidermis- outer layer
    1. Stratified squamous epithelium
    2. Often keratinized (hardened by keratin)
  - B. Dermis
    1. Dense connective tissue
  - C. Subcutaneous tissue (hypodermis) is deep to dermis
    1. Not part of the skin
    2. Anchors skin to underlying organs
    3. Composed mostly of adipose tissue
  - D. Layers of epidermis
    1. Stratum basale (stratum germinativum)
      - a. Deepest layer of epidermis
      - b. Lies next to dermis
      - c. Cells undergoing mitosis
      - d. Daughter cells are pushed upward to become the most superficial layers
    2. Stratum spinosum
    3. Stratum granulosum
    4. Stratum lucidum
      - a. Formed from dead cells of the deeper strata
      - b. Occurs only in thick, hairless skin of the palms of hands and soles of feet
    5. Stratum corneum
      - a. Outermost layer of epidermis
      - b. Shingle-like dead cells are filled with keratin (protective protein prevents water loss from skin)
    6. Summary of layers from deepest to most superficial
      - a. Stratum basale
      - b. Stratum spinosum
      - c. Stratum granulosum
      - d. Stratum lucidum (thick, hairless skin only)
      - e. Stratum corneum
    7. Melanin
      - a. Pigment (melanin) produced by melanocytes
      - b. Melanocytes are mostly in the stratum basale
      - c. Color is yellow to brown to black
      - d. Amount of melanin produced depends upon genetics and exposure to sunlight
  - E. Dermis
    1. Two layers
      - a. Papillary layer (upper dermal region)
        - 1) Projections called dermal papillae
          - a) Some contain capillary loops
          - b) Other house pain receptors and touch receptors

- b. Reticular layer (deepest skin layer)
          - 1) Blood vessels
          - 2) Sweat and oil glands
          - 3) Deep pressure receptors
      - 2. Overall dermis structure
        - a. Collagen and elastic fibers located throughout the dermis
          - 1) Collagen fibers give skin its toughness
          - 2) Elastic fibers give skin elasticity
        - b. Blood vessels play a role in body temperature regulation
- F. Normal skin color determinants
  - 1. Melanin
    - a. Yellow, brown, or black pigments
  - 2. Carotene
    - a. Orange-yellow pigment from some vegetables
  - 3. Hemoglobin
    - a. Red coloring from blood cells in dermal capillaries
    - b. Oxygen content determines the extent of red coloring
- G. Skin appendages
  - 1. Cutaneous glands are all exocrine glands
    - a. Sebaceous glands
    - b. Sweat glands
  - 2. Hair
  - 3. Hair follicles
  - 4. Nails
- H. Appendages of the skin
  - 1. Sebaceous glands
    - a. Produce oil
    - b. Lubricant for skin
    - c. Prevents brittle hair
    - d. Kills bacteria
    - e. Most have ducts that empty into hair follicles; others open directly onto skin surface
    - f. Glands are activated at puberty
  - 2. Sweat glands
    - a. Produce sweat
    - b. Widely distributed in skin
    - c. Two types
      - 1) Eccrine
        - a) Open via duct to pore on skin surface
      - 2) Apocrine
        - a) Ducts empty into hair follicles
    - d. Sweat and its function
      - 1) Composition
        - a) Mostly water
        - b) Salts and vitamin C
        - c) Some metabolic waste
        - d) Fatty acids and proteins (apocrine only)
      - 2) Function

- a) Helps dissipate excess heat
- b) Excretes waste products
- c) Acidic nature inhibits bacteria growth
  - i. Odor is from associated bacteria

### 3. Hair

- a. Produced by hair follicle
- b. Consists of hard keratinized epithelial cells
- c. Melanocytes provide pigment for hair color
- d. Hair anatomy
  - 1) Central medulla
  - 2) Cortex surrounds medulla
  - 3) Cuticle on outside of cortex
    - a) Most heavily keratinized
- e. Associated hair structures
  - 1) Hair follicle
    - a) Dermal and epidermal sheath surround hair root
  - 2) Arrector pili muscle
    - a) Smooth muscle
    - b) Pulls hair upright when cold or frightened
  - 3) Sebaceous gland
  - 4) Sweat gland

### 4. Nails

- a. Scale-like modifications of the epidermis
  - 1) Heavily keratinized
- b. Stratum basale extends beneath the nail bed
  - 1) Responsible for growth
- c. Lack of pigment makes them colorless
- d. Nail structures
  - 1) Free edge
  - 2) Body is the visible attached portion
  - 3) Root of nail embedded in skin
  - 4) Cuticle is the proximal nail fold that projects onto the nail body

## IX. Skin homeostatic imbalances

### A. Infections

- 1. Athlete's foot (tinea pedis)
  - a. Caused by fungal infection
- 2. Boils and carbuncles
  - a. Caused by bacterial infection
- 3. Cold sores
  - a. Caused by a virus

### B. Infections and allergies

- 1. Contact dermatitis
  - a. Exposures cause allergic reaction
- 2. Impetigo
  - a. Caused by bacterial infection
- 3. Psoriasis
  - a. Cause is unknown
  - b. Triggered by trauma, infection, stress

## X. Skin homeostatic imbalances

### A. Burns

1. Tissue damage and cell death caused by heat, electricity, UV radiation, or chemicals
2. Associated dangers
  - a. Dehydration
  - b. Electrolyte imbalance
  - c. Circulatory shock
3. Rule of nines
  - a. Way to determine the extent of burns
  - b. Body is divided into 11 areas for quick examination
  - c. Each area represents about 9% of total body surface area
4. Severity of burns
  - a. First-degree burns
    - 1) Only epidermis is damaged
    - 2) Skin is red and swollen
  - b. Second-degree burns
    - 1) Epidermis and upper dermis are damaged
    - 2) Skin is red with blisters
  - c. Third-degree burns
    - 1) Destroys entire skin layer
    - 2) Burn is grey-white or black
5. Critical burns
  - a. Burns are considered critical if:
    - 1) Over 25% of body has second-degree burns
    - 2) Over 10% of body has third-degree burns
    - 3) There are third-degree burns of the face, hands or feet

### B. Skin cancer

1. Cancer- abnormal cell mass
2. Classified in two ways
3. Benign - does not spread (encapsulated)
4. Malignant- (metastasized) moves to other parts of body
5. Skin cancer is most common type of cancer
6. Skin cancer types
  - a. Basal cell carcinoma
    - 1) Least malignant
    - 2) Most common type
    - 3) Arises from stratum basale
  - b. Squamous cell carcinoma
    - 1) Metastasizes to lymph nodes if not removed
    - 2) Early removal allows a good chance of cure
    - 3) Believed to be sun-induced
    - 4) Arises from stratum spinosum
  - c. Malignant melanoma
    - 1) Most deadly of skin cancers
    - 2) Cancer of melanocytes
    - 3) Metastasizes rapidly into lymph and blood vessels
  - d. Detection uses ABCD rule

1) ABCD rule

- a) A = asymmetry
  - i. Two sides of pigmented mole do not match
- b) B = border irregularity
  - i. Borders of mole are not smooth
- c) C = color
  - i. Different colors in pigmented area
- d) D = diameter
  - i. Spot is larger than 6 mm in diameter