

I. Unit 4: Skin and Body Membranes

A. Body Membranes

1. Function of body membranes

- a) Cover body surfaces
- b) Line body cavities
- c) Form protective sheets around organs

B. Classification of Body Membranes

1. Epithelial membranes

- a) Cutaneous membranes
- b) Mucous membranes
- c) Serous membranes

2. Connective tissue membranes

- a) Synovial membranes

C. Cutaneous Membrane

1. Cutaneous membrane = skin

- a) Dry membrane
- b) Outermost protective boundary

2. Superficial epidermis is composed of keratinized stratified squamous epithelium

3. Underlying dermis is mostly dense connective tissue

D. Mucous Membranes

1. Surface epithelium type depends on site

- a) Stratified squamous epithelium (mouth, esophagus)
- b) Simple columnar epithelium (rest of digestive tract)

2. Underlying loose connective tissue (lamina propria)

3. Lines all body cavities that open to the exterior body surface

4. Often adapted for absorption or secretion

- a) microvilli increase surface area for absorption

E. Serous Membranes

1. Surface is a layer of simple squamous epithelium - mesothelium
2. Underlying layer is a thin layer of areolar connective tissue
3. Lines open body cavities that are closed to the exterior of the body
4. Serous membranes occur in pairs separated by serous fluid
 - a) Visceral layer covers the outside of the organ
 - b) Parietal layer lines a portion of the wall of ventral body cavity
5. Specific serous membranes
 - a) Peritoneum
 - (1) Abdominal cavity
 - b) Pleura
 - (1) Around the lungs
 - c) Pericardium
 - (1) Around the heart

F. Connective Tissue Membrane

1. Synovial membrane
 - a) Connective tissue only
 - b) Lines fibrous capsules surrounding joints
 - c) Secretes a lubricating fluid - synovial fluid

G. Integumentary System

1. Skin (cutaneous membrane)
2. Skin derivatives
 - a) Cutaneous glands
 - (1) Sweat glands - sudoriferous
 - (2) Oil glands - sebaceous
 - b) Hair
 - c) Nails

H. Skin Structure

1. Epidermis - outer layer
 - a) Stratified squamous epithelium

a) Stratified squamous epithelium

b) Often keratinized (hardened by keratin)

2. Dermis

a) Dense connective tissue

3. Subcutaneous tissue (hypodermis) is deep to dermis

a) Not part of the skin

b) Anchors skin to underlying organs

c) Composed mostly of adipose tissue

4. Layers of the Epidermis

a) Stratum basale (stratum germinativum)

(1) Deepest layer of epidermis

(2) Lies next to dermis

(3) Cells undergoing mitosis

(4) Daughter cells are pushed upward to become the more

b) Stratum spinosum

c) Stratum granulosum

d) Stratum lucidum

(1) Formed from dead cells of the deeper strata

(2) Occurs only in thick, hairless skin of the palms of hands and soles of feet

e) Stratum corneum

(1) Outermost layer of epidermis

(2) Shingle-like dead cells are filled with keratin (protective protein prevents water loss from skin)

f) Summary of layers from deepest to most superficial

(1) Stratum basale

(2) Stratum spinosum

(3) Stratum granulosum

(4) Stratum lucidum (thick, hairless skin only)

(5) Stratum corneum

g) Cell types within the epidermis

(1) Melanocytes

(a) Melanin

(i) Pigment (melanin) produced by melanocytes

(a) Melanocytes are mostly in the stratum basale

(ii) Color is yellow to brown to black

(iii) Amount of melanin produced depends upon genetics and exposure to sunlight

(2) Keratinocytes

(a) most common cell

(b) Produce keratin

(3) Dendritic cells

(a) Immune function

(4) Merkel cells

(a) Touch receptors

5. Dermis

a) Two layers

(1) Papillary layer (upper dermal region)

(a) Projections called dermal papillae

(i) Some contain capillary loops

(ii) Other house pain receptors and touch receptors

(2) Reticular layer (deepest skin layer)

(a) Blood vessels

(b) Sweat and oil glands

(c) Deep pressure receptors

b) Overall dermis structure

(1) Collagen and elastic fibers located throughout the dermis

(a) Collagen fibers give skin its toughness

(b) Elastic fibers give skin elasticity

(2) Blood vessels play a role in body temperature regulation

6. Normal Skin Color Determinants

a) Melanin

(1) Yellow, brown, or black pigments

b) Carotene

(1) Orange-yellow pigment from some vegetables

c) Hemoglobin

(1) Red coloring from blood cells in dermal capillaries

(2) Oxygen content determines the extent of red coloring

7. Skin Appendages

a) Cutaneous glands are all exocrine glands

(1) Sebaceous glands

(2) Sweat glands

b) Hair

c) Hair follicles

d) Nails

8. Appendages of the Skin

a) Sebaceous glands

(1) Produce oil

(a) Lubricant for skin

(b) Prevents brittle hair

(c) Kills bacteria

(2) Most have ducts that empty into hair follicles; others open directly onto skin surface

(3) Glands are activated at puberty

b) Sweat glands - sudoriferous glands

(1) Produce sweat

(2) Widely distributed in skin

(3) Two types

(a) Eccrine

(i) Open via duct to pore on skin surface

(b) Apocrine

(i) Ducts empty into hair follicles

(ii) Sweat includes fatty acids and proteins

(4) Sweat and Its Function

(a) Composition

(i) Mostly water

(ii) Salts and vitamin C

(iii) Some metabolic waste

(iv) Fatty acids and proteins (apocrine only)

(b) Function

(i) Helps dissipate excess heat

(ii) Excretes waste products

(iii) Acidic nature inhibits bacteria growth

(a) Odor is from associated bacteria

c) Hair

(1) Produced by hair follicle

(2) Consists of hard keratinized epithelial cells

(3) Melanocytes provide pigment for hair color

(4) Hair anatomy

(a) Central medulla

(b) Cortex surrounds medulla

(c) Cuticle on outside of cortex

(i) Most heavily keratinized

(5) Associated hair structures

(a) Hair follicle

(i) Dermal and epidermal sheath surround hair root

- (i) Dermal and epidermal sheath surround hair root
- (b) Arrector pili muscle
 - (i) Smooth muscle
 - (ii) Pulls hairs upright when cold or frightened
- (c) Sebaceous gland
- (d) Sweat gland - apocrine sweat glands

(6) Types of hair

- (a) Lanugo
 - (i) Fetal hair
- (b) Vellus
 - (i) Peach fuzz
- (c) Terminal
 - (i) Coarse hair

d) Nails

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

I. Skin Homeostatic Imbalances

1. Infections

- a) Athlete's foot (tinea pedis)
 - (1) Caused by fungal infection
- b) Boils and carbuncles

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(1) Caused by bacterial infection

c) Cold sores

(1) Caused by virus

2. Infections and allergies

a) Contact dermatitis

(1) Exposures cause allergic reaction

b) Impetigo

(1) Caused by bacterial infection

c) Psoriasis

(1) Cause is unknown

(2) Triggered by trauma, infection, stress

3. Burns

a) Tissue damage and cell death caused by heat, electricity, UV radiation, or chemicals

b) Associated dangers

(1) Dehydration

(2) Electrolyte imbalance

(3) Circulatory shock

c) Rule of Nines

(1) Way to determine the extent of burns

(2) Body is divided into 11 areas for quick estimation

(3) Each area represents about 9% of total body surface area

d) Severity of Burns

(1) First-degree burns

(a) Only epidermis is damaged

(b) Skin is red and swollen

(2) Second-degree burns

(a) Epidermis and upper dermis are damaged

(b) Skin is red with blisters

(3) Third-degree burns - full thickness burns

(a) Destroys entire skin layer

(b) Burn is gray-white or black

e) Critical Burns

(1) Burns are considered critical if

(a) Over 25% of body has second-degree burns

(b) Over 10% of the body has third-degree burns

(c) There are third-degree burns of the face, hands, or feet

4. Skin Cancer

a) Cancer - abnormal cell mass

b) Classified two ways

(1) Benign

(a) Does not spread (encapsulated)

(2) Malignant

(a) Metastasized (moves) to other parts of the body

c) Skin cancer is the most common type of cancer

d) Skin Cancer Types

(1) Basal cell carcinoma

(a) Least malignant

(b) Most common type

(c) Arises from stratum basale

(2) Squamous cell carcinoma

(a) Metastasizes to lymph nodes if not removed

(b) Early removal allows a good chance of cure

(c) Believed to be sun-induced

(d) Arises from stratum spinosum

(3) Malignant melanoma

(a) Most deadly of skin cancers

- (a) Most deadly of skin cancers**
- (b) Cancer of melanocytes**
- (c) Metastasizes rapidly to lymph and blood vessels**
- (4) Detection uses ABCD rule**
 - (a) ABCD Rule**
 - (i) A = Asymmetry**
 - (a) Two sides of pigmented mole do not match**
 - (ii) B = Border irregularity**
 - (a) Borders of mole are not smooth**
 - (iii) C = Color**
 - (a) Different colors in pigmented area**
 - (iv) D = Diameter**
 - (a) Spot is larger than 6 mm in diameter**