

The Integumentary System

I. Organ Systems

A. Organ = two or more types of tissue that perform a common function.

B. Membranes are organs: Epithelial + Connective tissue that cover and line cavities.

C. A system is a group of organs that perform a specialized function.

D. Integumentary System is membrane + accessory organs.

II. Types of Membranes(4)

A. Serous Membrane

- Line cavities with no openings to outside.
- Consists of simple squamous epithelium + loose connective.
- Cells secrete serous fluid(lubrication of membrane)
- Types of Serous Membranes
 - Parietal Pleura- lining of thorax
 - Parietal Peritoneum- lining of abdomen
 - Visceral Pleura- cover organs within thorax
 - Visceral Peritonium- cover organs within abdomen.

II. Types of Membranes(4)

B. Mucous Membrane

- Line cavities and tubes with openings to the outside.
- Epithelium + loose connective tissue
- Specialized cells(goblet) secrete mucus
- Found in:
 - Oral and nasal cavities
 - Tubes of the digestive, respiratory, urinary, reproductive systems

II. Types of Membranes(4)

C. Synovial Membranes

- Inner linings of joint cavities (Synovial Joints)
- Fibrous connective over loose connective and adipose
- Cells secrete a thick, colorless fluid into joint cavity (synovial fluid)- lubricates joints.

D. Cutaneous Membrane-Skin

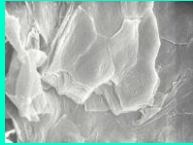
III. Functions of Skin

- Largest organ of body
- Protective covering
- Helps regulate body temp.
- Slows water loss from deeper tissue.
- Excretes small quantities of wastes.
- Houses sensory receptors.
- Synthesizes biochemicals

IV. Epidermis (outer layer)

A. Functions

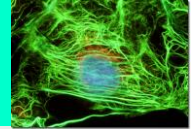
1. Protects against water loss, mechanical injury, and chemicals.
2. Keeps out microorganisms
3. Protects against UV radiation.



IV. Epidermis (outer layer)

B. Structure

1. Stratified Squamous Epithelial(lacks blood)
2. **Stratum basale**
 - a. Deepest cells of epithelium
 - b. Fed by dermal blood vessels
3. **Keratinocytes**
 - a. Older cells pushed upward
 - b. Undergo keratinization
 - c. Produce tough, waterproof, fibrous protein(keratin)
4. **Stratum Corneum**- Forms the outermost layer of skin

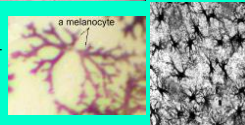


IV. Epidermis (outer layer)

C. Skin Color

1. Melanocytes

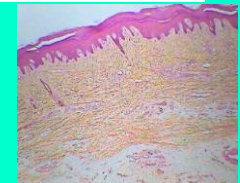
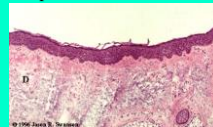
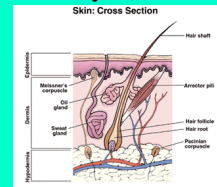
- a. Near basement membranes
 - b. Secrete melanin into nearby epidermal cells (**cytokrine secretion**)
 - c. Melanin absorbs light energy.
 - d. Sunlight, UV radiation, and X-rays stimulate melanin production
 - e. Amount and size of melanin granules determines color
2. Highly oxygenated blood gives pinkish complexion.
 3. Poorly oxygenated blood gives bluish complexion (**cyanosis**)



V. Dermis (inner layer)

A. Functions

1. Houses accessory organs
2. Binds epidermis to underlying tissue.
3. Supply nutrients to all skin cells.
4. Helps regulate body temperature



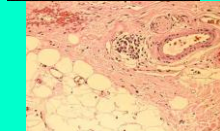
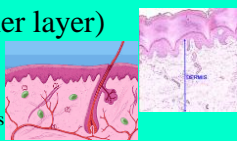
V. Dermis (inner layer)

B. Structure

1. Composed of fibrous connective, epithelial, smooth muscle, nervous tissue, and blood.
2. Separated from epidermis by a basement membrane.

C. Subcutaneous Layer (Hypodermis)

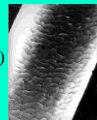
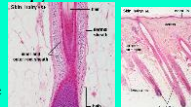
1. Below the dermis
2. Binds skin to underlying organs.
3. Loose connective and adipose tissue.
4. Collagen and elastic fibers are continuous with dermis(no sharp boundary)



VI. Accessory Organs of Skin

A. Hair Follicles

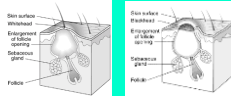
1. Lined by epidermal tissue
2. Extends into the dermis
3. Dermal blood vessels feed the hair root
4. Older cells keratinize, move upward and away (forming a hair)
5. **Arrector pili muscle**(smooth) attach to each follicle.(cause goosebumps)
6. Color determined by melanocytes.
7. Congenital Generalized Hypertrichosis- abnormal amount of follicles.



VI. Accessory Organs of Skin

B. Sebaceous Glands (holocrine)

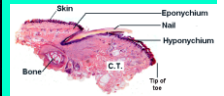
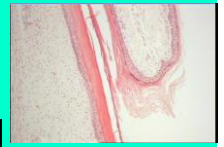
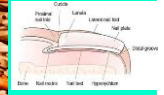
1. Groups of specialized epithelial cells attached to follicles.
2. Secretes **sebum** (oily fatty material and cellular debris)
3. Keeps hair and skin soft, pliable, and waterproof.
4. Acne vulgaris- overactive, inflamed, plugged sebaceous glands.



VI. Accessory Organs of Skin

C. Nails

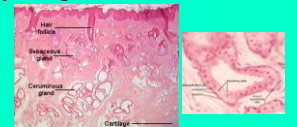
1. Keratinized stratified squamous epithelial cells.
2. Form from the growing region (**lunula**) at nail root.
3. Attaches along the nail bed.
4. Epithelium is continuous with the skin.



VI. Accessory Organs of Skin

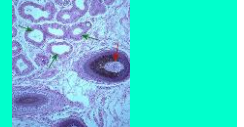
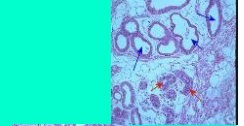
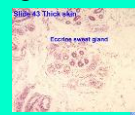
- ### D. Ceruminous Glands- specialized to secrete earwax.
- ### E. Sudoriferous Glands- sweat glands

1. All are exocrine glands(ducts).
2. Ball shaped, coiled tube originating in the deep dermis.
3. Most numerous in the palms and soles.



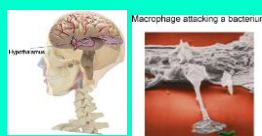
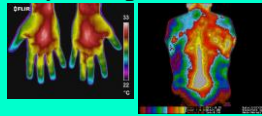
VI. Accessory Organs of Skin

4. **Eccrine Sweat Glands**
 - a. Most numerous sweat gland.(forehead, neck, back)
 - b. Not associated with follicles.
 - c. Respond to elevated body temp.
 - d. Sweat- mainly water, some salt, urea, uric acid(excretory)
5. **Apocrine Sweat Glands**
 - a. Activate when upset, frightened or in pain.
 - b. Numerous in armpits and groin
 - c. Connect to hair follicles.
 - d. Sex hormones stimulate their development(puberty)



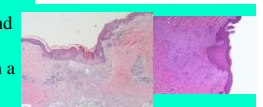
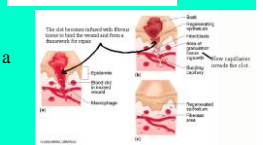
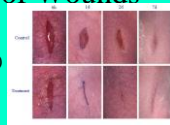
VII. Regulation of Body Temperature

1. Normal is 37° C or 98.6° F.
2. Major heat producers: skeletal and cardiac muscle, liver
3. Hypothalamus(in Brain) is temp. control center.
4. Too hot- blood vessels dilate and sweat is secreted.
5. Too cold- blood vessels constrict and sweat glands are inactive.
6. Interleukins- Released from phagocytes and raise the set point.
7. Evaporating sweat takes energy away.
8. High humidity → low evaporation → heat exhaustion(fatigue, headache, nausea, cramps)



VIII. Healing of Wounds

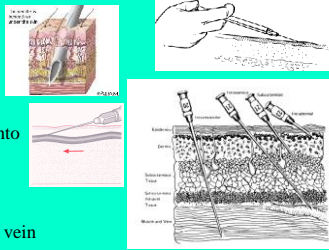
- A. Damaged tissue more permeable.
- B. Blood vessels dilate → more nutrients and oxygen(inflammation)
- C. Shallow wound- epithelial cells are stimulated and fill gap.
- D. Deep wound
 1. Broken blood vessels form clot.
 2. Blood clot and dried tissue form a protective scab.
 3. Fibroblasts move in and secrete collagenous fibers(binding wound)
 4. Phagocytes remove dead cells and other particles
 5. New connective tissue may form a scar.



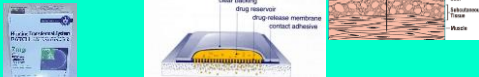
IX. Medical Connections

A. Injections

1. Hypodermic
 - a. Subcutaneous- beneath skin.
 - b. Intramuscular- into muscle
2. Intradermal- within skin.
3. Intravenous- within vein



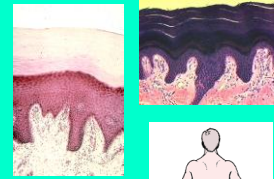
B. Transdermal Medication- across the skin(patch)



IX. Medical Connections

C. Calluses

1. Normally production of epidermal cells = loss of stratum corneum
2. Reproduction increases when rubbed or pressed regularly



D. Decubitus Ulcer (pressure ulcer)- bedsore

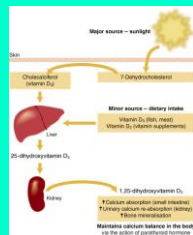
1. Constant pressure disrupts blood supply.
2. Usually at bony projections.



IX. Medical Connections

E. Vitamin D Production

1. Necessary for normal bone and tooth development.
2. Forms from **dehydrocholesterol** (from diet or digestive cells).
3. Dehydrocholesterol is converted to Vitamin D in skin by UV radiation.



F. Immune System

1. Keratinocytes produce substances that stimulate white blood cell(T lymphocytes) development.
2. **T lymphocytes** defend against bacteria and viruses.



X. Skin Cancer

A. Cutaneous Carcinomas

1. Originate from epithelial cells(basal and squamous)
2. Most common form of cancer(fair-skinned and over forty)
3. Develop from hard, dry, scaly lesions with red bases, flat or raised.
4. Slow growing and can be cured by removal or radiation.



X. Skin Cancer

B. Cutaneous Melanomas

1. Originate from melanocytes
2. Pigmented with melanin- brown, black, gray, blue
3. Irregular in shape.
4. Initiated by short, intermittent exposure to high intensity sunlight(burn not tan)
5. Spreads horizontal(curable), spreads downward(survival is low)

