INTEGUMENTARY SYSTEM
CHAPTER 4

Objectives
1. List the general function of each membrane type (cutaneous, mucous, serous, synovial) and give its location.
2. Compare the tissue makeup of the major membrane types.

You are responsible for outlining this section in your notes p. 92-94

Objectives
3. List the functions of the integumentary system and explain how each function is accomplished.
4. Be able to recognize and name skin structures when provided with a model or diagram
5. Name the layers of the epidermis and describe the characteristics of each

Objectives
6. Name and describe the two regions of the dermis.
7. Name the factors that determine skin color and describe the function of melanin.
8. Explain how temperature is regulated in the dermis.

Objectives
9. Describe the distribution and function of the sebaceous glands, sweat glands, hair and nails.
10. Describe the developmental aspects of the skin.

Objectives

FUNCTIONS
• Waterproofs
  - Protein called keratin hardens to prevent water loss
• Protection
  - 1st line of defense against pathogens, chemicals & abrasions
• Insulation
  - Regulates heat loss by controlling blood flow to capillaries
  - Cools body through evaporation of perspiration
BASIC STRUCTURE

Made up of 2 tissue types:
1. Epidermis: stratified squamous epithelia - can keratinize or become hard
2. Dermis: dense connective tissue - connected to epidermis - if separated form a blister


EPIDERMIS

- composed of stratified squamous epithelia tissue
- Avascular
- Contains 5 layers or strata
- New epidermis every 25 - 45 days
- Contains melanocytes that produces melanin - pigment that colors the skin & protects against UV rays

a. Strata basale - deepest layer of epidermis
- Receives nutrients & oxygen from dermis
- Constant cell division (mitosis) with new cells pushing upward
b. **Strata spinosum**  
- Cells become keratinized (waterproofing protein)

c. **Strata granulosum**  
- Cells begin to die

d. **Strata lucidum**  
- Clear layer  
- Palms and soles

e. **Strata corneum**  
- Outermost layer  
- Abundance of keratin to protect underlying cells  
- 20-30 cell layers

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**DERMIS**

- Consists of 2 regions:  
  1. **Papillary** - upper dermal region  
     - Uneven layer due to fingerlike projections called *dermal papillae*  
     - Dermal papillae contain capillaries that nourish the epidermis and touch receptors called *Meisner's corpuscles*

  2. **Reticular** - deepest layer of dermis  
     - Contains blood, sweat & oil glands, pressure receptors  
     - Collagen fibers provide toughness and bind water  
     - Elastic fibers provide elasticity  
     - Both fibers decrease with age

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**Temperature Regulation in Dermis**

- Increase in body temperature - bv swell (dilate) causing blood to rush closer to skin surface; skin reddens and heat radiates from skin surface

- Decrease in body temperature - bv constricts keeping blood in deeper skin layers; heat is conserved
**SUBCUTANEOUS / HYPODERMIS**

- Underlying fat layer
- Contains adipose tissue, bv & nerves

**Skin Color**

- Melanin - yellow, reddish brown or black
- Carotene - orange yellow
- Hemoglobin - iron compound in blood

**SENSORY RECEPTORS**

- Meissner’s corpuscle - light touch
- Usually located in dermal papillae
- Merkel’s corpuscle - touch receptor in epidermis

**SENSORY RECEPTORS**

- Pacinian corpuscle - deep pain
- Krause corpuscle - cold
- Ruffini corpuscle - heat

**SEBACEOUS GLANDS**

- Oil glands; all areas except palms & sole of feet
- Sebum - mixture of oily substances & fragmented cells; provides lubrication & kills bacteria
- White head - sebum appears on skin surface when duct is clogged
- Black head - sebum oxidizes, dries, darkens & hardens
- Acne - bacterial infection of sebaceous gland
- Seborrhea - “cradle cap”; overactive glands in infants; red bumps that gradually form a yellow crust
SUDERIFEROUS GLAND

- sweat glands; open externally via a funnel shaped pore
- 1. Eccrine gland - most numerous; found throughout body; produce sweat
  a. Sweat - clear secretion containing water, salts, Vit C, ammonia, urea, uric acid & lactic acid
  b. pH ranges from 4 - 6 which prohibits bacterial growth

2. Apocrine glands - confined to axillary & genital regions
   - Larger gland with ducts emptying into hair follicles
   - Secretions similar to sweat but contain proteins & fatty acids
   - Bacteria metabolize proteins & fatty acids as causing odor

HAIR & HAIR FOLLICLES

- Hair guards head from bruises, shields eyes & removes dust from respiratory tract
- Structure of Follicle
  - 1. follicle - produces hair
  - 2. root - part of hair enclosed in follicle
  - 3. shaft - part of hair projecting from surface of skin or scalp
  - 4. hair bulb matrix - inferior end of bulb where cell division occurs
  - 5. arrector pili - muscle that raises hair
• Structure of Hair Shaft
  1. Medulla - central core; not present in all hair
  2. Cortex - middle bulky layer
  3. Cuticle - outer layer; resembles roof shingles; heavily keratinized; provides strength

• Medulla of Human Hair

• Medulla of Cat Hair

• Cuticle of Human Hair

• NAILS
  1. 3 regions - free edge, plate (visible) & root (embedded)
  2. Nail folds - overlapping borders that surround nail
  3. Cuticle - thick nail fold; proximal
  4. Nail bed - beneath nail; thickens at proximal area to form nail matrix (where growth occurs)
  5. Lanula - white crescent area over nail matrix
  6. Grow approx. 3mm / month; 6 months for complete regrowth
Developmental Aspects of Skin

- **INFANCY** - skin thin & showing bv
- Lanugo - downy hair that covers fetus during 5 - 6 month & sheds at birth
- Vernix caseosa - white, cheesy looking substance that covers baby at birth; produced by sebaceous glands & protects skin while in amniotic sac
- Milia - build up in sebaceous glands; common on nose & forehead; resemble whitehead

- **CHILDHOOD** - skin thickens; subcutaneous builds up

- **ADOLESCENCE TO ADULTHOOD** - sebaceous glands are activated - acne occurs

- **OLD AGE** - subcutaneous decreases
  - Moisture loss due to decrease in sebaceous secretions
  - Thinning skin more susceptible to bruising
  - Decrease in elasticity & loss of subcutaneous causing bagging of skin