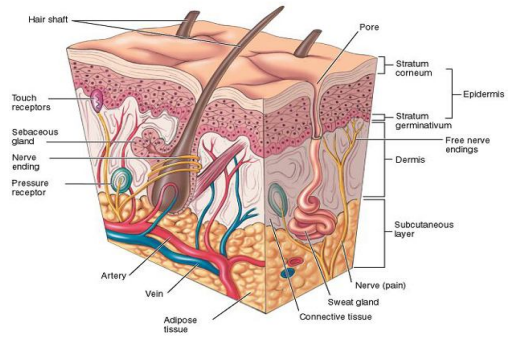
Integumentary System

Rita Carey-Nita

Structure of Integumentary System

- Integumentary System includes:
  - Skin
  - Sweat glands
  - Sebaceous glands
  - Hair
  - Nails



Skin

- Skin: AKA Cutaneous Layer
- 2 layers:
  - Epidermis & Dermis
- Epidermis:
  - Outer layer
  - Avascular
  - No nerves
  - Thin stratified squamous epithelium

Epidermis

- 2 layers:
  - stratum corneum & stratum germinativum
- Stratum Germinativum:
  - Lies close to dermis / Deepest layer
  - Access to rich blood supply
  - Cells constantly divide—Mitosis
  - Cells replaced every 2-4 weeks
  - Keratinzation occurs producing keratin

Epidermis

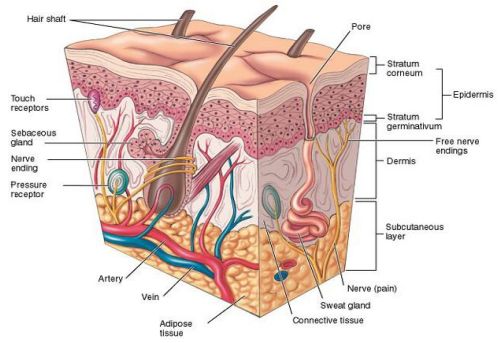
- Stratum corneum:
  - Surface layer of epidermis
  - Composed of dead, keratinized cells
  - Cells constantly replaced by other cells that are moving up from deeper layers
  - The dead cells are continuously sloughed off through wear & tear

Dermis

- Dermis:
  - AKA: Corium or True Skin
  - Located under epidermis
  - Thickness depends on site
  - Composed of dense fibrous connective tissue
  - Contains collagen to maintain shape & strength; elastin fibers for stretch
  - Nourishes & supports the epidermis
  - Accessory structures are embedded in dermis

Subcutaneous

- Subcutaneous Layer:
  - Layer beneath dermis & on top of muscle
  - Not considered part of skin
  - Attaches epidermal/dermal layer to underlying structure
  - Composed of adipose & loose connective tissue
  - Cushions, protects, insulates & anchors skin to underlying structures



- Skin Color:
  - Determined by genetics, physiological, UV rays & sometimes disease
  - Melanocytes secrete a skin-darkening pigment: **melanin**
  - The more melanin secreted the darker the skin
  - Skin also contains yellow pigment called **carotene**

- Conditions related to malfunction of melanocytes:
  - Albinism: failure of melanocytes to secrete melanin.
  - Vitiligo: loss of pigment in certain area of the skin creating patches of white skin.
  - Freckles & Moles: concentration of melanin in an area

- Diseases or conditions that affect skin color:
  - Poorly oxygenated blood causes skin to turn blue; called **cyanosis**
  - Increased blood flow to skin causes flushing or reddened skin
  - Increase in bilirubin causes yellow coloration of skin which is reflective of liver disease; **jaundice**
  - Adrenal disease deposits melanin in skin creating a bronze color
  - Bruising indicates that blood has escaped from the blood vessels & clotted under the skin; **ecchymosis**

Accessory Structures

- Hair:
  - Composed of keratinized cells
  - Growth affected by sex hormones; testosterone & estrogen
  - Grows 1mm every 3 days
  - Lose 25-100 hairs/day
  - Color is determined by genetics & melanin

Hair

- Shape of hair shaft determines hair type
- Hair has three parts:
  - Shaft: visible keratinized cells
  - Root: below skin where mitosis takes place
  - Hair follicle: epidermal bulb in dermal layer form which root grows
- Hair follicles are surrounded by arrector pili muscles. Contraction of arrector pili is stimulated with cold or fright muscles contract & hair stands erect causes an increase in temperature—shivering is response

Hair

- Primary function of Hair:
  - Protection & Insulation
    - Scalp: from sunlight & cold
    - Eyelashes/eyebrows: protects eyes
    - Nostrils & ear: deters foreign objects & insects
  - Disease process causing hair loss is alopecia
  - Nutritional status determines hair texture

Nails

- Nails:
  - Thin plates of stratified squamous epithelial cell
  - Very hard form of keratin
  - Function as protection from injury
  - Contains: free edge—nail body—nail root
  - Pink is normal color
- Unhealthy nails may represent disease process

Glands

- Sebaceous glands:
  - AKA oil glands
  - Associated with hair follicles & travels to surface
  - Secrete sebum which lubricates & waterproofs skin & inhibits bacteria growth on skin
  - Increase activity of sebaceous glands during puberty—increased acne
  - Decrease secretion with aging—dry brittle hair & skin
  - Fetus covered with vernix caseosa

Glands

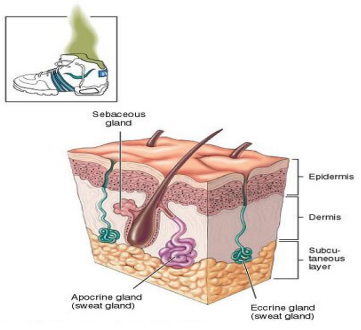
- Sudoriferous gland:
  - AKA sweat gland
  - Located in the dermis & subcutaneous layer
  - All regions of skin but more in palms & soles of feet
  - Each person has approx. 3 million
  - Secretes sweat
  - Two types: apocrine & eccrine

Sudoriferous Glands

- Apocrine Glands:
  - Most abundant in axilla & genitals
  - Respond to emotional stress
  - Activated during puberty
  - Sweat does not produce strong odor; when mixed with bacteria can be odoriferous
  - Associated with hair follicles

Sudoriferous Glands

- Eccrine Glands:
  - More numerous & wide spread throughout body; forehead, upper lip, palms, soles of feet
  - Not assoc with hair follicles
  - **Key role in temperature regulation**
  - Active during entire lifetime
- Modified sweat glands include:
  - Mammary gland secretes breast milk
  - Ceruminous glands secrete cerumen



Function of Integumentary System

- Acts as physical barrier to microorganisms, foreign material & harmful substances
- Protects internal organs & structures from injuries due to chemical & physical trauma
- Helps body retain water & electrolytes
- Excretes waste
- Synthesizes & secretes Vitamin D
- Regulates body temperature
- Houses sensory receptors

Temperature Regulation

- Metabolism in cells produces heat
- Body constantly produces & loses heat
- 80% of heat is lost through the skin
- 4 ways heat is lost:
  - Radiation
  - Conduction
  - Convection
  - Evaporation

Temperature Regulation

- Radiation: heat is lost from warm object to the cooler air surrounding the warm object
- Conduction: loss of heat from a warm body to a cooler object in contact with the warm body
- Convection: loss of heat by air currents moving across the surface of the skin
- Evaporation: when a liquid becomes a gas

Body Temperature Regulation

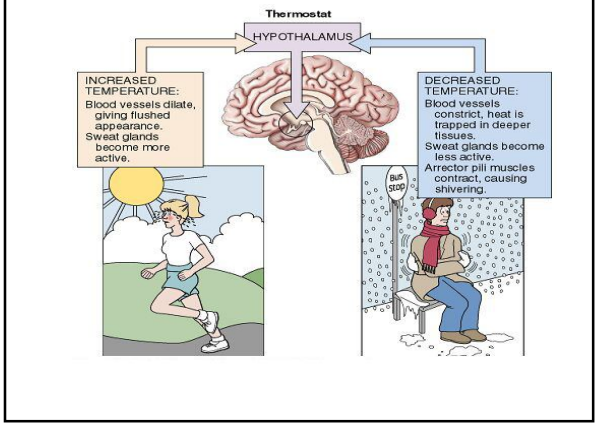
- Normal body temp. 98.6°F
- Thermostat of body is located in the hypothalamus
- Three structures assist in regulation:
  - Blood vessels
  - Sweat glands
  - Arrector pili muscles

Body Temperature Regulation

- Body temperature ***increases***
  - Blood vessels dilate allowing blood to flow toward surface of skin
  - Sweat glands are activated & release sweat
  - As sweat evaporates, heat is lost
  - Decreases temperature

Body Temperature Regulation

- Body temperature ***decreases***
  - Blood vessels constrict reducing blood flow to surface of skin
  - Sweat glands less active
  - Arrector pili muscles contract, causing shivering
  - Shivering causes increase production of heat



Burns

- Cause major destruction to integumentary system
- Classified by depth & extent
- Depth:
  - Partial thickness
    - First degree or Second degree
  - Full thickness
    - Third degree
- Extent
  - Rule of Nines