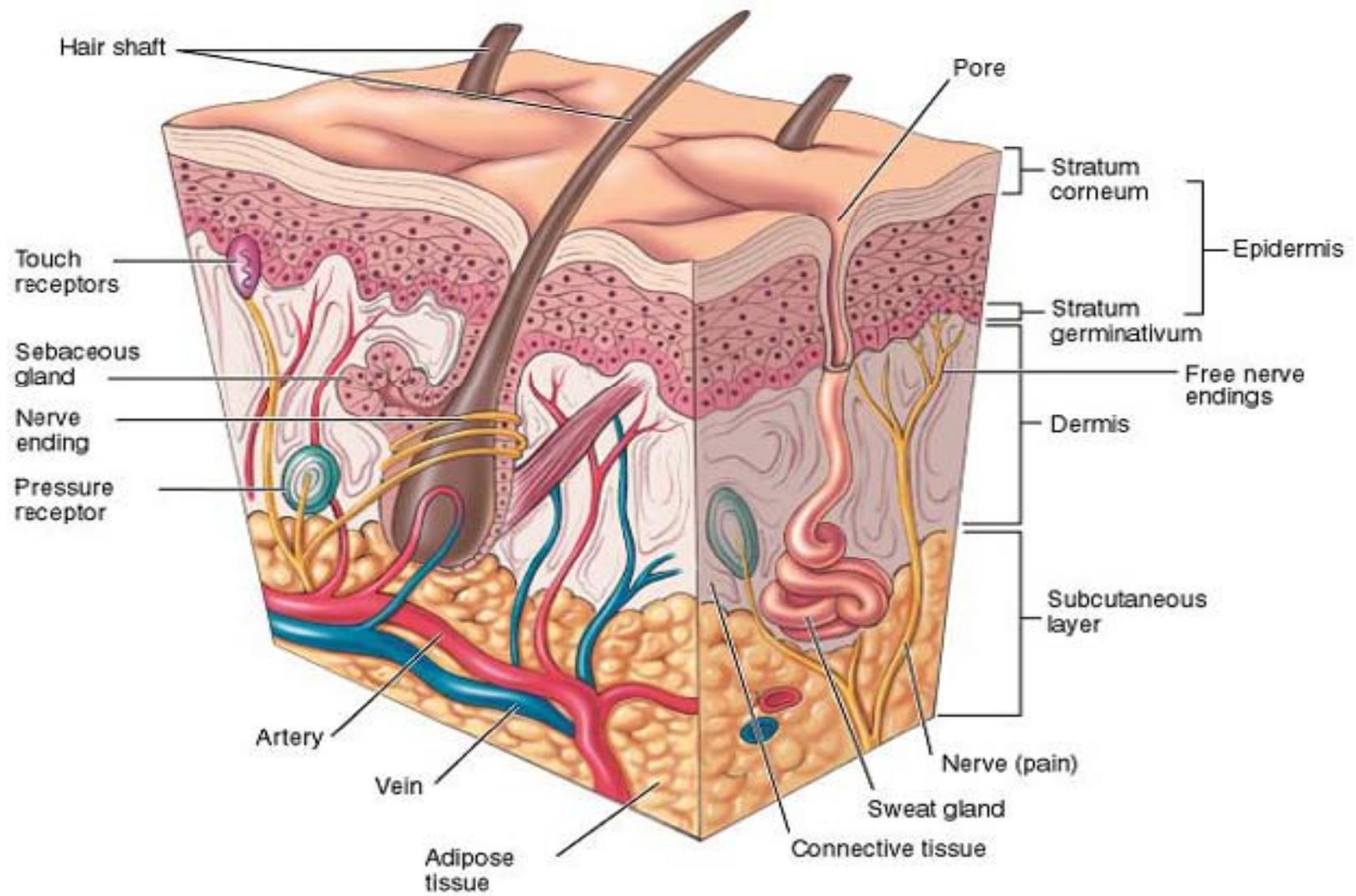


# Integumentary System

Rita Carey-Nita

# Integumentary System

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



# Integumentary System

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

# Integumentary System

- 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
  - Keratinization occurs producing keratin

# Integumentary System

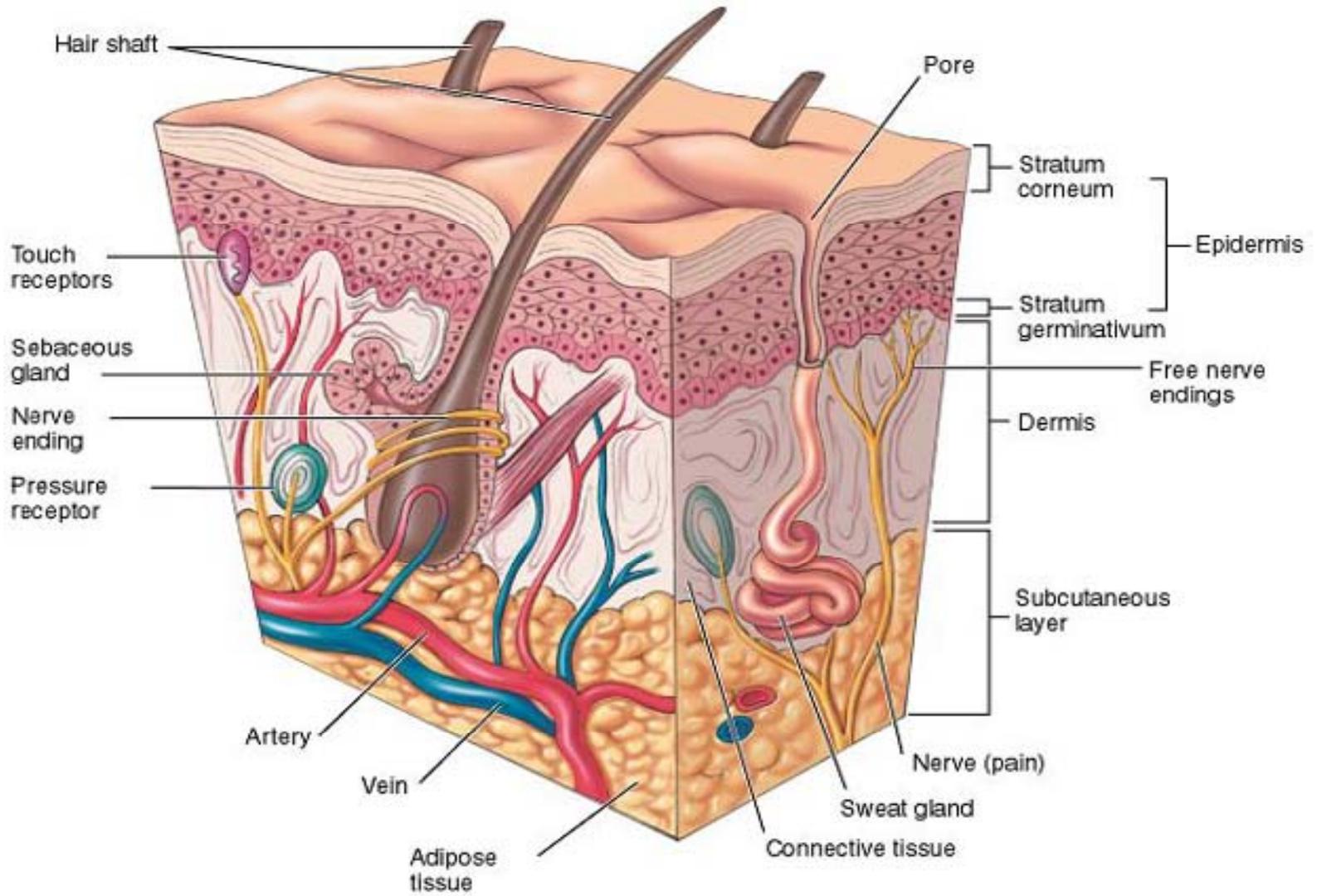
- Stratum corneum:
  - Surface layer of epidermis
  - Composed of dead, keratinized cells
  - Cells constantly replaced by other cells that are moving up from deeper layers
  - The dead cells are continuously sloughed off through wear & tear

# Integumentary System

- 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

# Integumentary System

- 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



# Integumentary System

- 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

# Integumentary System

- 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

# Integumentary System

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

# Integumentary System

- 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

# Integumentary System

- 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 from 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

# Integumentary System

- 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

# Integumentary System

- 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

# Integumentary System

- 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

# Integumentary System

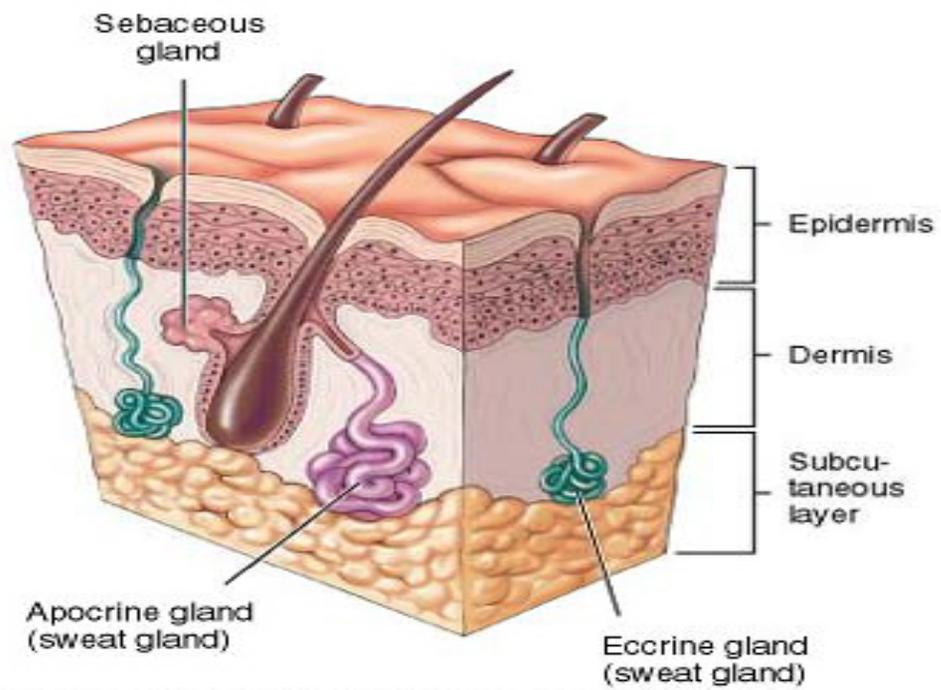
- Sudoriferous gland:
  - AKA sweat gland
  - Located in the dermis & subcutaneous layer
  - All regions of skin but more in palms & soles of feet
  - Each person has approx. 3 million
  - Secretes sweat
  - Two types: apocrine & eccrine

# Integumentary System

- Apocrine:
  - 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

# Integumentary System

- Eccrine:
  - 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
- Other glands include:
  - Mammary gland secretes breast milk
  - Ceruminous glands secrete cerumen



# Integumentary System

## Function of the 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

# Integumentary System

## Temperature Regulation

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

# Integumentary System

- 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

# Integumentary System

## 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

# Integumentary System

## Temperature Regulation

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

# Integumentary System

## 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
- Increase production of heat

# Thermostat

HYPOTHALAMUS

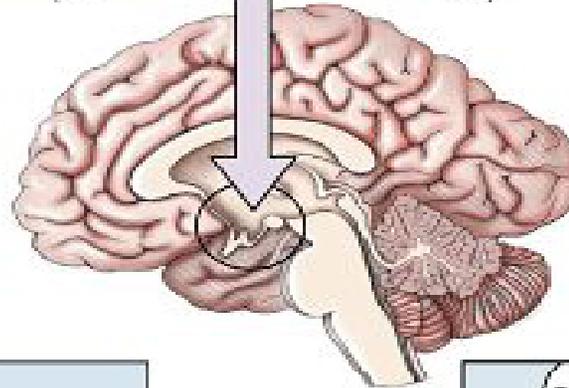
## INCREASED TEMPERATURE:

Blood vessels dilate, giving flushed appearance. Sweat glands become more active.



## DECREASED TEMPERATURE:

Blood vessels constrict, heat is trapped in deeper tissues. Sweat glands become less active. Arrector pili muscles contract, causing shivering.



# Integumentary System

## Burns

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