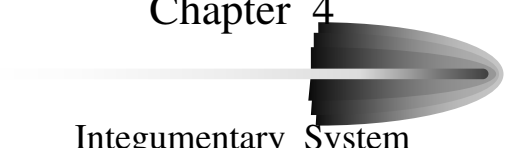



Chapter 4
Integumentary System



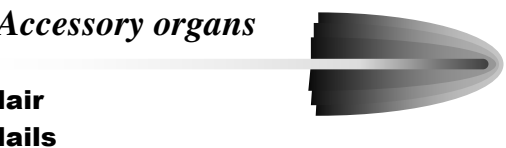
Integumentary System

- **Skin & its accessory organs make up the Integumentary System**
 - Largest organ in the body
 - Maintains homeostasis
 - Protective covering
 - Retards water loss
 - Regulates body temperature
 - Houses sensory receptors
 - Contains immune system cells
 - Synthesizes chemicals
 - Excretes small amounts of waste



Accessory organs

- **Hair**
- **Nails**
- **Oil glands**
- **Sweat glands**



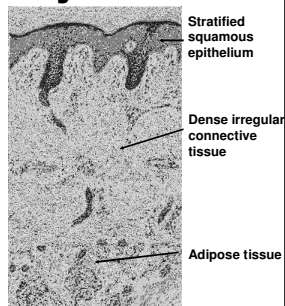
Skin Cells

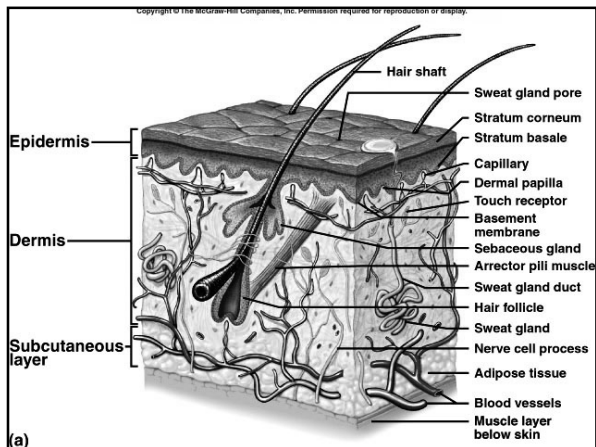
- Help produce vitamin D when exposed to sun
- Keratinocytes –

Layers of Skin

- Skin consist of 3 Layers

- Epidermis
- Dermis
- Subcutaneous layer





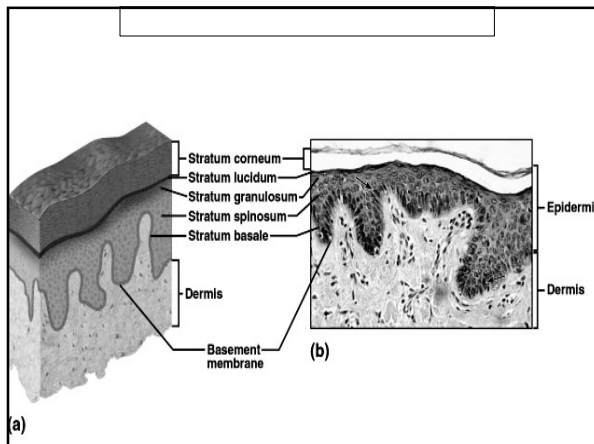
Epidermis

- made up of stratified squamous
- avascular –
- cells pushed outward & keratinized as they die
- thickest on palms & soles; due to ↑ friction
- melanocytes –

Epidermis

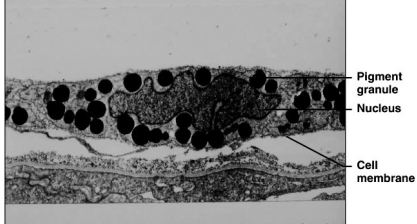
• **5 Layers of the Epidermis**

- Stratum corneum – outer layer; keratinized, dead layer of epithelial cells
- Stratum lucidum – cells appear clear; nuclei, organelles, membranes not visible; callouses
- Stratum granulosum – layers of flattened granular cells
- Stratum spinosum – many layers of cells w/large, central nucleus
- Stratum basale – single layer of reproducing cells; contains melanocytes; next to dermis



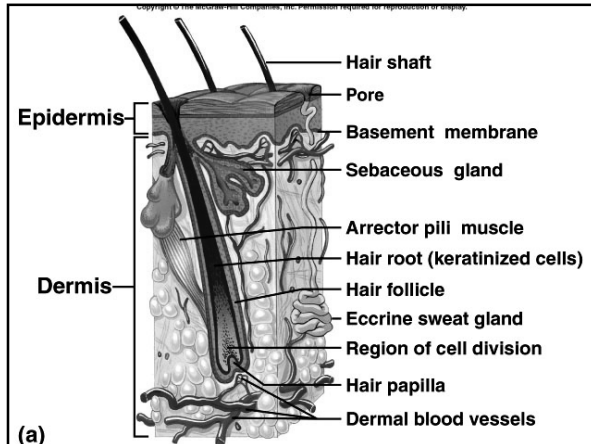
Epidermis

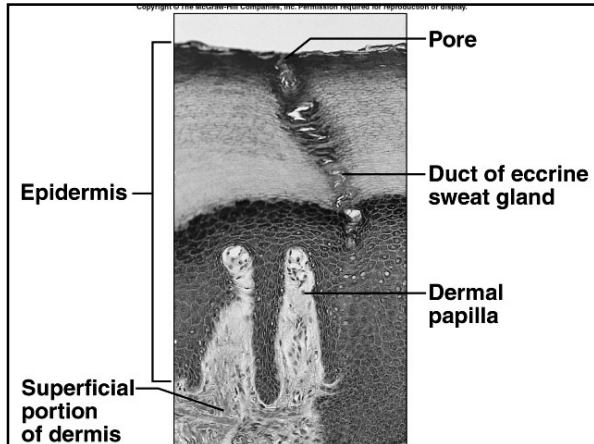
Melanocytes are stimulated by sunlight & pass melanin to nearby cells creating a tan



Dermis

- strong but flexible connective tissue composed of collagen, elastin, & reticular fibers (dense connective tissue)
- dermal papillae – projection between epidermis & dermis; form whorls & patterns that are genetically unique (fingerprints)
- binds epidermis to underlying tissues
- blood vessels present; helps regulate temp
- muscle cells present in some tissues
- sensory receptors present; Meissner's corpuscles
- sweat and oil glands present
- hair follicles present





Dermal Layers

- **Two layers:**
 - Papillary
 - Reticular

Dermal Layers

- **Papillary layer**
 - Areolar connective tissue with collagen and elastic fibers and blood vessels
 - Dermal papillae contain:
 - > -
 - > -
 - > -

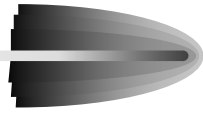
Dermal Layers

- **Reticular layer**

- ~

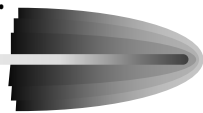
- **Collagen fibers** –

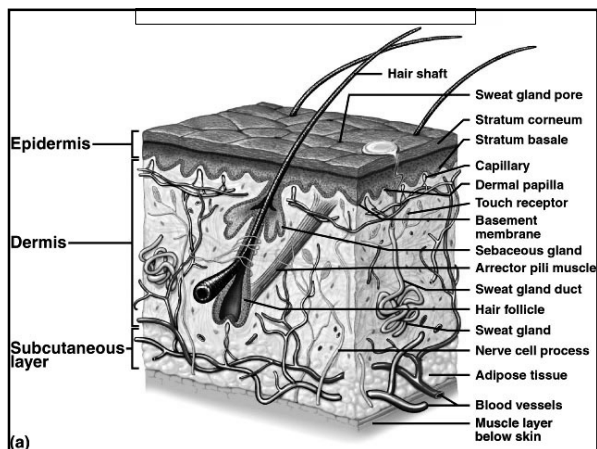
- **Elastic fibers** –



Subcutaneous Layer

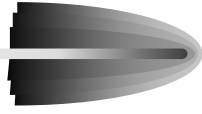
- also called hypodermis
- binds skin to underlying organs
- most adipose tissue which insulates
- contains major blood vessels that nourish skin cells





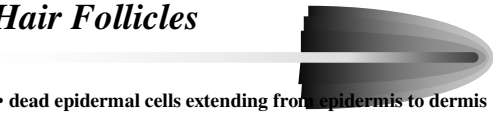
Hair

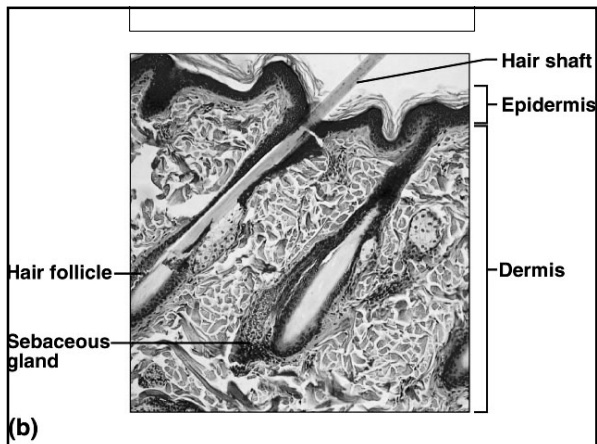
- **Protective organ**
- **Produced by hair follicle**
- **Fused keratinized cells**
- **Not present**

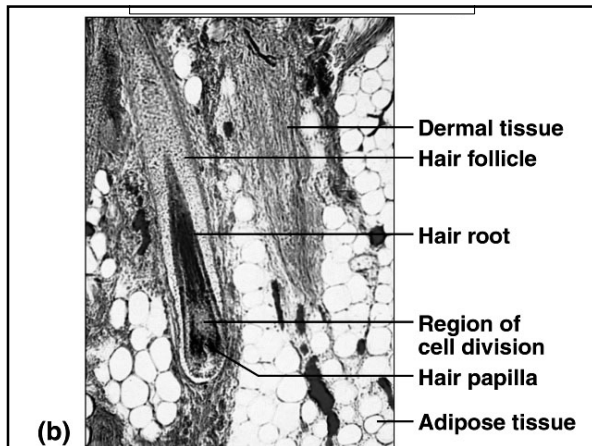


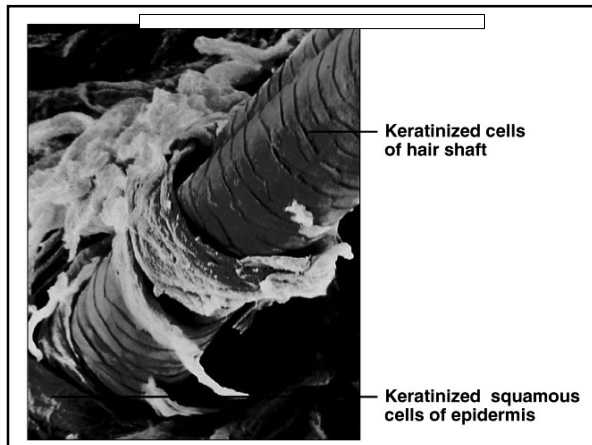
Hair Follicles

- dead epidermal cells extending from epidermis to dermis
- 3 parts to follicle
 - hair root
 - hair shaft
 - hair papilla
- hair color determined by
- follicle surrounded by nerves, sebaceous glands, & smooth muscles
 - arrector pili muscle –









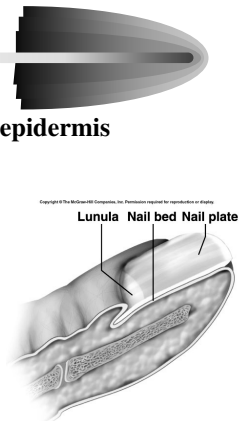
Hair Thinning and Baldness

- **Alopecia—**
- **True (frank) baldness**
 - Genetically determined and sex-influenced condition
 - Male pattern baldness is caused by follicular response to DHT (Dihydrotestosterone)

Nails

- protective coverings
- scale like modification of epidermis

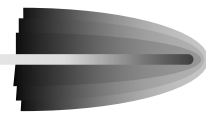
- nail plate –
- nail bed
- lunula –

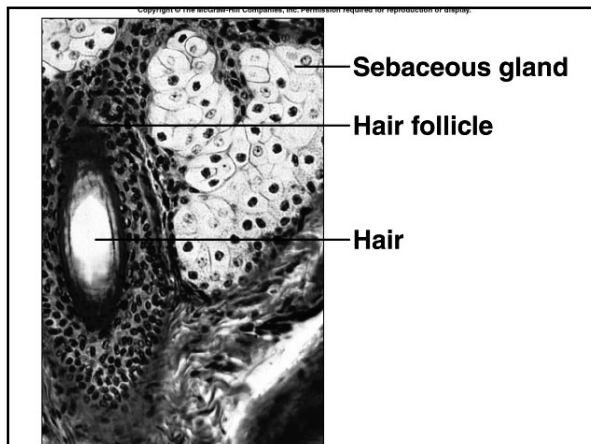


Sebaceous Glands

• Oil Glands

- usually associated with hair follicles
- waterproof
- moisturizes hair
- secretes sebum or greasy substance
- absent on palms and soles





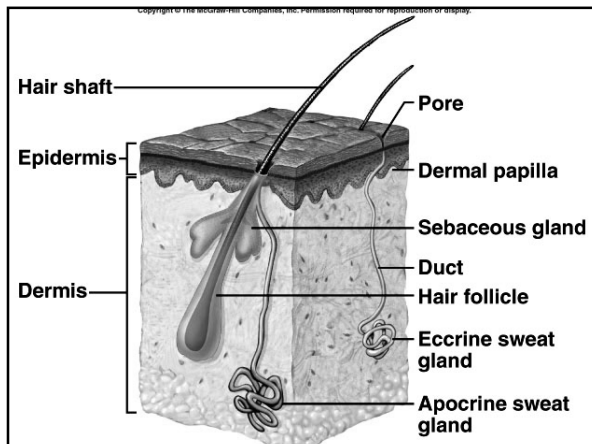
Sweat Glands

• Sudoriferous or Sweat Glands

- widespread in skin
- 99 %
- ~ 500 ml/day with little activity
- deeper dermis or hypodermis
- thermoregulation

2 Types Sweat Glands

- **Eccrine glands** – coil tubes located in dermis; respond to body temperature; most numerous
Ex.
- **Apocrine glands** - located in hypodermis; ducts connected to hair follicle; active at puberty & sexual arousal
 - ceruminous glands –
 - mammary glands –
 - axillary



Skin Color

Genetic Factors

- varying amounts of melanin produced from melanocytes
- polygenetic
- albinos lack melanin

Environmental Factors

- stimulate melanocytes to produce more melanin
- sunlight
- UV light from sunlamps, tanning beds

Physiological Factors

- dilation of dermal blood vessels
- constriction of dermal blood vessels
- hemoglobin
- carotene
- jaundice

Infections & allergies of the Skin

• Infections & allergies


- Athletes foot –
- Boils –
- Cold sores –
- Impetigo –
- Contact dermatitis –
- Psoriasis
 - Cause is unknown; heredity
 - Triggered by trauma, infection, stress

Burns

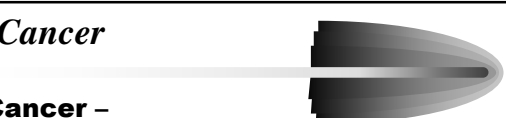
• Burns

- Tissue damage and cell death caused by heat, electricity, UV radiation, or chemicals
- Dangers to body
 - Dehydration
 - Electrolyte imbalance
 - Circulatory shock
- Lost fluids must be replaced immediately

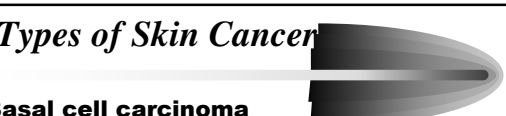
Burns

- 
- **1st degree burn**
 - Only epidermis is damaged
 - Skin is red & swollen
 - **2nd degree burn**
 - Epidermis & upper dermis are damaged
 - Skin is red w/blisters
 - **3rd degree burns**
 - Destroys entire skin layer
 - Burn is gray-white or black

Cancer

- 
- **Cancer –**
 - **Metastasis –**
 - **Two types**
 - Benign - Does not spread (encapsulated)
 - Malignant - Metastasized (moves) to other parts of the body
 - Skin cancer is the most common type of cancer

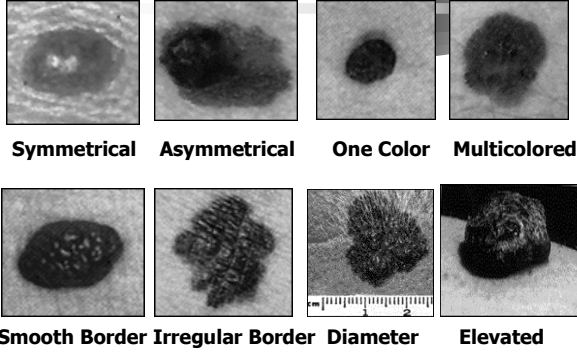
Types of Skin Cancer

- 
- **Basal cell carcinoma**
 - Most common type & easiest to treat
 - Arises from stratum basale
 - **Squamous cell carcinoma**
 - Arises from stratum spinosum
 - Metastasizes to lymph nodes
 - Early removal allows a good chance of cure
 - **Malignant melanoma**
 - Most deadly
 - Cancer of melanocytes
 - Metastasizes rapidly to lymph & blood vessels

Skin cancer

- **Carcinogens – environmental factors that have been linked to cancer**
 - Radiation, asbestos, tobacco
- **ABCDE's of Skin cancer**
 - Assymetrical – 2 sides do not match
 - Border irregularity – indentations
 - Color variation
 - Diameter - ↑ 6mm
 - elevated

ABCDE's of Skin Cancer



Symmetrical Asymmetrical One Color Multicolored

Smooth Border Irregular Border Diameter Elevated

Life Span Changes

- Scaly skin
- Age spots
- Dermis becomes reduced
- Loss of fat
- Wrinkles
- Sagging
- Sebaceous glands secrete less oil
- Melanin production slows
- Hair thins
- Number of hair follicles decrease
- Impaired nail growth
- Sensory receptors decline
- Inability to control body temperature
- Less vitamin D production