

Chapter 6: Integumentary System

- 6.1: Skin and Subcutaneous Tissue
 - The **skin** is the body's largest and heaviest organ
 - 15% of the body weight
 - Stratified squamous epithelium (**epidermis**) and connective tissue (**dermis**)
 - 1-2mm thick
 - **Thick Skin**: covers palms, soles, and corresponding surfaces of the fingers and toes
 - It's epidermis is .5 mm thick because of the **stratum corneum**
 - Has sweat glands, but no hair follicles or sebaceous glands
 - **Thin Skin**: epidermis of .1 mm
 - Thin stratum corneum
 - Possess hair follicles, sebaceous glands, and sweat glands
 - Functions of the Skin
 - Resistance to Trauma and Infections: suffers most physical injuries, but resists and recovers from trauma better than any other organ
 - Keratin: tough protein in the skin that gives it its durability
 - Linked by desmosomes
 - Slight acidity (pH 4-6) is a defense mechanism (**acid mantle**)
 - Dry and flaky
 - Other Barrier Functions: barrier to water
 - Prevents from absorbing too much and losing too much water
 - Barrier to UV rays and potential chemicals
 - Vitamin D Synthesis: reacts to heat, cold, touch, texture, pressure, vibrations, and tissue injury
 - Abundant in face, palms, fingers, soles, nipples, and genitals
 - Thermoregulations: Monitor the body surface temperature
 - **Thermo-receptors**: cutaneous nerve endings
 - Nonverbal Communication: expressive faces
 - Appearance of hair, skin, and nails
 - Birth marks and scars
 - The **Epidermis**: a keratinized stratified squamous epithelium that's surface consists of dead cells that lacks blood vessels so it depends on diffusion of nutrients from the underlying connective tissue
 - Cells of the Epidermis
 - **Stem Cells**: undifferentiated cells that divide and give rise to the keratinocytes
 - Found in stratum basale

- **Keratinocytes:** the great majority of epidermal cells
 - Synthesize keratin
- **Melanocytes:** only occur in the stratum basale amid to the stems cells and deepest to the keratinocytes
 - Synthesize brown/black pigments **melanin**
 - Constantly shedding melanin-containing fragments
 - Accumulate on sunny side of nucleus
- **Tactile Cells:** receptors for touch
 - Basal layer and dermal nerve fibers
 - **Tactile disc**
- **Dendritic Cells:** found in the spinosum and granulosum
 - Immune cells that originate in the bone marrow but migrate to the epidermis of the oral cavity, esophagus, and vagina
 - Stand guard against toxins, microbes, and other pathogens
- Layers of the Epidermis
 - **Stratum Basale:** consists mainly of single layers of cuboidal to low columnar stem cells and keratinocytes resting on the basement membrane
 - **Stratum Spinosum:** several layers of keratinocytes makes this the thickest stratum
 - Only the first layer can divide
 - **Stratum Granulosum:** three to five layers of flat keratinocytes
 - **Stratum Lucidum:** thin zone only in thick skin
 - Densely packed with a clear protein called “eleidin”
 - **Stratum Corneum:** 30 layers of dead, scaly, keratinized cells that form a durable surface layer
 - Resistant to abrasion, penetration, and water loss
- Life History of a Keratinocyte
 - Produced deep in the epidermis by the mitosis of stem cells in the basale
 - As they form they push older ones toward the surface
 - Become flatted the closer they get to the surface
 - Produce more keratin filaments and lipid filled **membrane-coating vesicles**
 - Granulosum: 4 important developments
 - Keratohyalin granules release a protein called filaggrin that binds cytoskeletal keratin filaments together into coarse, tough bundles
 - Cells produce a tough layer of envelope proteins just beneath the plasma membrane

