Integumentary System

- Consists of:
  - Skin
  - Hair
  - Nails
  - Sweat glands
  - Sebaceous glands (oil)

- Functions
  - Protection: protects UV, protects abrasion, physical & chemical barrier
  - Temp regulation: sweat, reduces body temp
  - Stimulus perception: touch, temp, pressure, thermoregulation
  - Excretion: eliminate waste, change
  - Synthesis of vitamin D: bones absorb Ca, conversions
  - Blood/water reservoir: dermis = vascular, stores tool blood until needed elsewhere

- Structure
  - Two Regions
    - Epidermis: superficial, keratinized, stratified squamous epithelia
      - Function: thickness for connection
      - Avascular but innervated
    - Dermis: under the epidermis, thick fibrous connective tissue layer
      - Vascular or avascular
  - Hypodermis
    - Deep to the dermis
    - Part of the skin? Not part of the skin?
○ Aka "superficial fascia"
  ▪ Sheets of connective tissue
  ○ Made of adipose & areolar tissue
  ○ Function: anchors skin to underlying muscle also a shock absorber and an insulator
  ○ Contains Pacinian corpuscles: nerve ending sensitive to pressure cell cluster sensory receptor

- Epidermis
  ○ Cells:
    ▪ Keratinocytes
    ▪ Melanocytes
    ▪ Langerhans cells
    ▪ Merkel cells
  ○ Keratinocytes
    ▪ Protein keratin
    ▪ Gives skin protective properties such as: waterproof
    ▪ Most cells in epidermis
    ▪ Tightly connected by desmosomes
    ▪ On the surface there are dead keratinocytes that are shed.
  ○ Melanocytes
    ▪ Deepest epidermis
    ▪ Produce protein melanin which gives rise to skin color, which are packaged into melanosomes which help to protect nuclei from UV damage
  ○ Langerhans Cells
    ▪ Aka dendritic cells
    ▪ Macrophages which patrol deep epidermis as part of the immune system
    ▪ *LONGER HANDS!- pseudopods
  ○ Merkle Cells
    ▪ Aka tactile cells
    ▪ Sensory receptors that sense touch

- Layers of epidermis
  ○ SURFACE
- corneum
- lucidum
- granulosum
- spinosum
- basale

- DEEP
- Memory device:
  - Baby Spits up Grandpa Loses Cool

- Stratum Basale
  - Deepest Layer
  - Single layer of [mitotic (dividing) dividing] keratinocytes that move toward the [surface] to replaced dead cells that have been [shed off]
  - Regeneration of cells
  - 10-25% of [melanocytes]

- Stratum Spinosum
  - Living cells
  - Spikey looking [prickle cells]
  - Begin production of [keratin]
  - Can also find [melanosomes & dendritic] cells

- Stratum Granulosum
  - Lose [nucli] and [organelles] as nourishment is farther away.
  - Nourishment meaning [blood]
  - Cells accumulate [keratin] granules

- Stratum Lucidum
  - Found in thick areas aka [palms] & [feet/pedal surface]
  - This is because they have an extra protective layer

- Stratum corneum
  - Many rows of flat, [anucleated] and [dead] keratinized cells
  - Function: [protect] and prevent [water] loss, prevent [abrasion/penetration] and act as a physical [barrier]

Dermis
- Characteristics:
Dermis

- Strong flexible and connective
- Cells include: fibroblasts, macrophages, some mast cells and WBCs
- Fibers within the matrix bind the body together
- The “hide” of leather
- Contains: nerves, blood vessels, and lymphatic vessels
- Contains epidermal hair follicles, oil glands and sweat glands

- Two layers
  - Papillary layer
  - Reticular layer

- Papillary Layer
  - Contains fingerlike regions where the dermis projects up into the dermis which is called, dermal papillae
    - Contains dermal projections nerve endings and Meissner’s Corpuscles which are touch receptors
  - In thick skin, dermal papillae create dermal ridges which become epidermal ridges which are our fingerprints.
    - They’re also called friction ridges gripping
    - Which enhance sense of touch
  - Reticular Layer
    - 80% of dermal thickness
    - Coarse, dense fibrous connective tissue
    - Elastic fibers which give stretch-recoil properties
    - Collagen provides strength and resiliency
      - Which bind water and keep skin hydrated
    - Define Cutaneous Plexus: network of blood vessels between reticular & hypodermis
    - Within the reticular later there are pockets in the matrix that contain adipose tissue for nutrient and storage.

- Define cleavage lines, what are they also called, are they visible, who thinks they’re important. tension line, externally visible collagen fibers running parallel to surgeons
Flexure lines are in the reticular layer and are dermal folds or near joints.

- Dermis is tight at deeper structures
- Skin's ability to slide gives the deep creases
- Visible on: hands, toes, wrists, fingers, soles

Skin Color
- Three pigments
  - Melanin
  - Hemoglobin
  - Carotene

Melanin
- Pigment made by skin**, made by melanocytes in the stratum basale
  - Packaging into melanosomes that are sent to keratinocytes to shield DNA from sunlight (UV)
  - Sun exposure stimulates melanin production
- Two forms
  - reddish yellow
  - brownish black

- We all have the same number of keratinocytes, the color differences are due to the form of melanin
- Freckles and pigments moles are local accumulation of melanin

Carotene
- yellow & orange pigment
- Obvious on palms & soles
- Accumulates in stratum corneum and hypodermis
- Converted to Vitamin A for vision and epidermal health

- Hemoglobin
- O2 carrying pigment in blood that gives skin a pinkish hue
In people with fair skin have pinkish hue due to:

- Hemoglobin so color of hemoglobin shows through
- Skin color is a blend of genetics & environment