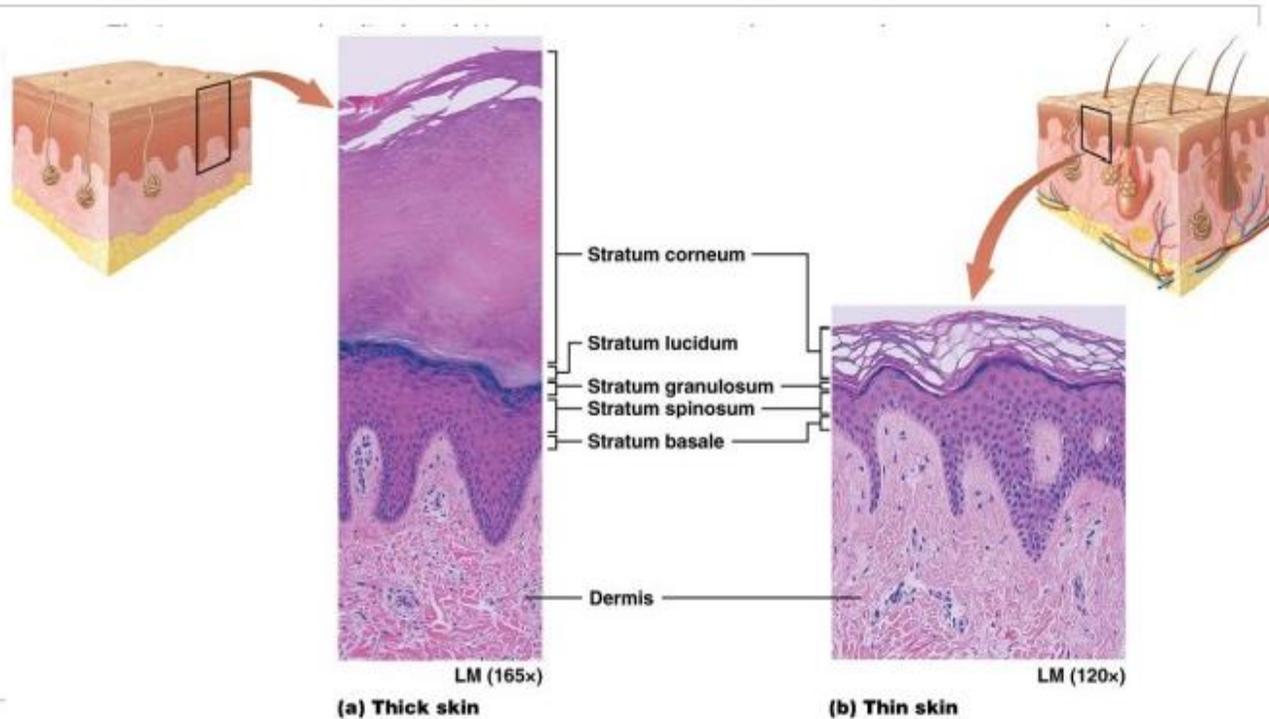




General Histology / Year 2



Thick and Thin Skin



Integumentary System *Skin* Lecture 8

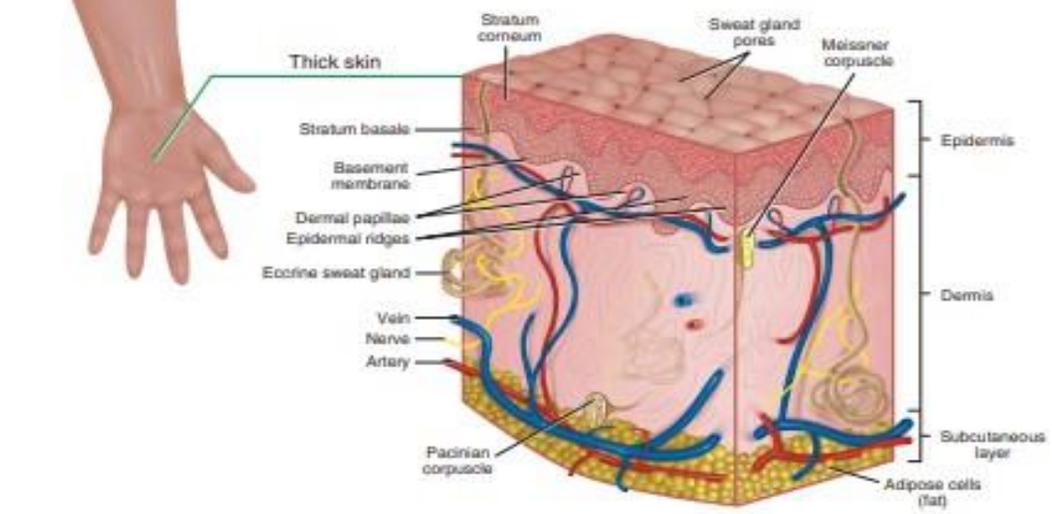
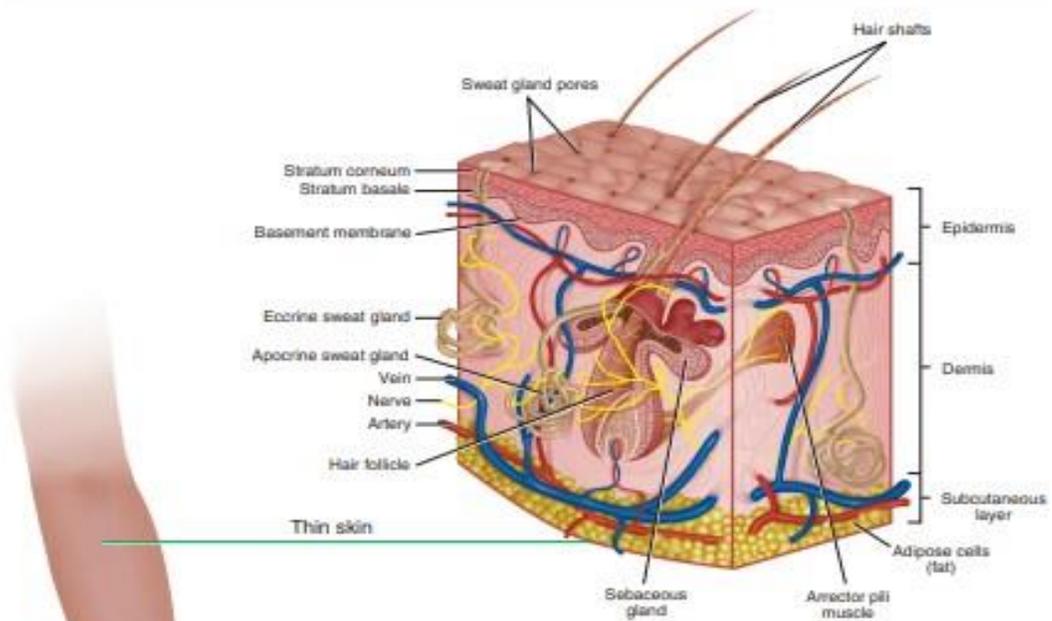
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The Integumentary System

- **The Skin is the largest single organ of the body, typically accounting for 15 – 20 % of total body weight and, in adults, presenting 1.5 – 2 m² of surface to the external environment. Also Known as the integumentary system.**
- **The surfaces of the body are covered either by thin skin or thick skin.**
- **The thickness of the skin varies over the surface of the body, from less than (1) mm to more than (4) mm.**
- **However, the skin is histologically different at two locations: The palms of the hands and the soles of the feet.**
- **These areas are subject to the most abrasion, are hairless, and have a much thicker epidermal layer than skin in any other location. This hairless skin is referred to as thick skin.**
- **Elsewhere, the skin possesses a much thinner epidermis and is called thin skin. It contains hair follicles in all but a few locations.**

Skin

- In humans, skin derivatives (appendages) include nails, hair, and several types of sweat and sebaceous glands.
- Skin, or integument, consists of two distinct regions—the superficial epidermis and a deep dermis.
- The surface layer of the skin, or the epidermis, is nonvascular and is lined by keratinized stratified squamous epithelium with distinct cell types and different cell layers.
- Inferior to the epidermis is the vascular dermis, characterized by dense irregular connective tissue, blood vessels, nerves, and different glands. In some areas of the body, numerous hair follicles are visible in the dermis.
- Beneath the dermis is the hypodermis, or a subcutaneous layer of connective tissue and adipose tissue that forms the superficial fascia seen in gross anatomy.



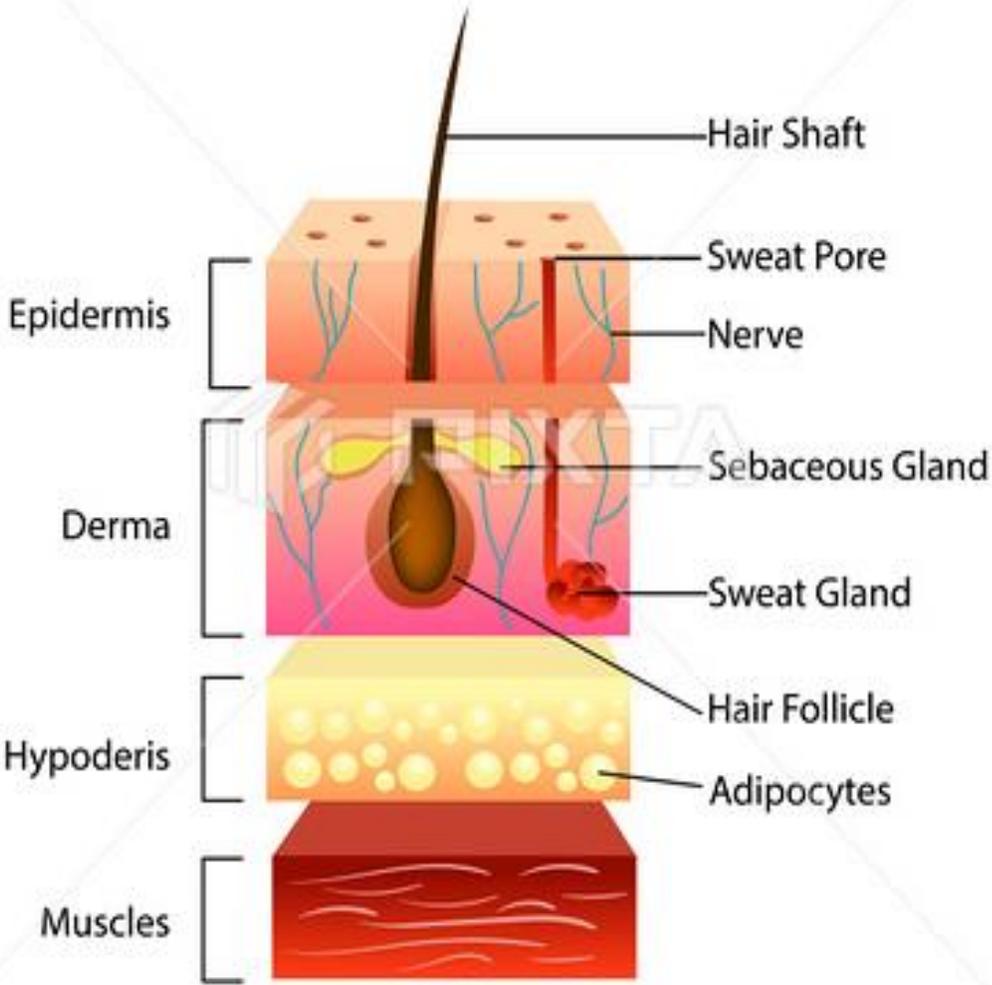
Functions of Skin

- The skin has four major functions:
- **Protection.** The skin provides protection against ultraviolet light and mechanical, chemical and thermal harm; its relatively impermeable surface prevents dehydration and acts as a physical barrier to invasion by microorganisms.
- **Sensation.** The skin is the largest sensory organ in the body and contains a variety of receptors for touch, pressure, pain and temperature.
- **Thermoregulation.** In humans, skin is a major organ of thermoregulation . The body is insulated against heat loss by the presence of hairs and subcutaneous adipose tissue. Heat loss is facilitated by evaporation of sweat from the skin surface and increased blood flow through the rich vascular network of the dermis.
- **Metabolic function.** Subcutaneous adipose tissue constitutes a major store of energy, mainly in the form of triglycerides. Vitamin D synthesized in the epidermis and supplements that derived from dietary sources.

Layers of the Skin

- The skin has three main layers:-
- An outer keratinizing stratified squamous epithelium which is self-regenerating – **the epidermis**.
- An underlying tough supporting and nourishing layer of fibroelastic tissue – **the dermis**.
- A variable deep layer, mainly adipose tissue – **the hypodermis or subcutaneous**.
- Accessory structures
 - - Hair
 - - Nails
 - - Exocrine glands

Human Skin Structure

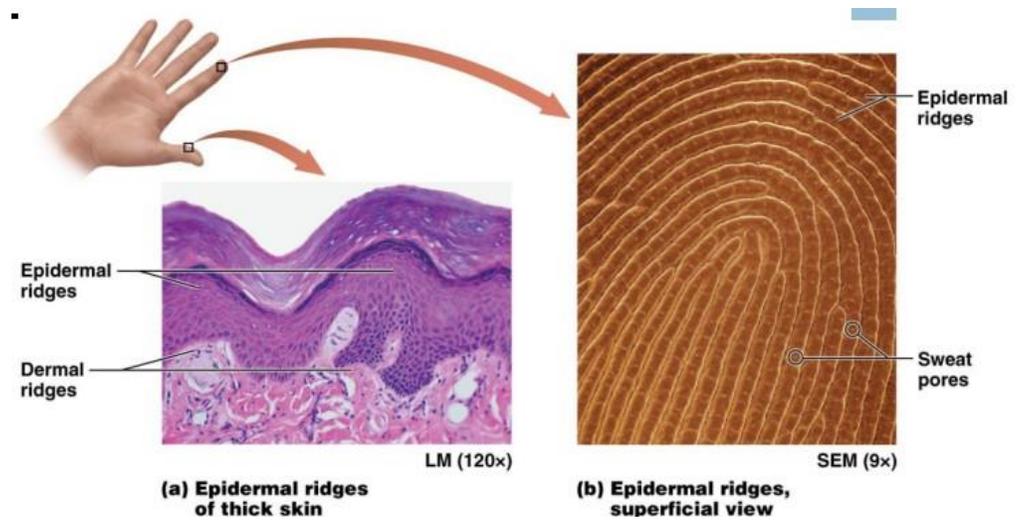


Epidermis

- The epidermis is composed of stratified squamous epithelium in which four distinct layers can be identified. In the case of thick skin, a fifth layer is observed.
- The layers beginning with the deepest layer, these are as follow:-
- **Stratum Basale (Germinal layer): The First Layer**
- Deepest or basal single layer of cells that rests on the basement membrane.
- Cells attached by desmosomes and by hemidesmosomes to the basement membrane.
- Cells serve as stem cells for the epidermis and show increased mitotic activity.
- Cells mature and migrate upward in the epidermis and produce intermediate keratin filaments.

Epidermis

- Stratum Basale forms epidermal ridges (**Fingerprints**).
- Fingerprints are genetically determined, so no two people have exactly the same fingerprint pattern.
- Therefore, fingerprints can be used as a means of identification, for example, at crime scenes.



Epidermis

- **Stratum Spinosum: The Second Layer**
- **Is the layer above the stratum basale that consists of four to six rows of cells.**
- **During histologic preparation, cells shrink and intercellular spaces appear as spines.**
- **Spines represent sites of desmosome attachments to keratin tonofibrils.**
- **Cells synthesize keratin filaments that become assembled into tonofibrils.**

Epidermis

- **Stratum Granulosum: The Third Layer**
- Cells above the stratum spinosum and consists of three to five cell layers of flattened cells.
- Cells filled with dense keratohyalin granules and membrane-bound lamellar granules.
- Keratohyalin granules consist of the protein filaggrin that cross-links with keratin filaments.
- Combination of keratintono filaments with keratohyalin granules produces soft keratin.
- Lamellar granules discharge lipid material between cells and waterproof the skin.

Epidermis

- **Stratum Lucidum: The Fourth Layer**
- Lies superior to the stratum granulosum, found in thick skin only; lucid and barely visible.
- Hydrolytic enzymes disrupt cell contents and pack them with keratin filaments.
- **Stratum Cornium: The Fifth Layer**
- Most superficial layer and consists of flat, dead cells filled with soft keratin.
- Keratinized cells continually shed from the surface and replaced by new cells.
- During keratinization, hydrolytic enzymes eliminate the nucleus and organelles.

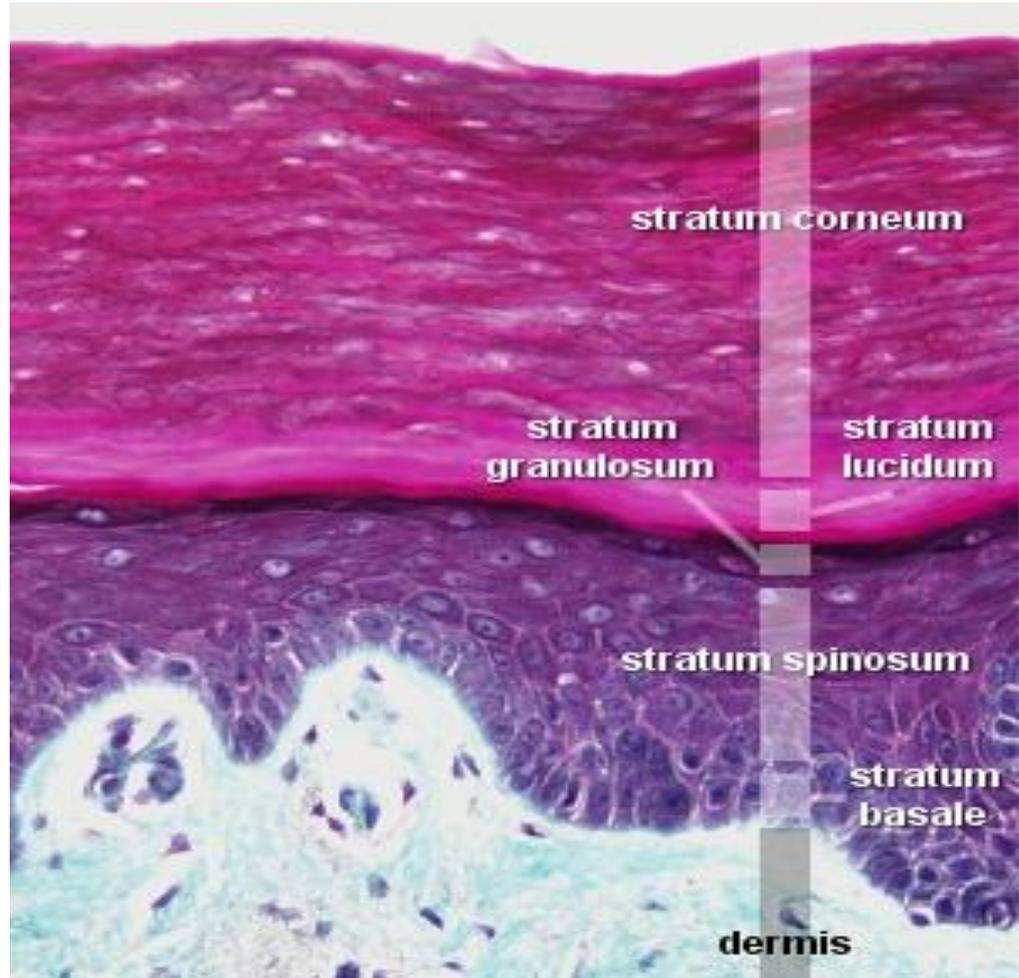
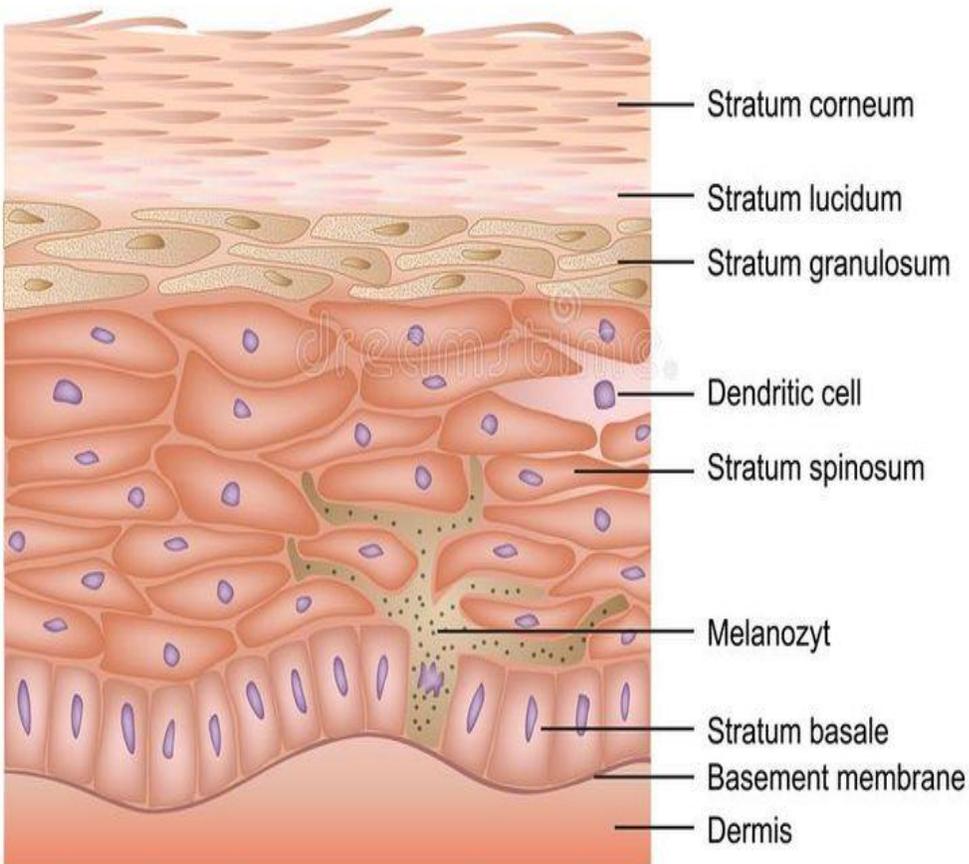
Skin Cells

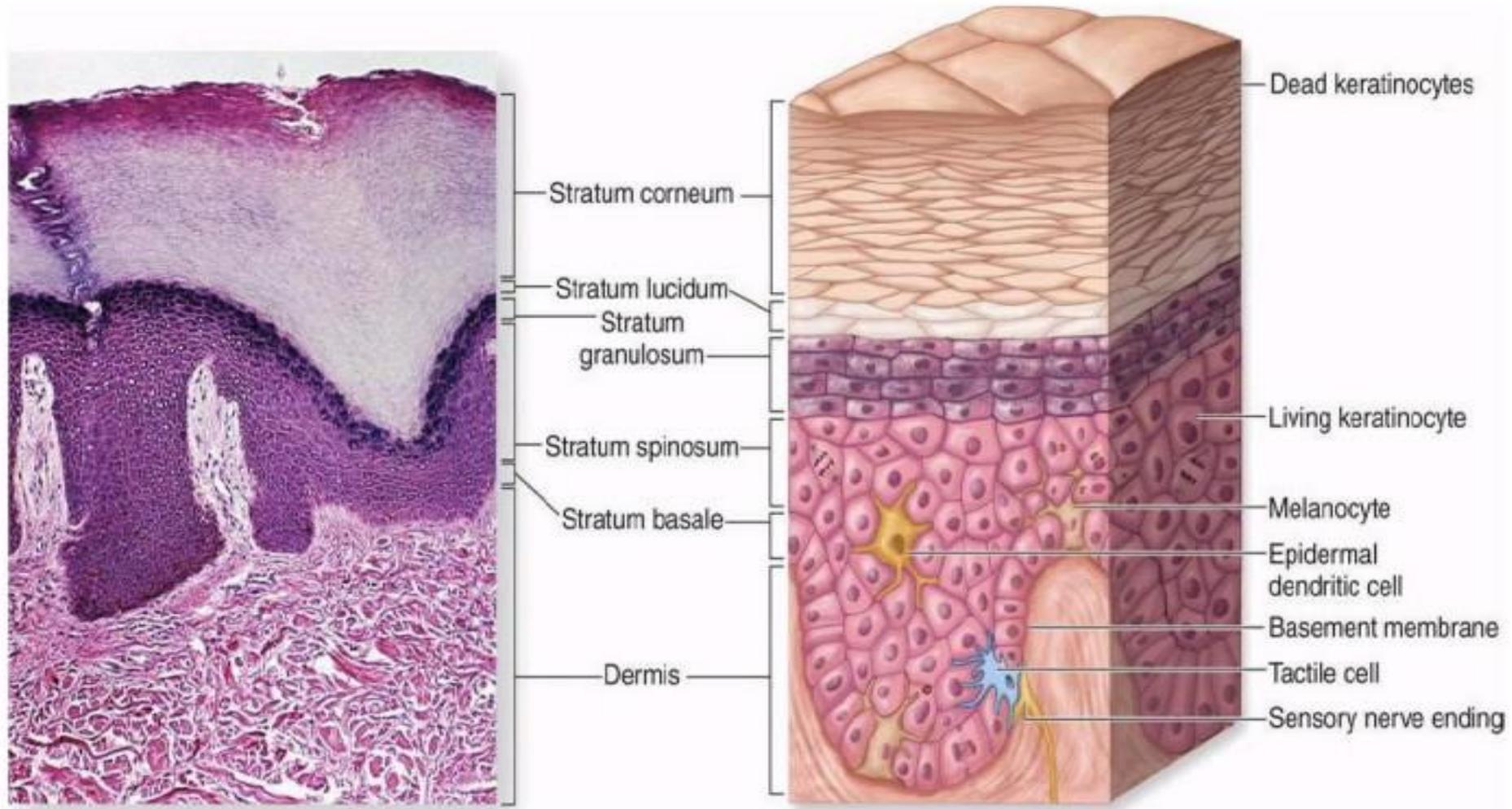
- **Melanocytes**
- **Arise from neural crest cells and are located between the stratum basale and stratum spinosum.**
- **Long irregular cytoplasmic or dendritic extensions branch into the epidermis.**
- **Synthesize from amino acid tyrosine a dark brown pigment: melanin.**
- **Melanin transferred from cytoplasmic extensions to keratinocytes in basal cell layers.**
- **Melanin darkens skin color and protects it from ultraviolet radiation.**

Skin Cells

- **Langerhans Cells**
- Dendritic-type cells originate from the bone marrow and migrate via the blood to the skin.
- Found primarily in the stratum spinosum and are part of the immune system of the skin.
- Are antigen-presenting cells of the skin.
- **Merkel Cells**
- Present in the basal layer of the epidermis and function as mechanoreceptors for sensation.

Structure of the Epidermis





skin layers

Dermis

- **Dermis: (Papillary and Reticular Layers)**
- **Papillary Layer**
- **Basement membrane separates the dermis from the epidermis.**
- **Is the superficial layer in the dermis and contains loose irregular connective tissue.**
- **Dermal papillae and epidermal ridges form interdigitations.**
- **Connective tissue filled with fibers, cells, and blood vessels.**
- **Sensory receptors (Meissner corpuscles) are present in the dermal papillae.**

Dermis

- **Reticular Layer**

- **Is the deeper and thicker layer in dermis, filled with dense irregular connective tissue.**
- **Few cells present and collagen is type I .**
- **No distinct boundary between the papillary and reticular layers.**
- **Blends inferiorly with the hypodermis layer of superficial fascia.**
- **Contains arteriovenous anastomoses and sensory receptors in Pacinian corpuscles.**
- **Concentric lamellae of collagen fibers surround myelinated axons in Pacinian corpuscles.**

hypodermis

- **The hypodermis is the subcutaneous layer lying below the dermis.**
- **It consists largely of fat. Made of elastic areolar and adipose tissues.**
- **Connected to the reticular layer of integument by connective tissue fiber.**
- **It is interlaced with blood vessels and nerves.**
- **It provides the main structural support for the skin, as well as insulating the body from cold and aiding shock absorption.**

