SKIN

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FUNCTIONS OF THE SKIN

1. **Protective**. It provides a physical barrier against thermal and mechanical insults such as frictional forces and against most potential pathogens and other material.

2. **Sensory**. Many types of sensory receptors allow skin to constantly monitor the environment.

3. **Thermoregulatory**.

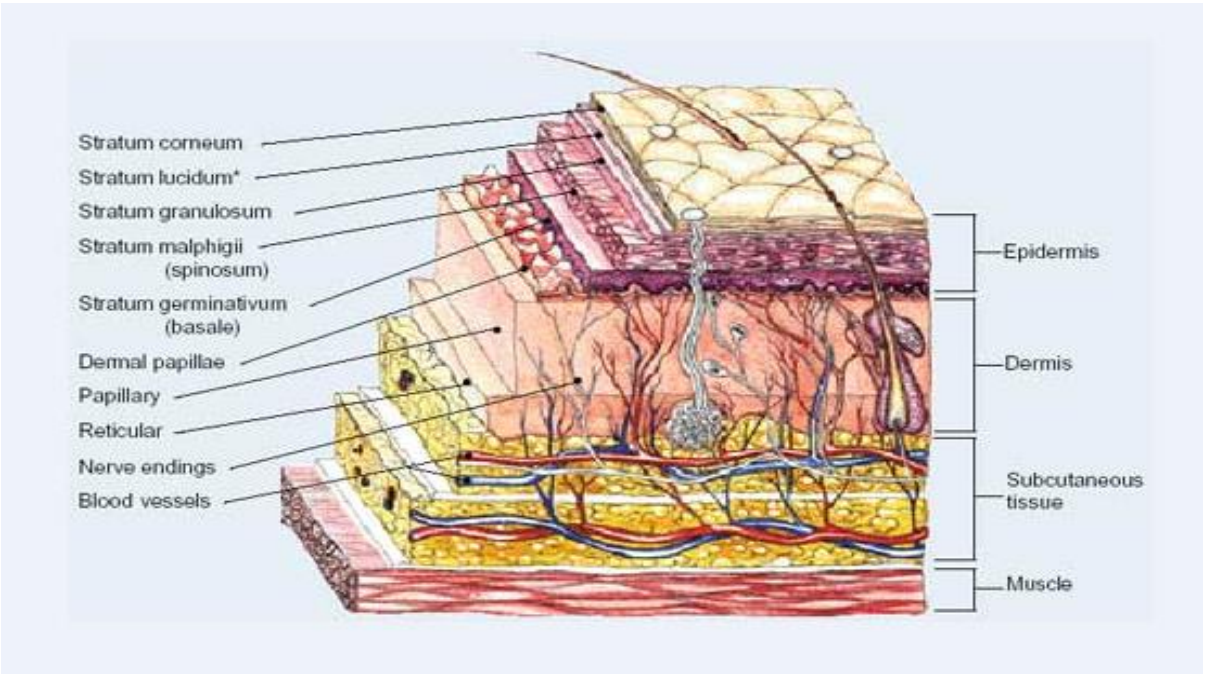
4. **Metabolic**. Cells of skin synthesize vitamin D3, needed in calcium metabolism and proper bone formation

Skin is the heaviest single organ of the body.

It is composed of :

1. EPIDERMIS is composed of stratified squamous keratinized epithelium, containing *keratinocytes* and *non-keratinocytes*.

2. DERMIS is dense irregular connective tissue rich in blood vessels., collagen and elastic fibers.



Types of Skin

Two types based on the comparative thickness of the epidermis into; *thin* and *thick* skin.

- The epidermal layer of thin skin is about 75-150 μm, but it is about 400-600μm in thick skin.
- Thick skin is smooth, non-hairy, and is found in the palms and soles.
- Thin skin is hairy, and is found elsewhere on the body.

1- Epidermis contains two types of cells

A – Keratinocyts

- They are keratin forming cells.
- They are organized into layers and become mature in about 4 weeks.
- Each layer represents a dynamic stage of cell division and cell maturation.
- Cell renewal (Mitosis).
- Cell differentiation (Keratinization)
- Cell death

B - Non-Keratinocytes:

- Melanocytes
- Langerhans cells
- Merkel`s cells

- **Layers of Epidermis**
- Stratum Basale
- Stratum spinosum
- Stratum Granulosum
- Stratum Lucidum
- Stratum Corneum

- **1- Stratum Basale**

- Single layer of basophilic columnar or cuboidal cells resting on a basement membrane at the dermal -epidermal junction.

- They contain stem cells , which are responsible for renewal of epidermal cells.

- All cells in stratum basale contain *intermediate keratin filaments*.

- As cells progress upward, the number of keratin filaments increases until they represent half the total proteins in the stratum corneum.

- Desmosomes bind cells of this layer in their lateral and upper surfaces.

- Hemidesmosomes bind cells to the basal lamina.

2- Stratum Spinosum

- It is composed of cuboidal or slightly flattened cells, with central nuclei.

- The cytoplasm filled with bundles of filaments (TONOFILAMENTS)

- These bundles end at and insert into the cytoplasmic densities of the desmosomes.

- Cells of this layer are firmly bound together by the filaments filled the cytoplasmic spines and desmosomes that punctate the cell surface, giving them spine-like appearance.

- The first two layers are called *MALPIGIAN LAYER*, which show mitotic activity and contain stem cells.

3- Stratum Granulosum

- It is consisted of 3 -5 layers of flattened polygonal cells, whose cytoplasm is filled with non-membranous basophilic granules called *Keratohyalin Granules*.

- Another type of granules that can be seen by E/M are membranous *Lamellar granules*.

- - These granules fuse with the cell membrane and release their lipid content into the intercellular spaces forming a Sheet of Lipid Deposit.

- These sheet acts as a barrier sealing the skin.

4- Stratum Lucidum

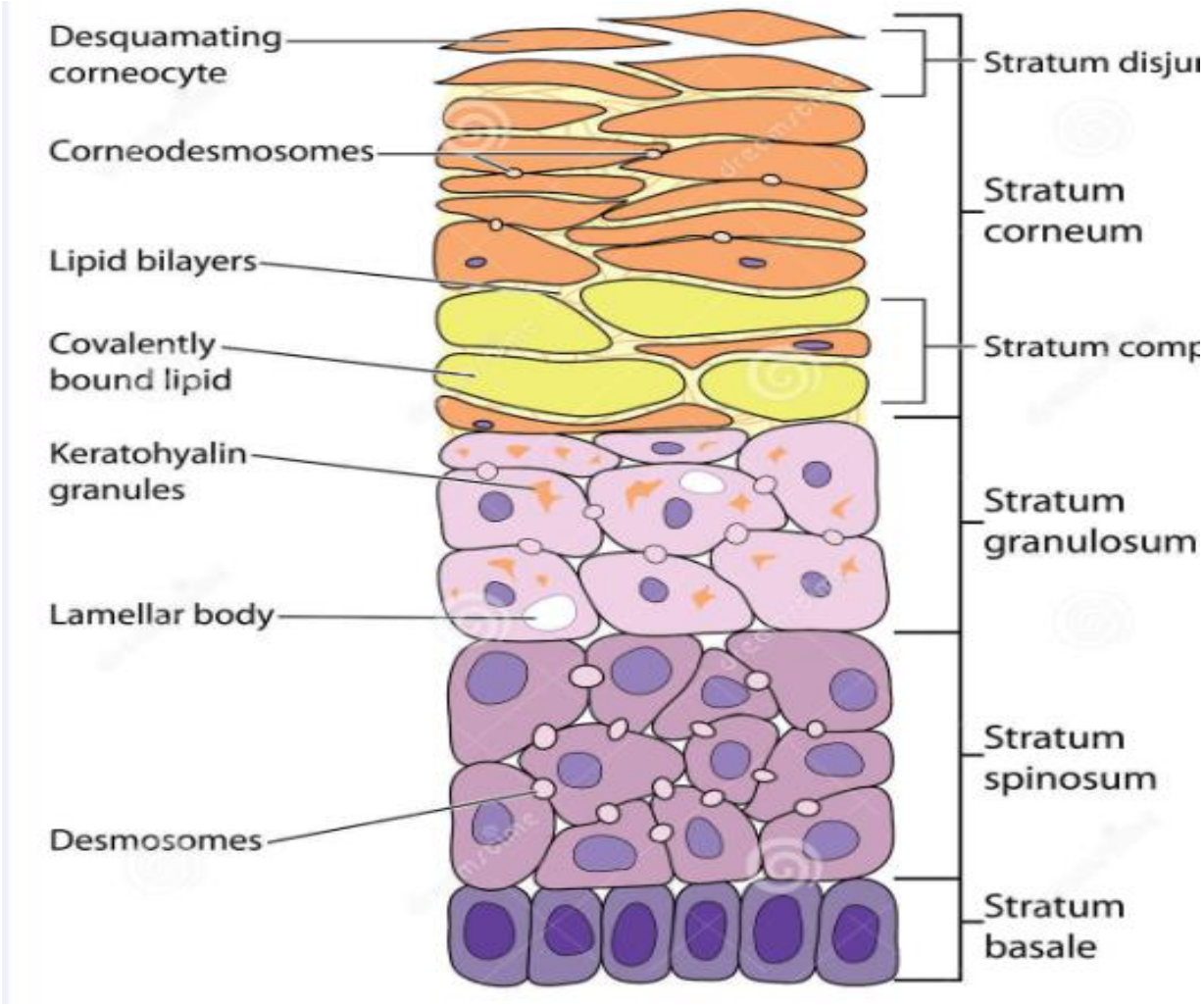
- More common in thick skin, as a thin layer of flattened eosinophilic cells. The cytoplasm and cell organoids are no longer present, but desmosomes are still present.

- The cytoplasm consists of densely packed Keratin Filamints .

5- Stratum Corneum

- It is consisted of 15-20 layers of flattened non-nucleated keratinized cells, whose cytoplasm is filled with Keratin.

- After keratinization, the *horny cells* contain only fibrillar and amorphous proteins and thickened plasma membrane.



Non- Keratinized Cells

1- Melanocytes

- The color of skin is the result of several factors such as melanin, carotene and the hemoglobin in the dermal capillaries.
- There are two types of melanin:
- Eumelanin: dark brown pigment produced by melanocytes.
- Pheomelanin: reddish pigment present in red hair.
- Melanocytes have long cytoplasmic processes that branch into the epidermis, running between cells of stratum basale and spinosum.
- They are located beneath or between cells of stratum basale.

2- Langerhans Cells

- They are phagocytic skin cells present mainly within the cells of Stratum Spinosum; and represent 2- 8% of the cells.

- They are star shaped cells, with indented nucleus.

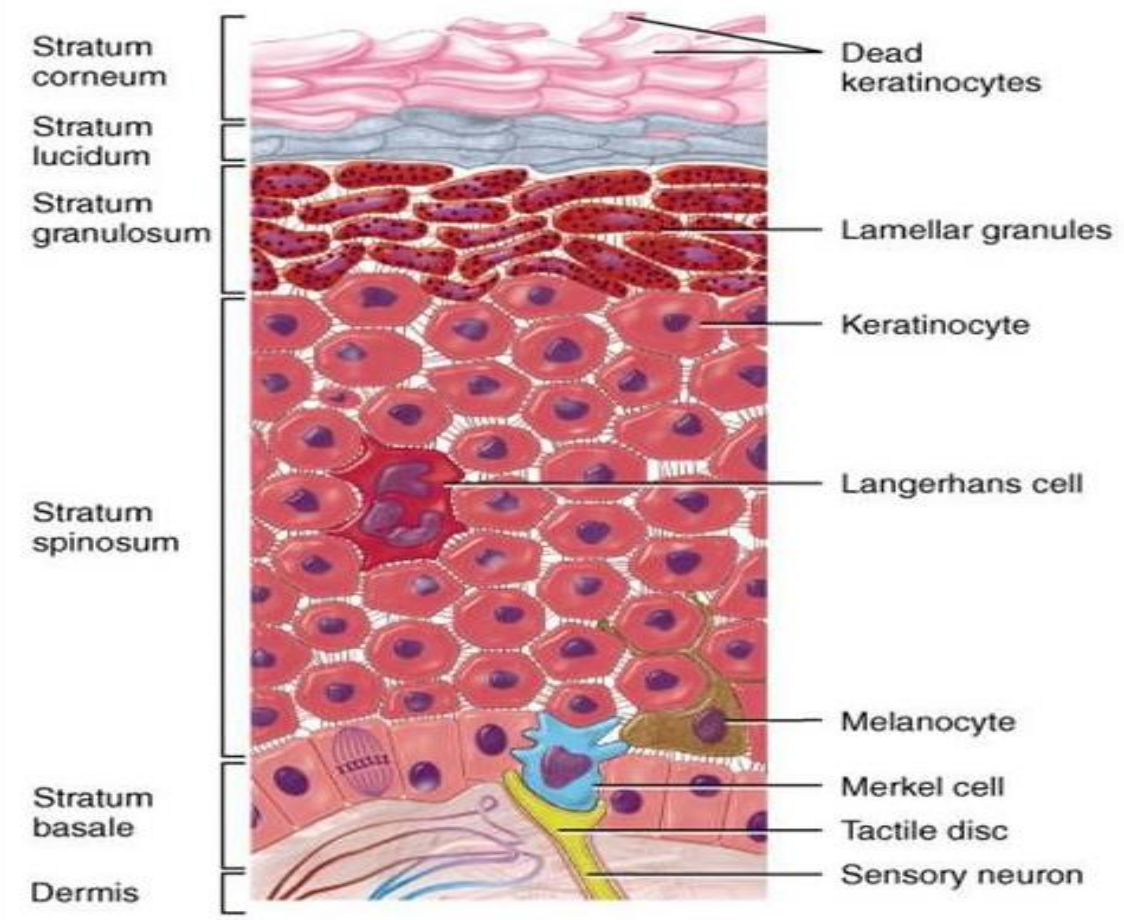
- The cytoplasm contain special granules called **BIRBECKS GRANULES**.

3- Merkel's Cells

- Sensory skin cells.

- Located mainly in thick skin.

- Act as mechanoreceptors.



DERMIS

- It is formed of two layers:-
- Papillary layer
- Reticular layer

Papillary Layer

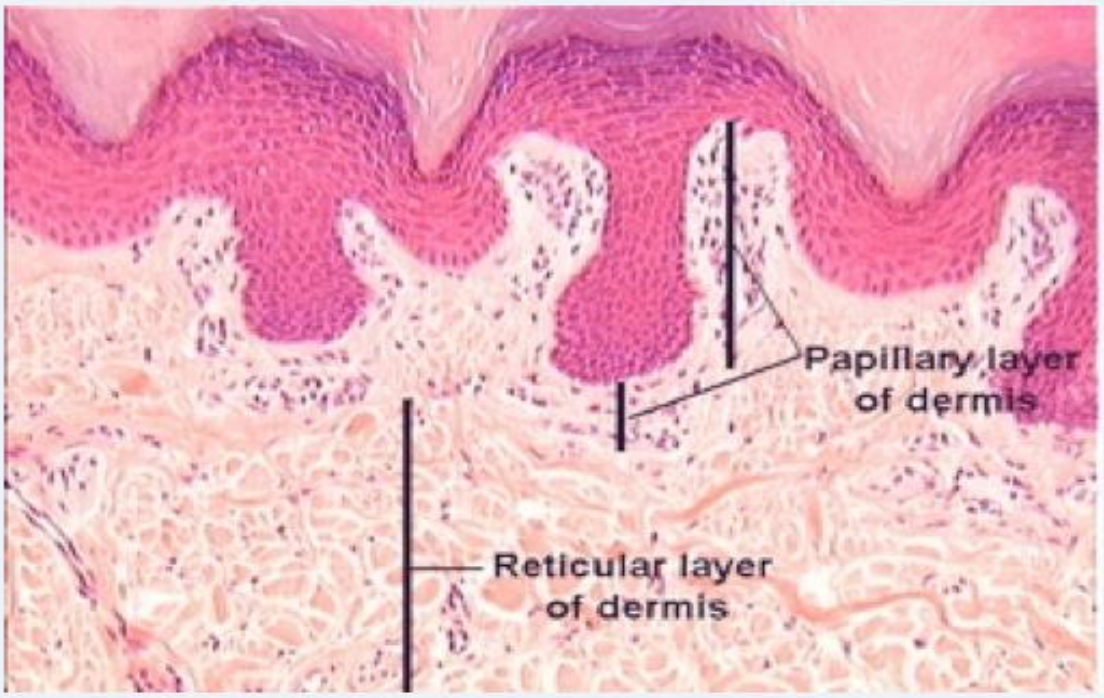
- Vascular connective tissue layer separated from the epidermis by basement membrane.
- It contains fine axonal connections of free sensory nerve endings (sensory receptors) such as :
- Superficial touch receptor or corpuscle of touch (Meissner's corpuscles).
- Lamellated corpuscle or deep pressure receptor (Pacinian corpuscle) .

Dermal Papillary

They are the junction of the dermis and epidermis. They are irregular projections of the dermis (papillae) interdigitate with evaginations of the epidermis (epidermal ridges). They contain fine interlacing collagen and elastic fibers, blood vessels, and lymphatics.

Reticular layer

- It is thicker than the papillary layer.
- It is formed of reticular, collagen and elastic fibers.
- It contains many sensory receptors like Pacinian Corpuscles.


Papillary layer
of dermis
Reticular layer
of dermis