Introduction to Dermatology Part-1
(Skin Structure)

Course Objectives :

Below is a summary of the key objectives of the course.

- To understand the basics of skin anatomy.
- To be familiar with the language of dermatology by learning the primary and secondary skin lesions and to be able to describe various skin conditions.
- To enable medical students to recognize the most common skin diseases and to manage them.
- To be familiar with the diagnostic laboratory tests pertinent to dermatology.
- To help students to formulate decent differential diagnoses of skin diseases.
- To gain an overview of the skin manifestations of systemic diseases.
- To be able to deal very appropriately with different emergencies in dermatologic diseases

Sources: doctor's slides and notes + FITZPATRICK color atlas +433team male and female + 434team

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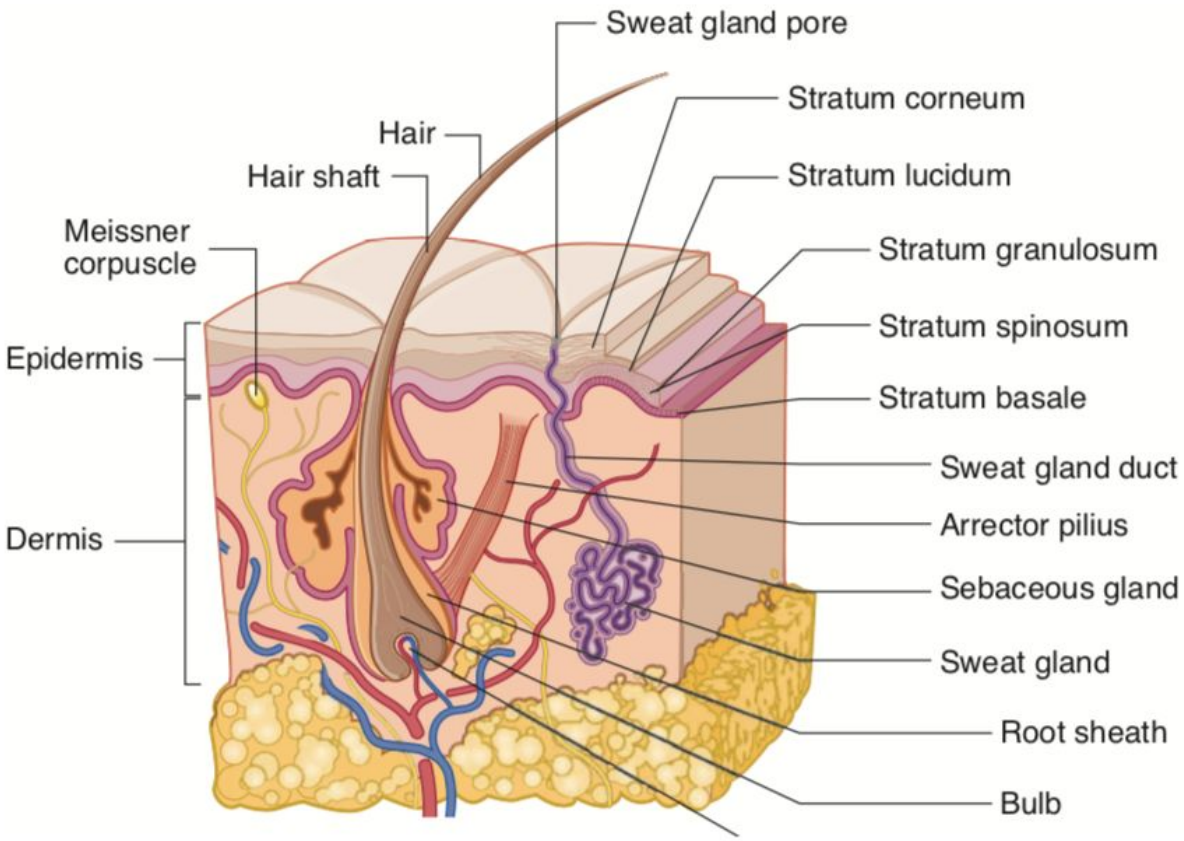
[Color index : Important | Notes | Extra]

The Skin

The **human skin** is the outer covering of the body.The skin is a complex, dynamic organ and is the largest organ of the body.



Skin function :

- ★ Barrier to harmful exogenous substance & pathogens.
- ★ Prevents loss of water & proteins.
- ★ Sensory organ protects against physical injury.
- ★ Regulates body temperature.
- ★ Important component of the immune system.
- ★ Vit.D production by absorbing UVB.
- ★ Has psychological and cosmetic importance such as hair, nails.

The Skin structure consists of:

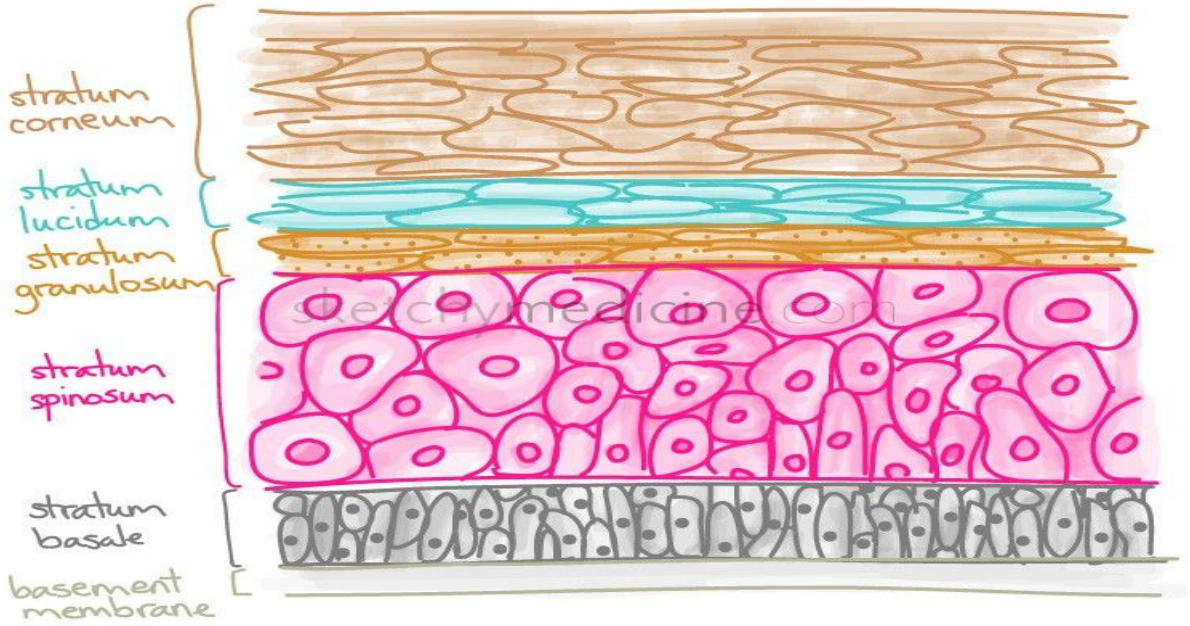
1-Epidermis
2-Basement membrane
3-Dermis
4-Subcutaneous tissue
5-Skin appendage

-The Epidermis Is the outermost layer of the skin. The main cell types which make up the epidermis are:

1-Keratinocytes (90% of epidermis + produce keratin)
2-Melanocytes (produce melanin responsible for skin color).
3-Merkel cells (They are abundant in highly sensitive skin areas like that of the fingertips and is essential for light touch).(Merkel cell carcinoma is an aggressive malignant tumor).
4-Langerhans cells (are antigen presenting cells).

The Epidermal zones :

1-stratum corneum (horny cell layer): is the outermost layer of the epidermis (dead cells with no organelles)
2-stratum lucidum (wasn't mentioned in the slides or by the dr) very thin absent in areas with thin skin (back) (it is only found in palms and sols
3-stratum granulosum (granular layer) (flat cells containing keratohyaline organelles).
4-stratum spinosum (spinous layer) (polyhedral cells attached by desmosomes)
5-stratum basale (basal layer) (columnar dividing cells).stem cells



Stratum corneum (cornified layer horny cell layer)

- Outermost layer
- The cells in this layer have No nucleus
- Its 25 cell layer
- The cells have a thick envelope that helps it resist external chemicals.

Stratum granulosum (granular cell layer):

- Diamond shaped cells
- Cytoplasm is filled with keratohyalin organelles (the protein Keratohyalin forms dense cytoplasmic granules that promote dehydration of the cells well as aggregation and cross-linking of the keratin fibers. The nuclei and other organelles then disintegrate, and the cells die)
- The thickness of this layer is proportional to that of the stratum corneum
- In thin skin its 1-3 cell layers and 10 cell layers in thick (fingertips, hand and soles)

Stratum spinosum (Spinous cell layer):

- In the spinous layer they are connected to each other by desmosomes and gap junctions which appear as spines thus called spinous layer
- Bone marrow derived Langerhans cells which are antigen presenting cells (MHC II) are found in this layer.(skin immune function) And they can be identified through birbeck granules. Abnormal proliferation of these cells is seen in Langerhans cell histiocytosis

Basal cell layer (stratum basale) :

- This layer Rests on (above) the basement membrane
- Divides continuously and moves upwards.
- It takes 28 days to transmit cells from this layer to stratum corneum
- Melanocytes are dendritic cells lying between basal cells in a ratio of 1:10
- Melanocytes are cells responsible for skin pigment and provide protection from UV light. They are mainly seen in this layer.
- The **size of melanosomes** and packaging differentiate white from dark skin.
- The number of melanocytes are **equal** in white and dark skin
- Melanocytes can also be found in the hair bulb, eye and brain.

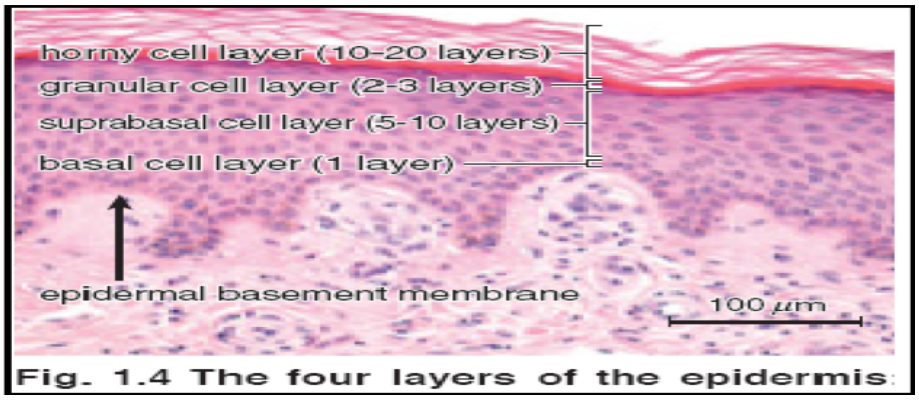


Fig. 1.4 The four layers of the epidermis

Cornification (keratinization) :

- It is the cytoplasmic events that occur in the cytoplasm of epidermal keratinocytes during their terminal differentiation into dead horny cell (corneocyte)
- The total process takes approximately 2 months
- It involves the formation of keratin polypeptides.
- Abnormalities in this process lead to roughness and scaling of the skin like PSORIASIS (In psoriasis it takes 3 days which will result in a lot of scales)

Basement Membrane :

Between epidermis and dermis and Consists of two layers:

- **Lamina Lucida (thin clear amorphus space)** **(above) (superficial)**
- **Lamia dense (an electron dense area)** **(below)(deep)**

Contains important proteins and proteinous structures which are important in bullous and autoimmune diseases

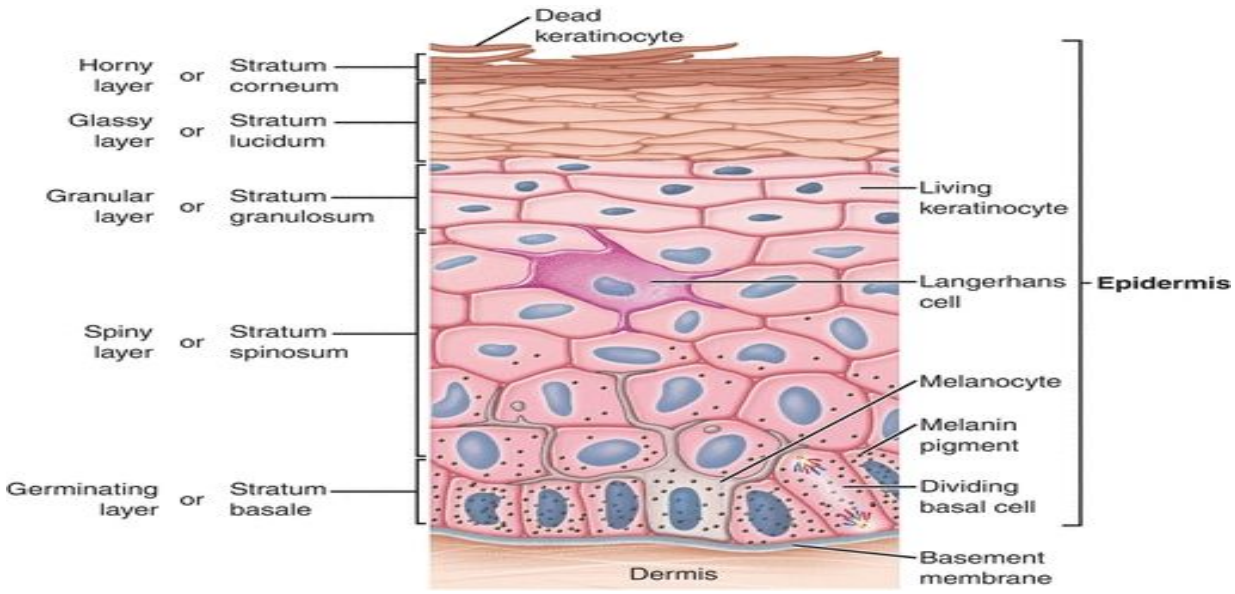
- **Laminin**
- **Desmosomes**: adheres keratinocytes to the basement membrane
- **Anchoring filaments**: connects lamina lucida to lamina densa
- **Anchoring fibrils**: connects lamina densa to papillary dermis

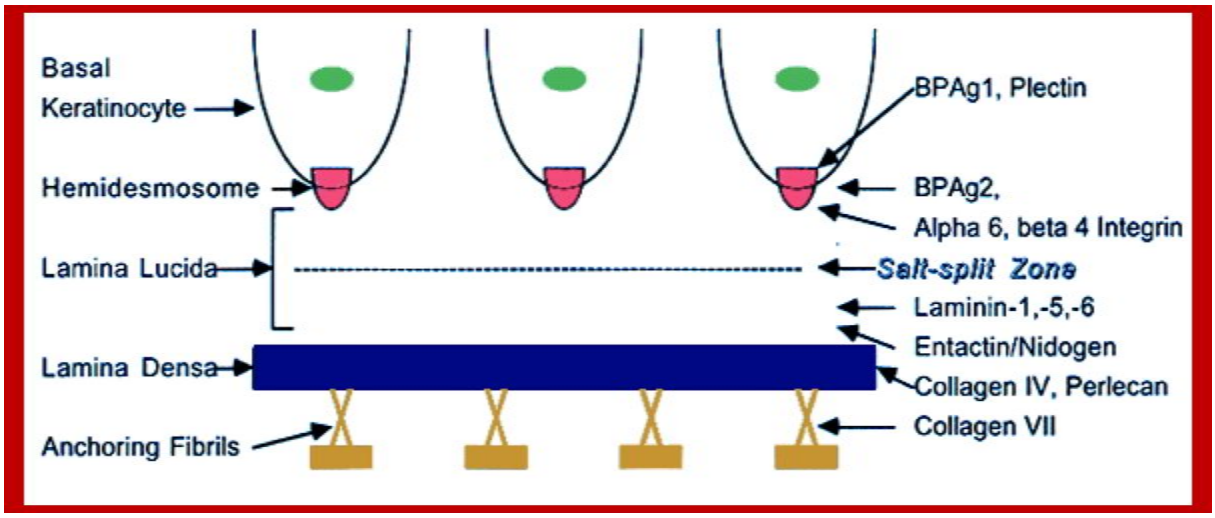
Its the site of attack injury in **blistering diseases**

Types of blisters :

1-Intraepidermal blisters (within the spinosum layer) (like pemphigus vulgaris)

2-subepidermal : between dermis and epidermis like(bullous pemphigoid)





Dermis:

1-Upper layer is called papillary dermis

2-the lower part is called reticular dermis.

Consists of:

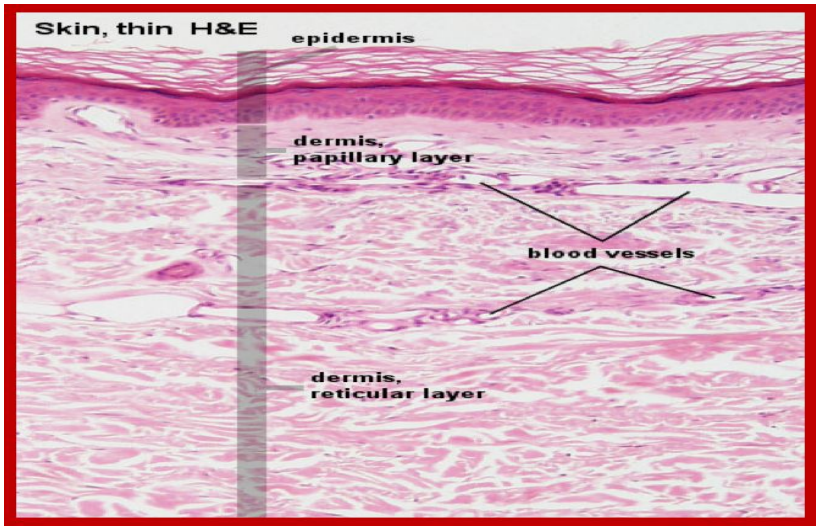
1. Collagen fibers (strength)
   Thin fibers in papillary dermis but thick and coarse in the reticular dermis.
2. Elastic fibers (elasticity)
3. Ground substance (softness) binds water and maintains skin turger
4. fibroblasts (produce collagen)
5. blood vessels(It provides nourishment to the epidermis and interact with it during wound repair, nerves, lymphatics and muscles

   So the function of derims is to give the skin its strength and elasticity and to provide the epedirems with nourishment .

   When we get older we will have less ground substance , collagen fibers and elastic fibers so we will get wrinkles and dry skin.

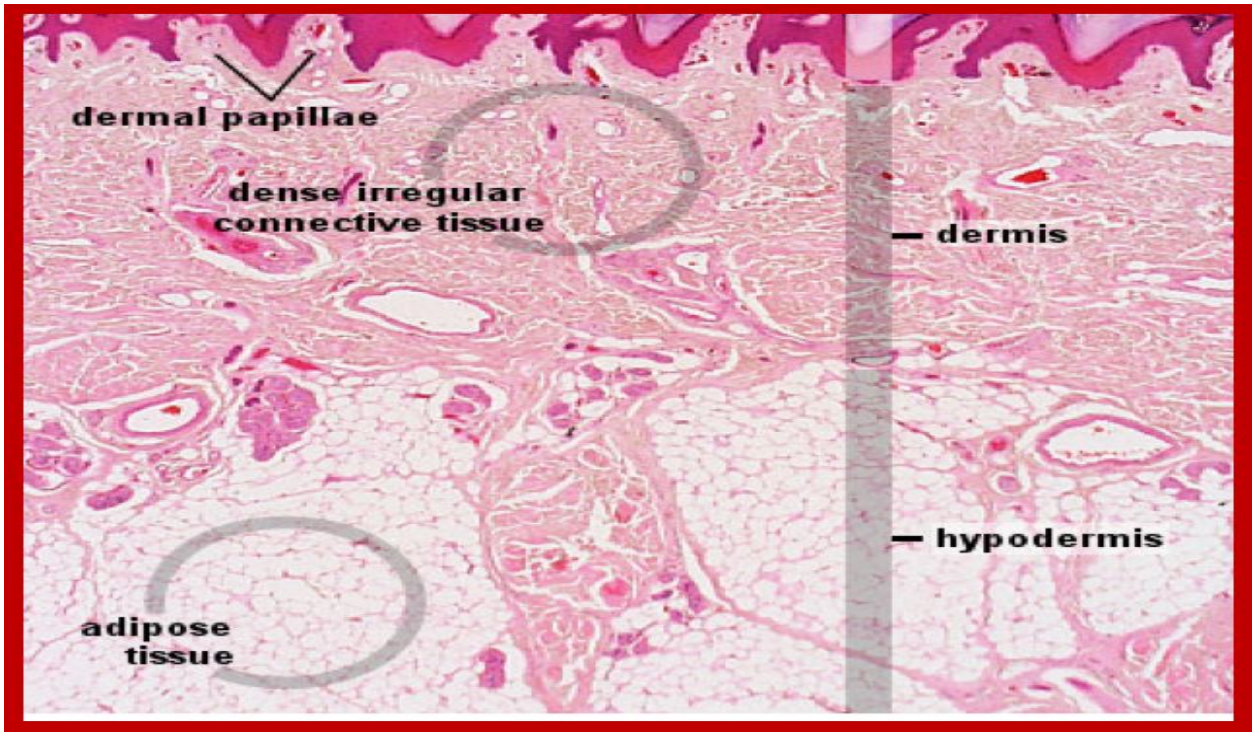
The cells in the dermis include:

-macrophages, fibroblasts, dermal dendritic cells and mast cells (immune functions)



Subcutaneous fat:

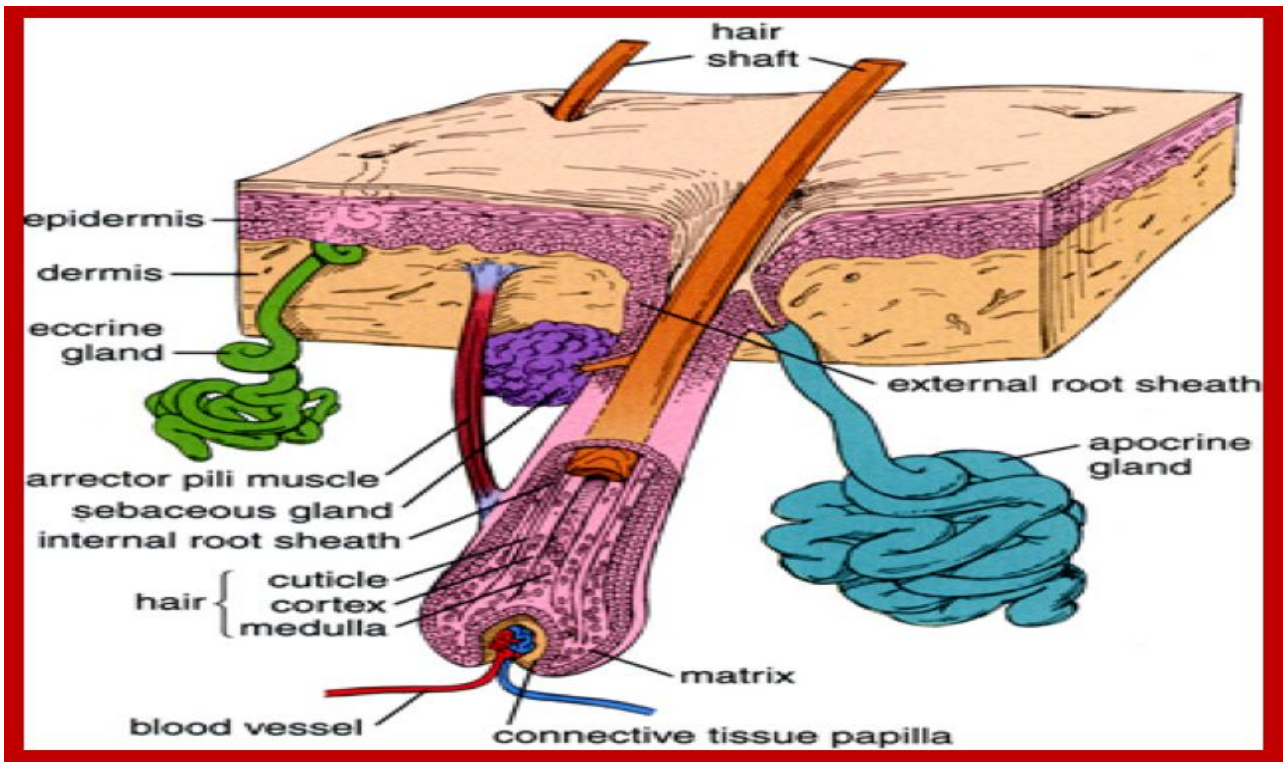
- lies below the dermis.
- Attach the skin to underlying bone
- and muscle as well as supplying it with blood vessels and nerves
- The main cell types are fibroblasts macrophages and adipocytes
- Inflammation of the subcutaneous fat is called panniculitus



Skin appendage are skin-associated structures that serve a particular function

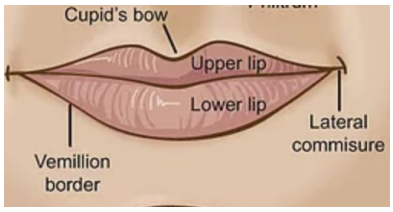
It includes :

1-eccrine/apocrine glands
2-hair follicles
3-sebaceous glands
4-nails



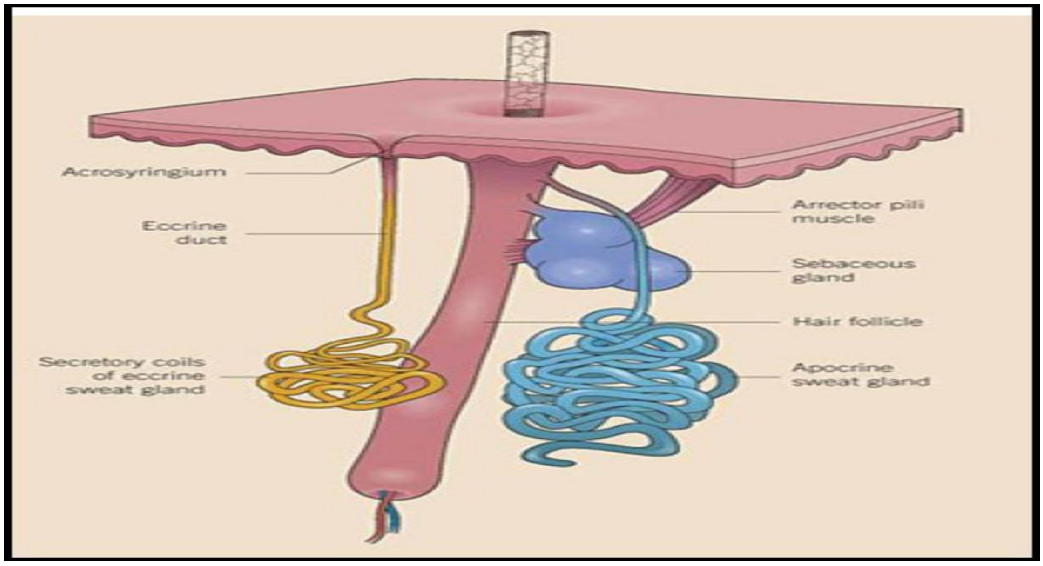
Eccrine glands:

- Tubular structures open freely on the skin , not attached to hair follicles.
- Under the influence of **cholinergic stimuli**.
- Present everywhere except
    - The vermilion border[1]
    - Nailbeds
    - glans penis
    - Labia minora



- Abundant in palms and soles.

[1] is the normally sharp demarcation between the lip and the adjacent normal skin.



Apocrine:

- Secrete viscous material that gives musky odor when acted upon by Bacteria.

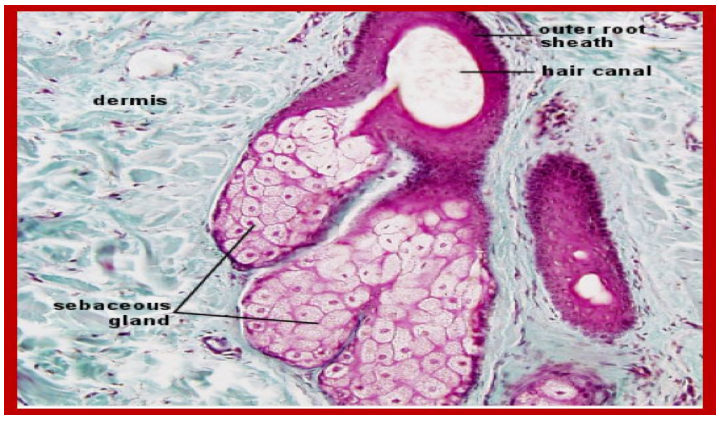
- Present in

  - The axillae
  - -Anogenital area
  - Modified glands in the external ear canal
  - The eyelids (moll's glands) and areolae.

- Under **adrenergic stimuli.**[2]

Sebaceous glands :

• Attached to hair follicles or open freely.
• Present in the scalp, forehead, face and upper chest **except palms and soles.**
• Secrete sebum to moisturize the skin.
• Sebaceous glands are under the control of **androgens**
Sometimes present in abnormal location such as the lips or the mucus membrane on the inside (we don't have hair in that area so the presentation of sebaceous glands is abnormal) So Ectopic glands in the mucous membrane are called → fordyce spots.



Hair follicles:

- Hair follicle has the hair shaft, hair bulb and the bulge.
- Pilosebaceous unit include:
    - hair follicle
    - sebaceous gland
    - arrector pili Muscle.

nails:

- The nail plate is formed of hard keratin.
- Proximal nail fold morphology can be altered in connective tissue disease.
- The lunula is the visible part of the matrix.
- The matrix covers the mid-portion of the distal Phalanx.
- Fingernails grow 3mm/month.
- Toenails grow 1mm/month.
- Nails can be affected in systemic and skin diseases.