

Microanatomy of Skin

The skin is the **largest organ** in the body making up about **16 %** of body weight

The skin has many functions :

- 1- protective barrier against noxious external factors**
- 2- Keep the internal systems intact**
- 3- prevents loss of body fluids**
- 4- Helps to regulate body temperature**
- 5-acts as a sensory organ**
- 6-Plays a role in Vitamin D synthesis**
- 7- play a role in immune surveillance**
- 8- cosmetic association**

Skin is composed of 3 layers

:

1- Epidermis

2- Dermis

3- Subcutis

1- Epidermis : is a **stratified squamous epithelium**

which is **0.1 mm** thick

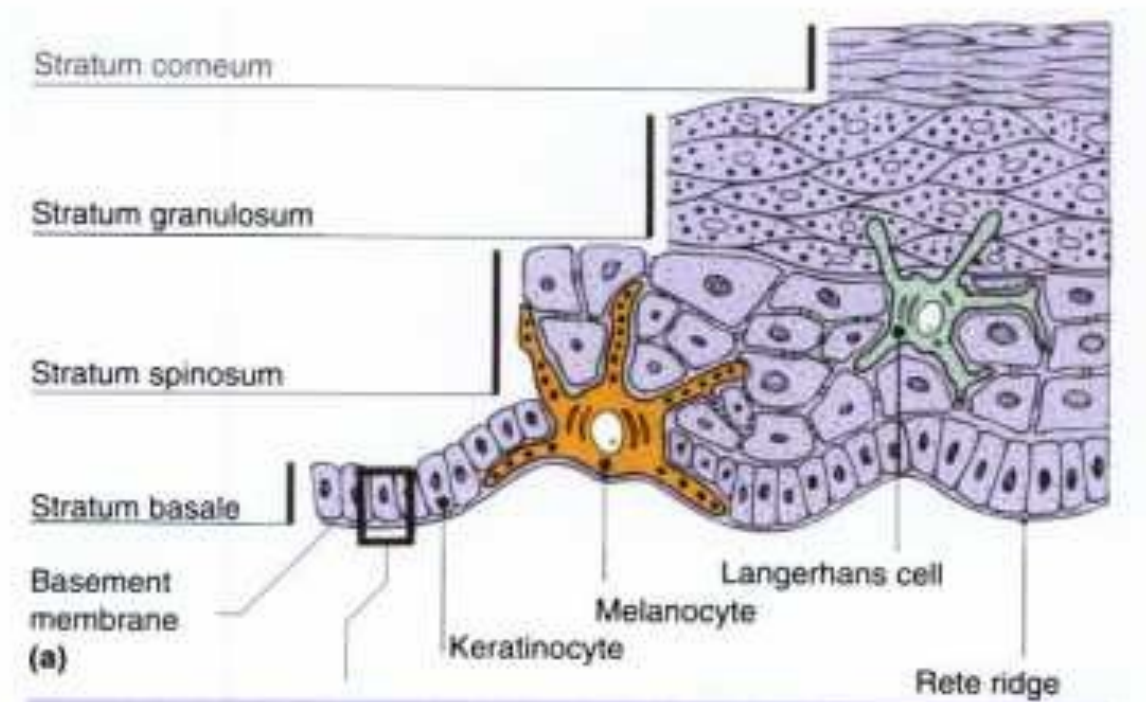
although palm/ sole is greater **0.8-1.4mm**

it contains many types of cells :

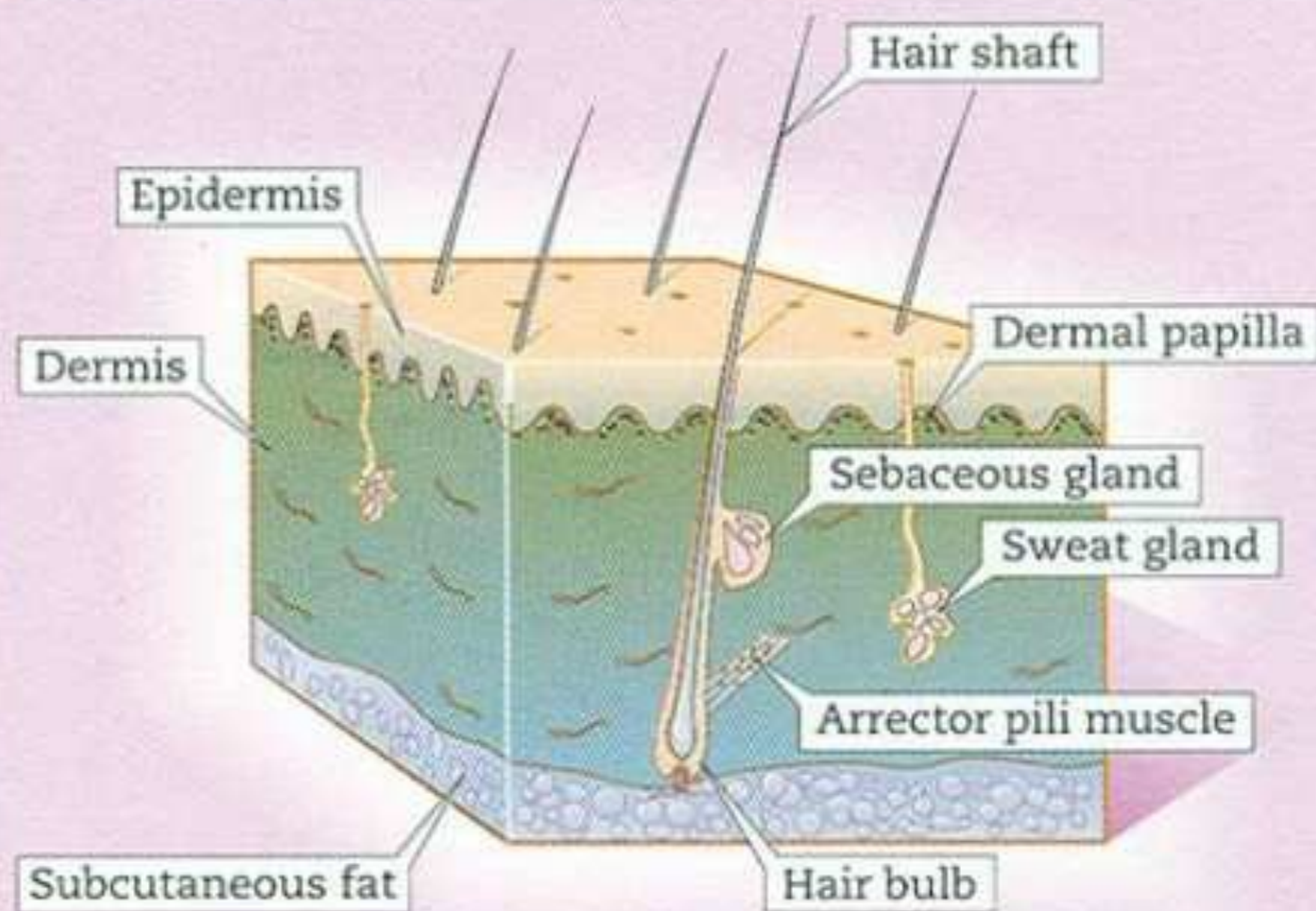
- Keratinocyte
- Melanocyte
- Langer hans cell
- Merkel cells

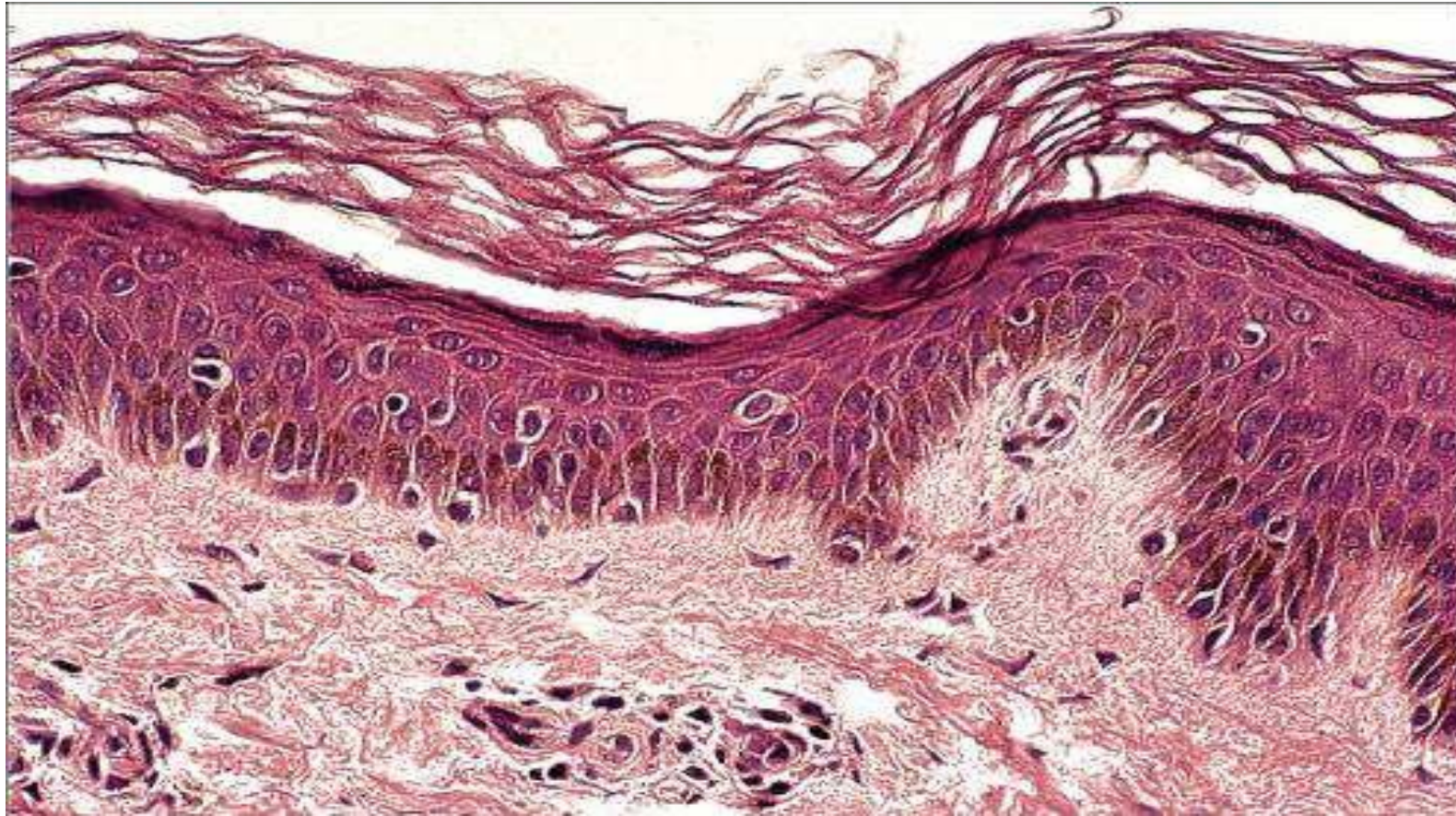
The four layers of the epidermis represent the stages of maturation of keratin by keratinocytes :

- 1 Basal cell layer (stratum basale)**
- 2 Prickle cell layer (stratum spinosum)**
- 3 Granular cell layer (stratum granulosum)**
- 4- Horny layer (stratum corneum)**



SKIN STRUCTURE





The role of maturation :
the cells take 14 days from basal layer to the corneal layer and
a further 14 days to shed the cornified layer i.e. :
28days for complete turnover

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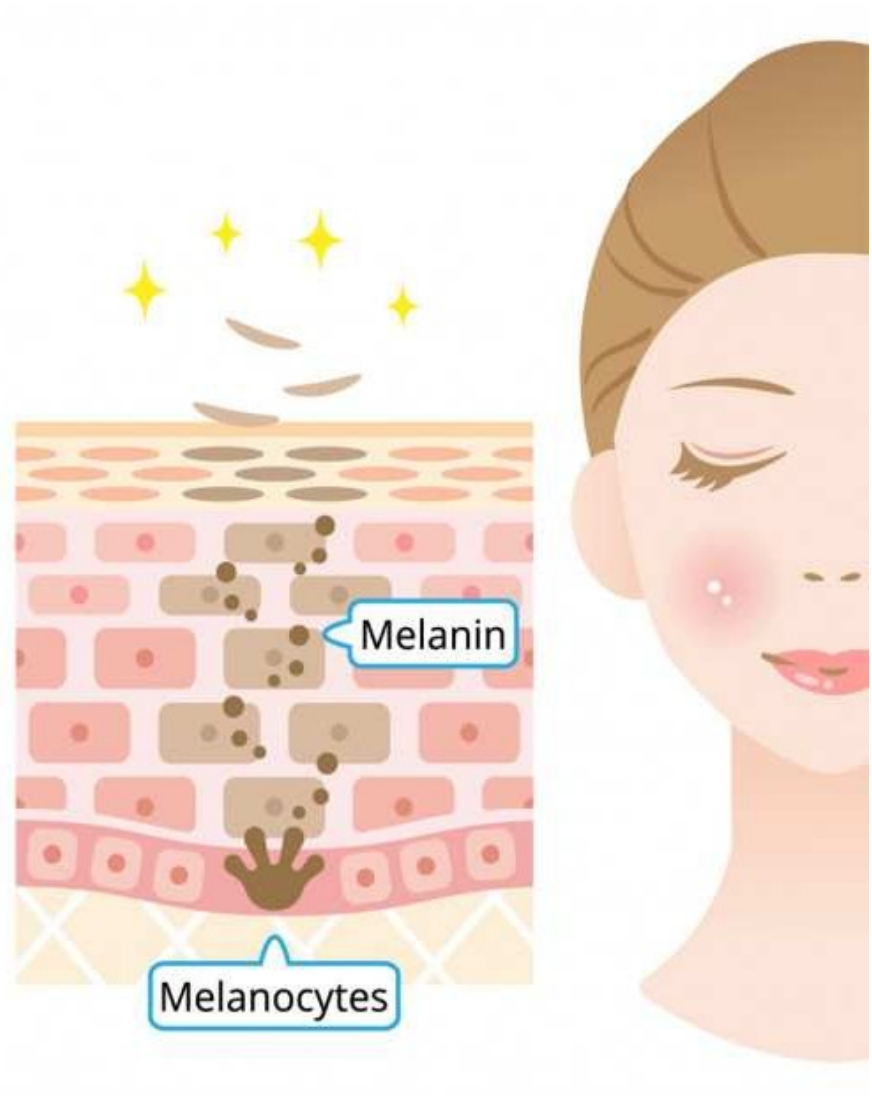
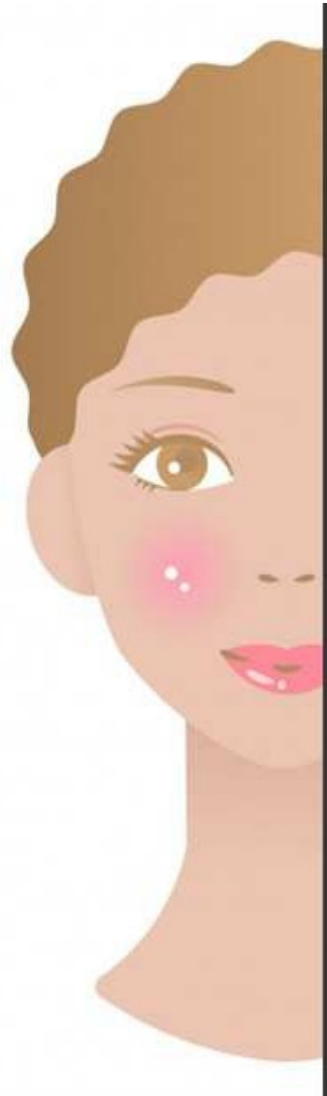
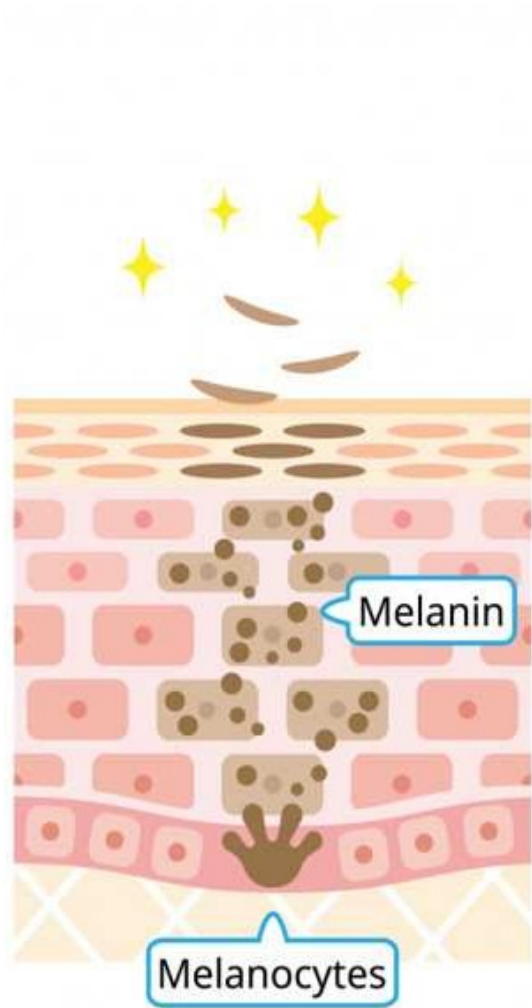
Melanocytes:

They are **dendritic** cell (clear cell in H & E stain) located in the **basal cell population**, making up **5- 10 %** of them.

They synthesize the pigment: **melanin** & transfer it to the neighboring keratinocytes up to the stratum corneum
By organelles known as **melanosomes**.

Melanin acts as **UV absorbing blanket** which reduces the amount of radiation penetrating the skin.

Variations in **racial pigmentation** are NOT due to differences melanocyte numbers but due to: **the number and size of melanosomes**



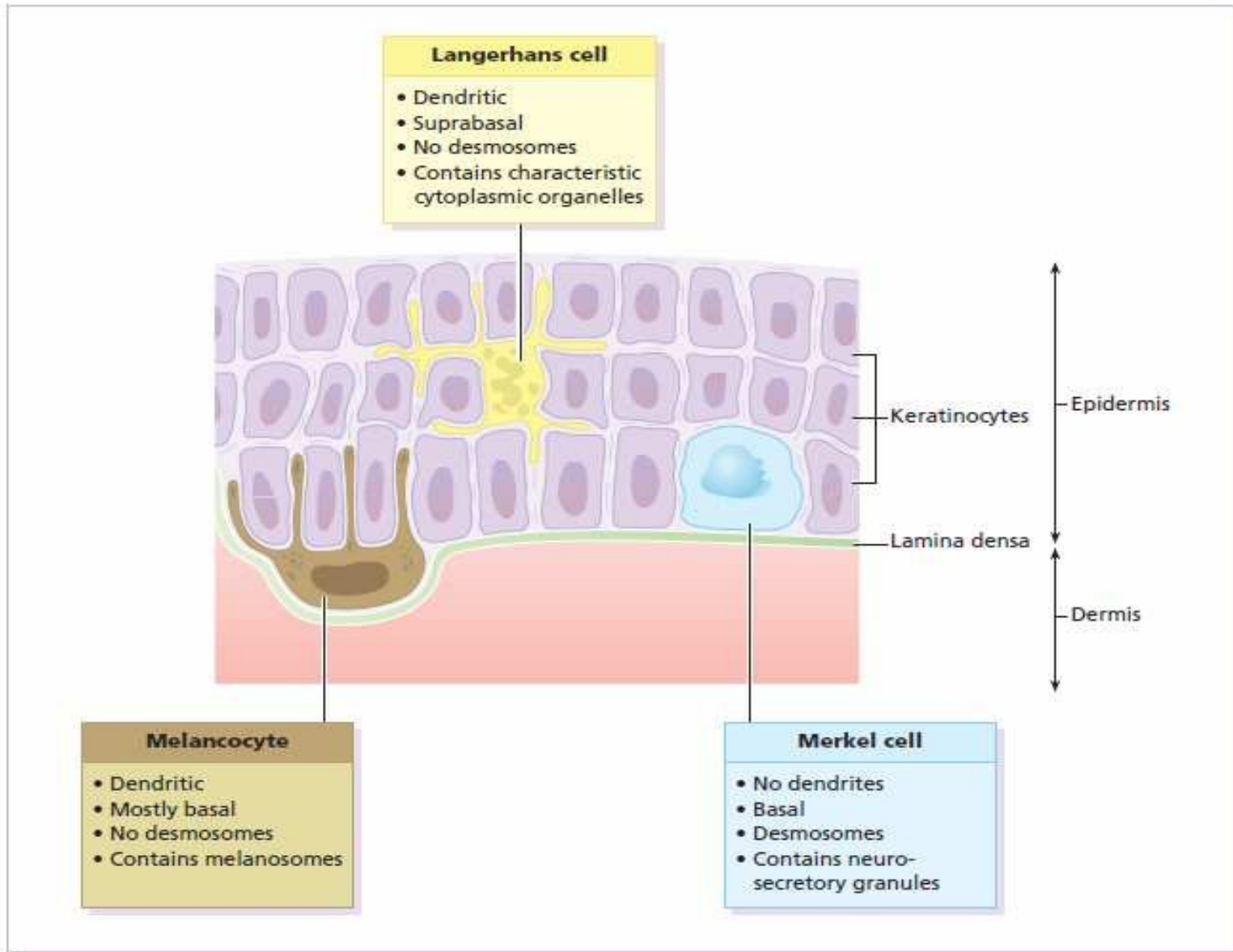


Fig. 2.5 Melanocyte, Langerhans cell and Merkel cell.

2- Dermis :

is a tough supportive connective tissue matrix , It composed of 2 parts :

1 -**Papillary dermis** : upper loose collagen

2 -**Reticular dermis** : coarse deeper layer and makes **70 %** of the dermis

The dermal fibers are immersed in a **semi-solid matrix** called **Glycosaminoglycans**

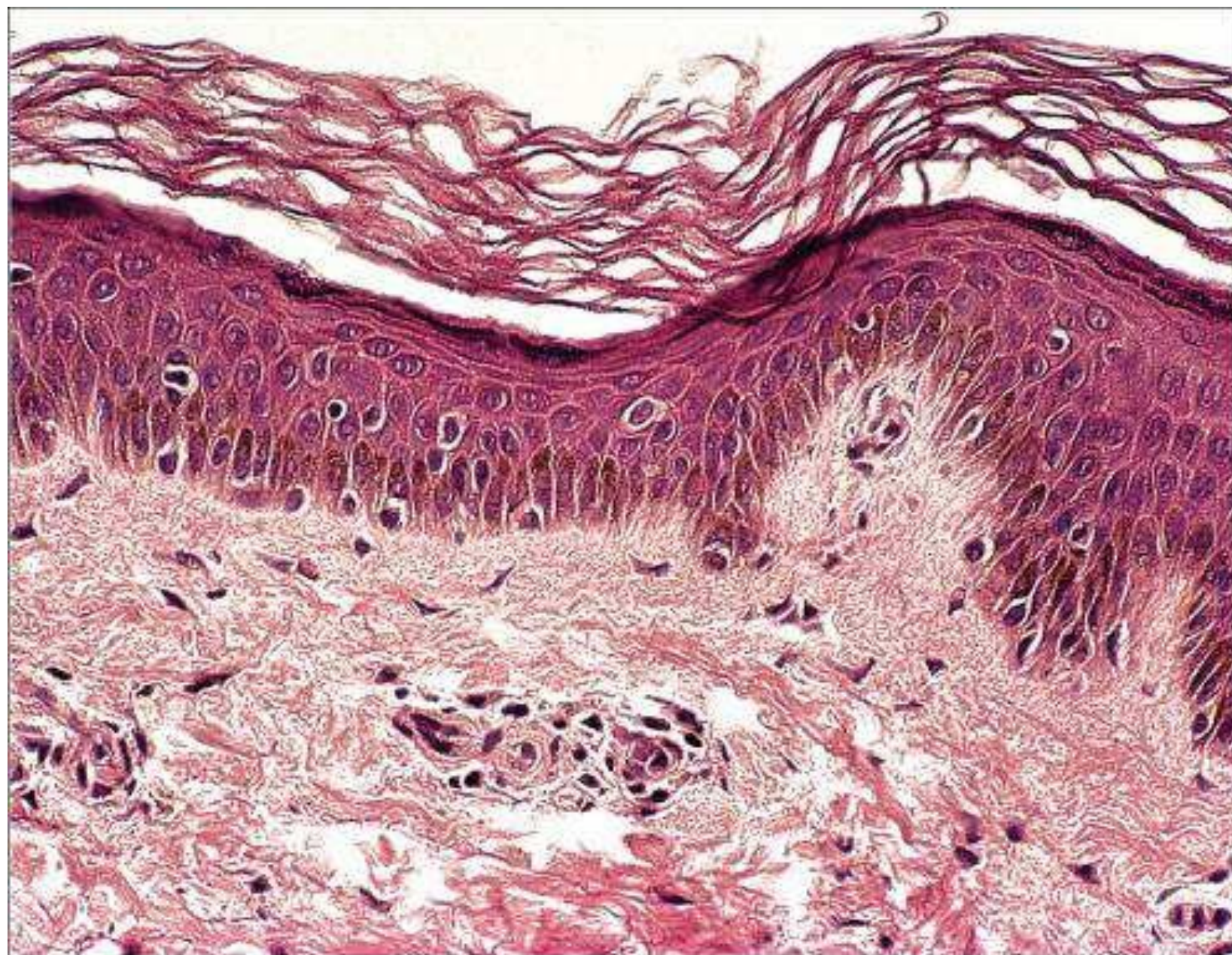
The dermis contains these cells :

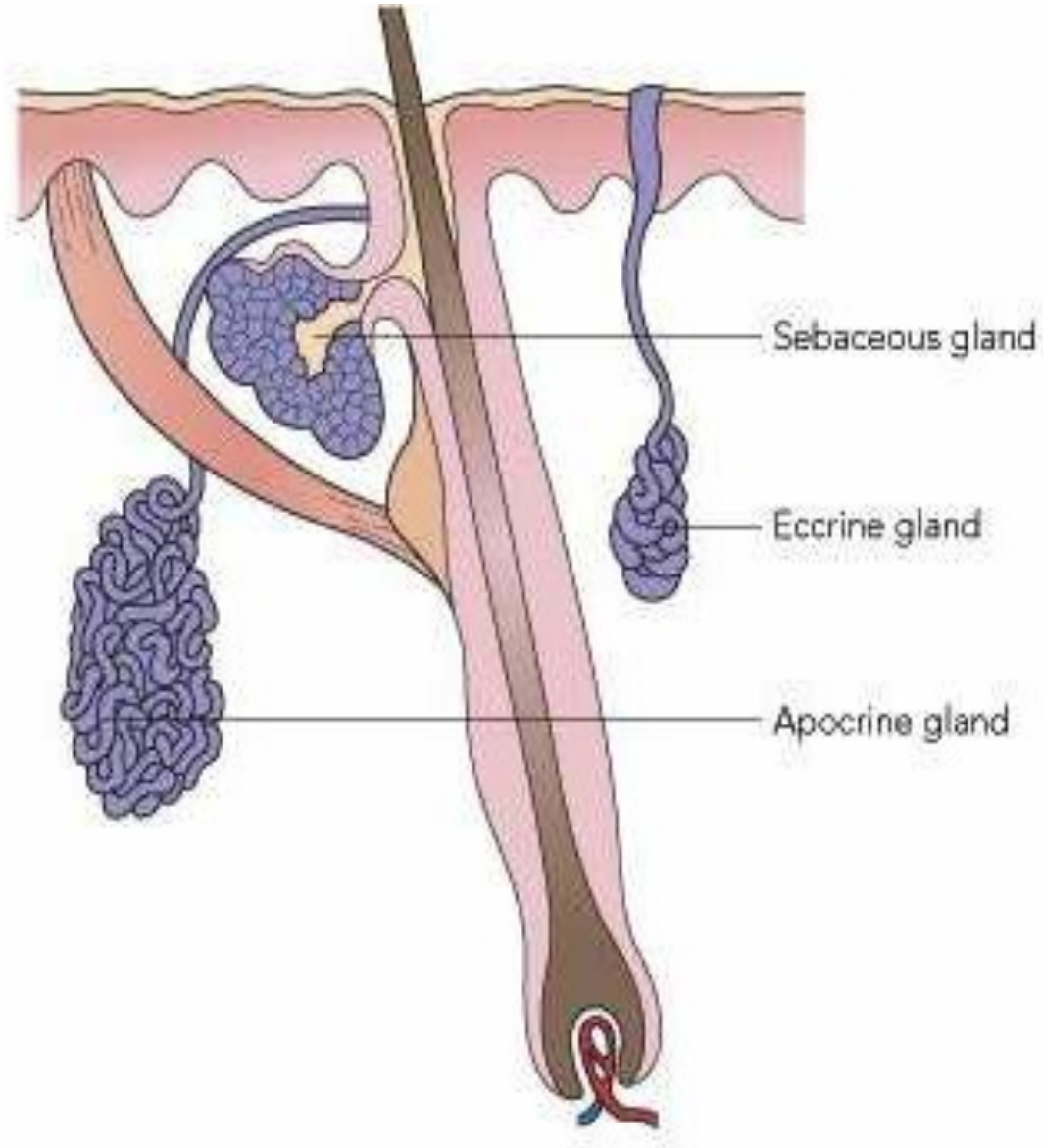
1- **fibroblast**

2- **mast cell**

3- **macrophages**

4- **lymphocytes**





**other skin
appendages :**

- Sweat glands
eccrine gland
apocrine gland

- Hair
- Nail

Hair :

Hairs are found over the entire surface of the skin, with the exception of the glabrous skin of the palms, soles, glans penis and vulval introitus.

On average there are **100 000 hair follicles** on the scalp and the normal rate of growth is **0.4 mm / day**

There are 2 important types of hair:

- **Vellus hairs :**

short, fine, light covering most body surfaces.

- **Terminal hairs :**

longer, thicker and darker , found on scalp, eyebrows, eyelashes, on the pubic, axillary and beard areas

Hair growth is **cyclical**, with three phases :

1. **Anagen** : is the growing phase. scalp hair this lasts from 3-5 years, eyebrow hair it lasts only 4 months.

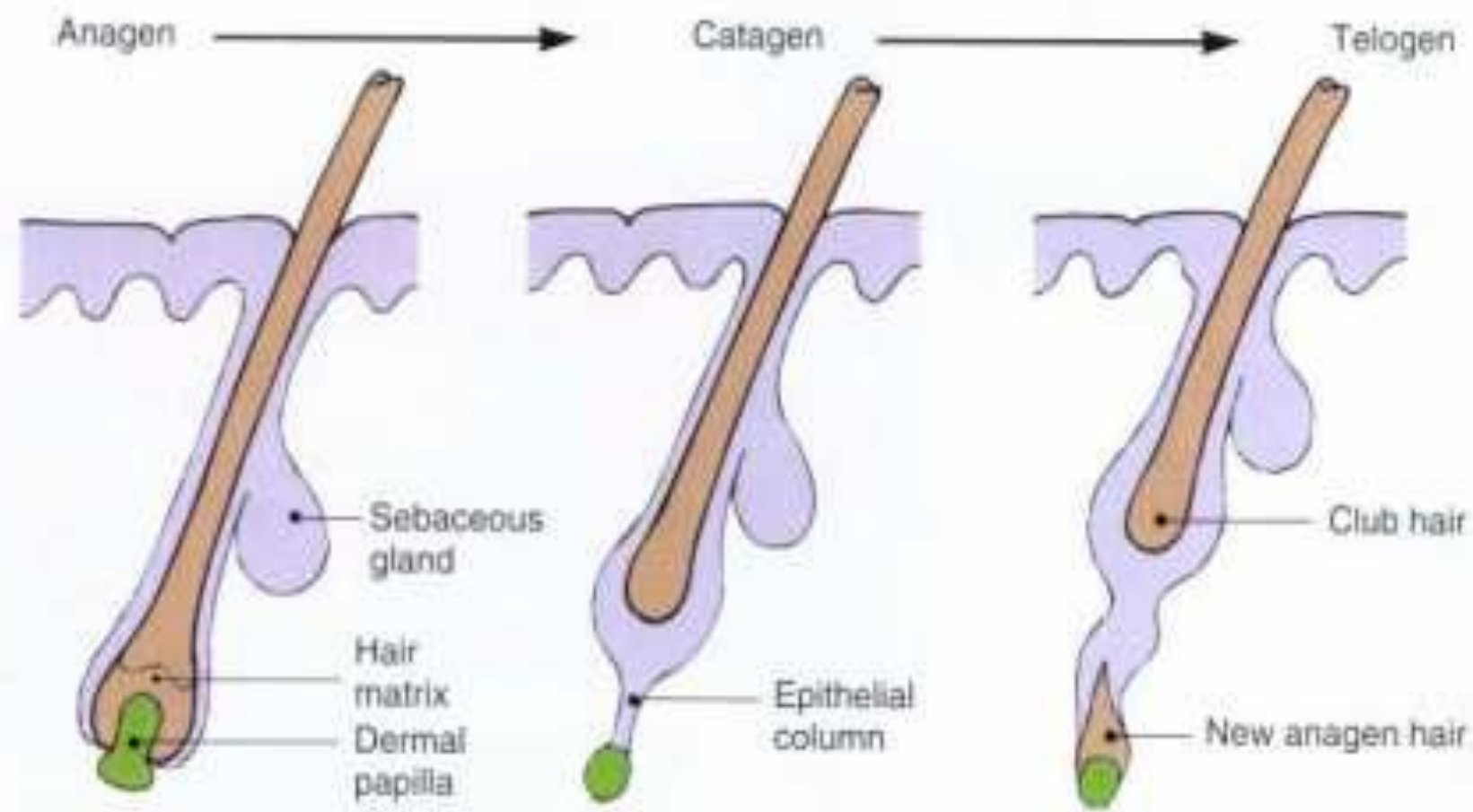
At any one time, 80-90% of scalp hairs are in anagen

2. **Catagen** : is the resting phase and lasts 3-5 weeks.

(At any one time 10-20% of scalp hairs are in catagen)

3. **Telogen** : is the shedding phase, lasts 3-5 months

Each day 50-100 scalp hairs are shed



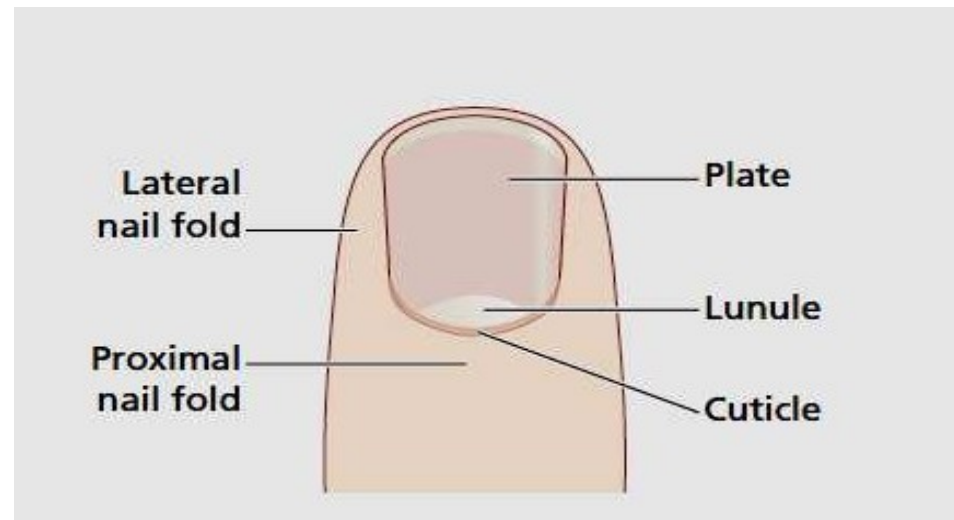
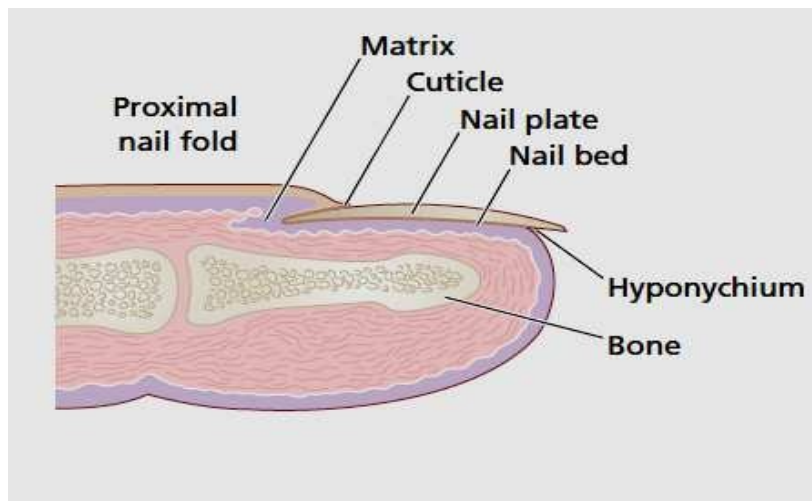
1. 2 The three phases of hair development.

Nail

it consists of of hardened and densely packed keratin .
It protects the finger tip and facilitates grasping and tactile sensitivity in the finger pulp.

The **nail matrix** contains dividing cells which mature, keratinize and move forward to form the nail plate

It grows at a rate of **0.1 mm/24 h** for the fingernail. Toenails grow more slowly.



Terminology of Skin lesions

Primary skin lesions :- unmodified

- ① Macule : well-defined discoloration of skin $\leq 5\text{mm}$
- ② Patch : like macule but $> 5\text{mm}$
- ③ Papule : well-defined elevation of skin $\leq 5\text{mm}$
- ④ Plaque : like papule but $> 5\text{mm}$

- ⑤ Node: solid defined elevation
greater part lies beneath skin surface
& usually 1 cm in diameter
- ⑥ Vesicle: well defined lesion ≤ 5 mm
containing fluid
- ⑦ Pustule: vesicle containing pus
- ⑧ Bullae: vesicle but > 5 mm
- ⑨ wheel: oedematous, red, transient
elevation of skin
- ⑩ Purpura: visible collection of blood in skin

Secondary skin lesions :-

- ① Scale : accumulation of keratin, easily shed from skin
- ② Crust : dried serum, exudate, pus or blood over skin surface, usually eroded surface
- ③ Fissure : linear deep crack in the skin
- ④ Ulcer : deep loss of skin (epidermis + dermis) usually heals with scar formation
- ⑤ Erosion : superficial loss of skin (epidermis) heals without scarring
- ⑥ Excoriation : linear scratch mark
- ⑦ Lichenification : thickening of skin & hyperpigmentation & exaggerated skin markings, usually ~ continuous rubbing

There are special tests or procedures in dermatology :

- Skin biopsy :

which may be : shave , incisional , excisional , punch

- Dermoscopy :

- Woods light :

DERMOSCOPY A hand lens with built-in lighting and magnification (10–30X). It allows for the noninvasive inspection of deeper layers of the skin (dermal-epidermal junction and beyond). This is especially useful in distinguishing benign and malignant growth patterns in pigmented lesions.



Woods light examination

it produces ultraviolet light A (UVA)= 365 nm wavelength

- Vitiligo ----milky white
- Tinea Versicolor----**golden yellow**
- Tinea Capitis (caused by microsporum)---**yellow green**
- Erythrasma -----**coral red**