



SKIN (INTEGUMENT) LECTURE 6



Curriculum: Phase 1/ Semester2/ TOB/ Session 3

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SELECTED REFERENCES



- **Histology Textbooks ‘Basic Histology’, Junqueira, 13 th Edition.**
- **‘Colour Atlas of Histology’ Gartner and Hiatt**



LECTURE OBJECTIVES

- *describe the macroscopic structure of human skin (ie as determined by the naked eye) and how this large and highly visible organ varies with site, sex, age, ethnicity and exogenous influence.*
- *describe how some of these variations influence the susceptibility to and/or the manifestations of skin disease.*
- *describe the microscopic and molecular structure of human skin including:*

the different regions of the epidermis:

- ☐ *horny layer (stratum corneum)*
- ☐ *granular layer (stratum granulosum)*
- ☐ *prickle cell layer (stratum spinosum)*
- ☐ *basal layer (stratum basale)*



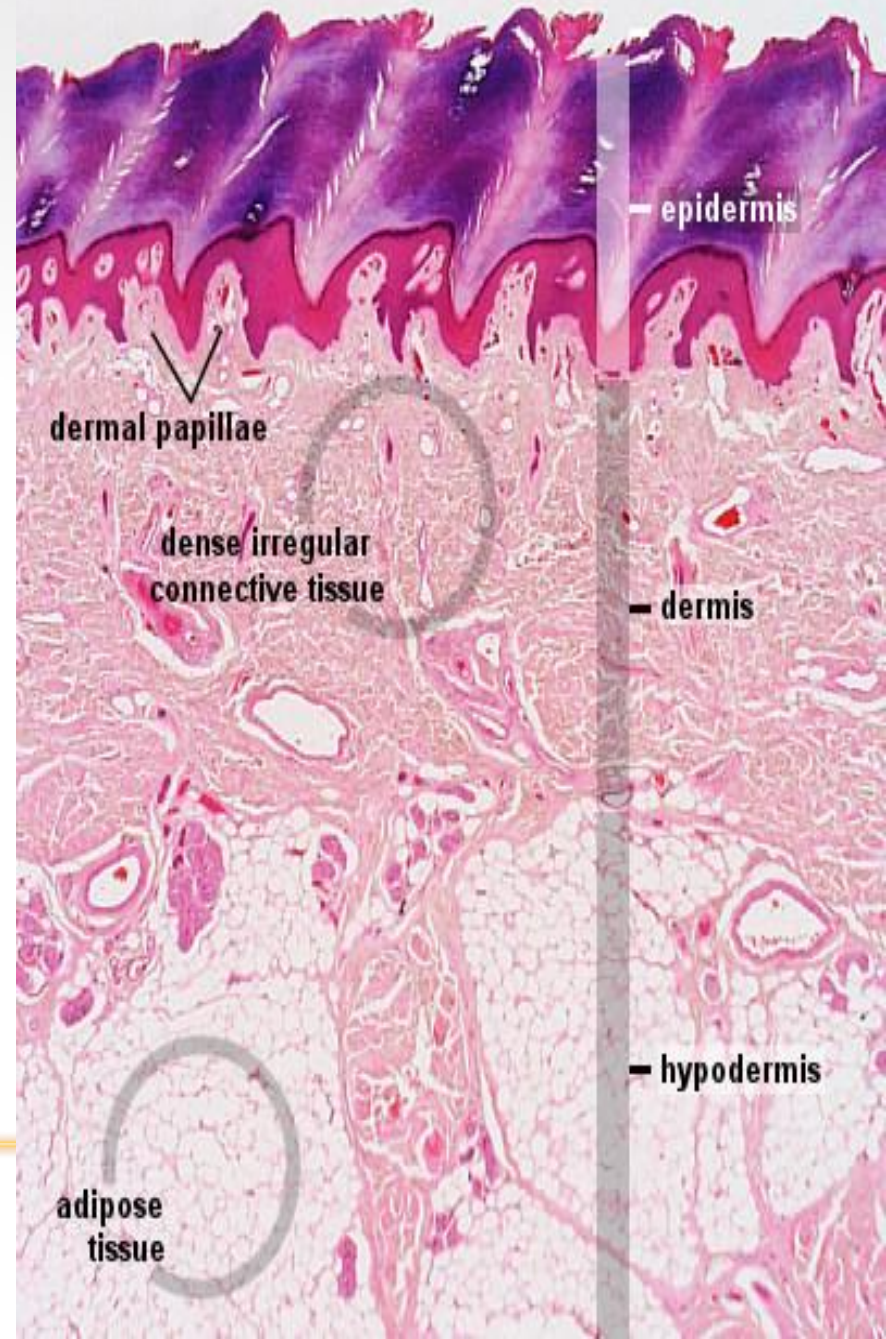
- the process of keratinocyte differentiation
- epidermal dendritic (Langerhans) cells and melanocytes
- *the dermo-epidermal junction (basement membrane zone)*
- **the dermis and its constituents**
- ❖ *cellular constituents fibroblasts blood vessels*
- ❖ *lymphatic vessels mast cells nerves*
- ❖ *extracellular matrix collagen elastin*
- ❖ *ground substance*

1. 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.

2. The skin is composed of the epidermis, an epithelial layer of ectodermal origin, and the dermis, a layer of mesodermal connective tissue .

3. The junction of dermis and epidermis is irregular, and projections of the dermis called papillae interdigitate with evaginations of the epidermis known as epidermal ridges.

4. Beneath the dermis lies the subcutaneous tissue or hypodermis



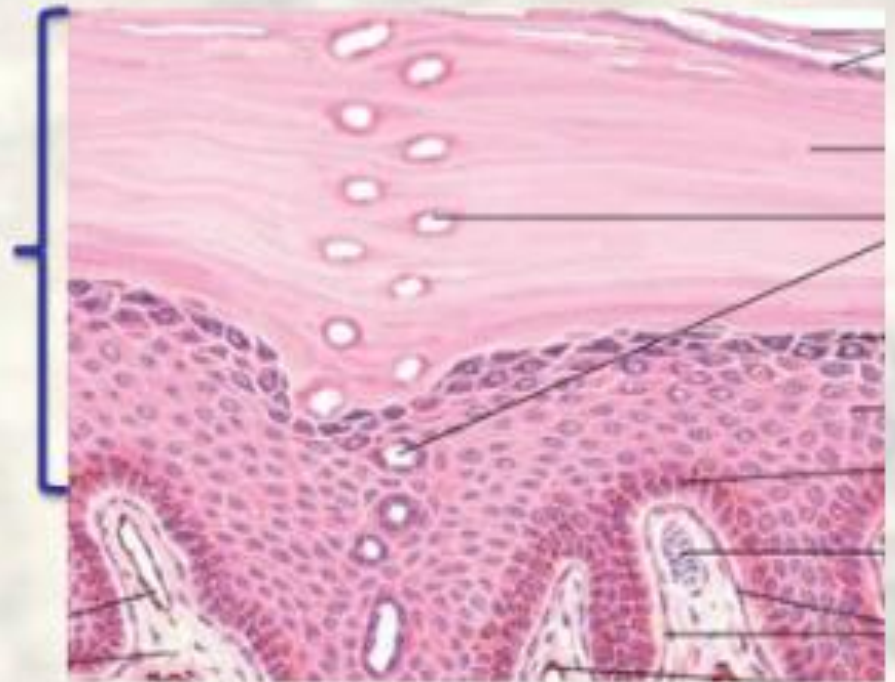


FUNCTIONS OF THE SKIN

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

The Epidermis

- It consists of stratified squamous keratinized epithelium.
- Thickness:
 - ~ 0.075-0.150 mm in thin skin
 - ~ 0.4-0.6 mm in thick skin.



The Epidermis

➤ consists of 5 layers (stratum = layer)

1. Stratum basale "germinativum"

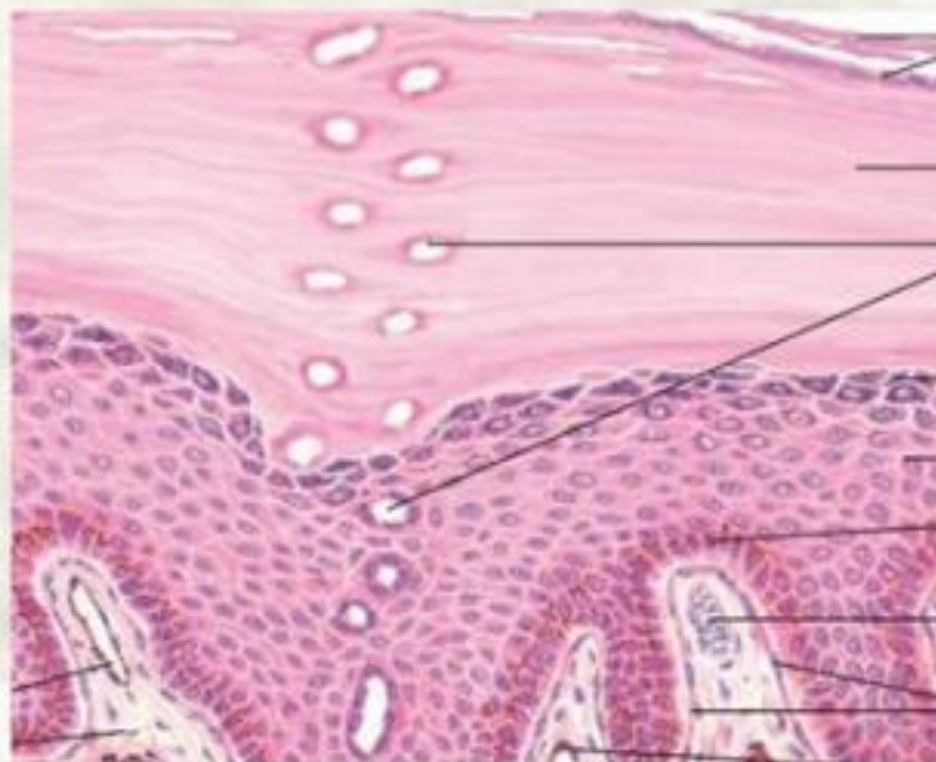
2. Stratum spinosum

3. Stratum granulosum

4. Stratum lucidum

(only in thick skin)

5. Stratum corneum



The Epidermis

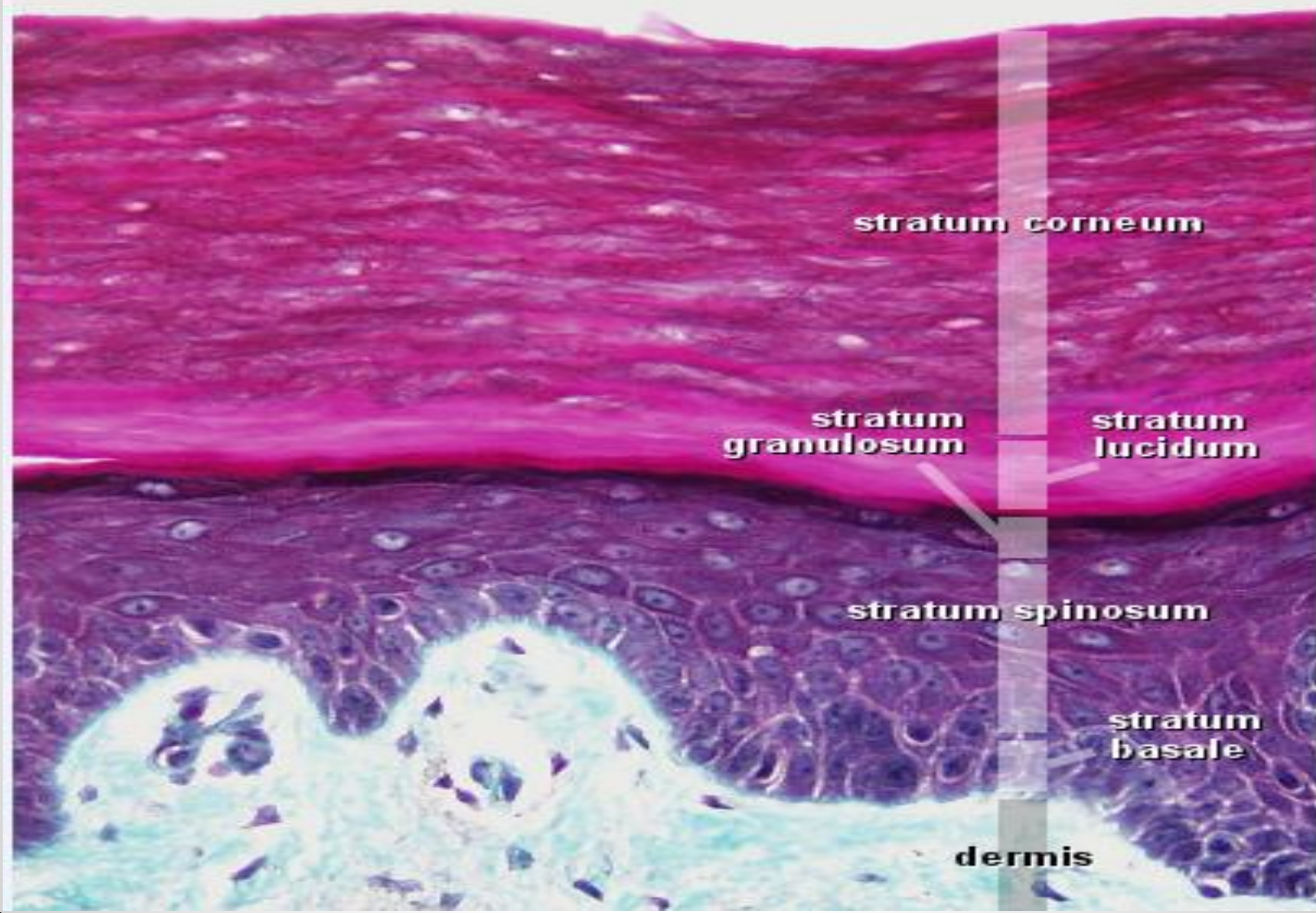
1) Stratum Basale

- Single layer, basophilic, \perp (perpendicular) to the basal lamina
- Show increased mitosis (continuous turnover 15-30 days).

2) Stratum Spinosum

- Polygonal, have spiny projections (tonofibrils + desmosomes).

Skin, thick trichrome



Nucleus

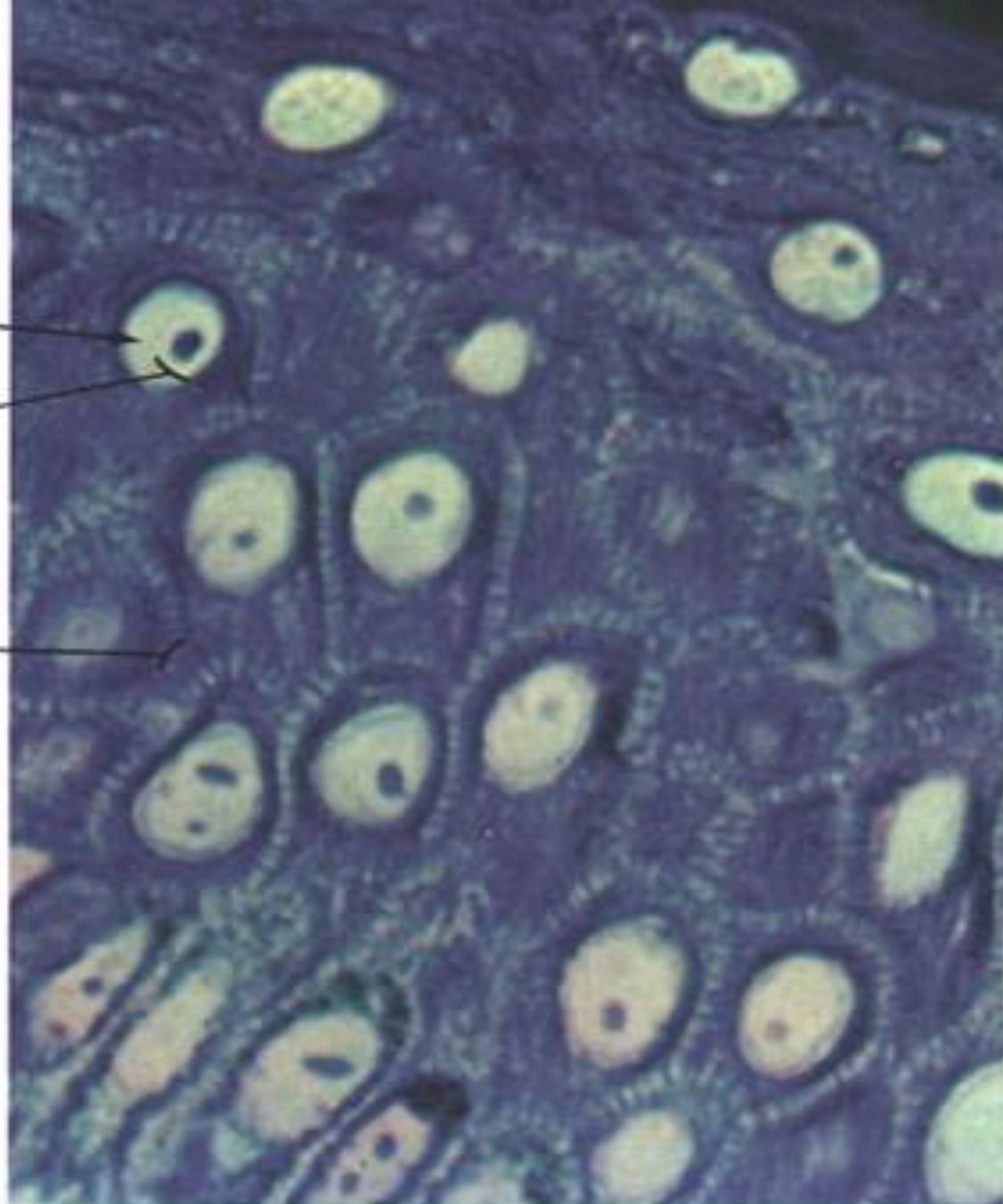
Nucleolus

Desmosomes
(Intercellular
bridges)

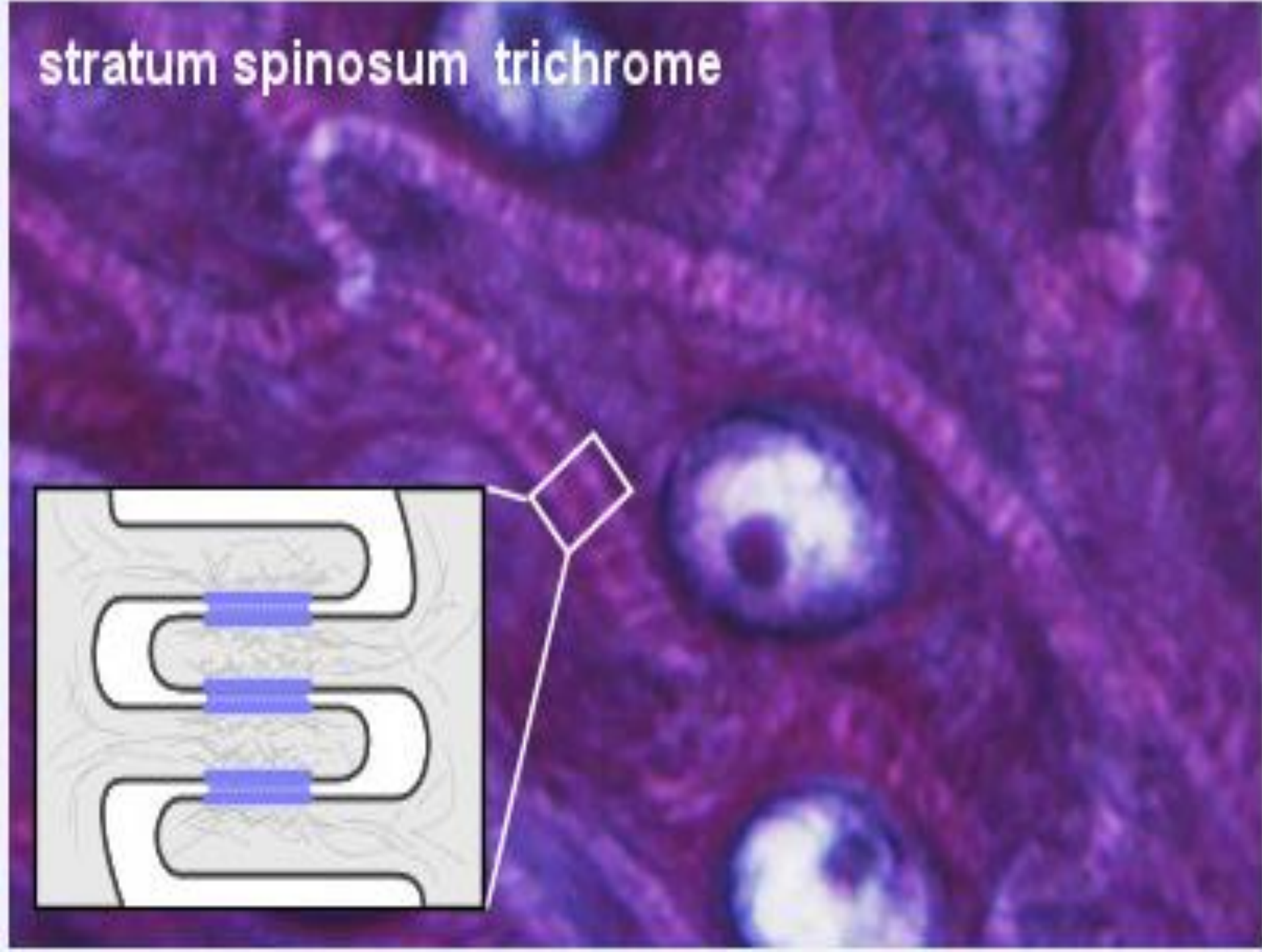
Stratum
spinosum

Stratum
basale

10 μ m



stratum spinosum trichrome



The Epidermis

3) Stratum Granulosum

- Coarse basophilic granules (keratohyalin)
- By E.M. it shows lamellar granules → lipids → barrier.

4) Stratum Lucidum

- Translucent layer, flattened eosinophilic cells
- No nuclei or organelles
- Well developed in thick skin.

5) Stratum Coreum

- Keratinized cells filled with keratin protein



psoriasis



**Increase in the number of proliferating cells
as well as a decrease in the cycle time of
these cells that result in greater epidermal
thickness and more rapid renewal of
epidermis**





pemphigus

type of blistering

**disorder is caused by
autoimmune damage to
intercellular junctions
between keratinocytes**



Basal cell carcinoma

Malignant tumour of
stratum basale
rarely lethal







squamous cell carcinoma

**Malignant tumour
of stratum
spinosum rarely
lethal**

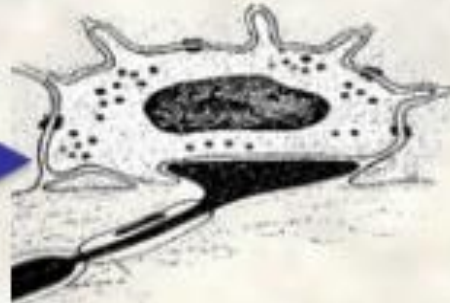


Cells of The Epidermis

1. Keratinocytes → 

2. Melanocytes → 

3. Langerhans "dendritic" Cells → 

4. Merkel's Cells → 

Keratinocytes

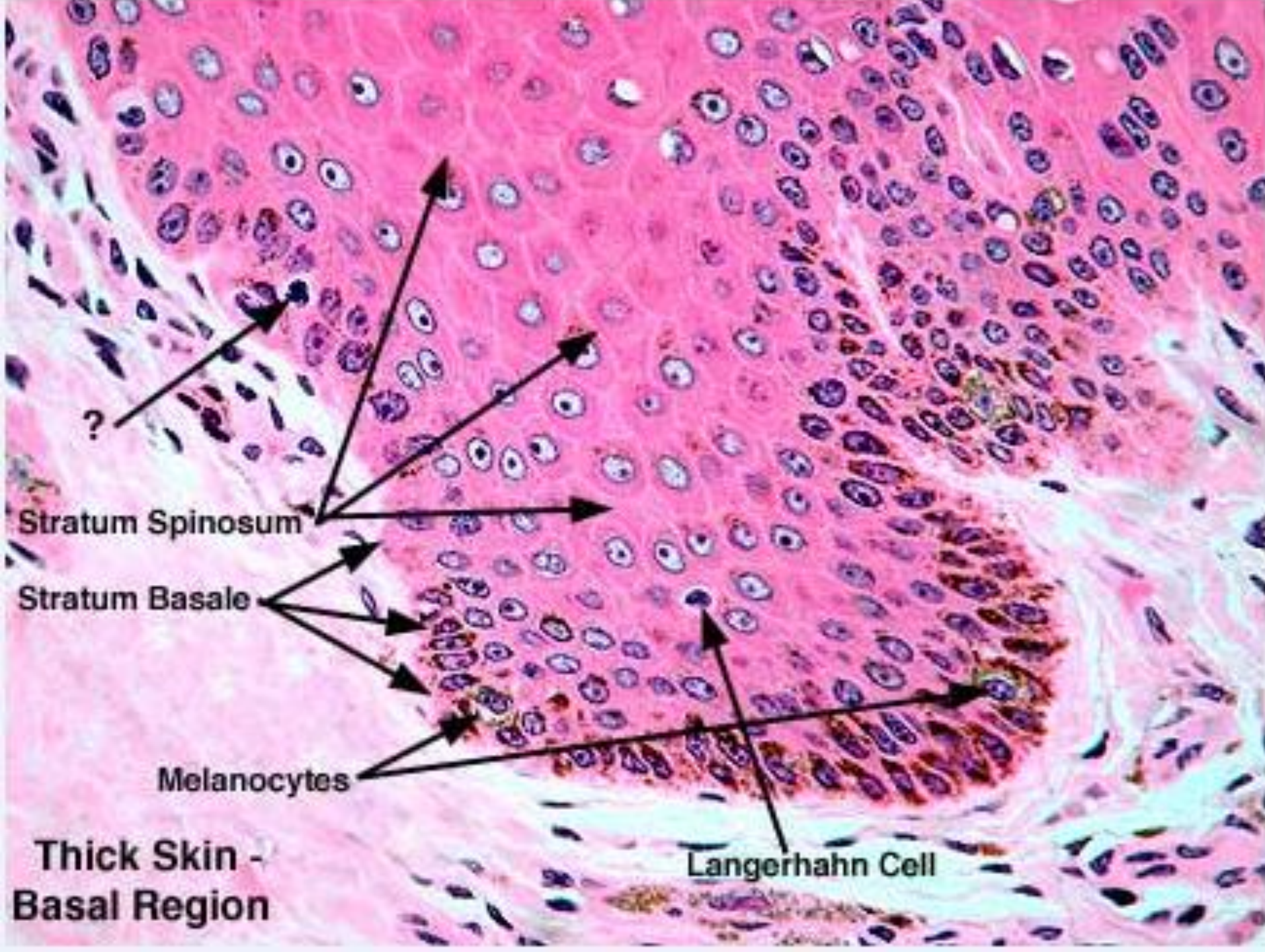
- These are epithelial cells that form the stratified squamous keratinized epithelium of the epidermis.
- The most numerous cells found in the epidermis.
- The basal layer divide to replace the superficial dead cells.
- bound together with various cellular junctions.

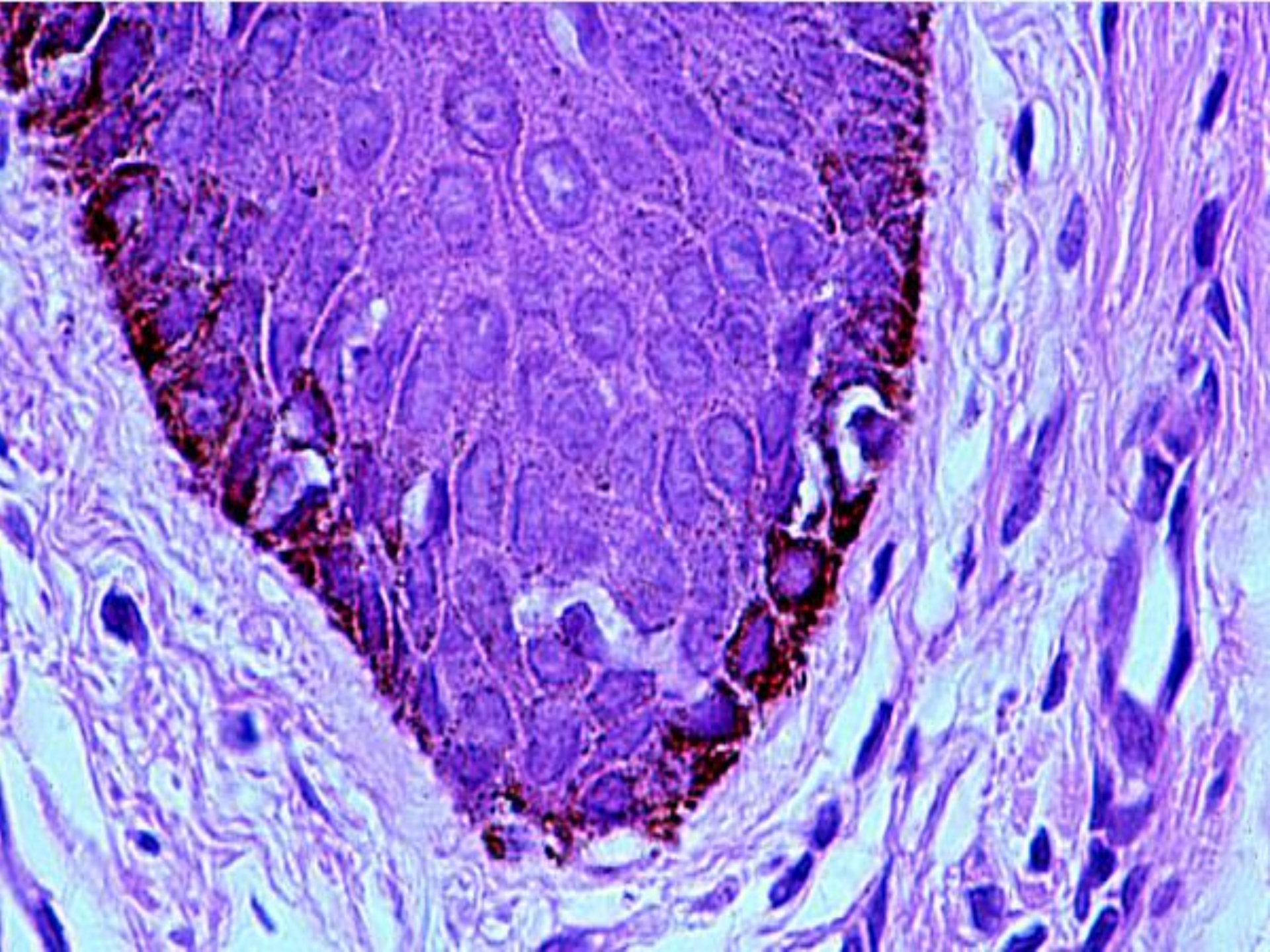


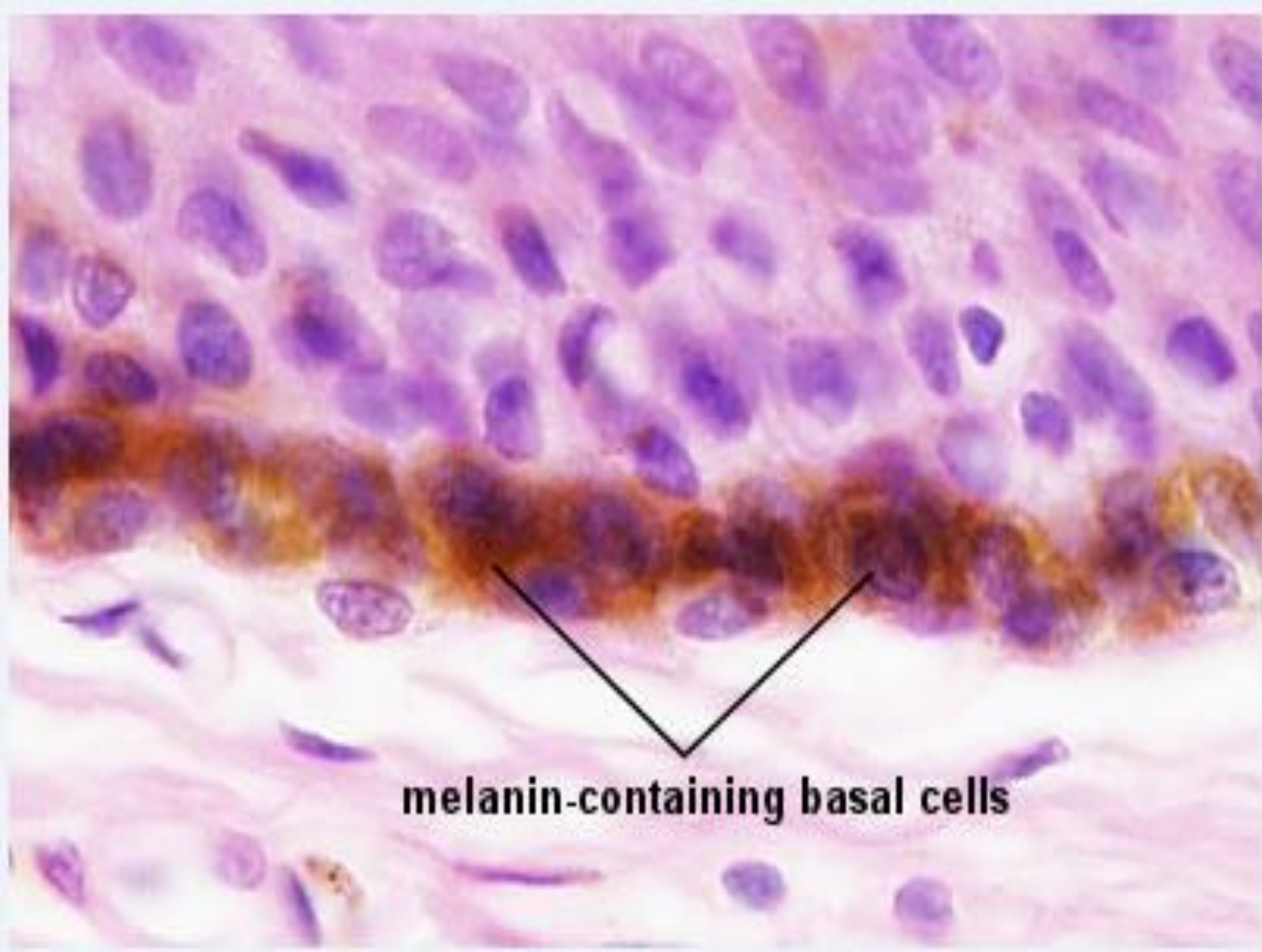
Melanocytes

- They give the skin its color.
- They are present in stratum basal & spinosum.
- Melanin granules → migrate through the cytoplasmic extensions → enter keratinocytes.
- Contain pigments
 - Eumelanin (dark hair)
 - Pheomelanin (red hair)









melanin-containing basal cells



malignant melanoma

**Invasive tumour of
melanocytes, dividing
rapidly and invade the
blood and lymphatic
vessels**





vitiligo

**The degeneration
and disappearance
of entire
melanocytes
causes a patchy
loss of pigment in
the skin**



Melanocytes

- Melanin synthesis

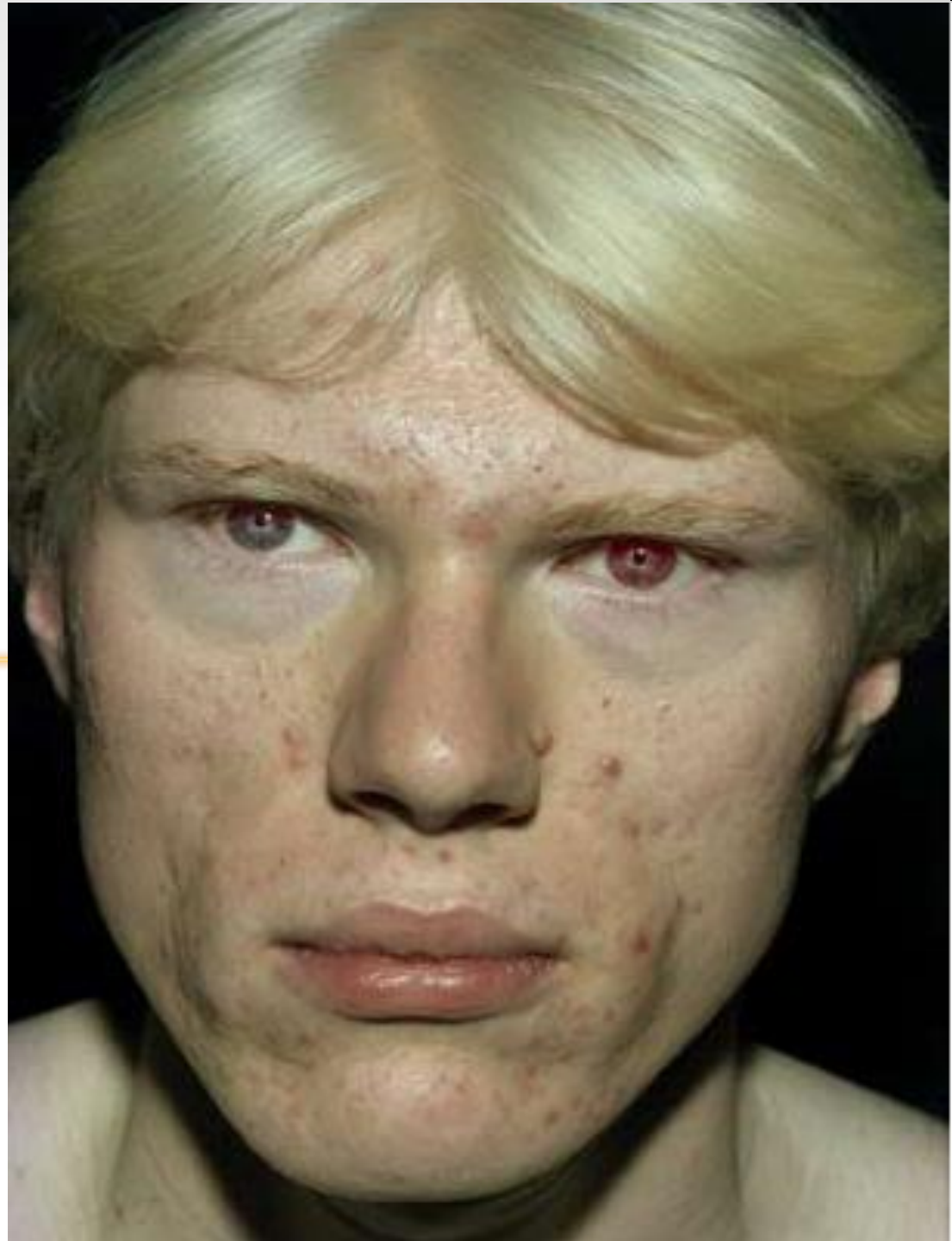


- The number of melanocytes is constant per area in human regardless of sex or race.
- Skin color is the result of the amount of melanin granules & melanocyte activity.

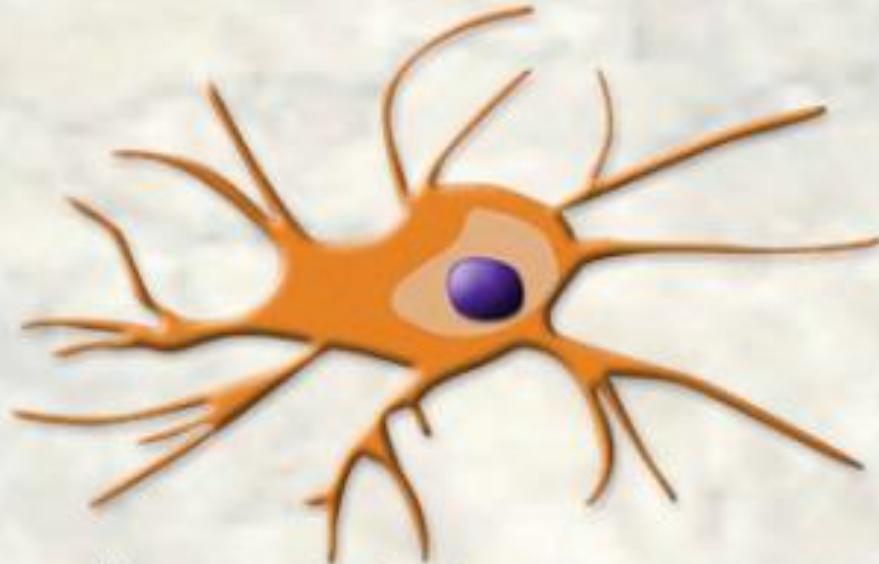


albinism

A hereditary inability of the melanocytes to synthesize of melanin, is caused by the absence of tyrosinase activity or the inability of cells to take up tyrosine



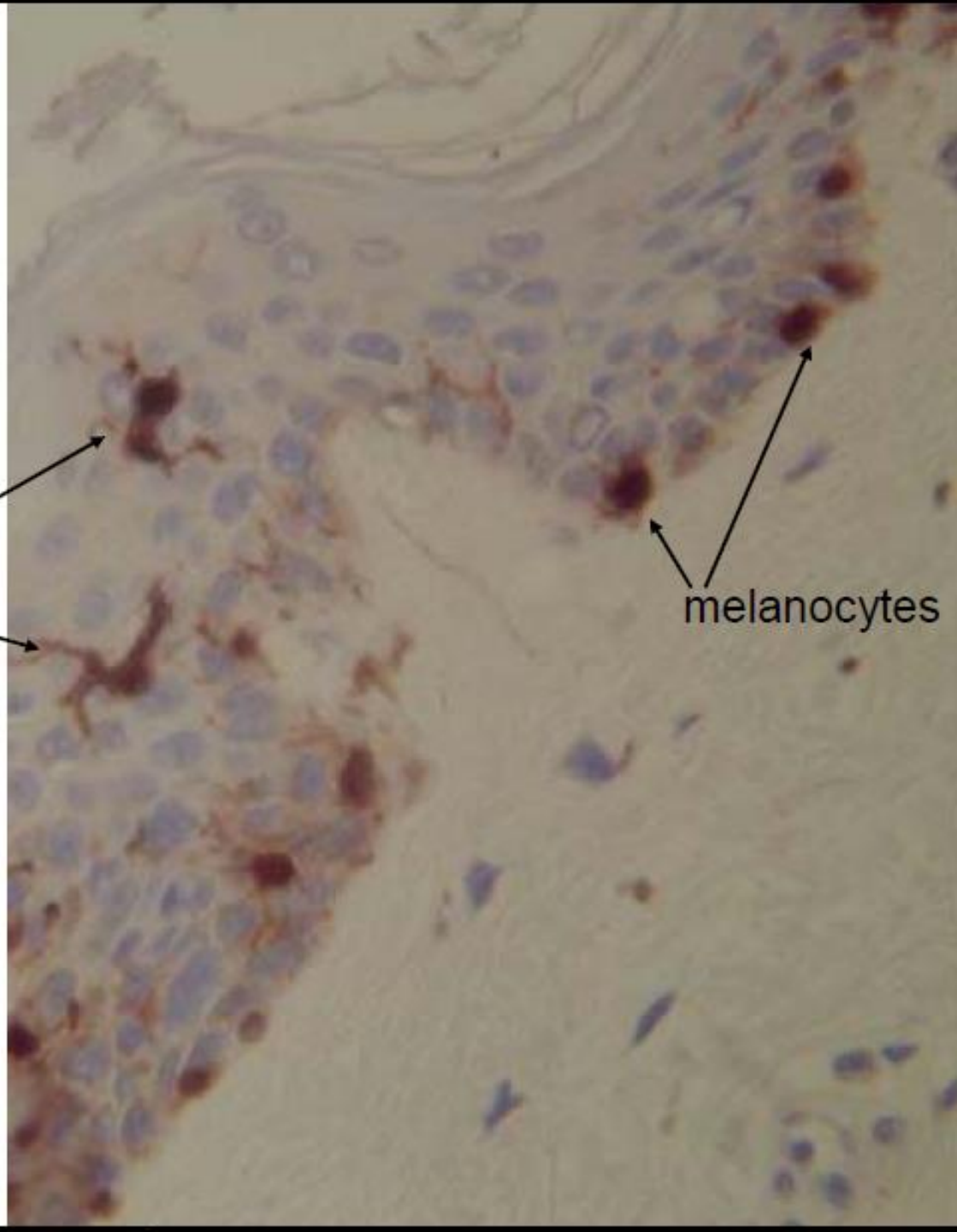
Langerhans “dendritic” Cells



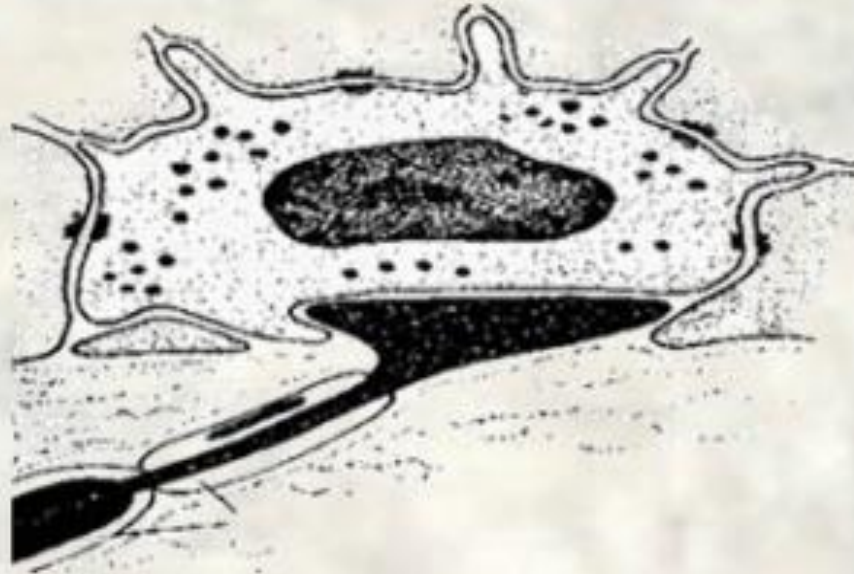
- Star-shaped cells, mainly in stratum spinosum
- Derived from macrophages.
- They are antigen-presenting cells (APC).

High power photomicrograph of human epidermis, with S100 monoclonal antibody staining to demonstrate **Langerhans cells** and **melanocytes** (by coincidence these two unrelated cell types stain with the same reagent)

Langerhans cells:
dendritic antigen presenting cells of the epidermis, situated throughout the prickle cell layer. Responsible for presentation of antigens to T lymphocytes and for cutaneous delayed-type hypersensitivity reactions (you will learn about this in immunology)



Merkel's Cells



- Generally found in thick skin
- Similar to epidermal epithelial cells but show dense granules.
- They are mechano-receptors.

The Dermis

- Consists of C.T, variable in thickness.
- It forms lamina reticularis to share in the formation of basal laminin "basement membrane"
- Consists of 2 layers
 - Outer papillary layer
 - Inner reticular layer.
- Contain fibroblasts, mast cells, macrophages and leukocytes.



Bullous pemphigoid

One type of blistering disorder due to abnormalities of the dermal-epidermal junction



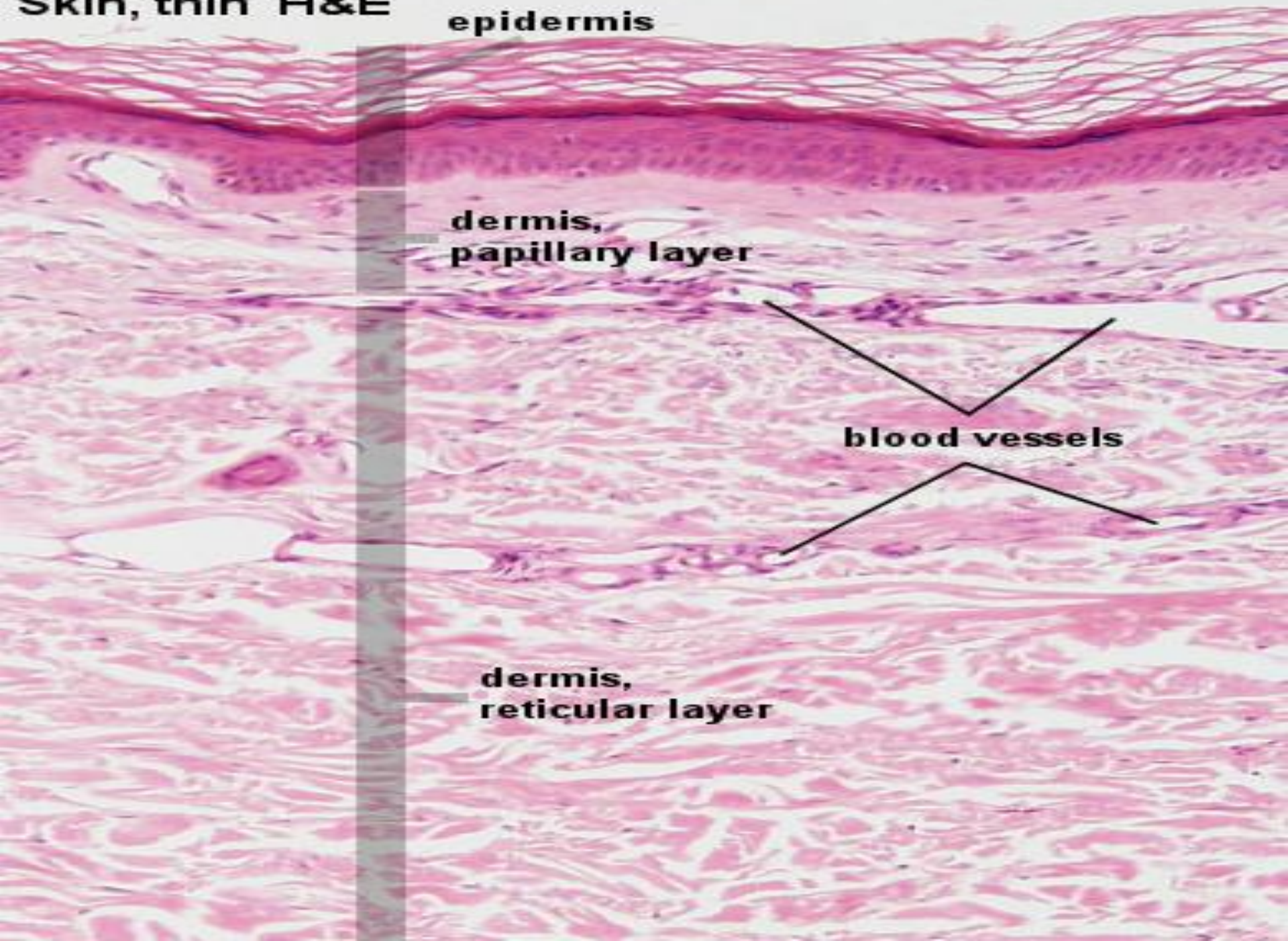
Skin, thin H&E

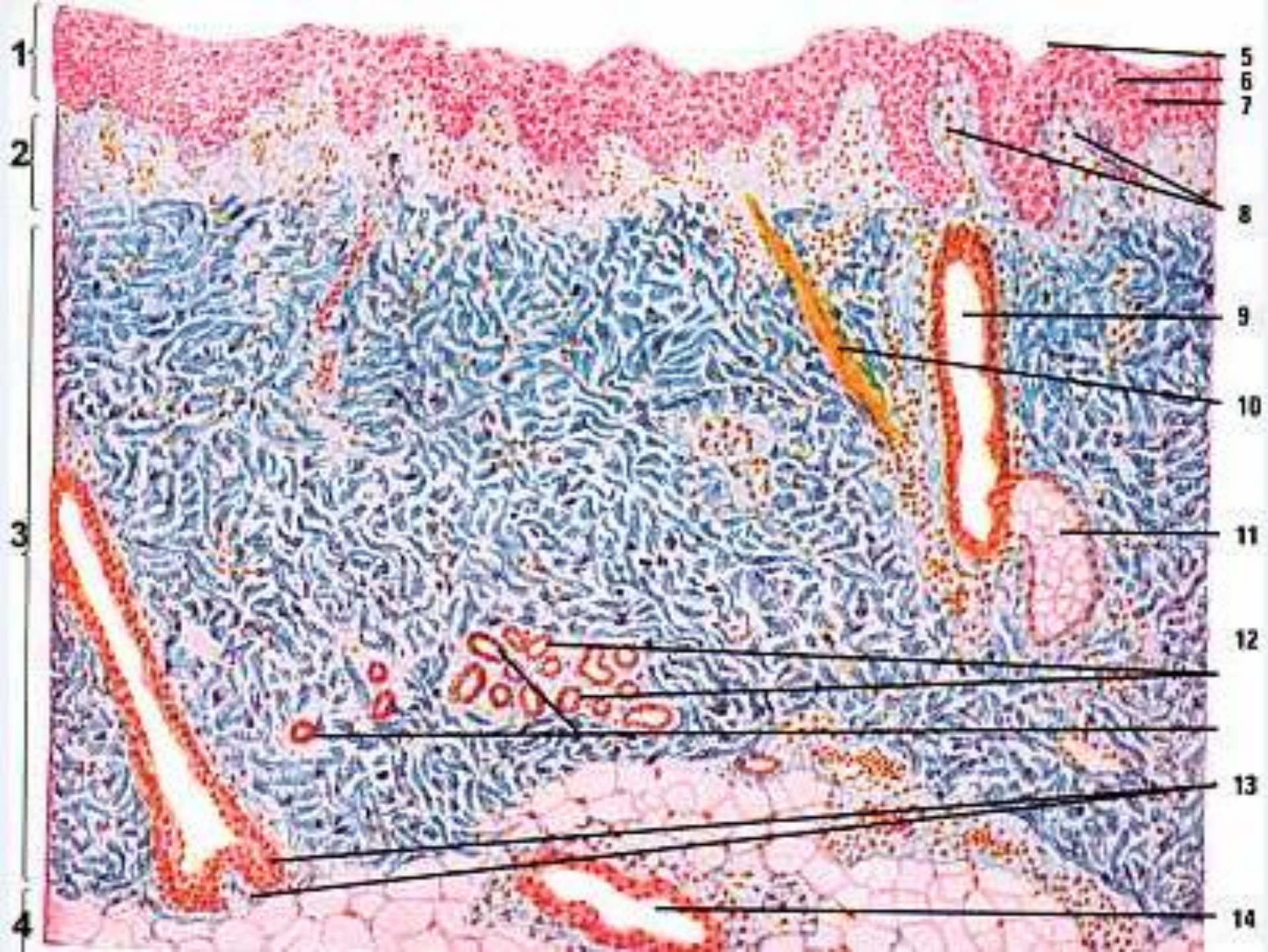
epidermis

**dermis,
papillary layer**

blood vessels

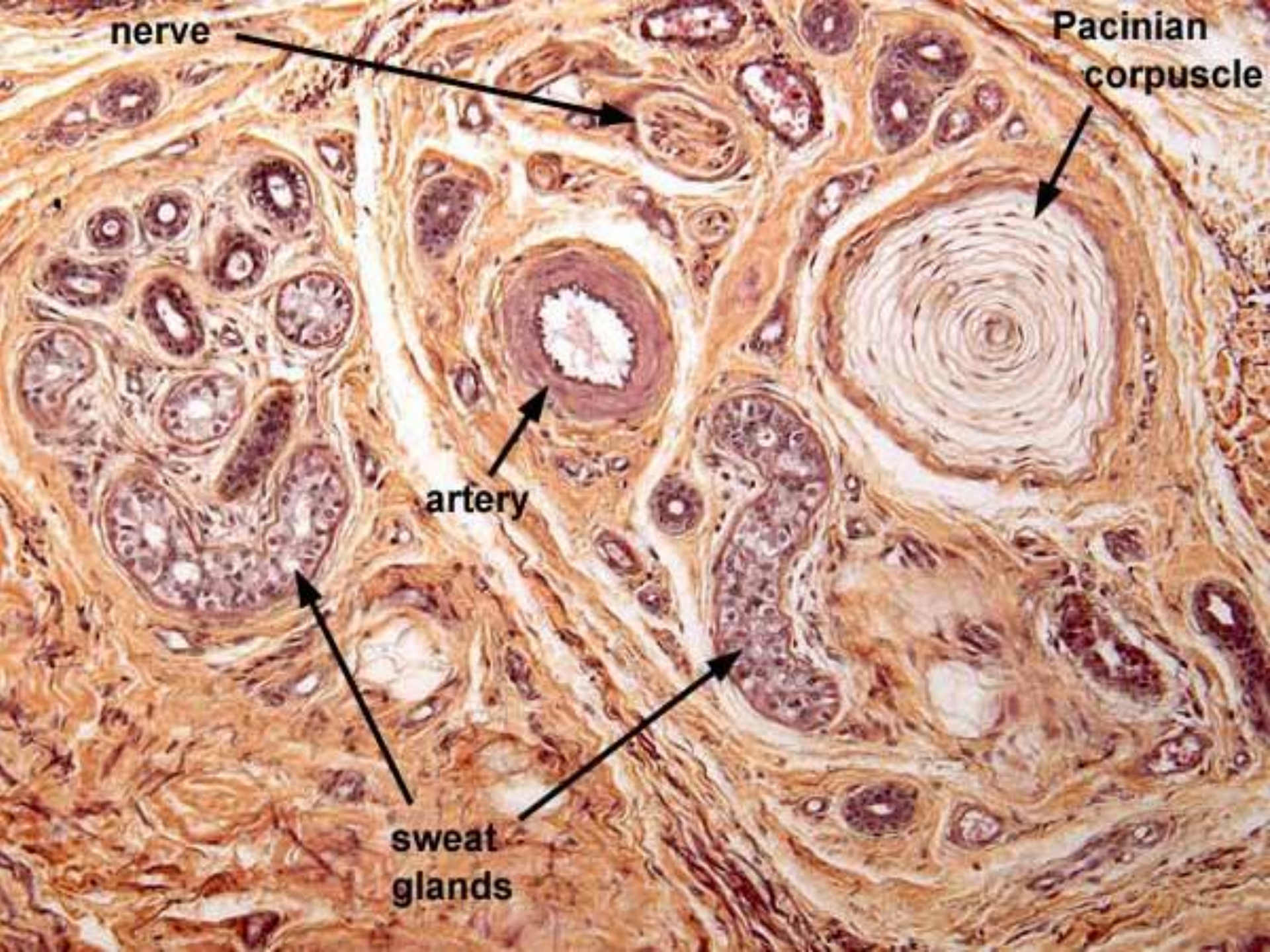
**dermis,
reticular layer**





The Dermis

- The structure is related to age
- Collagen synthesis ↓ with age.
- Elastic fibers ↑ (5 times) after puberty (adults).
- Rich in blood & lymph, A-V anastomosis and sensory receptors.

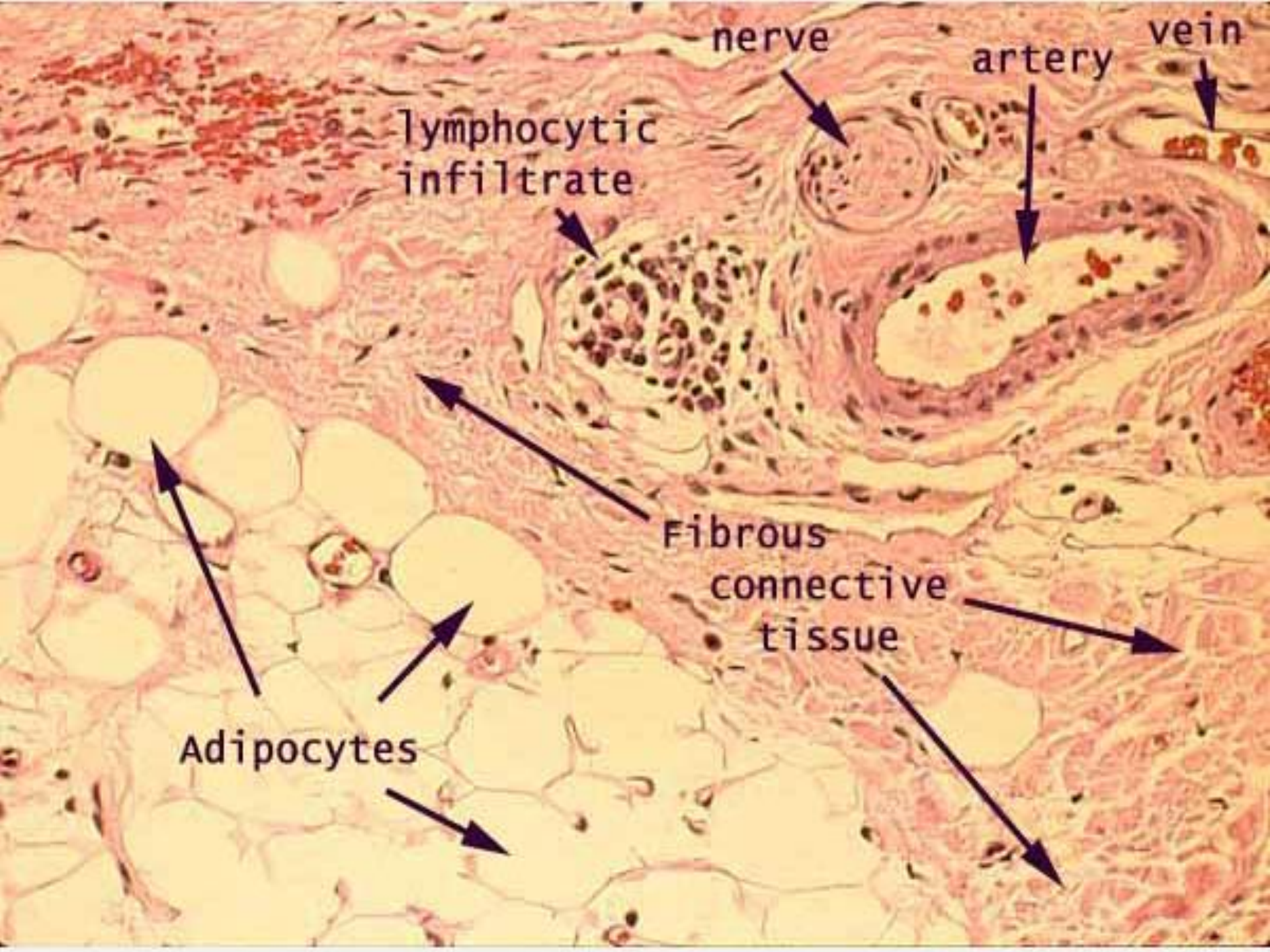


nerve

Pacinian
corpuscle

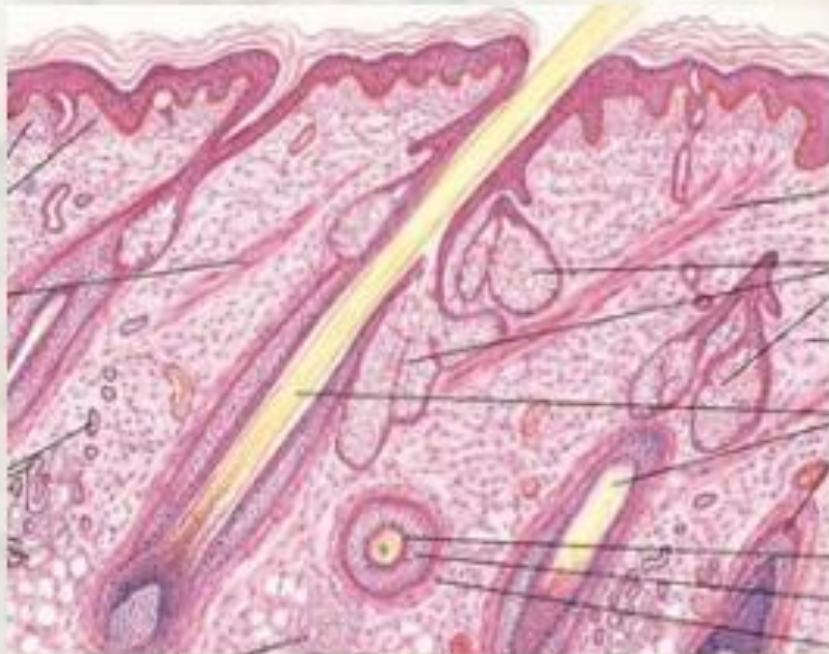
artery

sweat
glands

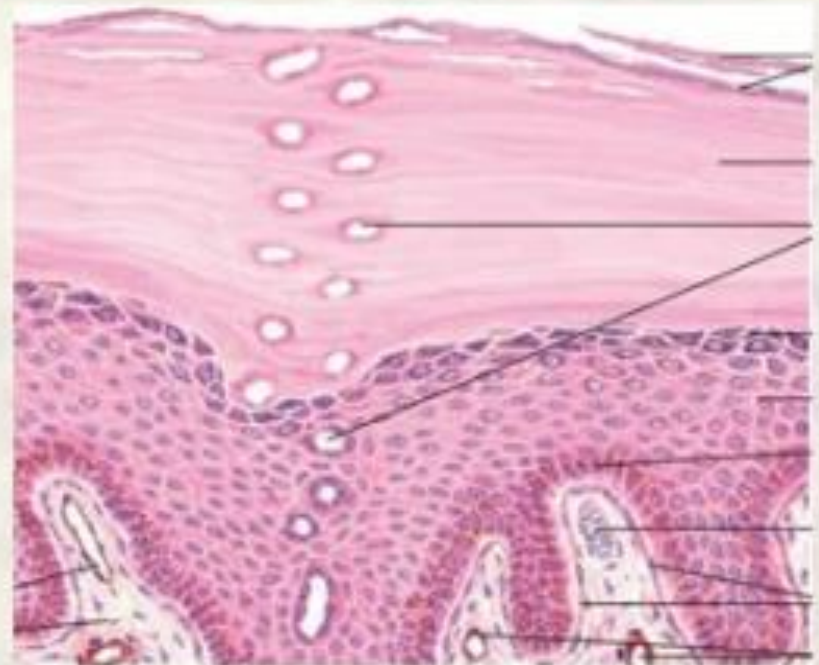


Types of Skin

1- Thin Skin



2- Thick Skin



Comparison between Thin & Thick Skins

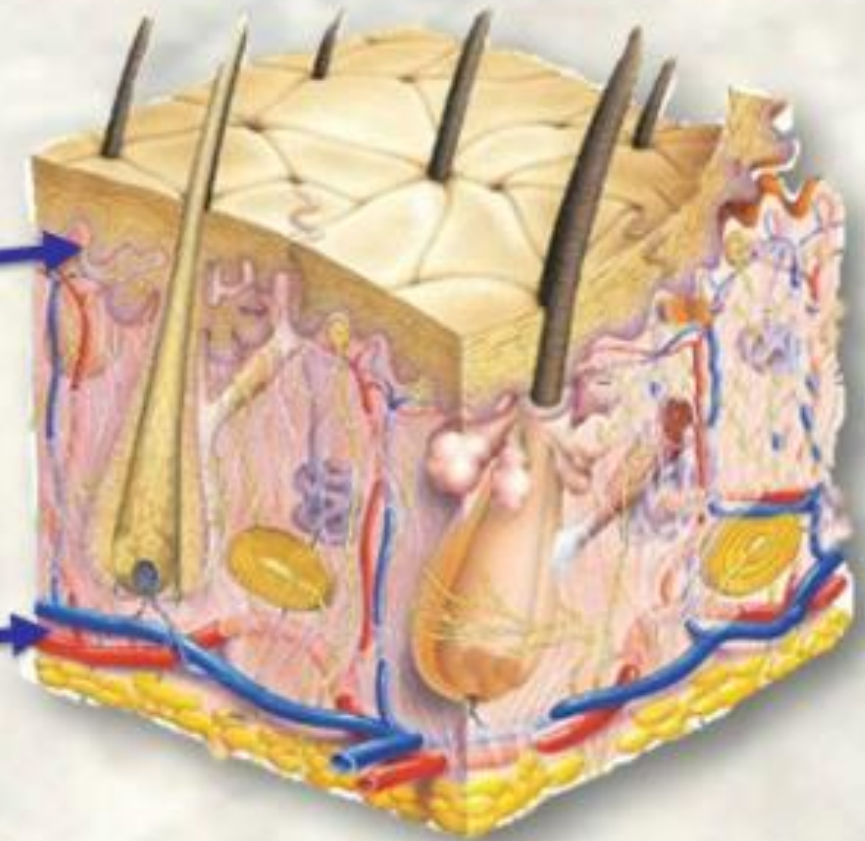
	Thick Skin	Thin Skin
<i>Sites</i>	skin of palms and soles	others areas of skin
<i>Epidermis</i>	thick	thin
<i>Stratum Lucidum</i>	present	absent
<i>Dermis</i>	regular dermal papillae	irregular dermal papillae
<i>Hairs</i>	absent	present
<i>Sebaceous glands & arrector pili muscles</i>	absent	present

Skin Circulation

- Blood vessels of the skin form 2 plexuses:

1) *Papillary plexus*:
found in the dermal
papillae

1) *Dermal plexus*:
found in the dermis &
hypodermis.



The Skin Receptors

- The skin is the richest organ in sensory receptors which receive information from the outside environment.
- The sensory receptors of the skin are concerned with several senses such as: pain, temperature, touch, and pressure.

