

ANATOMY & PHYSIOLOGY OF THE SKIN

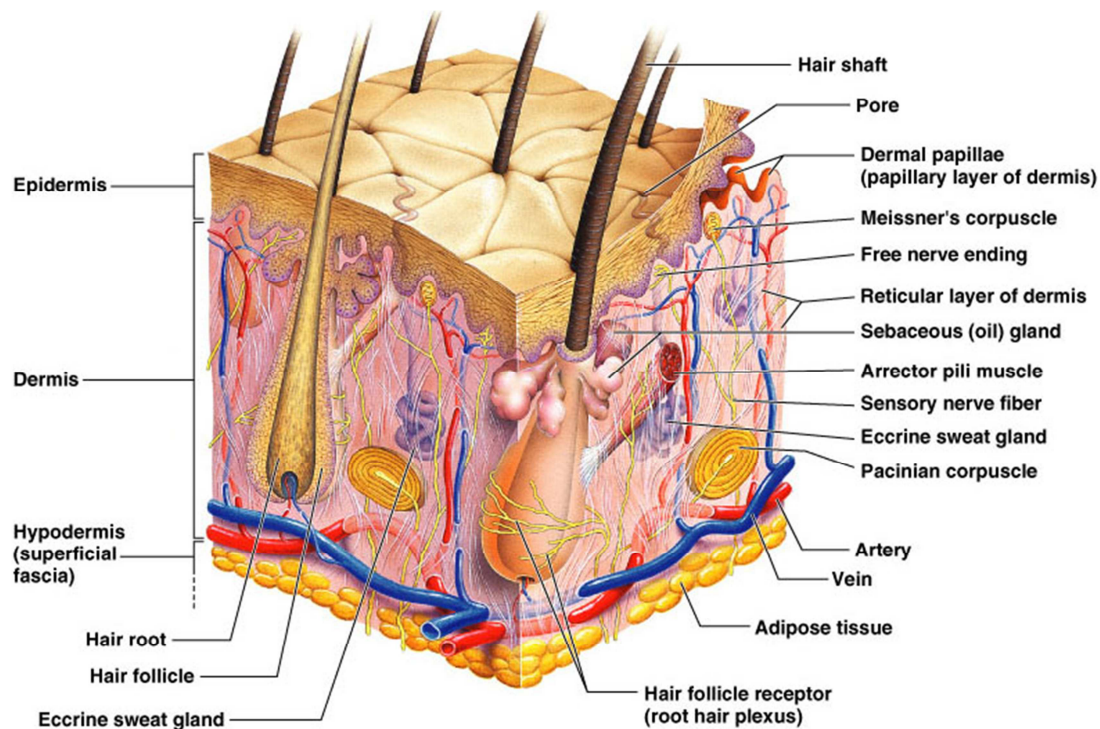
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The skin consists of three major layers

1-Epidermis – superficial layer

2-Dermis – middle layer

3-Hypodermis (subcutaneous fat) – deepest layer



I-Epidermis:

The epidermis is the cellular layer and lacks blood vessels or lymphatics & consisting of 4 cell types and 4 or 5 layers

Cells are keratinocytes, melanocytes, Merkel cells & Langerhans'.

1-**Keratinocytes** – produce keratin

2-**Melanocytes** – produce melanin

3-**Langerhans'** – help activate the immune system

4-**Merkel cells** – function as touch receptors

The epidermis is consist of 5 layers:

1- Stratum Basale - stratum germinativum

Deepest layer & it is attached to the dermis at basement membrane zone & Consists of a single row of columnar keratinocytes.

These cells undergo rapid division (epidermopoiesis).

2- Stratum Spinosum (Prickly Layer)

Cells contain a thick bundles of intermediate filaments attached to desmosomes. Melanin granules and Langerhans' cells are abundant in this layer.

3- Stratum Granulosum (Granular Layer)

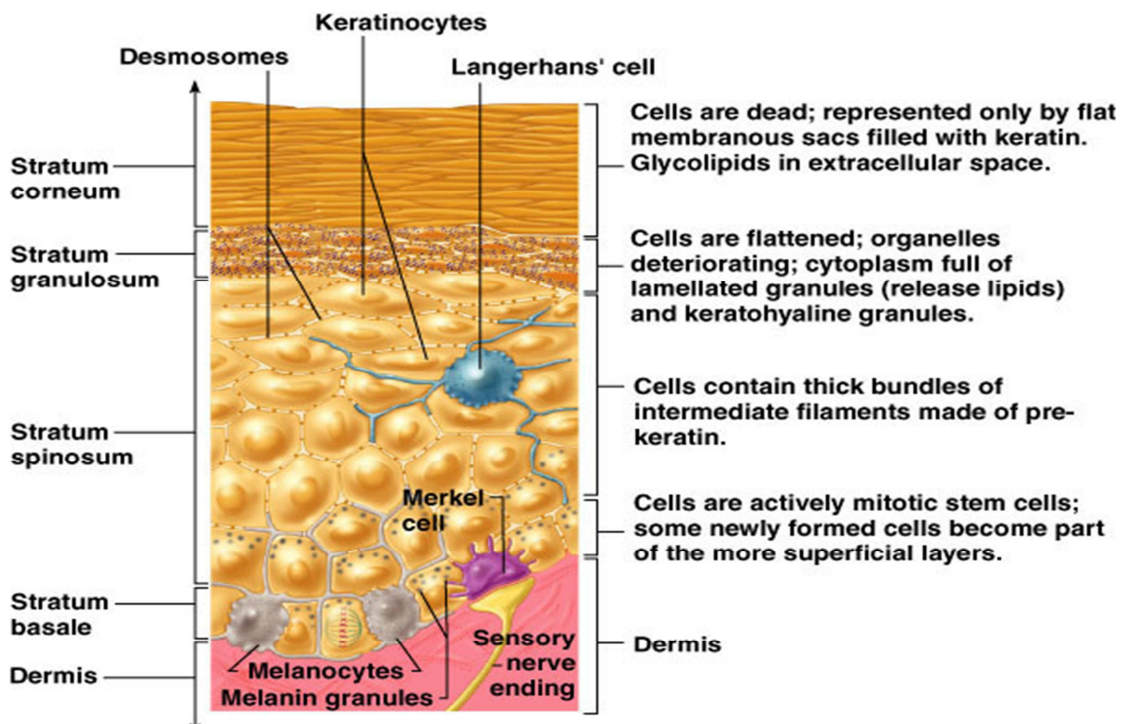
Thin; 3-5 cell layers ,Keratohyaline granules accumulate in the cells of this layer.

4- Stratum Lucidum (Clear Layer)

Thin, transparent band & consists of a few rows of flat, dead keratinocytes, the layer present in thick skin only (palm & sole)

5- Stratum Corneum (Horny Layer)

Dead flattened cells containing keratin



II-Dermis:

Is a connective tissue composed mainly of collagen fibers, elastic fibers, matrix substance (mucopolysaccharide) & many cells. Cell types: fibroblasts, macrophages, occasionally mast cells and white blood cells. The dermis is divided into two layers – papillary and reticular:

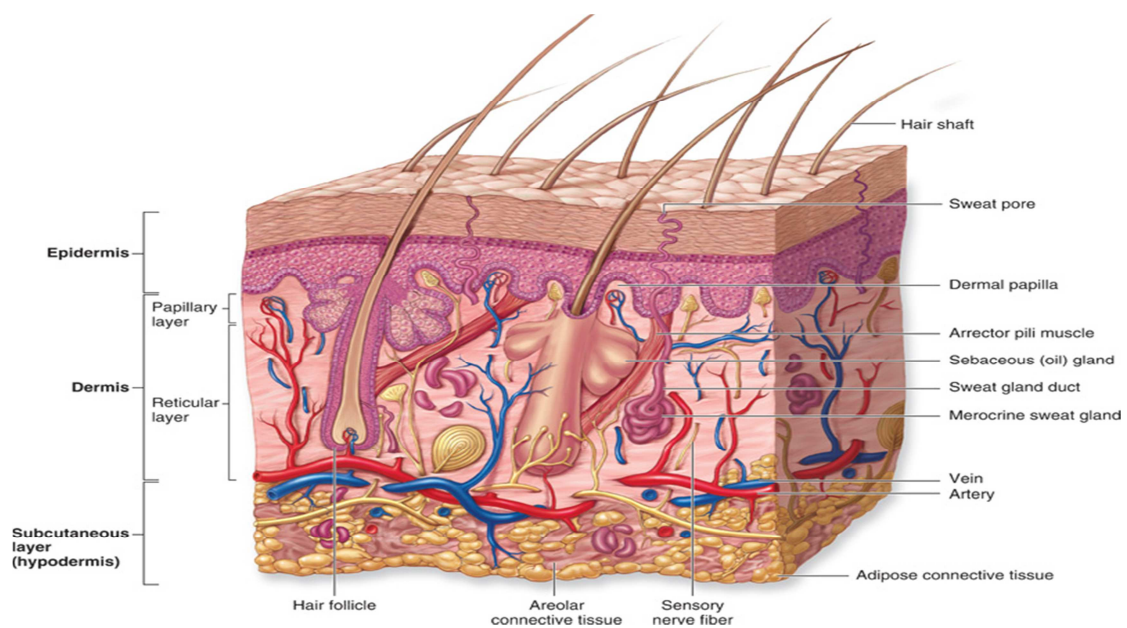
1-Papillary layer:

Consist mainly of collagen and elastic fibers. It has peg-like projections called dermal papillae. Dermal papillae contain capillary loops, Meissner corpuscles (touch & pressure receptors in fingers, palm & sole) & free nerve endings.

2-Reticular layer:

Approximately 80% of the thickness of the skin & contain:

- a- **Collagen fibers** - provide strength to skin
- b- **Elastic fibers** -- provide stretch-recoil properties
- c- **Ground substance** or matrix: mucopolysaccharide



III-Hypodermis:

is also called Subcutaneous layer & lies deep to the skin. It is composed of adipose tissue.

Skin Color:

Three pigments contribute to skin color

1-Melanin – responsible for darkness skin

2-Carotene – yellow to orange pigment,

3-Hemoglobin – responsible for pinkish of the skin.

Melanocytes produce melanin and it is transferred to the keratinocytes in contact with the melanocyte. Melanin is contained in melanosomes.

In whites the melanosomes are small and grouped in membrane bound organelles. In blacks they are large and individual.

Sweat glands (SG):

Sweat glands are divided into 2 types:

1- **Eccrine SG** – found all over the body but more in palms, soles & head, produce sweat, has cooling effect & prevent overheating,

2- **Apocrine SG** – found more in axillary and anogenital, they are related to hair & responsible for body odor

Modified apocrine SG :

1- **Ceruminous glands** : at external ear canal that secrete cerumen

2- **Mammary glands** – secrete milk.

Sebaceous Glands:

sebaceous glands found all over hairy areas in the body(not in palm& sole), they secrete an oily secretion called sebum under the effect of androgen hormone. Sebum soften the skin contribute to barrier function of skin & has antimicrobial activity

Hair:

Hair is present on all parts of the human skin except the palms, soles, lips ,terminal phalanges and glans penis.

Types of Hair:

1-Vellus (lanugo) hair. unpigmented and unmedullated hair - on all parts of the skin

2-Terminal hair. is pigmented and medullated. scalp, eyebrows, eyelashes, axilla, pubic area, the beard and moustache areas.

Functions of skin:

1- Skin act as a barrier both physical & immunological: The stratum corneum layer acts as a two-way physical barrier to prevent the inward or outward passage of water and electrolytes.

2- Thermoregulation: Heat can be lost through the skin surface by radiation, convection, conduction and evaporation. In high environmental temperatures, the process of evaporation is considerably enhanced by eccrine sweating.

3- Sensory organ: Skin had both afferent sensory and efferent autonomic nerve .The sensory nervous system detects the sensations of touch, vibration, pressure, change in temperature (warmth and cold), pain and itch. The autonomic system has an important role in maintaining cutaneous homeostasis by regulating vasomotor functions, pilomotor activity and eccrine sweat gland secretion

4- Produce hormones: leptin is secreted by adipocytes & it help to control appetite (low level of leptin stimulate appetite & raised level reduce appetite).

5-Synthesize vitamin D after ultra-violet radiation.

6-Sociosexual communication.