

HUMAN ANATOMY AND PHYSIOLOGY-1(BP101T)

UNIT: 2 INTEGUMENTARY SYSTEM

CLASS: 1

TOPIC: STRUCTURE AND FUNCTIONS OF SKIN

Skin is the largest organ of the body. It is not uniformly thick. At some places, it is thick and, in some places, it is thin. The average thickness of the skin is about 1-2 mm. In the sole of the foot, palm of the hand and in the interscapular region, it is considerably thick, measuring about 5 mm. In other areas of the body, the skin is thin. It is thinnest over eyelids and penis measuring about 0.5 mm only.

Skin is made up of two layers:

1. Outer epidermis
2. Inner dermis

The epidermis is the outer layer of skin. It is formed by stratified epithelium, which consists of 5 layers:

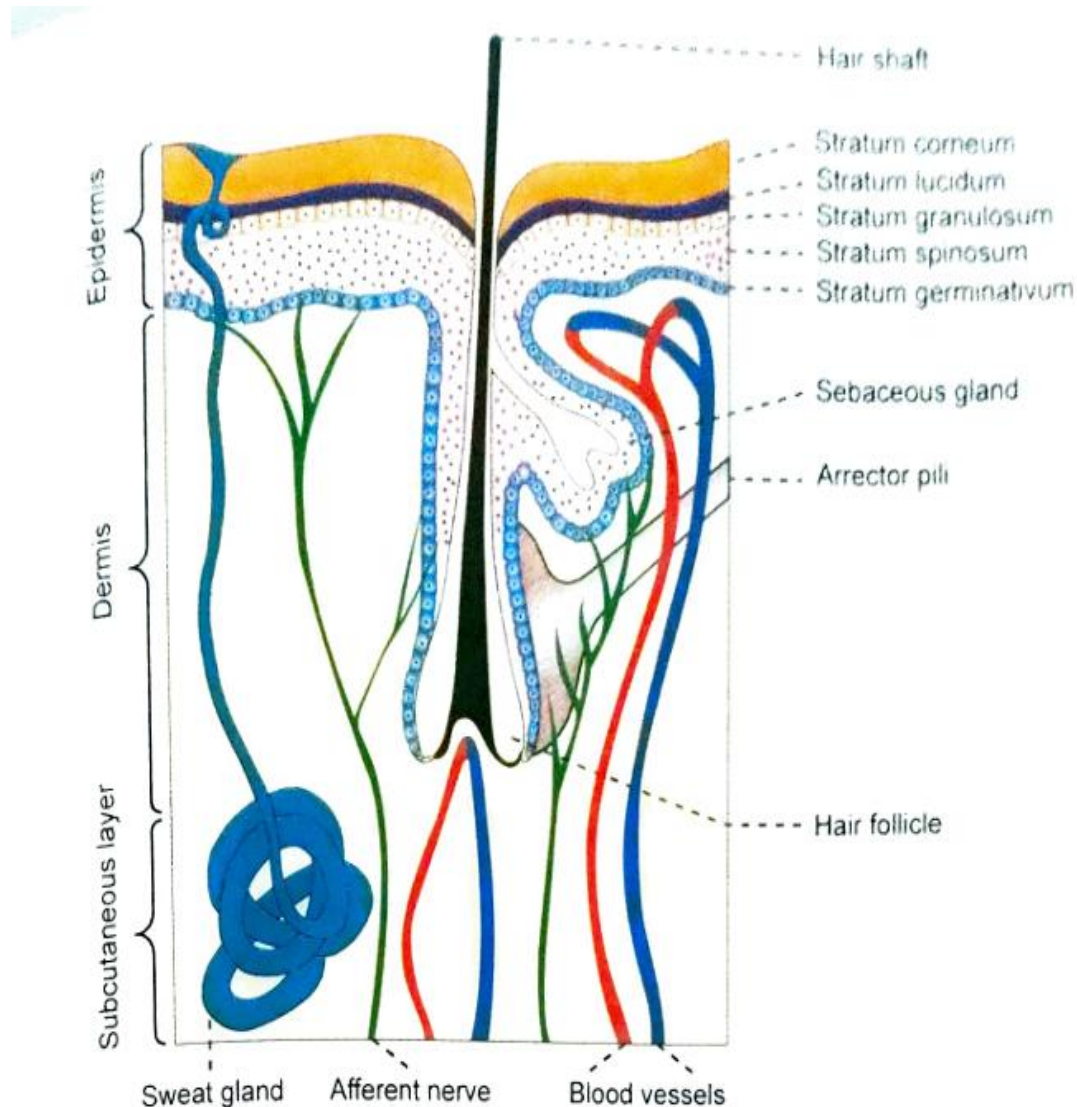
1. Stratum corneum
2. Stratum lucidum
3. Stratum granulosum
4. Stratum spinosum
5. Stratum germinativum

The important feature of epidermis is that, it does not have blood vessels. The nutrition is provided to epidermis by the capillaries of dermis.

- 1. STRATUM CORNEUM:** It is also known as horny layer. It is the outer most layer and consists of dead cells, which are called corneocytes. These cells lose their nucleus due to pressure and become dead cells. The cytoplasm is flattened with fibrous protein known as keratin. Apart from this, these cells also contain phospholipids and glycogen.
 - 2. STRATUM LUCIDUM:** It is made up of flattened epithelial cells. Many cells have degenerated nucleus and, in some cells, the nucleus is absent. As these cells exhibit shiny character, the layer looks like a homogeneous translucent zone. So, this layer is called stratum lucidum (Lucid = clear).
 - 3. STRATUM GRANULOSUM:** It is a thin layer with 2-5 rows of flattened rhomboid cells. The cytoplasm contains granules of a protein called keratohyaline. The keratohyaline is the precursor of keratin.
 - 4. STRATUM SPINOSUM:** Stratum spinosum is also known as prickly cell layer because the cells of this layer possess some spine like protoplasmic projections. By these projections, the cells are connected to one another.
 - 5. STRATUM GERMINATIVUM:** It is a thick layer made up of polygonal cells superficially and columnar or cuboidal epithelial cells in the deeper parts. Here, new cells are constantly formed by mitotic division. The newly formed cells move continuously towards the stratum corneum. The stem cells, which give rise to new cells, are known as keratinocytes. Another type of cells called melanocytes are scattered between the keratinocytes. The melanocytes produce the pigment called melanin. The colour of the skin depends upon melanin. From this layer, some projections called rete ridges extend down up to dermis. These projections provide anchoring and nutritional function.
- 2. INNER DERMIS:** Dermis is the inner layer of the skin. It is a connective tissue layer made up of dense and stout collagen fibers, fibroblasts and histiocytes. The collagen fibers exhibit elastic property and are capable of

storing or holding water. The collagen fibers contain the enzyme collagenase, which is responsible for wound healing. Dermis is made up of 2 layers:

1. Superficial papillary layer
2. Deeper reticular layer



1. SUPERFICIAL PAPILLARY LAYER: This layer projects into the epidermis. It contains blood vessels, lymphatics and nerve fibers. This layer also has some pigment containing cells known as chromatophores. Dermal papillae are finger-like projections arising from the superficial papillary dermis. Each papilla contains a

plexus of capillaries and lymphatics which are oriented perpendicular to the skin surface. The papillae are surrounded by rete ridges extending from the epidermis.

2. RETICULAR LAYER: Reticular layer is made up of reticular and elastic fibers. These fibers are found around the hair bulbs, sweat glands and sebaceous glands. The reticular layer also contains mast cells, nerve endings, lymphatics, epidermal appendages and fibroblasts. Immediately below the dermis, subcutaneous tissue is present. It is a loose connective tissue, which connects the skin with the internal structures of the body. It serves as an insulator to protect the body from excessive heat and cold of the environment. Lot of smooth muscles called arrector pili are also found in skin around the hair follicles.

APPENDAGES OF SKIN: The hair follicles with hairs, nails, sweat glands, sebaceous glands and mammary glands are considered as appendages of the skin.

COLOR OF THE SKIN: The color of the skin depends upon two important factors:

1. Pigmentation of skin
2. Hemoglobin in the blood.

1. PIGMENTATION OF THE SKIN: Cells of the skin contain a brown pigment called melanin. The cells, which synthesize melanin are called melanocytes. The melanocytes are present mainly in the stratum germinativum and stratum spinosum of epidermis. After synthesis, this pigment spreads to the cells of the other layers.

MELANIN: Melanin is the skin pigment and it forms the major determinant of human skin. Skin becomes dark w melanin content increases. It is protein in nature and is synthesized from the amino acid tyrosine via dihydro phenylalanine (DOPA).

Deficiency of melanin leads to albinism (hyco pigmentary congenital disorder).

2. HEMOGLOBIN IN THE BLOOD

The amount and the nature of haemoglobin that circulate in the cutaneous blood vessels play an important role-the coloration of the skin:

- i. When haemoglobin content decreases skin becomes pale
- ii. When blood rushes to skin due to cutaneous vasodilatation (blushing), the color of the skin becomes pink
- iii. During cyanosis which is caused by excess amount of reduced hemoglobin, the skin becomes bluish.

FUNCTIONS OF THE SKIN:

- ✚ PROTECTIVE FUNCTION: Protection from Bacteria and Toxic Substances, Protection from Mechanical Blow, Protection from Ultraviolet Rays.
- ✚ SENSORY FUNCTION: Skin is considered as the largest sense organ in the body. It has many nerve endings, which form the specialized cutaneous receptors. These receptors are stimulated by the sensations of touch, pain, pressure or temperature sensation and convey these sensations to the brain via afferent nerves. At brain level, the perception of different sensations occurs.
- ✚ STORAGE FUNCTION: skin Stores fat, water, chloride and sugar. It can also store blood by the dilatation of the cutaneous blood vessels.
- ✚ SYNTHETIC FUNCTION: Vitamin D, is synthesized in skin by the action of ultraviolet rays from sunlight on cholesterol.
- ✚ REGULATION OF BODY TEMPERATURE: Skin plays an important role the regulation of body temperature. Excess heat is lost from the body through Skin by radiation, conduction, convection and evaporation. Sweat glands of

the skin play active part In heat loss by secreting sweat. The lipid content of sebum prevents loss of heat from the body in cold environment.

✚ REGULATION OF WATER AND ELECTROLYTE BALANCE: Skin regulates water balance and electrolyte balance by excreting water and salts through sweat.

✚ ABSORPTIVE FUNCTION: Skin can absorb the fat-soluble substance and some ointments.

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