

EXPLANATION IN STUDENTS USING NEW TECHNOLOGIES IN THE STUDY OF SKIN HISTOANATOMY

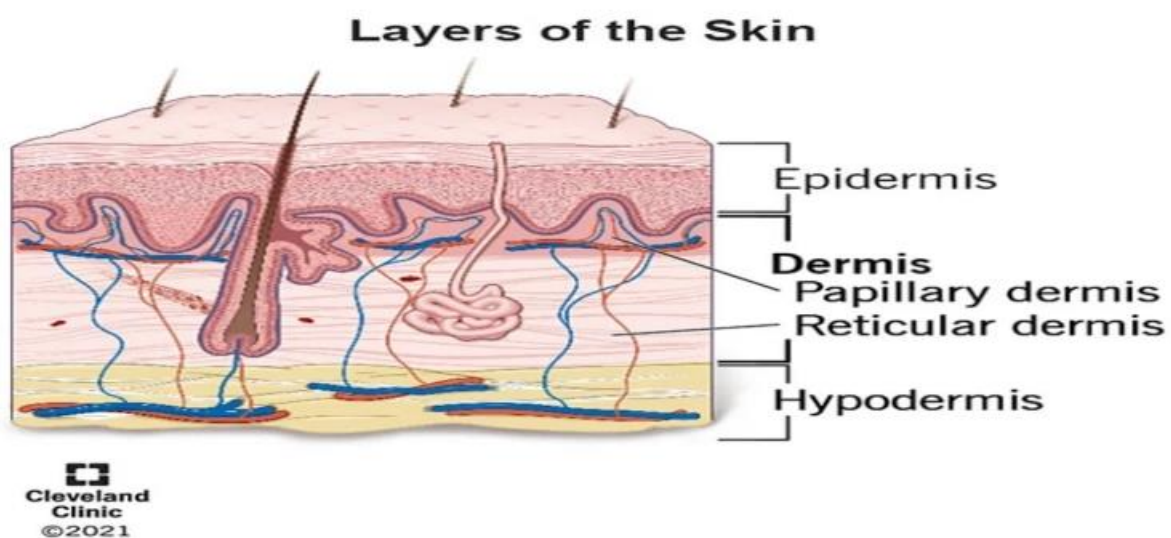
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Annotation: The skin and its appendages that derive from the epidermis (hair follicles, sweat glands, sebaceous glands, nails, and mammary glands) establish the integumentary system. Histologically, skin has two main layers—the epidermis and the dermis—with a subcutaneous fascia called the hypodermis, which lies deep in the dermis. The epidermis is formed of four to five layers of cells made mostly out of keratinocytes, along with three other different and less abundant cells. The dermis underlies the epidermis. This article was written from internet sources, and as a result of research conducted by scientists, and quotes from them without copyright infringement.

Key words: Epidermis, skin, dermis, hair, keratinocytes.

Epidermis , Four evident cells make the stratified squamous keratinized epithelium of the epidermis. Keratinocytes are the most frequent ones.³ Other less-abundant and nonepithelial cells are interspersed among the keratinocytes in specific locations. These cells are the melanin-producing melanocytes, tactile Merkel cells,⁴ and antigen-presenting Langerhans cells (Figure 1).



Dermis , The dermis derives from three different mesenchymal sources. The dermis of the face and neck derives from the neural crest, limbs and the body wall derive from the lateral plate mesoderm, and the back derives from the paraxial mesoderm.

The dermis is the layer that supports, nourishes, and binds the epidermis to the hypodermis. It has a tough supporting fibroelastic tissue. The collagen bundles and other connective tissue elements of the dermis blend with those of the hypodermis,

Subcutaneous tissue, superficial fascia, hypodermis , Subcutaneous tissue is located beneath the reticular layer of the dermis and made up of a looser connective tissue. Generally, it transforms into subcutaneous adipose tissue. The adipose cells form a layer varying in thickness, which depends on its location in the body, sex, and the state of nutrition. Adipose tissue contributes to thermal insulation and storage of energy, and it acts as a shock absorber.

Glands , The skin glands are the sweat glands (eccrine, apocrine), sebaceous glands, and mammary glands.²⁴ Mammary glands are a specialized type of sweat glands. Sweat glands originate from the epidermis. They fold within themselves and invaginate towards the underlying dermis. The ducts of the eccrine sweat glands keep their communication with the surface of the skin, and apocrine sweat glands discharge into hair follicles where they originate. The eccrine and apocrine sweat glands show different

Sebaceous glands , Sebaceous glands are absent in the hairless thick skin of the palms, soles, and the sides of the feet inferior to the hairline. They derive from hair follicles. They occur more frequently in the dermis of the face, forehead, and scalp. They are outgrowths of the external sheath of the hair follicle above the insertion point of the arrector pili muscle of the follicle. Usually more than one gland opens to one third of the upper portion of the hair follicles' canal. Secretory ducts open directly.

Skin is the largest organ in the body and covers the body's entire external surface. It is made up of three layers, the epidermis, dermis, and the hypodermis, all three of which vary significantly in their anatomy and function. The skin's structure is made up of an intricate network which serves as the body's initial barrier against pathogens, UV light, and chemicals, and mechanical injury. It also regulates temperature and the amount of water released into the environment. This article discusses the relevant anatomical structures of the skin's epidermal layer, its structure, function, embryology, vascular supply, innervation, surgical considerations, and clinical relevance.

Skin Thickness

The thickness of each layer of the skin varies depending on body region and categorized based on the thickness of the epidermal and dermal layers. Hairless skin found in the palms of the hands and soles of the feet is thickest because the epidermis contains an extra layer, the stratum lucidum. The upper back is considered thickest based on the thickness of the dermis, but it is considered "thin skin" histologically because the epidermal thickness lacks the stratum lucidum layer and is thinner than hairless skin.

Layers of Epidermis

The layers of the epidermis include the stratum basale (the deepest portion of the epidermis), stratum spinosum, stratum granulosum, stratum lucidum, and stratum corneum (the most superficial portion of the epidermis).

Stratum basale, also known as stratum germinativum, is the deepest layer, separated from the dermis by the basement membrane (basal lamina) and attached to the basement membrane by hemidesmosomes. The cells found in this layer are cuboidal to columnar mitotically active stem cells that are constantly producing keratinocytes. This layer also contains melanocytes.

Stratum spinosum, 8-10 cell layers, also known as the prickle cell layer contains irregular, polyhedral cells with cytoplasmic processes, sometimes called "spines", that extend outward and contact neighboring cells by desmosomes. Dendritic cells can be found in this layer.

Stratum granulosum, 3-5 cell layers, contains diamond shaped cells with keratohyalin granules and lamellar granules. Keratohyalin granules contain keratin precursors that eventually aggregate, crosslink, and form bundles. The lamellar granules contain the glycolipids that get secreted to the surface of the cells and function as a glue, keeping the cells stuck together.

Stratum lucidum, 2-3 cell layers, present in thicker skin found in the palms and soles, is a thin clear layer consisting of eleidin which is a transformation product of keratohyalin.

Stratum corneum, 20-30 cell layers, is the uppermost layer, made up of keratin and horny scales made up of dead keratinocytes, known as anucleate squamous cells. This is the layer which varies most in thickness, especially in callused skin. Within this layer, the dead keratinocytes secrete defensins which are part of our first immune defense.

Cells of the Epidermis

- Keratinocytes
- Melanocytes
- Langerhans' cells
- Merkel's cell

Keratinocytes

Keratinocytes are the predominant cell type of epidermis and originate in the basal layer, produce keratin, and are responsible for the formation of the epidermal water barrier by making and secreting lipids. Keratinocytes also regulate calcium absorption by the activation of cholesterol precursors by UVB light to form vitamin D.

Melanocytes

Melanocytes are derived from neural crest cells and primarily produce melanin, which is responsible for the pigment of the skin. They are found between cells of stratum basale and produce melanin. UVB light stimulates melanin secretion which is protective against UV radiation, acting as a built-in sunscreen. Melanin is produced during the conversion of tyrosine to DOPA by the enzyme tyrosinase. Melanin then travels from cell to cell by a process that relies on the long processes extending from the melanocytes to the neighboring epidermal cells. Melanin granules from melanocytes are transferred via the long processes to the cytoplasm of basal keratinocyte. Melanin transferred to neighboring keratinocytes by "pigment donation"; involves phagocytosis of tips of melanocyte processes by keratinocytes.

Langerhans' Cells

Langerhans cells, dendritic cells, are the skin's first line defenders and play a significant role in antigen presentation. These cells need special stains to visualize, primarily found in the stratum spinosum. These cells are of mesenchymal origin, derived from CD34 positive stem cells of bone marrow and are part of the mononuclear phagocytic system. They contain Birbeck granules, tennis racket shaped cytoplasmic organelles. These cells express both MHC I and MHC II molecules, uptake antigens in skin and transport to the lymph node.

Merkel Cells

Merkel cells are oval-shaped modified epidermal cells found in stratum basale, directly above the basement membrane. These cells serve a sensory function as mechanoreceptors for light touch, and are most populous in fingertips, though also found in the palms, soles, oral, and genital mucosa. They are bound to adjoining keratinocytes by desmosomes and contain intermediate keratin filaments and their membranes interact with free nerve endings in the skin.

Dermis

The dermis is connected to the epidermis at the level of the basement membrane and consists of two layers, of connective tissue, the papillary and reticular layers which merge together without clear demarcation. The papillary layer is the upper layer, thinner, composed of loose connective tissue and contacts epidermis. The reticular layer is the deeper layer, thicker, less cellular, and consists of dense

connective tissue/ bundles of collagen fibers. The dermis houses the sweat glands, hair, hair follicles, muscles, sensory neurons, and blood vessels.

Hypodermis

The hypodermis is deep to the dermis and is also called subcutaneous fascia. It is the deepest layer of skin and contains adipose lobules along with some skin appendages like the hair follicles, sensory neurons, and blood vessels.

Skin receives an extensive amount of stimuli from the environment as touch, stretch, vibrations, pressure, heat, cold, and pain and has appropriately responding receptors located in its layers. These receptors are classified into three groups, according to the type of response: mechanoreceptors for stretch, vibration, pressure and touch; thermoreceptors for heat and cold; and (3) nociceptors for pain. Receptors are either capsulated or unencapsulated. They are located in various levels

Hair follicles derive from the epidermis, invaginate deeply into the dermis, and give rise to hairs. The three types of human hair are vellus hair, terminal hair and lanugo hair. Vellus hair is short, fine, soft, and pale, as in the cover of the eyelids, and it is barely noticeable. It has no connection with the sebaceous glands. Terminal hair is long, large, coarse, hard, and dark, as the ones of the scalp and eyebrow. Lanugo hair is extremely fine and found on the surface of a

When we consider the multiple functional demands of skin, it is natural to expect an extensive amount of plasma, lymph, and tissue fluid exchange in the connective tissue matrix of the skin. Due to this, skin has a rich network of blood and lymph vessels in the dermis and hypodermis. Two major blood plexuses nourish the skin. The deeper one is between the hypodermis and dermis, and the superficial one is between the papillary and reticular layers of the dermis. The superficial one supplies

Besides the well-known functions of our skin, the main function of facial skin is undoubtedly to reflect our identity and mood. With the unique features of our facial skin, our faces announce to the world who we are and what we are feeling. Sometimes a scar, the result of the physiological healing process of a deep wound, tells our story to others more than our name, as on Al Pacino's face in the unforgettable cult movie of Brian De Palma, Scarface (1983).

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