

Skin adnexa

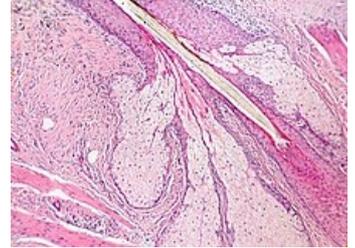


In Latin, *nexus* means connection, adnexa are connected organs, and as skin adnexa we refer to additional organs of the skin, derivatives of the epidermis: sweat and sebaceous glands, nails, hair. Depending on the location, the skin adnexa also includes the mammary gland.

Sebaceous glands

More detailed information can be found on the [Sebaceous Glands](#) page.

These are **holocrine** glands - sebum is produced by cell breakdown. It is located in the upper half of the corium, opens into the infundibula of hair follicles (but also without hair), together with it forms the so-called pilosebaceous unit. **Seborrheic localization** is typical for them - i.e. the face (nose and surroundings), the upper part of the breast and the back, on the contrary, they are not on the palms and flats. They also include the glandulae Meibomi et praeputiales Tysoni. Their secretion is influenced by hormones (mainly androgens).

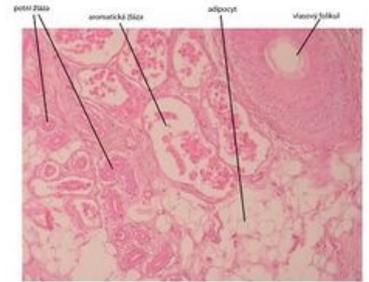


Sebaceous gland

Apocrine glands

See the [Apocrine Glands](#) page for more detailed information.

Apocrine (aromatic) glands are coiled, tubular glands with a long duct that are found in the axilla, perigenital, perianal, and around the nipple. They become active only after reaching sexual maturity. The composition of the secretion is under the main influence of sex hormones. They are stored deep, at the interface of the corium and the subcutaneous tissue, usually opening into the hair follicle. The oily product of the aroma glands contains proteins, lipids and steroids and is odorless. Substances, which are perceived as aromatic, arise only after the activation of the product by skin microbes.

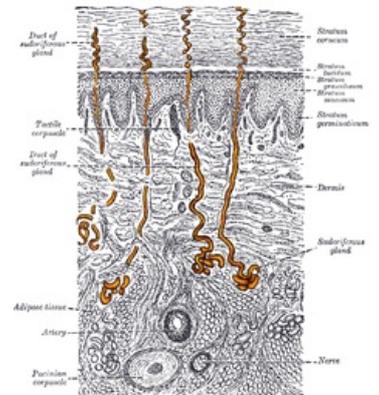


Apokrine žlijezde - aromatizirana žlijeza - preputialna žlijezda Tysona H&E

Eccrine sweat glands

More detailed information can be found on the [Eccrine Sweat Glands](#) page.

Eccrine sweat glands are important for thermoregulation and hydration of the stratum corneum. They produce an isotonic NaCl solution, the ions of which are reabsorbed by the duct epithelium. These glands are everywhere except the nail bed, red lips, glans penis, prepuce, labia minora and clitoris. Most of them can be found on the soles of the feet, palms and foreheads. The secretory part is stored in the pars reticularis dermis, curled into a ball. It is made up of single-layered epithelium and myoepithelial cells. The duct is spirally coiled, lined with a two-layered cuboidal epithelium, and opens into the epidermis.



Eccrine sweat glands (yellow)

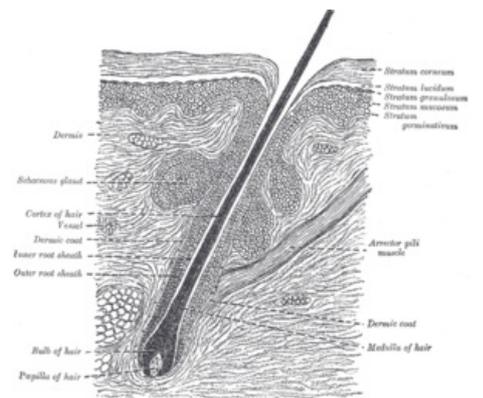
Hair and body hair

More detailed information can be found on the [Hair and body hair](#) page.

Hair and body hair are fibrous **keratinized structures** found all over the body except the palma manus, planta pedis, red lips, labia minora, clitoris, and glans penis.

There are approximately 60 hairs per cm^2 on the body surface. **Hair** is the longest hair on the human body, it grows on the hairy part of the head in an amount of about **600 hairs per cm^2** . The character of the hair (color and thickness) is different depending on location, race and can change according to age and gender.

- **Lanugo**(fluff) – fetal and terminal (hairs), vellus hair, terminal hair;
- **Pilli longi** – mane hair, beard, armpit hair, pubic hair and other pubic hair;
- **Pilli breves**– eyebrows, hairs in the nose, hairs at the mouth of the external auditory canal.



Schematic cross-section of skin

Macroscopic structure

The hair has two main parts, the free part (*scapus pilli*) and the part immersed in the skin, i.e. root (*radix pilli*). In depth, it ends with a thickening, the so-called **hair bulb** - *bulbus pilli* with germinal matrix. A part of the fibrous sheath - the **hair papilla**, which contains numerous blood vessels - sinks into the hair bulb from below.

Microscopic structure

The cells of the hair bulb surrounding the hair papilla are cylindrical, sit on a well-developed basal lamina and are equivalent to the cells of the *stratum basale epidermis* - they divide mitotically and their daughter cells reach the higher regions of the hair itself and its inner epithelial sheath. Another part is the medulla **pilli**, which consists of large vacuolated, incompletely keratinized cells. These cells are located in the central part of the bulbous pilli above the hair papilla.

The last part is **the hair cortex** (*cortex pilli*), which is made up of cells closely surrounding the central area of the bulbous pilli. These differentiate into spindle-shaped cells, keratinize and remain firmly connected. The layer of cubic cells towards the periphery of the bulbous pilli gradually changes to cylindrical cells, in the direction of the vertical axis they become flattened and completely keratinized. They are placed over each other with their ends, so that their free ends point apically towards the end of the free hair, which resembles the placement of "roof bags".

Melanocytes

Melanocytes are dendritic cells of neural crest origin located between epithelial cells at the base of the *bulbus pilli*. These cells make melanin, which is synthesized in melanosomes from tyrosine and occurs in two forms - eumelanin (the most common form, a brown-black polymer) and pheomelanin (causes red hair and freckles). Hair color depends on the activity of melanocytes. The pigment is transferred to the cells of the cortex and the pith of the hair - in the same way as the keratinocytes in the epidermis.

Hair follicle

It is formed by a root, which is surrounded by an outer and inner epithelial sheath. **The outer epithelial sheath** is a layer of cells from the surrounding skin that sinks into the dermis around the root of the hair and its inner epithelial sheath.

The inner epithelial sheath differentiates from the edge of the bulbous pilli and completely envelops the initial section of the radix pilli. Its cells gradually degenerate and desquamate (they disappear at the level where the sebaceous gland opens into the hair follicle). The inner epithelial sheath consists of three layers:

- **Cuticle of the vagina** - a similar structure to the cuticle of the hair, but the free ends point in the opposite direction, i.e. towards the bulbous pilli; the cells of both cuticles are wedged together and together they are moved in the apical direction.
- **Huxley's layer** - 1-3 rows of flattened cuboidal cells that have prominent eosinophilic trichohyaline granules in the cytoplasm.
- **Henle's layer** - flat epithelial cells that have the character of stratum lucidum epidermis.

In the vicinity of the apical region of the follicle, there is a **fully developed epidermis**, which thins out in the deeper parts, and here we find layers corresponding to the stratum germinativum epidermis. Epidermal cells are large bright and rich in glycogen. Around the outer epithelial sheath we find a **fibrous sheath** composed of inner circularly and outer longitudinally arranged elements of fibrous tissue, **capillaries** and **nerve fibers** are located between the two layers .

After **the hair** falls out, a new bulbous pilli is formed at the end of the cords of cells of the outer epithelial sheath, a newly formed fibrous papilla with blood vessels grows into this structure, and the growth of a new hair begins.

Musculus arrector pilli

It is a bundle of **smooth muscle cells** that bridges the sebaceous gland. It is attached to the fibrous sheath and to the *stratum papillare corii* and straightens the hair with its contraction. In addition, it facilitates the emptying of the sebaceous gland and causes **depression of the skin** where it is embedded in the dermis ("goosebumps").

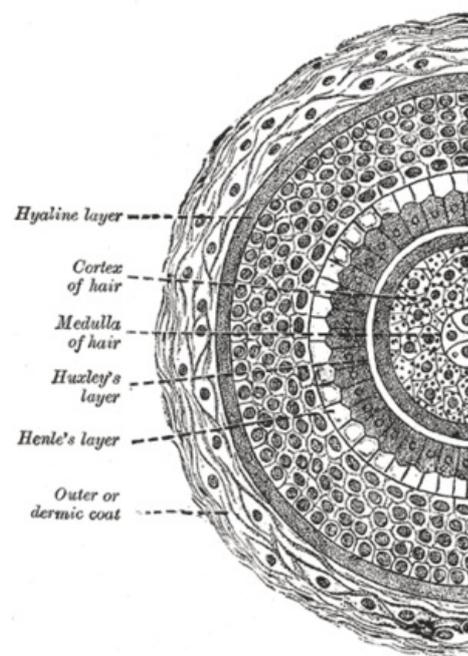
Nails

More detailed information can be found on the Nails page.

The nail is a horn plate growing from the nail matrix, it consists of hard keratin that does not peel off. Translucent nail matrix is visible as a proximal white spot - **lunula**. The nail bed gives the nail a pink color thanks to the rich network of capillaries. The skin wall of the nail (*paronychium*) passes into the *eponychium* at the back . The nail grows 0.12 mm per day. ^[1]

It grows back on the hands in 3-4 months and on the feet in 8-12 months.

Links



Hair structure

Související články

- Sebaceous glands
- Apocrine glands
- Eccrine sweat glands
- Hair and hair
- Nails
- Anatomy of the skin
- Physiology of the skin
- Histology: Thick-type skin (histological specimen) | Axilla/histological specimen

Source

- BENEŠ, Jiří. *Study materials* [online]. ©2007. [cit. 30.11.2010]. <<http://jirben2.chytrak.cz/>>.

Literature

- ŠTORK, Jiří, et al. *Dermatovenerology*. 1. edition. Prague : Galén, Karolinum, 2008. ISBN 978-80-7262-371-6.
1. ŠTORK, Jiří, et al. *Dermatovenerologie*. 2. edition. Praha : Galén, 2013. 502 pp. ISBN 978-80-7262-898-8.

