

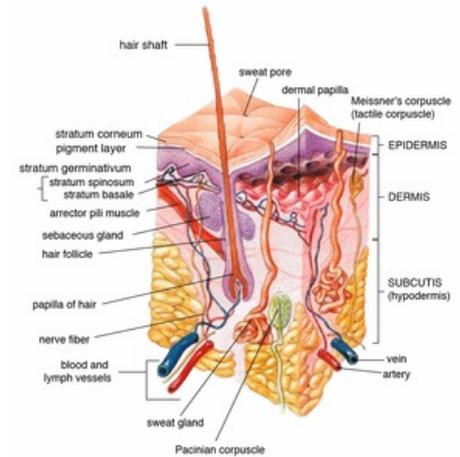
# Skin functions

The skin is the **largest organ** of the human body. In an adult, it has a size of **1.6-2 m<sup>2</sup>**, and the skin accounts for 5-9% of body weight. It forms a protective covering of the body with many important properties. Together with the other tissues of the body's surface, i.e. the mucous membranes of the digestive, respiratory, excretory and reproductive systems, it is referred to as the integument and forms the first line of defense of the organism against harmful environmental influences.

## Skin functions

### Protection function

- **Mechanical** barrier.
- **Chemical** barrier - the skin is poorly permeable to water and substances dissolved in it. The skin's sebaceous glands produce **sebum** for the hair follicles. The sebum then reaches the surface, where it helps maintain a **water-impermeable environment**. Fat-soluble substances penetrate the skin more easily.
- **Protection against radiation** - electromagnetic radiation in the 10-400 nm band corresponds to UV radiation. Such radiation can damage germ layer cells and cells of the skin's defense system. **Melanin** produced by melanocytes and distributed to keratinocytes protects us against UV rays. In addition, urocanate in the sebum also protects us from UV (it changes from *cis* to *trans*, *trans*-urocanate causes immunosuppression); sebum increases protection - after bathing or moisturizing the skin, its effect decreases up to 10x.
- **Protection against microorganisms** - sweat and sebum contain antibacterial substances. Furthermore, **acid** pH (4-6) and the presence of saprophytic microorganisms (decompose the proteins of animal bodies into ammonium salts) are also involved in the protection against microorganisms. In the deeper layers of the skin, defense is provided by Langerhans cells (dendritic cells of the monocyte line - immune system of the skin), Granstein cells (antigen presenting cells), lymphocytes and macrophages.



Skin structure

### Sensory function

The skin has a huge receptive surface, and through it we continuously communicate with the external environment using touch, pressure, vibration, pain and temperature receptors. Important cutaneous nerve endings include receptors for:

#### Perception of the pain

Free nerve endings.

#### Perception of touch and pressure

Receptive organs are **mechanoreceptors**. They react to **deformations**, bending of hair or hair. Receptors are either free or encapsulated unmyelinated endings of sensory fibers. The receptor potential is created by the deformation of the receptor cytoskeleton, which leads to the opening of mechanically controlled ion channels - the influx of Na<sup>+</sup> and Ca<sup>2+</sup> into the cells. This leads to depolarization and the generation of an action potential. The perception is not the same on the entire surface of the body. **The most sensitive** are the **fingertips** and **tongue**, lips, nose and forehead.

- Ruffini corpuscles - lie in the deep layers of the dermis, they slowly adapt.
- Merkel's disks - lie most superficially in the epidermis, they adapt slowly. They cluster into tactile plates in the hairy skin.
- Meissner's corpuscles - stored in the papillae of the dermis, adapt quickly.
- Vater-Pacini corpuscles - lie deeper in the dermis, are the most complex, adapt quickly and are able to detect vibrations.
- Golgi-Mazzoni corpuscles - have similar properties to Vater-Pacini corpuscles.
- Krause's corpuscles - similar to Meissner's corpuscles, but lie deeper.

#### Perception of heat and cold

Receptive organs are **thermoreceptors**. We distinguish **cold** and **heat** receptors. There are more cold receptors in the skin. The receptors respond to temperatures different from skin temperature. Cold receptors respond to a temperature range of 25-35 °C. Thermal receptors respond to a range of 38-48 °C. Temperatures above 45°C are perceived as **painful**.

#### Deep sensing - proprioception

- **Positional sense** - informs about the relative position of body parts and the position of the joints.

- **Motion sense** – detects movement and speed of movement.
- **Force sense** – "measures" muscle strength and resistance.

### Other functions

- **Metabolic** – due to ultraviolet radiation, the precursor of vitamin D is converted in the stratum granulosum (7-dehydrocholesterol is converted to cholecalciferol = vitamin D).
- **Thermoregulatory** – the heat exchange between the organism and the environment is regulated by changes in blood circulation to the skin and the formation of sweat.
- **Thermal insulation** – the skin and the subcutaneous fat layer (with a total weight of up to 20 kg) together form the thermal insulation layer of the human body.
- **Absorption** – the skin absorbs liposoluble substances (soluble in fats) contained in ointments.
- **Excretory** – there are apocrine and eccrine glands in the skin . Apocrine are predominantly found in the axilla and perigenital landscape and produce chemical odor signals. Eccrine glands are true sweat glands throughout the body
- **Energy and storage** – subcutaneous fat forms a store of energy depending on the body constitution. The proteins contained in the skin can also serve as a source of amino acids. The skin is also a storehouse of sugars, chlorides and water.
- **Komunikační** – prostřednictvím kůže také vyjadřujeme své emoce – je tedy součástí nonverbální komunikace.
- **Communicative** – we also express our emotions through the skin - is therefore a part of non-verbal communication.
- **Regenerative** – epidermal stem cells ensure the inexhaustibility of skin cells. They have the ability of unlimited division, they are stored in the basal layer and thus enable the constant change and regeneration of the skin.

## Links

### Related Articles

- Skin
- Anatomy of the skin
- Skin development
- Skin immune system
- Phototypes | Pigment | Pigmentation disorders
- **Histology:** Thick-type skin (histological specimen) | Axilla/histological specimen

### External links

- Kůže (czech wikipedia)
- Skin (english wikipedia)

### Source

- BENEŠ, Jiří. *Studijní materiály* [online]. [cit. 2010]. <<http://jirben.wz.cz>>.

### References

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- PETROVICKÝ, Pavel. *Anatomie s topografií a klinickými aplikacemi*. 1. edition. Osveta, 2002. 542 pp. ISBN 80-8063-048-8.