Olfaction

Olfaction is a chemoreception that forms the sense of smell. Olfaction has many purposes, such as the detection of hazards, pheromones, and food. It integrates with other senses to form the sense of flavor. The senses of smell and taste (gustatory system) are often referred to together as the chemosensory system, because they both give the brain information about the chemical composition of objects through a process called transduction.

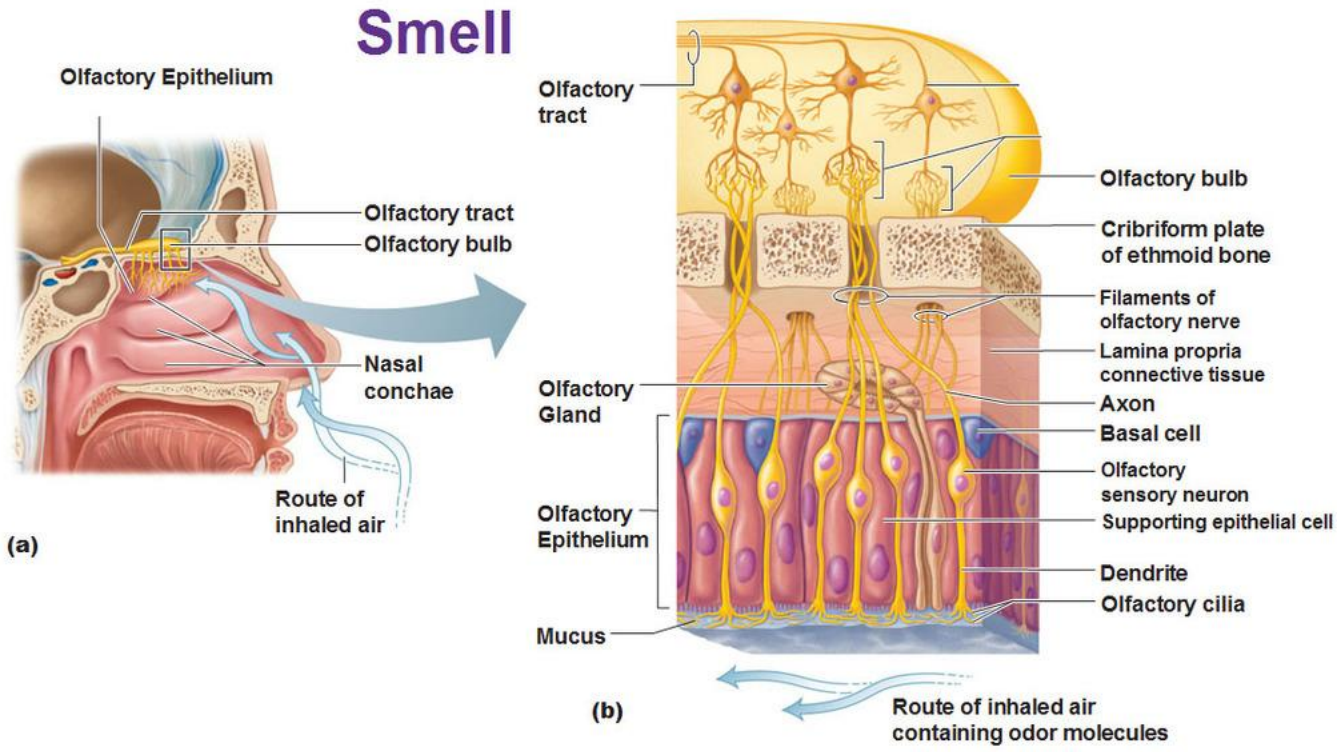
Olfactory system structures

Our sense of smell is a complex process that depends on sensory organs, nerves, and the brain. Structures of the olfactory system include:

- **Nose** : opening containing nasal passages that allows outside air to flow into the nasal cavity.
- **Nasal cavity**: cavity divided by the nasal septum into left and right passages. It is lined with mucosa.
- **Olfactory epithelium:** specialized type of epithelial tissue in nasal cavities that contains olfactory nerve cells and receptor nerve cells. These cells send impulses to the olfactory bulb.
- **Cribriform plate**: a porous extension of the ethmoid bone, which separates the nasal cavity from the brain. Olfactory nerve fibers extend through the holes in the cribriform to reach the olfactory bulbs.

- **Olfactory nerve**: nerve (first cranial nerve) involved in olfaction. Olfactory nerve fibers extend from the mucous membrane, through the cribriform plate, to the olfactory bulbs.
- **Olfactory bulbs**: bulb-shaped structures in the forebrain where olfactory nerves end and the olfactory tract begins.
- **Olfactory tract**: band of nerve fibers that extend from each olfactory bulb to the olfactory cortex of the brain.

- **Olfactory cortex**: area of the cerebral cortex that processes information about odors and receives nerve signals from the olfactory bulbs.



Our Sense of Smell

Our sense of smell works by the detection of odors.

Olfactory epithelium located in the nose contains millions of chemical receptors that detect odors. When we sniff, chemicals in the air are dissolved in mucus. Odor receptor neurons in olfactory epithelium detect these odors and send the signals on to the olfactory bulbs. These signals are then sent along olfactory tracts to the olfactory cortex of the brain. The olfactory cortex is vital for the processing and perception of odor. It is located in the temporal lobe of the brain, which is involved in organizing sensory input.

Touch

The skin is the largest organ in the human body and houses receptors that sense touch. Its ability to perceive touch sensations gives our brains variety of information about the environment around us, such as temperature, pain, and pressure.

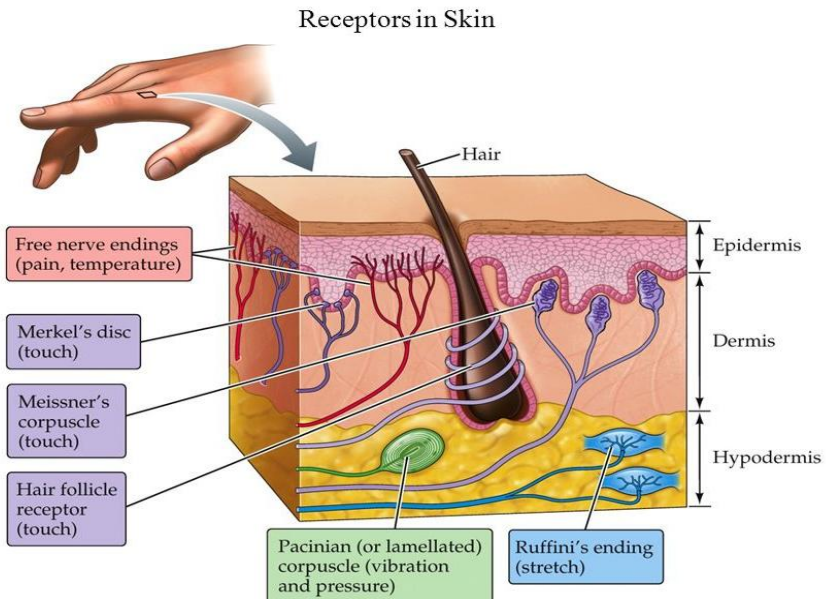
Skin Anatomy

The skin is composed of three layers:

1) Epidermis: The first skin layer that you can see. It made of dead skin cells. It contains melanin, which protects against the sun's harmful rays and also gives skin its color. The epidermis also contains very sensitive cells called touch receptors that give the brain a variety of information about the environment the body is in.

2) Dermis: The second layer of skin. The dermis contains hair follicles, sweat glands, sebaceous (oil) glands, blood vessels, nerve endings, and a variety of touch receptors.

3) Hypodermis (subcutaneous tissue): The bottom layer of the skin which is composed of fat and connective tissue.



Touch receptors in the skin are nerve cells that inform the brain about tactile or touch sensations. There are two main types:

Thermoreceptors:

These tell you about temperature. The two structures thought to be used for temperature detection are:

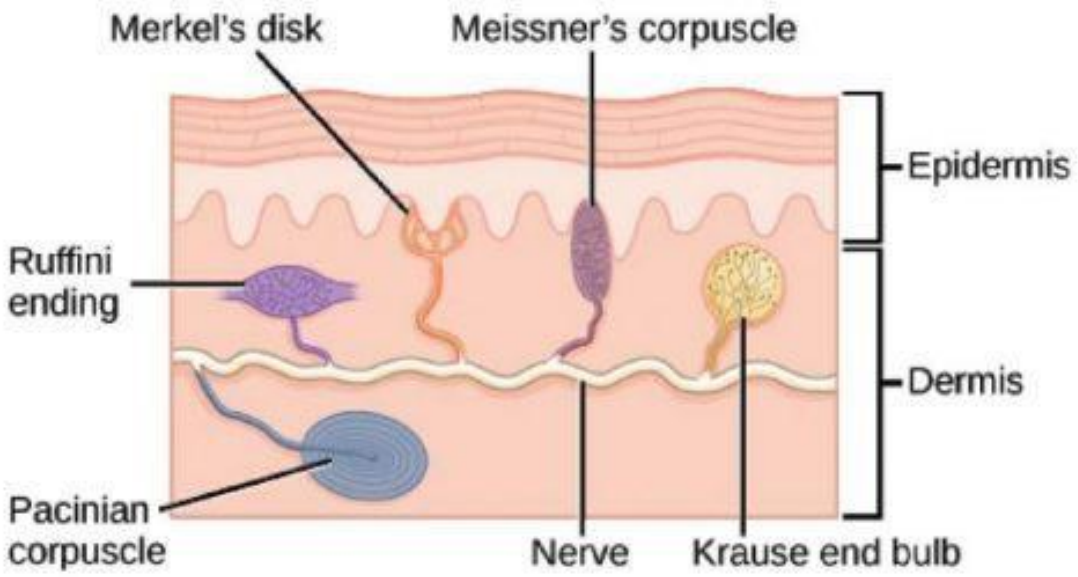
- end bulb of Krause, which detects cold
- Ruffini's end organ, which detects heat

Mechanoreceptors

These tell your body about pushing/pulling forces and body movement and are responsible for translating these physical forces into nerve impulses. Included in this receptor group are:

- Pacinian corpuscles, which detect deep-pressure touch and high-frequency vibrations
- Meissner's corpuscles, which are responsible for the detection of light touch and are found in the skin of the fingertips, lips, body orifices and nipples
- Merkel's discs, which provide information relating to pressure and texture and are found in areas like fingertip ridges.

The receptors change chemical, thermal or mechanical responses into electrical signals. The signals travel along axons (the extensions of nerve cells or neurons), which form pathways along which messages travel to areas of the brain that receive and interpret them. In the brain, we interpret sensations using our previous experiences and the properties of the receptors.


Merkel's disk
Meissner's corpuscle
Epidermis
Ruffini ending
Dermis
Pacinian corpuscle
Nerve
Krause end bulb