

C5 What functions does the skin have? – The skin as a sense organ

1 How does the skin react to touch?

1.6 Questions

- a) What are the three layers of skin?

Answer: From outside to inside, the layers are the epidermis, the dermis, and the subcutis.

- b) What structures in the skin are responsible for the perception of tactile stimuli?

Answer: The tactile corpuscles are located in the epidermis (such as Meissner's corpuscles, but there are other types of tactile corpuscles). These receptors react to changes in pressures and thus to light touch and shear forces, and are especially numerous in the fingertips and the oral mucosa, i.e., places where we do the most testing of objects and substances in the environment. They are less numerous on our backs. Meissner's corpuscles provide information on the surfaces of objects, which is the basis for the first subexperiment.

2 How does the skin perceive cold and heat?

2.6 Questions

- a) What different types of receptors are in human skin?

Answer: The receptors are pain receptors, tactile corpuscles, heat receptors, cold receptors, and pressure receptors.

- b) What layers of skin are they located in?

Answer: The receptors are located at different depths, depending on how important they are to survival.

Pain receptors and tactile corpuscles are located in the epidermis, because it is important for you to quickly perceive every pain stimulus and touch. When events that trigger the sensation of pain occur, you may have a matter of milliseconds to react. For example, if you step barefoot on a sharp object, it is necessary for you to feel the object before it penetrates your skin.

Heat and cold receptors are located in the upper layer of the dermis. Because it is not necessary to perceive every change in temperature, these receptors do not have to be in the epidermis. However, they are not located deep in the subcutis, since it is important to quickly notice major temperature changes. For example, if you put your hand in hot water, it is important for you to quickly realize that the water is too hot. Only then can you remove your hand from the water in time before it is scalded.

Pressure receptors are located in the transitional area between the dermis and subcutis. Because tissue is quite flexible, it is not necessary to react particularly sensitively to

pressure stimuli. For this reason, pressure stimuli have a lower priority than pain, touch, and temperature.

- c) Which receptors are responsible for sensing thermal stimuli?

Answer: The two types of receptors that can determine temperature changes are the heat and cold receptors.

It should also be mentioned that heat and cold receptors are not distributed evenly throughout the body. Cold receptors are most numerous on the nose, forehead, chest, and upper thighs. Heat receptors are especially numerous on the nose, soles of the feet, and insides of the elbows and knees.

3 How does the skin distinguish between different temperatures?

3.6 Questions

- a) What type of information do the heat and cold receptors deliver?

Answer: Heat receptors send stimuli when the temperature increases, and cold receptors send stimuli when the temperature decreases. The two types of receptors deliver information about temperature differences, but not about absolute temperatures. This is also the point we were able to clarify in the experiments. Cold receptors send stimuli when the ambient temperature is lower than the skin's temperature, and heat receptors when the ambient temperature is higher.

- b) Why does your hand that was in the warm water feel the difference in temperature longer than your other hand?

Answer: The temperature sensation of the hand that was in the warm water persists longer than that of the "cold" hand, firstly because hands have more cold receptors, and secondly because cold receptors adapt more quickly to the ambient temperature than heat receptors. In evolutionary terms, cold seems to pose a greater threat to humans than heat.