



Skin Senses: Temperature

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Sensitivity to temperature is a skin sense that is related to the human need to maintain internal temperature balance or thermal homeostasis. Temperature sensitivity is important in protecting one's self from intense temperature that may cause damage to the body.

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Mechanism

Specialized sensory receptors called thermoreceptors are responsible for temperature sensitivity. These thermoreceptors are located in the dermis of the skin. A cold environment results to lesser blood flow near the surface of the skin. Thus, the body feels colder. The opposite occurs when a person is in a hot environment or when a fever breaks. Below is a diagram of a thermoreceptor.

Receptor Sites

Most of body area is covered with skin which is normally sensitive to heat and cold. The most sensitive heat receptors are found on the elbows, nose, and fingertips. Meanwhile, cold receptors are found on the chest, chin, nose, fingers, and the upper lip. Hence, the nose has both sensitive heat and cold receptors which is why it is generally the most receptive sense. However, the fingertips are the most sensitive when it comes to the rate of heat conduction.

Thresholds

Different body parts have different temperature sensitivity levels; causing their respective thresholds to vary as well. According to Stevens et.al., the most sensitive body part to temperature is the face, particularly the face and cheeks, while the least sensitive ones are the thigh and calf. Temperature threshold is the point at which one can tolerate the hotness or coldness of a stimulus. Generally, as the stimulus lasts longer (temporal summation) and/or goes larger (spatial summation), temperature threshold gets smaller.

Function

Sensitivity to temperature ^[1] allows a person to adapt to the temperature of his environment in order to maintain the body's homeostatic balance. When the physical stimulus is interpreted by the brain as "hot", the brain sends signals back to the body part in contact to withdraw away from the stimulus. The same response may be observed when the stimulus is perceived as "cold".

Adaptation

Thermal receptors demonstrate adaptation just like the other types of sensory receptors. This can be observed when one hand is place in hot water, and the other hand is in the cold water. After a time (depending on the adaptation time of an individual), neither feels hot or cool. Researchers found that the human skin has a normal range of adaptation temperature – from 29 degrees Celsius to 37 degrees Celsius.

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Links

[1] <http://ergo.human.cornell.edu/studentdownloads/dea3500notes/thermal/thsensnotes.html>