

Touch, Physiology Of Encyclopedia Article

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Touch, Physiology Of

The ability to sense when the body contacts something depends on the presence of so-called cutaneous **mechanoreceptors** on the surface of the skin, and on the transmittance of signals from these receptors to the **brain**. This also is referred to as the somatosensory, or body-sensing, system.

The surface of the body is covered with touch receptors. Their distribution is not uniform. In humans, the fingertips and the tongue can have 100 receptors per square centimeter, while the back of the hand has less than ten receptors.

The receptors respond to the pressure of touch by initiating signals that are then routed to the brain for analysis. The **spinal cord** is important in this regard, as it functions as a conduit for sensory fibers. Then, feedback from the brain to appropriate regions of the body occurs to generate a response to the touch. The responses are varied, ranging from laughter in the case of tickling, to sexual arousal, to a rapid **muscle contraction** to pull a hand away from a painfully hot object.

Different areas of the body have different sensory pathways for touch. Light touch is sensed in the upper body by the fasciculus cuneatus and in the lower body by the fasciculus gracilis. Both these nerve fibers tend to run directly to the brain. The light touch receptors are often located close to a **hair** follicle. Even if the receptor is not touched directly, movement of the hair can be detected.

Touch stimuli are routed to the region of the brain known as the medulla, specifically to a region called the **thalamus**. This area of the brain is also called the somatosensory cortex, in recognition of its importance in the interpretation of touch stimuli.

If a touch is continuous, the stimulus of that touch will decrease. This enables the body to be aware of other touch sensations. The end of a prolonged touch will be noted and the involved receptors are ready for another response. This mechanism can go awry, so that the touch of things like clothing is constantly felt sometimes so much so that it is painful. This condition is known as mechano-allodynia (touch **pain**).

As the understanding of the **physiology** and the mechanisms of touch increases, it will be possible to mimic these functions in inanimate forms. Already, rudimentary work is underway to devise robots capable of human-like touch.