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THE SOMATOSENSORY PATHWAYS

The somatosensory system is the part of the **sensory system** concerned with the conscious perception of touch, pressure, pain, temperature, position, movement, and vibration, which arise from the muscles, joints, skin, and fascia

A somatosensory pathway typically consists of three neurons: primary, secondary, and tertiary.

1. In the periphery, **the primary neuron is the sensory receptor** that detects sensory stimuli like touch or temperature. The cell body of the primary neuron is housed in the dorsal root ganglion of a spinal nerve or, if sensation is in the head or neck, the ganglia of the trigeminal or cranial nerves.
2. **The secondary neuron** acts as a relay and is located in either the spinal cord or the brainstem. This neuron's ascending axons will cross, or decussate, to the opposite side of the spinal cord or brainstem and travel up the spinal cord to the brain, where most will terminate in either the thalamus or the cerebellum.
3. **Tertiary neurons** have cell bodies in the thalamus and project to the postcentral gyrus of the parietal lobe, forming a sensory homunculus in the

case of touch. Regarding posture, the tertiary neuron is located in the cerebellum

Sensory receptors

These sensory receptor cells are activated by different stimuli such as heat and nociception, giving a functional name to the responding sensory neuron, such as a thermoreceptor which carries information about temperature changes. Other types include mechanoreceptors, chemoreceptors, and nociceptors which send signals along a sensory nerve to the spinal cord where they may be processed by other sensory neurons and then relayed to the brain for further processing. Sensory receptors are found all over the body including the skin, epithelial tissues, muscles, bones and joints, internal organs, and the cardiovascular system.

Functions of the somatosensory pathway

The somatosensory system functions in the body's periphery, spinal cord, and the brain.

- Periphery: Sensory receptors (i.e., thermoreceptors, mechanoreceptors, etc.) detect the various stimuli.
- Spinal cord: Afferent pathways in the spinal cord serve to pass information from the periphery and the rest of the body to the brain.
- Brain: The postcentral gyrus contains Brodmann areas (BA) 3a, 3b, 1, and 2 that make up the somatosensory cortex. BA3a is involved with the sense of relative position of neighboring body parts and the amount of effort being

used during movement. BA3b is responsible for distributing somatosensory information to BA1 and shape and size information to BA2.

Structures

The somatosensory system is spread through all major parts of the vertebrate body. It consists both of sensory receptors and afferent neurons in the periphery (skin, muscle and organs for example), to deeper neurons within the central nervous system.

The somatosensory cortex

The Somatosensory Cortex is an area of the brain, located in the parietal lobe, that **processes sensory input from the skin, muscles, and joints**. This area detects and interprets information on touch, temperature, pain, and pressure and allows us to perceive the size, shape, and texture of an object via touch