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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.

The somatosensory system is a 3-neuron system that relays sensations detected in the periphery and conveys them via somatosensorypathways through the spinal cord, brainstem and thalamic relay nuclei to the sensory cortex in the parietal lobe. A somatosensory pathway typically consists of three neurons: primary, secondary, and tertiary.

- A. 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.
- B. 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.
- C. 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.

FUNCTIONS OF THE SOMATOSENSORY PATHWAYS

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.