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Matric no: 18/mhs02/162

Department: Nursing

Levels 200

Course: physiology

Somatosensory pathway.

Somatosensory pathways convey the information from sensory receptors in skin, skeletal muscles and joints. Somatosensory pathway are constituted by somatic nerve fibers called somatic afferent nerve fibers.

A somatosensory pathway will typically have three neurons: primary, secondary, and tertiary. The cell bodies of the three neurons in a typical somatosensory pathway are located in the dorsal root ganglion, the spinal cord, and the thalamus (Either of two large, ovoid structures of gray matter within the forebrain that relay sensory impulses to the cerebral cortex.) A major target of somatosensory pathways is the postcentral gyrus (A prominent structure in the parietal lobe of the human brain that is the location of the primary somatosensory cortex, the main sensory receptive area for the sense of touch.) in the parietal lobe (A part of the brain positioned superior to the occipital lobe and posterior to the frontal lobe that integrates sensory information from different modalities and is particularly important for determining spatial sense and navigation.) of the cerebral cortex. A major somatosensory pathway is the dorsal column–medial lemniscal pathway. The postcentral gyrus is the location of the primary somatosensory area that takes the form of a map called the sensory homunculus.

A somatosensory pathway will typically have three long neurons: primary, secondary, and tertiary. The first always has its cell body in the dorsal root ganglion of the spinal nerve.

Dorsal root ganglion: Sensory nerves of a dorsal root ganglion are depicted entering the spinal cord.

The second has its cell body either in the spinal cord or in the brainstem; this neuron's ascending axons will cross to the opposite side either in the spinal cord or in the brainstem. The axons of many of these neurons terminate in the thalamus, and others terminate in the reticular activating system or the cerebellum.

In the case of touch and certain types of pain, the third neuron has its cell body in the ventral posterior nucleus of the thalamus and ends in the postcentral gyrus of the parietal lobe.

In the periphery, the somatosensory system detects various stimuli by sensory receptors, such as by mechanoreceptors for tactile sensation and nociceptors for pain sensation. The sensory information (touch, pain, temperature, etc.,) is then conveyed to the central nervous system by afferent neurons, of which there are a number of different types with varying size, structure, and properties.

Generally, there is a correlation between the type of sensory modality detected and the type of afferent neuron involved. For example, slow, thin, unmyelinated neurons conduct pain whereas faster, thicker, myelinated neurons conduct casual touch.

Ascending Pathways

In the spinal cord, the somatosensory system includes ascending pathways from the body to the brain. One major target within the brain is the postcentral gyrus in the cerebral cortex. This is the target for neurons of the dorsal column–medial lemniscal pathway and the ventral spinothalamic pathway.

Many ascending somatosensory pathways include synapses in either the thalamus or the reticular formation before they reach the cortex. Other ascending pathways, particularly those involved with control of posture, are projected to the cerebellum, including the ventral and dorsal spinocerebellar tracts.

Another important target for afferent somatosensory neurons that enter the spinal cord are those neurons involved with local segmental reflexes.