

from the entry point into the cord and then to the brain, the sensory signals are carried through one of two alternative sensory pathways: (1) the dorsal column–medial lemniscal system or (2) the anterolateral system. These two systems come back together partially at the level of the thalamus.

The dorsal column-medial lemniscal pathway carries the sensory modalities of fine touch, vibrations and proprioception. Its name arises from the two major structures that comprise the DCML. In the spinal cord, information travels via the dorsal (posterior) columns. In the brainstem, it is transmitted through the medial lemniscus.

#### First order neurons

The first order neurons carry sensory information from the peripheral nerves to the medulla oblongata. It involves two different pathways ;

- Signals from the upper limb: travel in the fasciculus cuneatus (lateral part of the dorsal column ). They then synapse in the nucleus cuneatus of the medulla oblongata.
- Signal from the lower limb: travel in the fasciculus gracilis ( medial part of the dorsal column) and they synapse in the nucleus of the medulla oblongata.

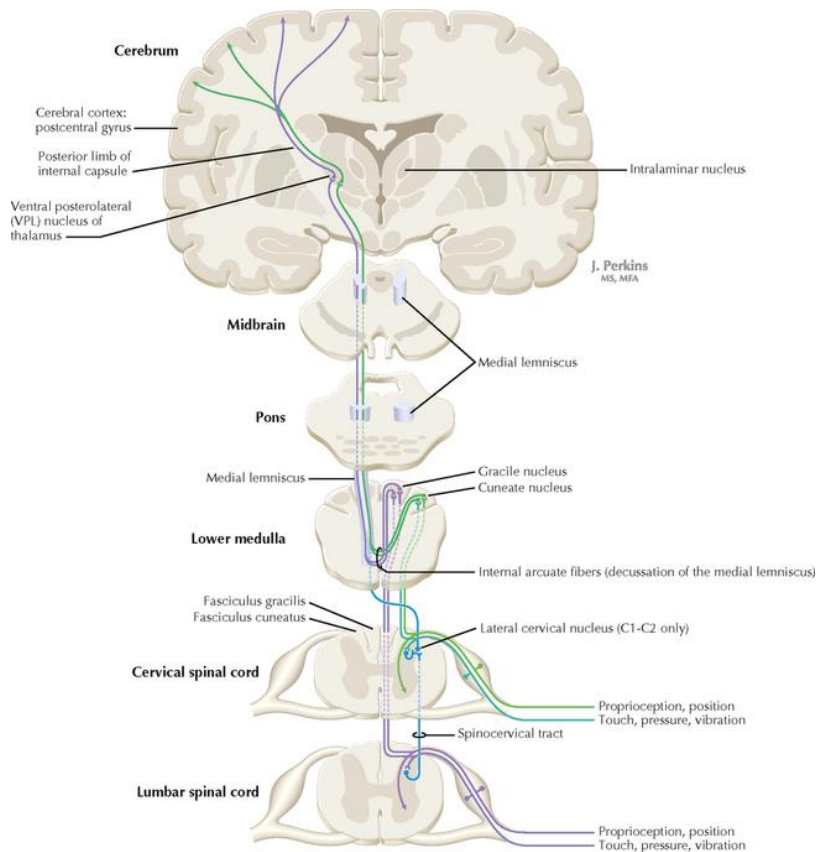
#### Second order neurons

The second order neurons begin in the cuneate nucleus or gracilis. The fibres receives information from the preceding neurons and delivers it to the third order neurons in the thalamus.

Within the medulla oblongata ,these fibres decussate . they then travel in the contralateral medial lemniscus to reach the thalamus

#### Third order neurons

The third order neurons transmit the sensory signals from the thalamus to the ipsilateral primary sensory cortex of the brain. They ascend from the ventral posterolateral nucleus of the thalamus , travel through the internal capsule and terminate at the sensory cortex.



The anterolateral system consists of two separate tracts:

- Anterior spinothalamic tract- carries the sensory modalities of crude touch and pressure
- Lateral spinothalamic tract- carries the sensory modalities of pain and temperature

First order neurons

The first order neurons arise from the sensory receptors periphery . they enter the spinal cord, ascend and synapse at the tip of the dorsal horn – an area known as the substantia gelatinosa.

Second order neurons

The second order neurons carry the sensory information from the substantia gelatinosa to the thalamus, after synapsing with the first order neurons, the fibres decussate within the spinal cord and then form two distinct tracts:

- Crude touch and pressure fibers – enter the anterior spinothalamic tract
- Pain and temperature fibres – enter the lateral spinothalamic tract.

Although they are functionally distinct, these tracts run alongside each other, they can be considered as a single pathway. They travel superiorly within the spinal cord, synapsing in the thalamus.

Third order neurons

The third order neurons carry the sensory signals from the thalamus to the ipsilateral primary sensory cortex of the brain. They ascend from the ventral posterolateral nucleus of the thalamus, travel through the internal capsule and terminate at the sensory cortex.

