

| Feature / Pathway | Posterior column - Medial lemniscal | Lateral Spinothalamic tract | Anterior Spinothalamic tract |
|-------------------|---|---|---|
| Modality | 1. Discriminative touch. 2. Conscious proprioception [muscle joint sense]. | 1. Pain. 2. Temperature. | Crude touch and pressure . [ventral Light touch]. |
| Receptor | Most types of receptors except free nerve endings. | Free nerve endings. | Free nerve endings. |
| 1st order neuron | Lies in the dorsal root ganglion > enters the posterior white column > ascends ipsilaterally > reaches the lower part of the medulla oblongata . | Lies in the dorsal root ganglion > synapses with the second neuron's cell body directly in the dorsal horn. [doesn't enter and ascend...] | Dorsal root ganglia. |
| 2nd order neuron | Collect in two nuclei: 1. Nucleus gracilis [medial], [below T6]. 2. Nucleus cuneatus [lateral], [above T6]. then > internal arcuate fibers [called so because they form an arch and <u>ascend contralaterally</u>] / lemniscal decussation > medial lemniscus > reach the thalamus. | Cell bodies lie in the dorsal horn of the posterior gray column called ' substantia gelatinosa ' which is formed by laminae I & II > <u>cross obliquely</u> to the opposite side > passes through white and gray commissures and ascends in the white one as the LATERAL spinothalamic tract. | The posterior horn of the gray column is called nucleus proprius which is formed by laminae III & IV > <u>cross obliquely</u> to the other side > passes through the anterior white and gray commissures > ascends in the contralateral white column as the Anterior spinothalamic tract. |
| 3rd order neuron | Thalamus [ventral posterolateral nucleus/VPL], here the synapsis takes place > pass through internal capsule > corona radiata in the cortex. | Thalamus [VPL] > internal capsule > corona radiata. | Thalamus [VPL] > internal capsule > corona radiata. |
| Termination | A part of the parietal lobe is known as the primary somatosensory [somesthetic] area [SI] in the postcentral gyrus . | A part of the parietal lobe is known as the primary somatosensory [somesthetic] area [SI] specifically in area number 3b and in the widespread cortical region . | Primary somesthetic area [SI]. |

| Feature/Pathway | Anterior Spinocerebellar | Posterior Spinocerebellar |
|------------------|--|--|
| Modality | Muscle and joint sensation [unconscious proprioception]. | Muscle and joint sensation [unconscious proprioception]. |
| Receptor | | Most receptors except free nerve endings. |
| 1st order neuron | Terminates at the base of poster gray column [nucleus dorsalis or Clark's nucleus in lamina 7] | Terminates at the base of poster gray column [nucleus dorsalis or Clark's nucleus in lamina 7] |
| 2nd order neuron | Majority > cross to the opposite side and ascend as anterior spinocerebellar tract in the contralateral column [they cross back later on]. Minority > ascend as anterior spinocerebellar tract in the lateral white column of the same side. Both ascend to the medulla oblongata. | Enters the posterolateral part of the lateral white matter column on the same side > ascend ipsilaterally to the medulla oblongata. |
| Termination | In the cerebral cortex [through the superior cerebellar peduncle]. | In the cerebral cortex [through the inferior cerebellar peduncle]. |

General notes~

>In general, we divide the gray matter into 7 laminae.

Regarding the spinothalamic tract, 3 laminae are included and those are I, II, and V [pain + temperature].

I & II [substantia gelatinosa] > **C fibers** > **SLOW** pain > stimulate **reticular formation** / MAJORITY here.

I & V > **A-delta fibers** > **FAST** pain.

It also ends in the **cingulate gyrus** [emotional aspect of pain/limbic system] + **Insular gyrus** [interpretation of pain stimuli from internal organs of the body / autonomic responses].

Thalamus + **T**hird order neuron.

> ALS modality: pain + temp. + crude touch + crude pressure.

| Feature / Tract | Vestibulospinal | Pontine reticulospinal | Rubrospinal | Medullary reticulospinal |
|------------------------|--|---|---|--|
| White column | <u>ANTERIOR</u> | <u>ANTERIOR</u> | <u>LATERAL</u> | <u>LATERAL</u> |
| Flexion or Extension?? | Facilitate <u>extensor</u> muscles and <u>inhibit flexor</u> muscles in association with the maintenance of balance. | Activates the <u>axial and proximal</u> limb <u>extensors</u> [antigravity muscles] to stand upright. | <u>Flexion</u> of the upper limbs [facilitation] and <u>inhibits the activity of extensors</u> . | <u>Inhibit</u> the <u>axial and proximal</u> limb extensors. Activates <u>flexors</u> ... |
| Receives input from | Cerebellum: Fastigial Vestibular nuclei [inner ear]. | Cortex: <u>inhibitory</u> . Decortication > more activation. | Cerebral cortex [would still function with decorticate]. Cerebellum. <u>emboliform</u> and <u>globose</u> nuclei. | |
| Crossover | Do <u>not</u> cross. | Do <u>not</u> cross. | Early <u>crossover</u> at the level of the nucleus. | Some <u>cross</u> , some <u>do not</u> . |

Tectospinal > Anterior white column / mainly cross

Reticulospinal > related to PARASYMP-

Lateral > flexor