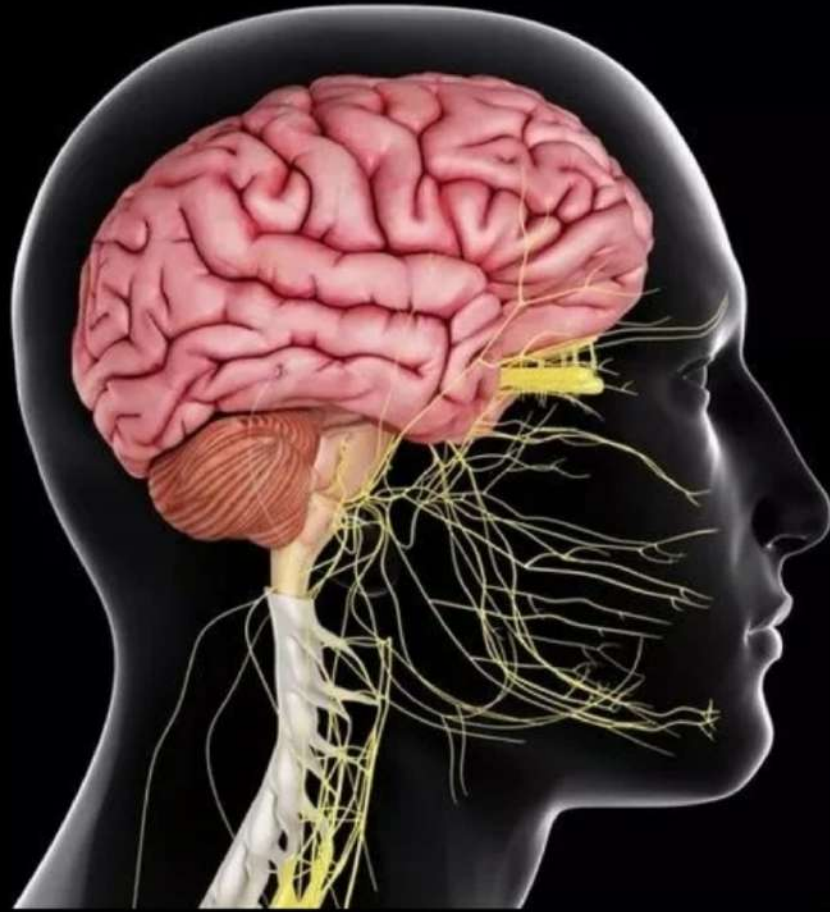




# CENTRAL NERVOUS SYSTEM



SUBJECT :           Anatomy          

LEC NO. :           3          

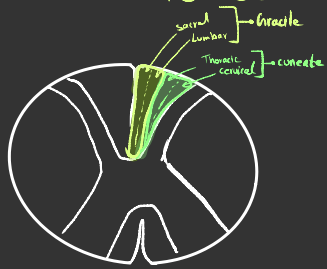
DONE BY :           Raha Dwairi          

وَقُلْ رَبِّ زِدْنِي عِلْمًا

# Ascending tract

**conscious proprioception**  
**"Lemniscal system"**  
 (Posterior column tract)  
 To cerebral cortex

**Gracile & cuneate**



Medially → Gracile - sense lower part of body (Below T<sub>6</sub>)

Laterally → cuneate - sense upper part of body (T<sub>6</sub> & above)

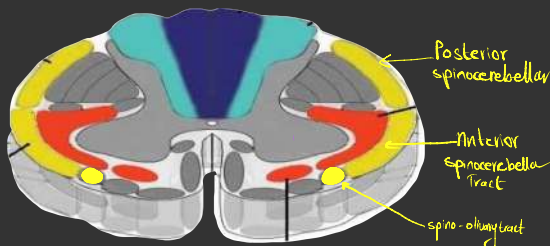
**Sense For:**  
**conscious proprioception**

- position
- movement
- vibration

**Fine touch**

- Tactile Discrimination
- Tactile localization
- stereognosis

**unconscious proprioception**  
**"To cerebellum"**



**Post. spinocerebellar Pathway**

Proprioception from: Lower limb

decussation: **Decussate**

entry of cerebellum through: **ICP**

ipsilateral/contralateral cerebellum: **ipsilateral cerebellum**

**Ant. spinocerebellar Pathway**

Proprioception from: Lower limb

decussation: **Decussate (few remain)**

entry of cerebellum through: **SCP**

ipsilateral/contralateral cerebellum: **ipsilateral cerebellum**

**Spino-olivary Pathway**

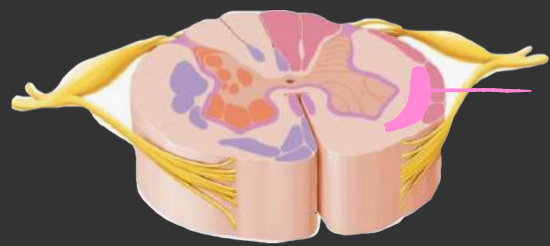
Proprioception from: upper limb + lower

decussation: **—**

entry of cerebellum through: **—**

ipsilateral/contralateral cerebellum: **—**

**spinothalamic tract**  
**"Anterolateral system"**



**Lateral spinothalamic tract**

**Pain & Temperature**

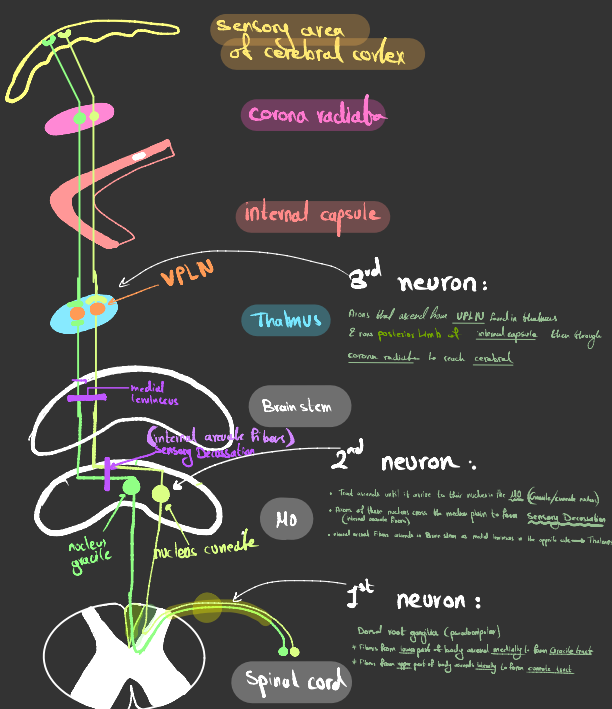
- Begins at 1, 4, 8 Laminae
- Ends on VPL of thalamus
- medial lamination are cervical fibers

**Ventral spinothalamic tract**

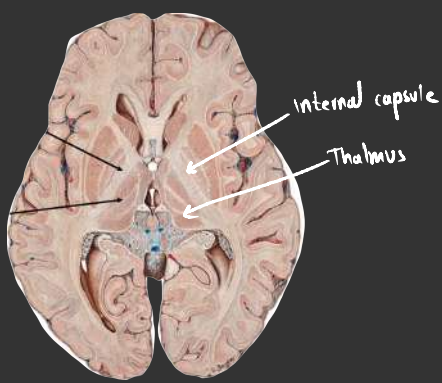
**crude touch & pressure**

- Begins at 4, 7
- cervical fibers are medial
- End on UPL

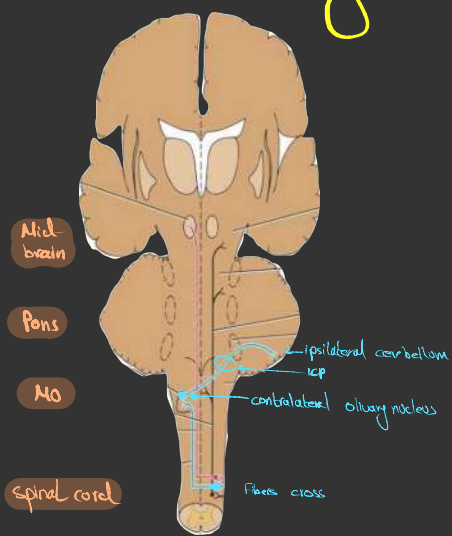
## Spinothalamic tract:



**sacral fibers are most medial**  
**cervical fibers are most lateral**



## spino-olivary tract:



It carries proprioception from both upper & lower limbs.  
 ? Fibers cross  
 ? End in contralateral olivary nucleus  
 ? Olivocerebellar fibers cross & pass via the ICP to reach the ipsilateral cerebellum.

## Imp Nates:

• upper limb → spino-olivary tract + cuneocerebellar tract

• Lower limb → spino-olivary tract + spinocerebellar tract

## spinothalamic tract

## spino tectal Tract

Ascends in: Lateral & ventral white column

Lateral white column

Cross: mostly

mostly

End: Pontine & medullary

superior colliculus

Route for: slow dull pain (chronic pain)  
 ↳ pain that doesn't allow you to sleep

Head turning toward source of pain

# Pain & temperature pathway ⇒ Lateral spinothalamic tract

## 1<sup>st</sup> neuron:

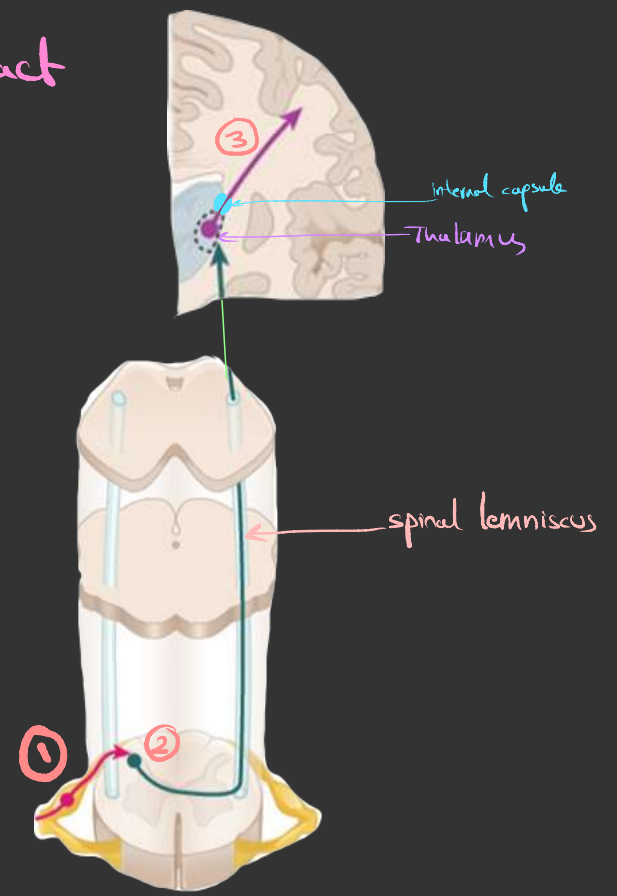
Dorsal root ganglion cells carry pain & temperature from receptors (Free nerve endings in skin) & end in Laminae of grey matter (1, 4, 8)

## 2<sup>nd</sup> neuron:

Axons of these neuron exit from laminae crossing to the opposite side & ascend in Brain stem as spinal lemniscus reach thalamus & end in UPLN

## 3<sup>rd</sup> neuron:

Axons of UPLN passes in Posterior limb of internal capsule to reach the sensory area



# Crude touch & pressure pathway ⇒ Anterior spino-thalamic tract

## 1<sup>st</sup> neuron:

cells carry touch & pressure from receptors of Dorsal root ganglion & enter to spinal laminae to end in Laminae (4, 7)

## 2<sup>nd</sup> neuron:

Axons of these neurons Ascends upward in Brain stem to join medial lemniscus reaches UPLN in Thalamus

## 3<sup>rd</sup> neuron:

Fibers of UPLN Ascends in posterior Limb of internal capsule & reaches sensory area of cerebral cortex

Note:

not all spinothalamic fibers end on UPLN of thalamus some end on intralaminar nuclei & midline nuclei (Involved in arousal Behaviour)

# Pain & Temperature from face:

Carried by TRIGEMINAL NERVE

## 1<sup>st</sup> neuron:

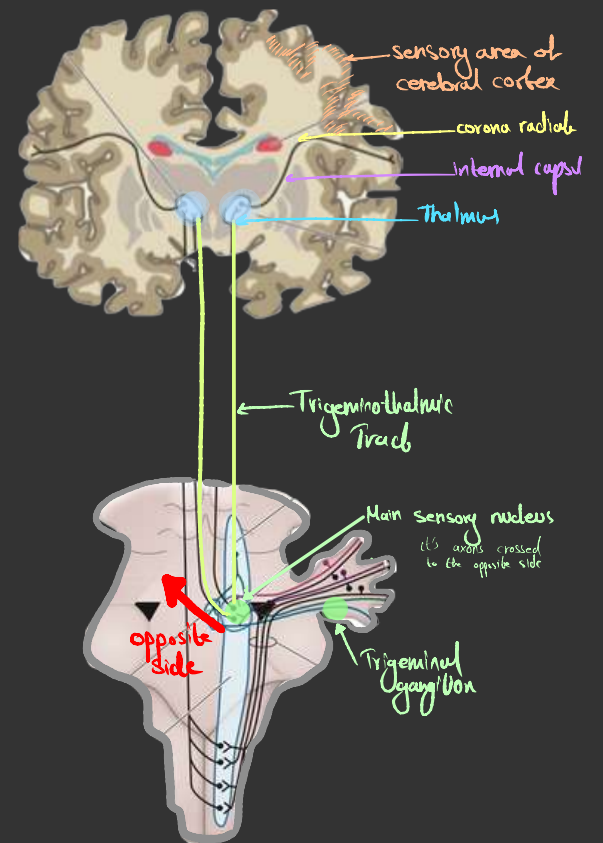
• Trigeminal ganglion (formed of pseudounipolar cells)

## 2<sup>nd</sup> neuron:

• Nucleus of Trigeminal (Main sensory nucleus) its axons cross to opposite side forming Trigemino-thalamic tract ends in the UPLN of thalamus

## 3<sup>rd</sup> neuron:

• Axons of UPLN ascend & pass within internal capsule then corona radiata to reach sensory area of cerebral cortex



ASCENDING TRACTS		
TRACTS		FUNCTION
Spinothalamic	Lateral Spinothalamic	Pain & temperature
	Anterior Spinothalamic	Light (crude) touch pressure
Dorsal Column System	Fasciculus Gracilis	Fine touch, proprioception, two-point discrimination
	Fasciculus Cuneatus	
Spinocerebellar Tracts	Anterior/Ventral Spinocerebellar	Movement and position mechanisms
	Post./Dorsal Spinocerebellar	
Spinotectal Tract		Afferent information for spinovisual reflexes and brings about mov't of the eyes and head toward the source of the stimulation
Spinoreticular Tract		Deep and chronic pain
Spino-olivary Tract		Conveys information to the cerebellum from cutaneous and proprioceptive organs

Tract	Funiculus	Decussation	Functions
<b>Ascending (Sensory) Tracts</b>			
Gracile fasciculus	Posterior	In medulla	Sensations of limb and trunk position and movement, deep touch, visceral pain, and vibration, below level T6
Cuneate fasciculus	Posterior	In medulla	Same as gracile fasciculus, from level T6 up
Spinothalamic	Lateral and anterior	In spinal cord	Sensations of light touch, tickle, itch, temperature, pain, and pressure
Spinoreticular	Lateral and anterior	In spinal cord (some fibers)	Sensation of pain from tissue injury
Posterior spinocerebellar	Lateral	None	Feedback from muscles (proprioception)
Anterior spinocerebellar	Lateral	In spinal cord	Same as posterior spinocerebellar

## Notes:

- \* Fine touch → Dorsal column tract
- crude touch → ventral spinothalamic tract
- \* cervical fibers are always medially except in Dorsal column tract
- \* medial lemniscus carry ⇒ conscious proprioception
- crude touch & pressure spinal lemniscus carry ⇒ Pain & temperature pathway