

# The sensory axis

# Things I'm going to cover and you're going to understand

- The basics
- Cutaneous receptors
- Dorsal column-medial lemniscus
- Spinothalamic tract
- The thalamus and the cortex
- Pain

# Receptors

- Stimulus → Membrane conduction change → Generator potential
- Intereceptors, exteroceptors, proprioceptors, teleceptors

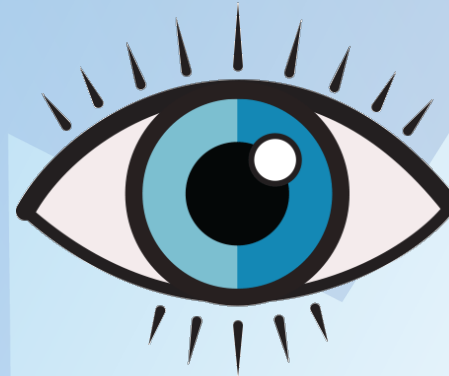
Thermoreceptors



Chemoreceptors



Photoreceptors



Mechanoreceptors



# Nerve fibers

- A
  - A $\alpha$  – Proprioception
    - 70-120m/s
  - A $\beta$  – Touch
    - 5-12m/s
  - A $\gamma$  – Motor
    - 3-6m/s
  - A $\delta$  – Pain, temp
    - 12-30m/s

- B – Pre ggl autonomic
  - 3-12m/s

- C – Pain, temp
  - 0,5-2m/s
  - C<sub>ggl</sub> – Post ggl symp
    - 0,7-2,3m/s

SLOW

FAST

A fibers = Thickest  
C fibers = Thinnest

# Cutaneous receptors

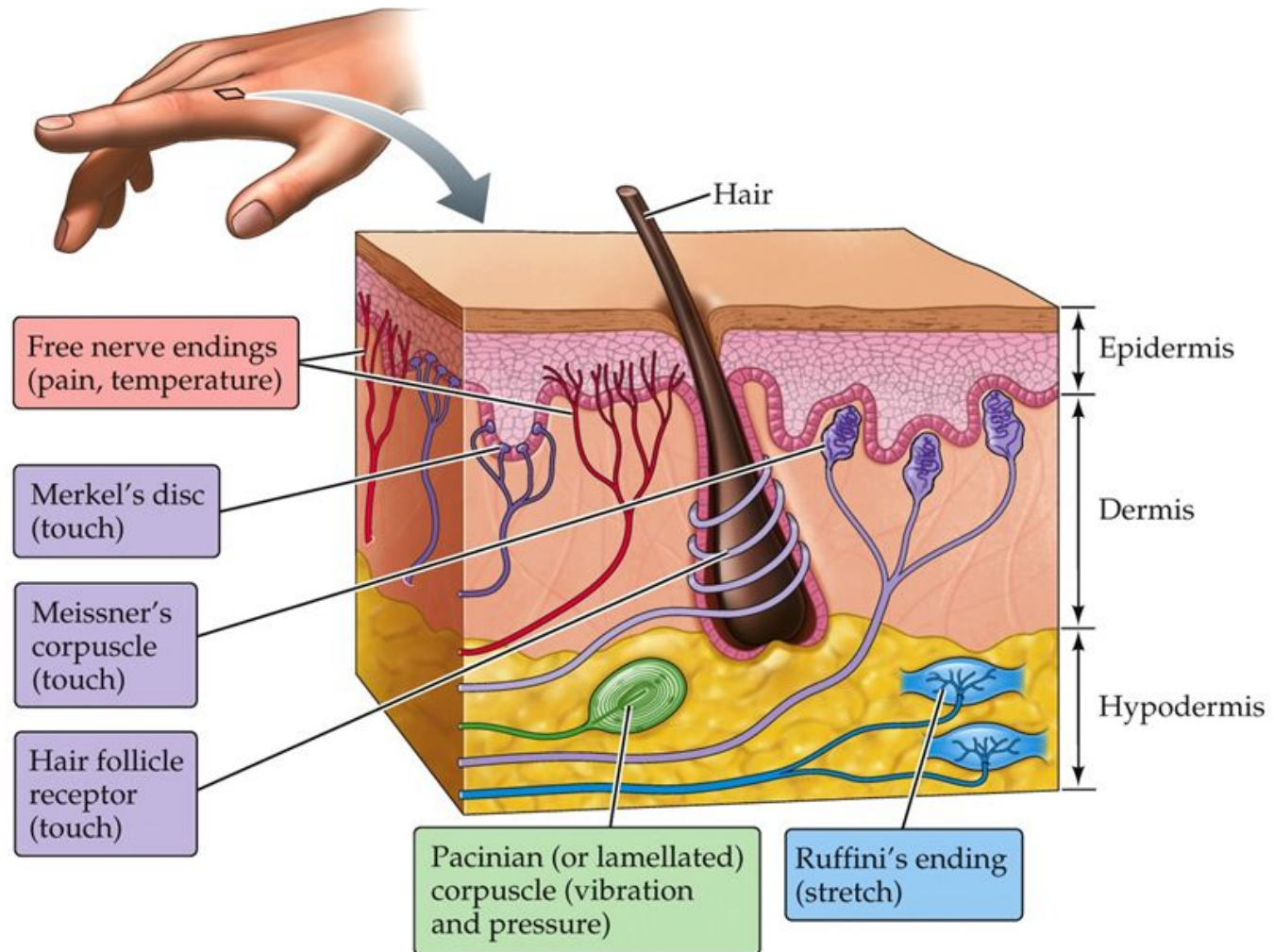
- Merkel discs
  - Fine touch
  - Discriminative touch
- Meissner corpuscles
  - Texture change
  - Slow vibrations
- Ruffini endings
  - Skin stretch
  - Sustained pressure
- Pacinian corpuscles
  - Deep touch
  - Fast vibrations

Apical

Basal

- Both "Corpuscles" are PHASIC receptors, while the other two are TONIC receptors
- \*ALL USE A $\beta$  FIBERS

## Receptors in Skin

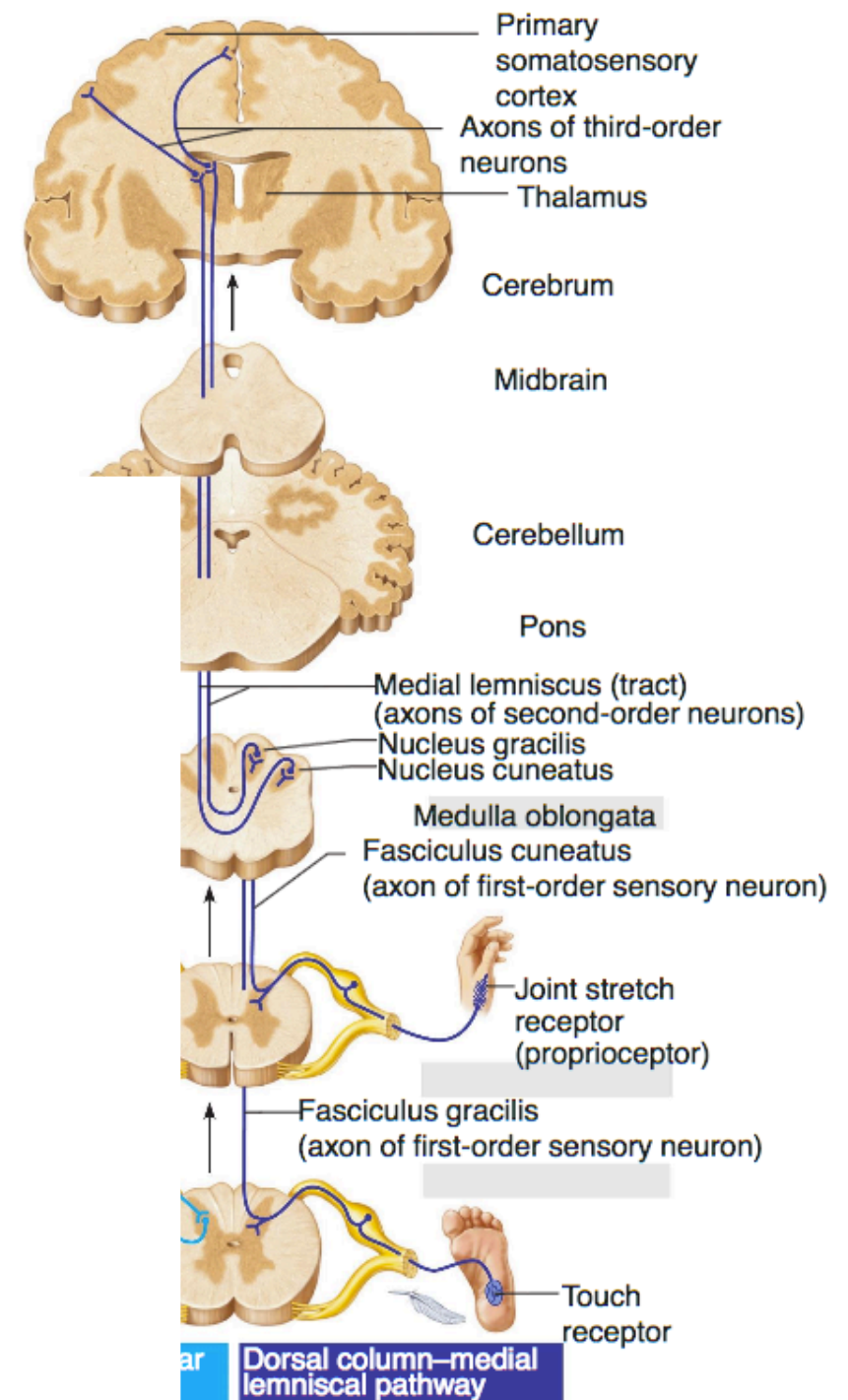


**BIOLOGICAL PSYCHOLOGY 7e, Figure 8.4**  
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# Dorsal column-medial lemniscus

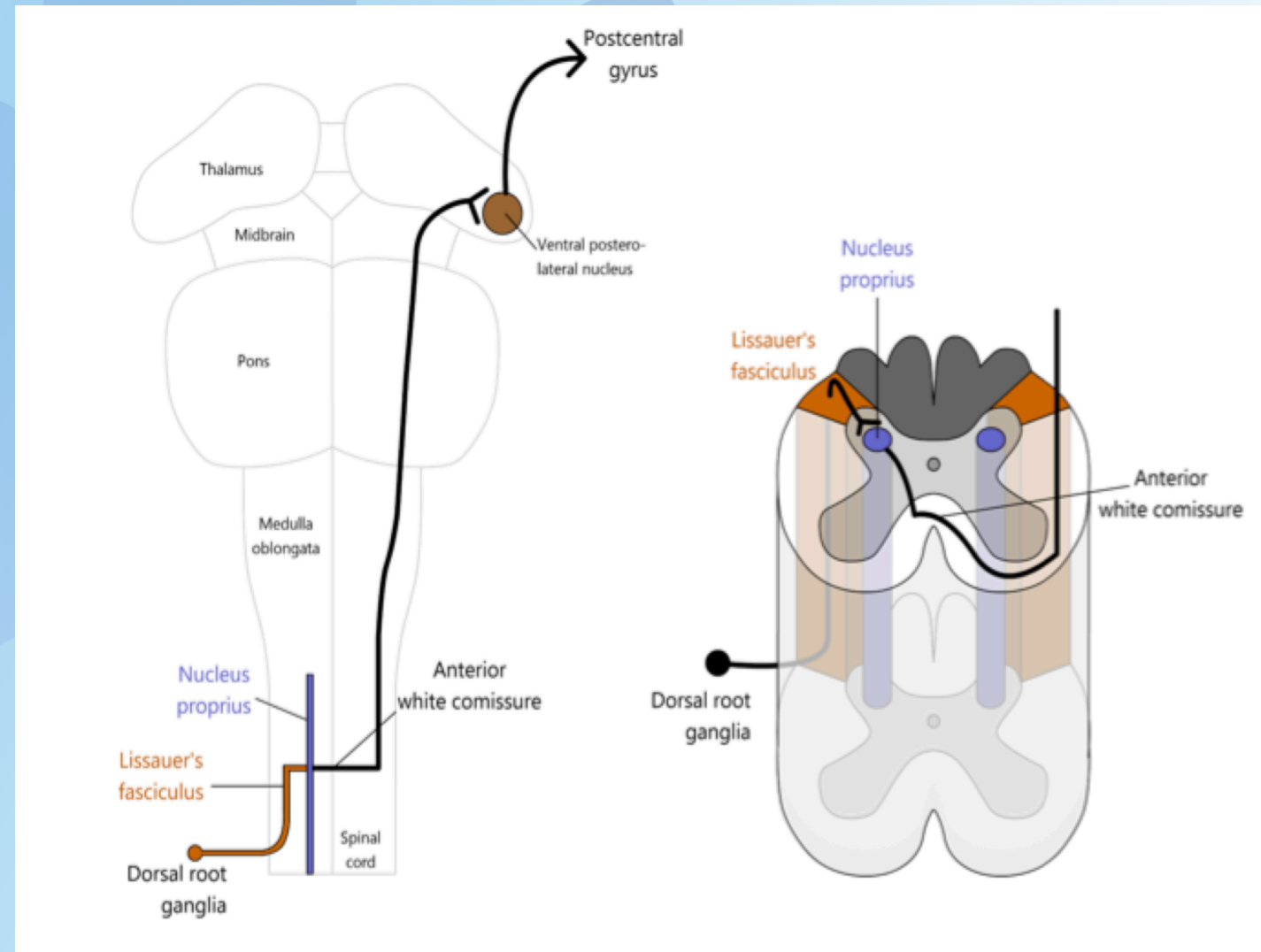
- Receives all information from
  - Merkel discs, Meissner corpuscles, Pacinian corpuscles, Ruffini endings
  - Muscles spindles and Golgi tendon organs
- Conscious proprioception
- Fine touch
- Vibration (Low and high)
- Pressure (deep and superficial)
- Two touch discrimination



# Spinothalamic tract

- Anterior spinothalamic
  - Crude touch
- Lateral spinothalamic
  - Temperature, pain, itching, sexual arousal

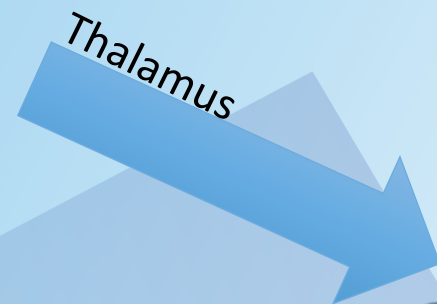
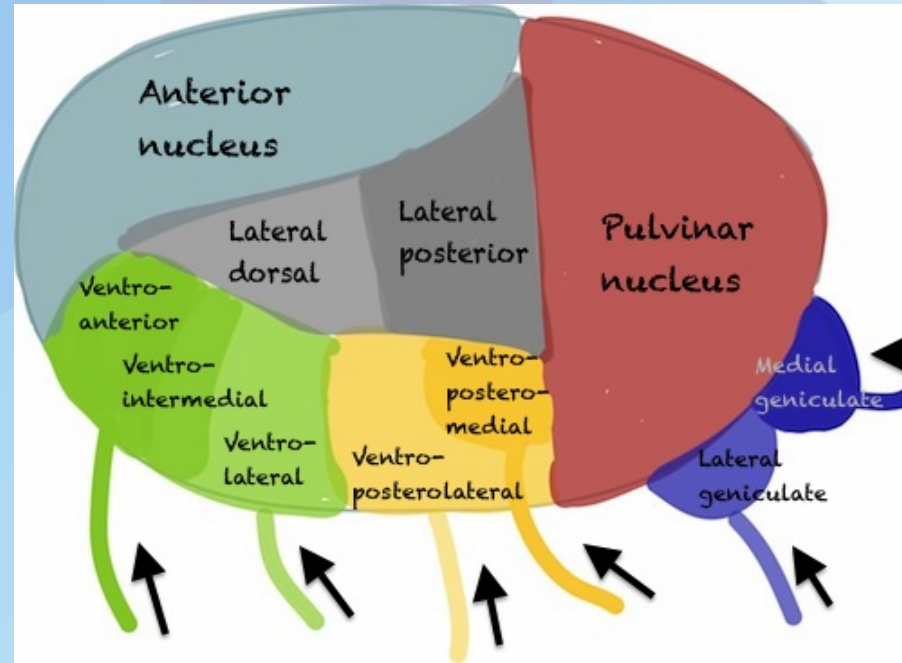
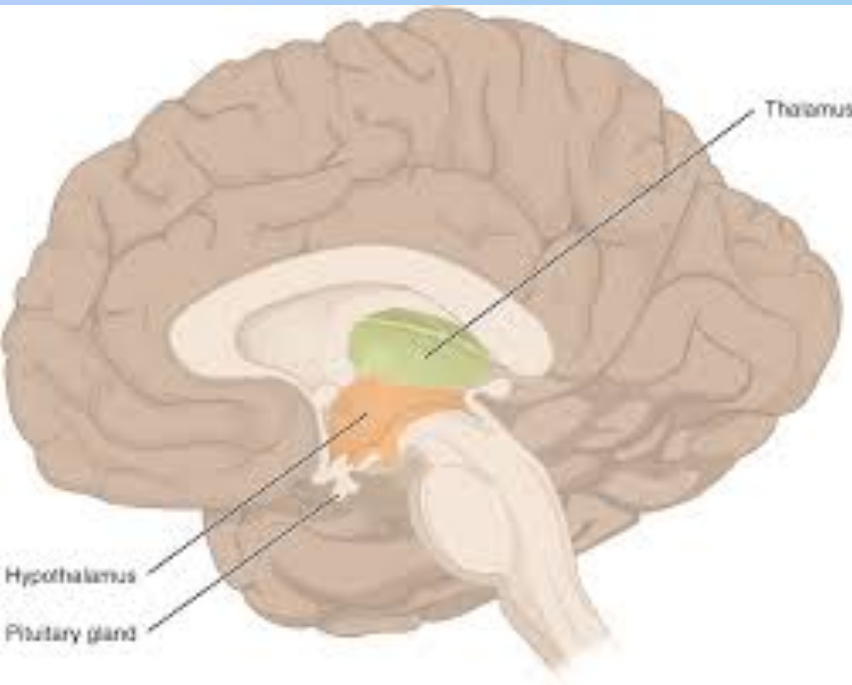
## Lateral spinothalamic tract





# Thalamus

- What is the Thalamus?
- Ventroposterolateral nucleus → Brodmann area 3,1,2



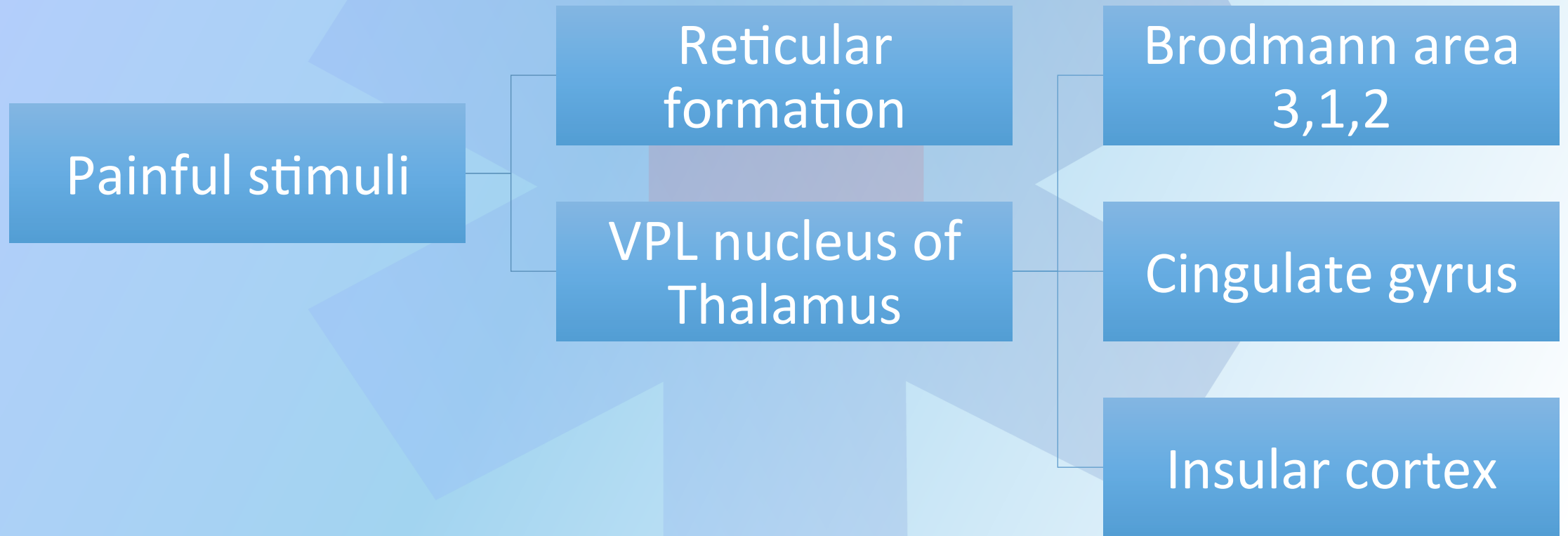
# Fast and slow pain

Fast pain	Slow pain
A $\delta$ fibers	C fibers
Myelinated	Unmyelinated
Glutamate	Substance P
Sharp, specific	Not sharp, dull, intense and diffuse
Terminates in VPL nucleus of Thalamus	75-90% terminates in the reticular formation

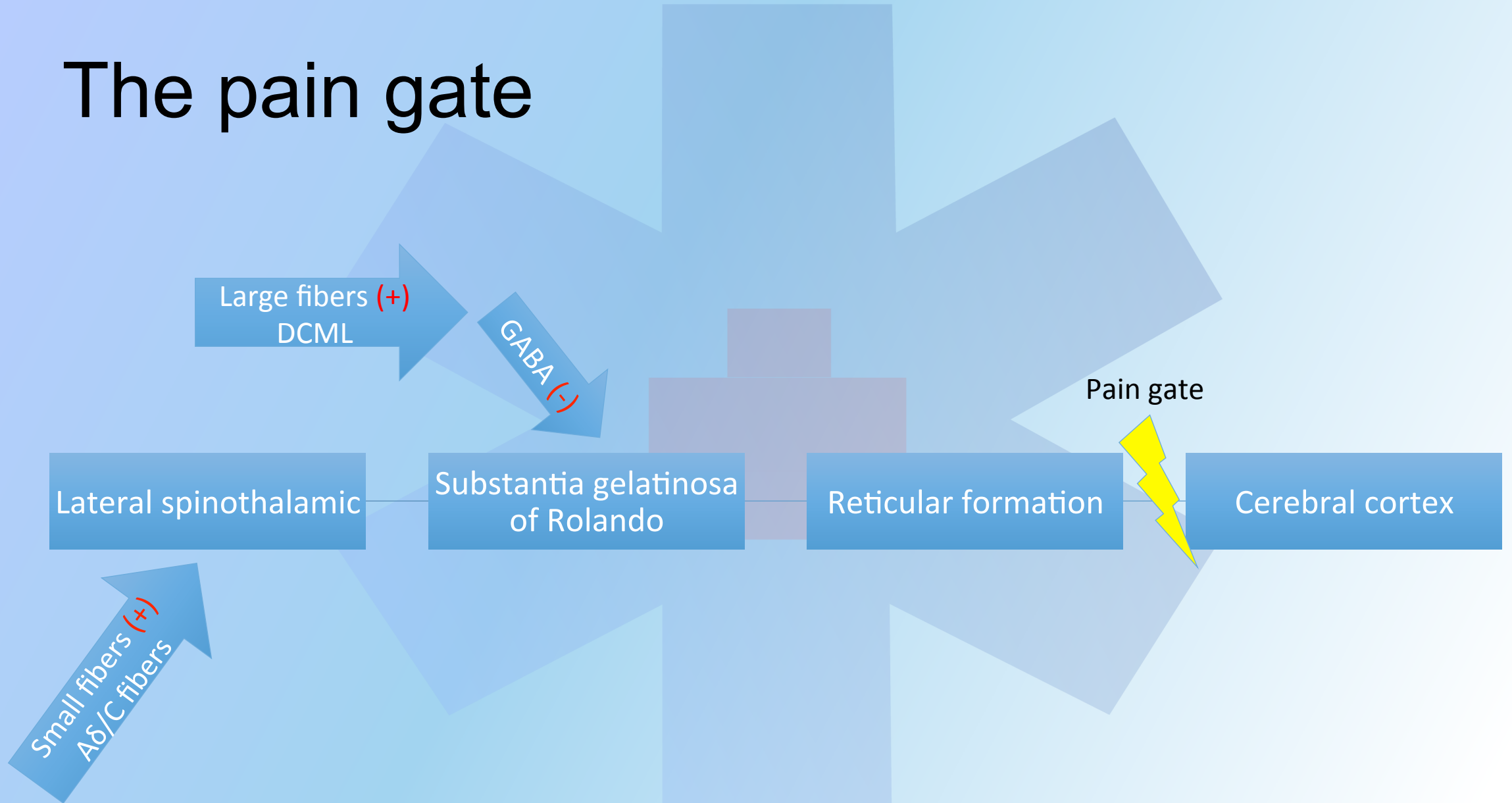
VR-1/TRPV-1	VRL-1
High temperatures (above 43C)	High temperatures (above 43C)
H <sup>+</sup> change	H <sup>+</sup> change
Capsaicins	

\*Nociceptors called free nerve endings

# Interpretation of pain

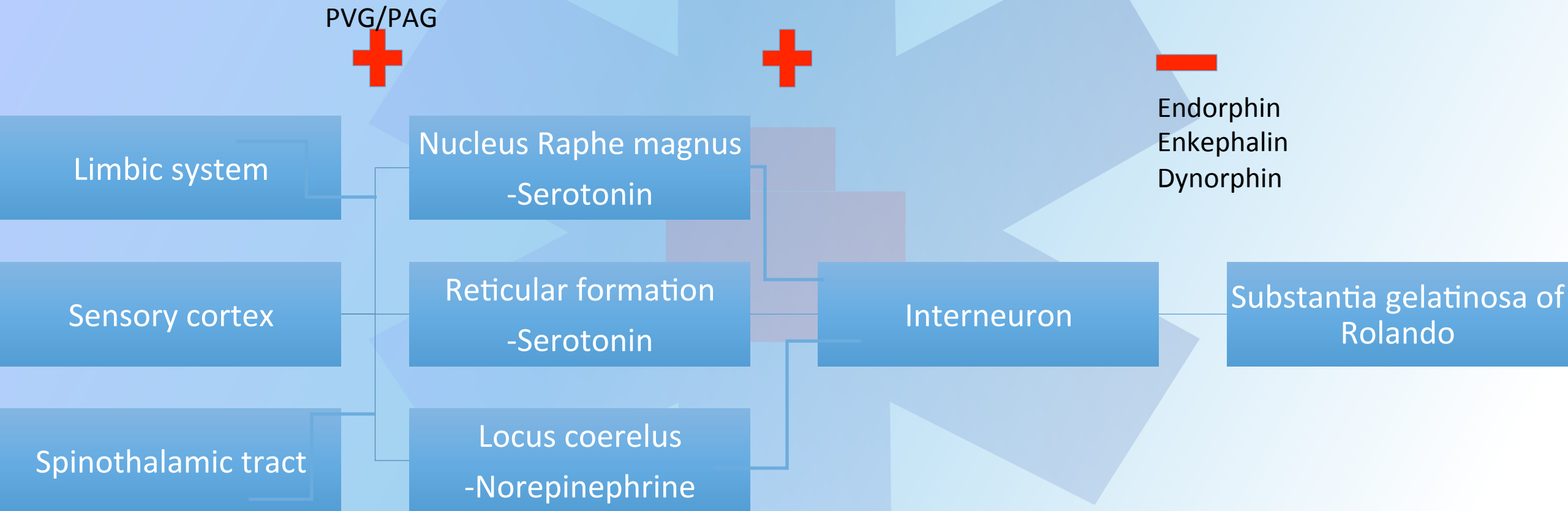


# The pain gate



# Descending analgesic system

=Pain relieving



PVG = Periventricular gray matter  
PAG = Periaqueductal gray matter



Thank you for me

