

Sensory system

Somatosensory Axis of the Nervous System

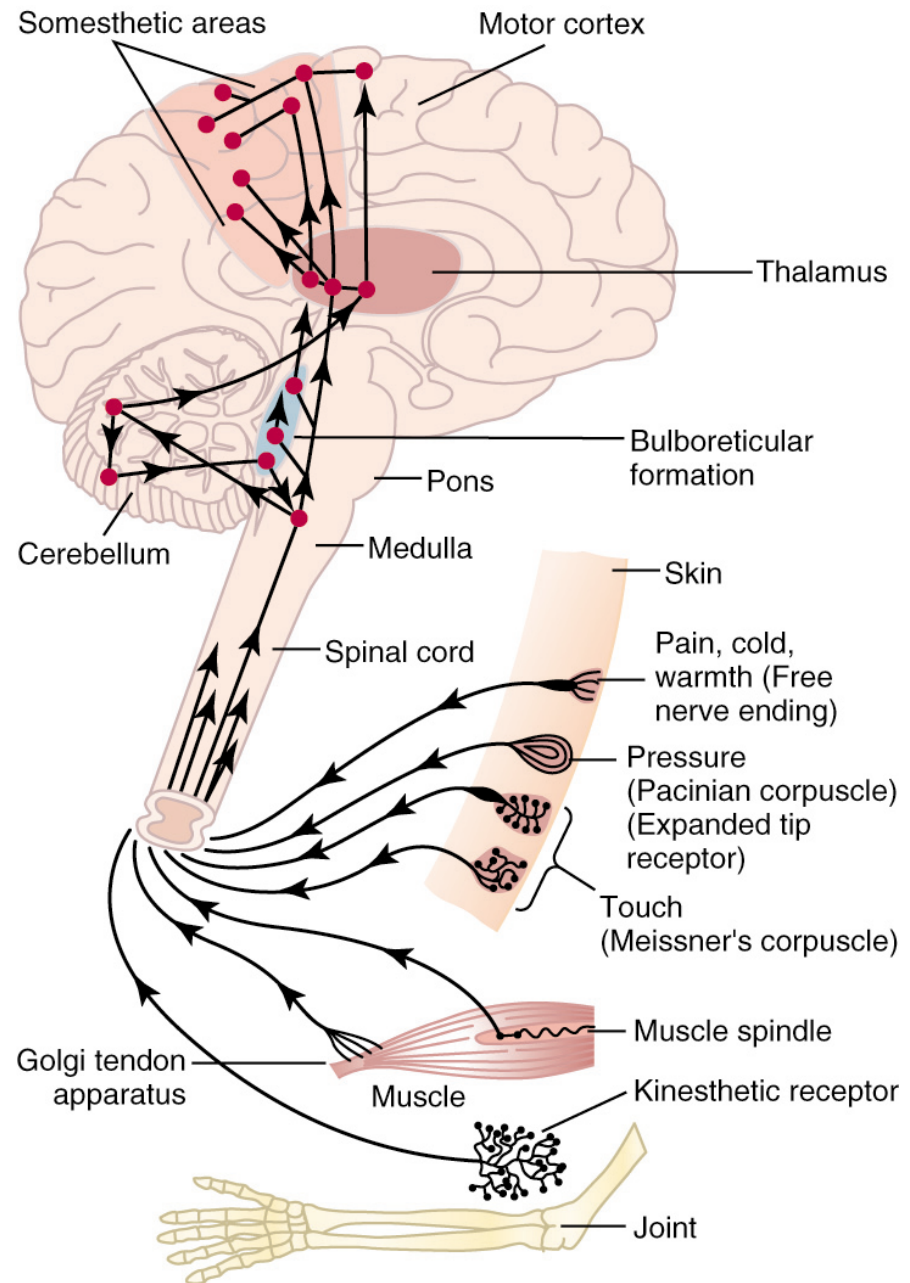
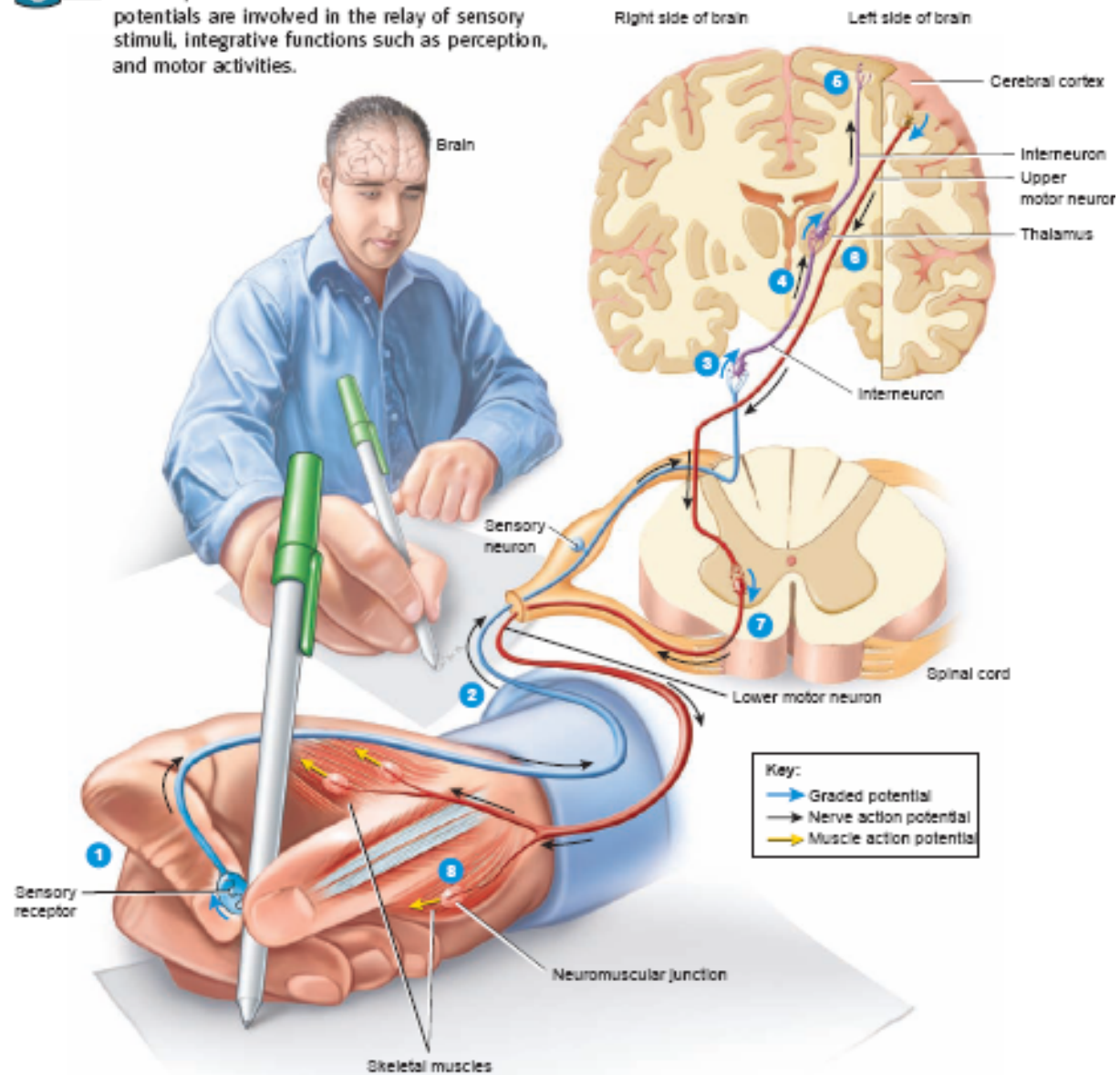


Figure 45-2

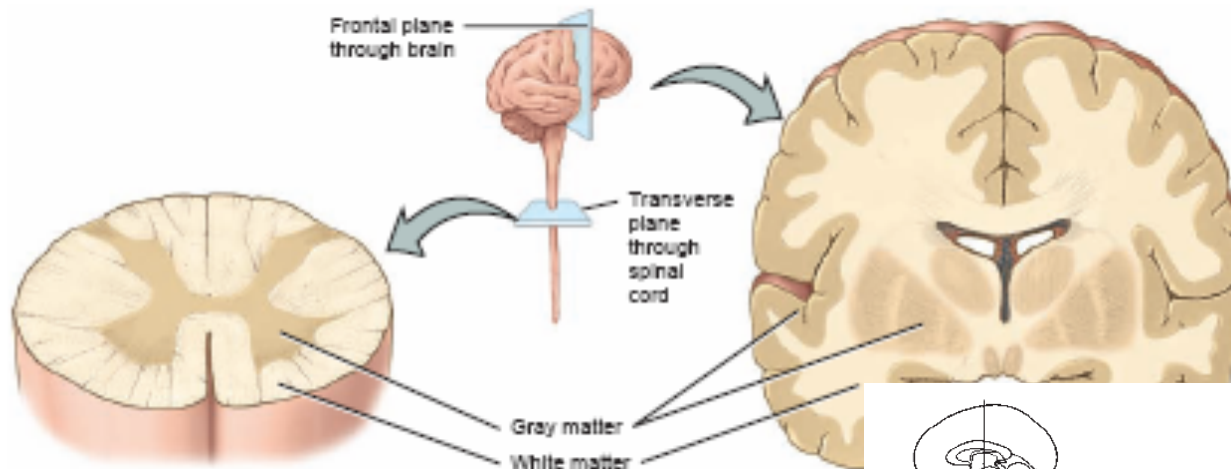
Figure 12.11 Overview of nervous system functions.



Graded potentials and nerve and muscle action potentials are involved in the relay of sensory stimuli, integrative functions such as perception, and motor activities.



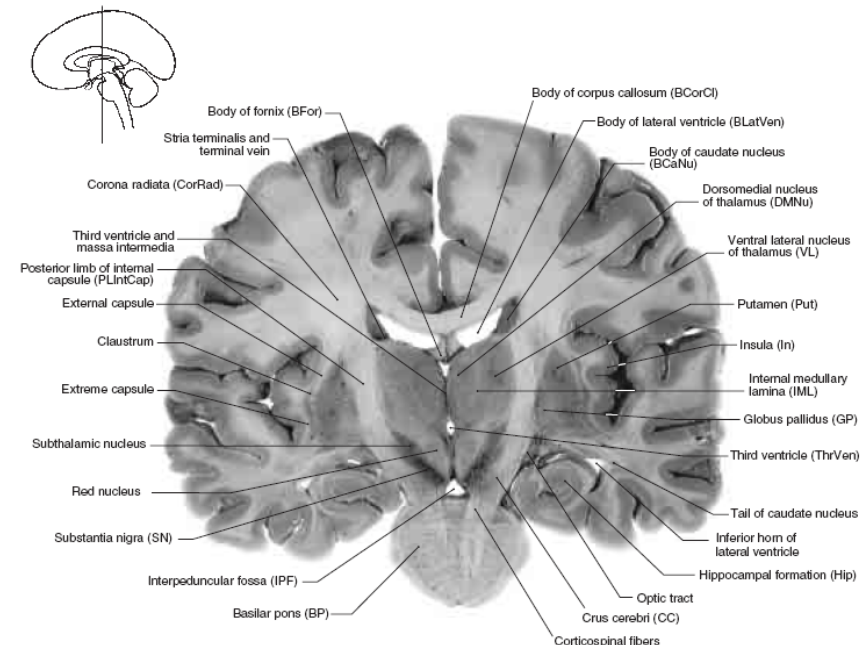
Nervous tissue



(a) Transverse section of spinal cord

Gray matter : neuron cells

White matter: myelinated axons



Types of sensation

- types of sensations
 - Somatic sensation
 - Special senses
 - Smell, taste, vision etc

Sensations receptors

Types of Sensory Receptors

- Mechanoreceptors
 - detect deformation
- Thermoreceptors
 - detect change in temperature
- Nociceptors
 - detect damage (pain receptors)
- Electromagnetic
 - detect light
- Chemoreceptors
 - taste, smell

Classification of Somatic Sensations

- mechanoreceptive - stimulated by mechanical displacement.
 - tactile
 - touch
 - pressure
 - vibration
 - tickle and itch
 - position or proprioceptive
 - static position
 - rate of change

Classification of Somatic Sensations

- thermoreceptive.
 - detect heat and cold.
- nociceptive.
 - detect pain and are activated by any factor that damages tissue.

Line Theory of Sensation

Receptor Excitation

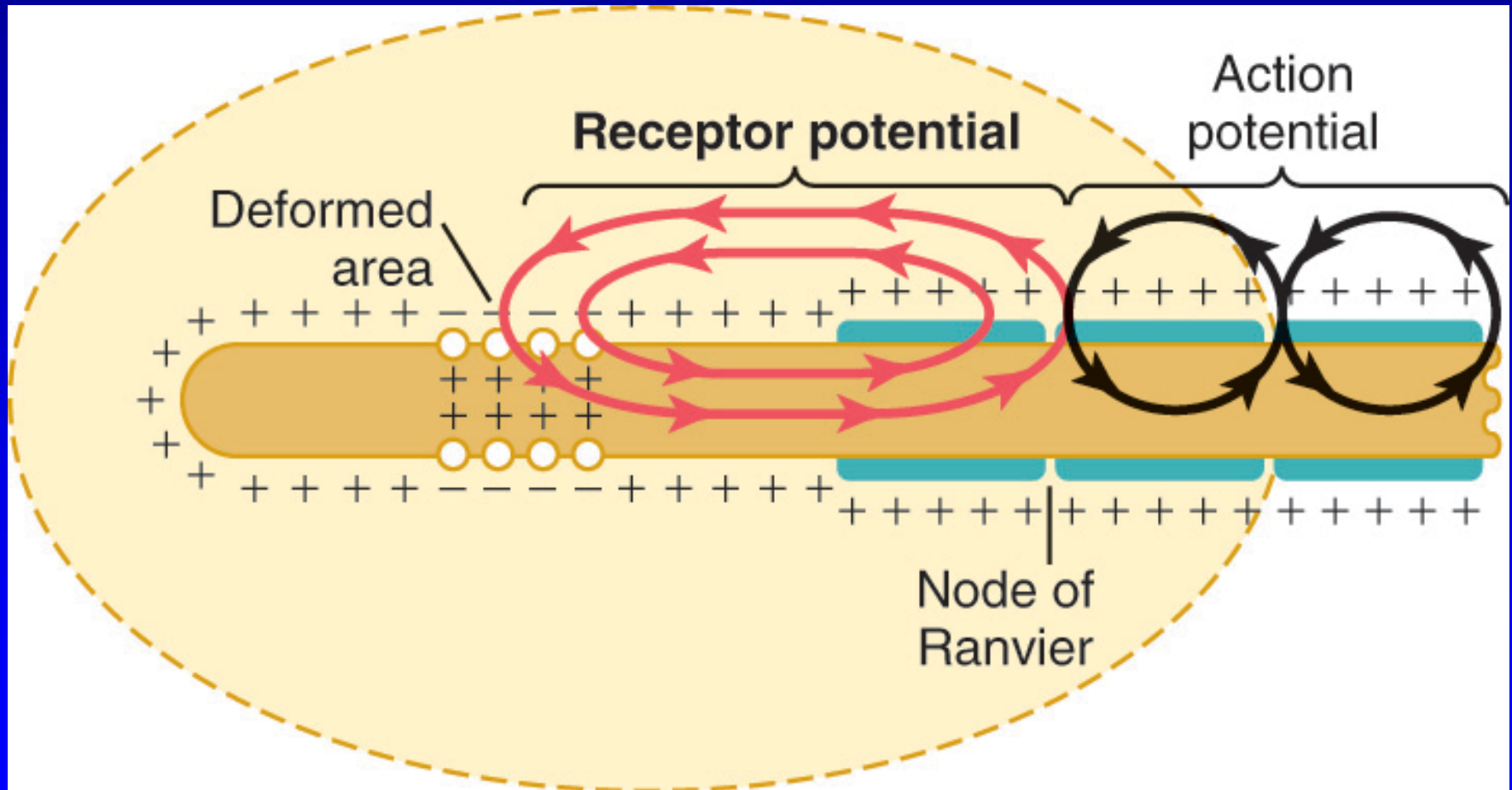


Figure 46-03

Receptor Potential

- the membrane potential of the receptor.
 - excitation of the receptor results from a change in this potential.
 - when the receptor potential rises above the threshold, action potentials appear and the receptor is active.
 - the greater the intensity of the stimulus, the greater the receptor potential, and the greater the rate of action potential generation.

Relationship between receptor potential and action potentials

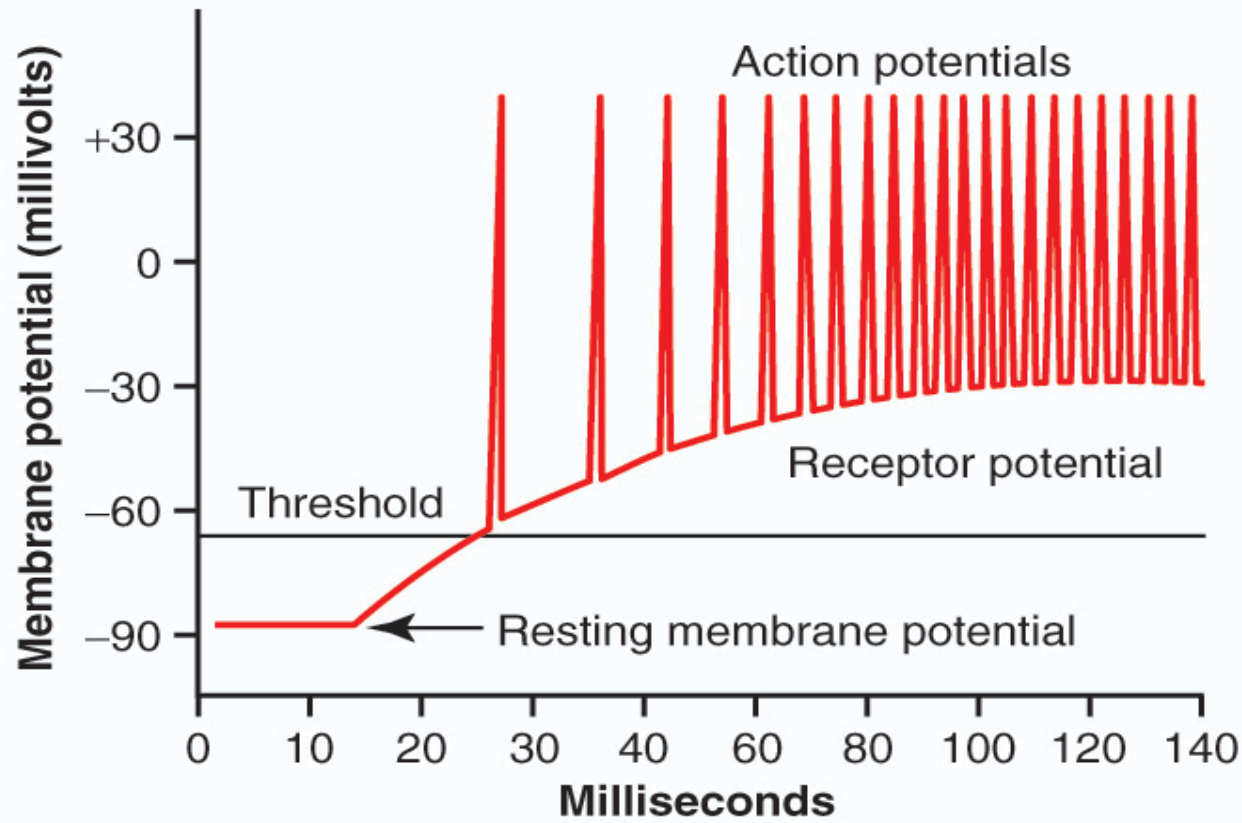
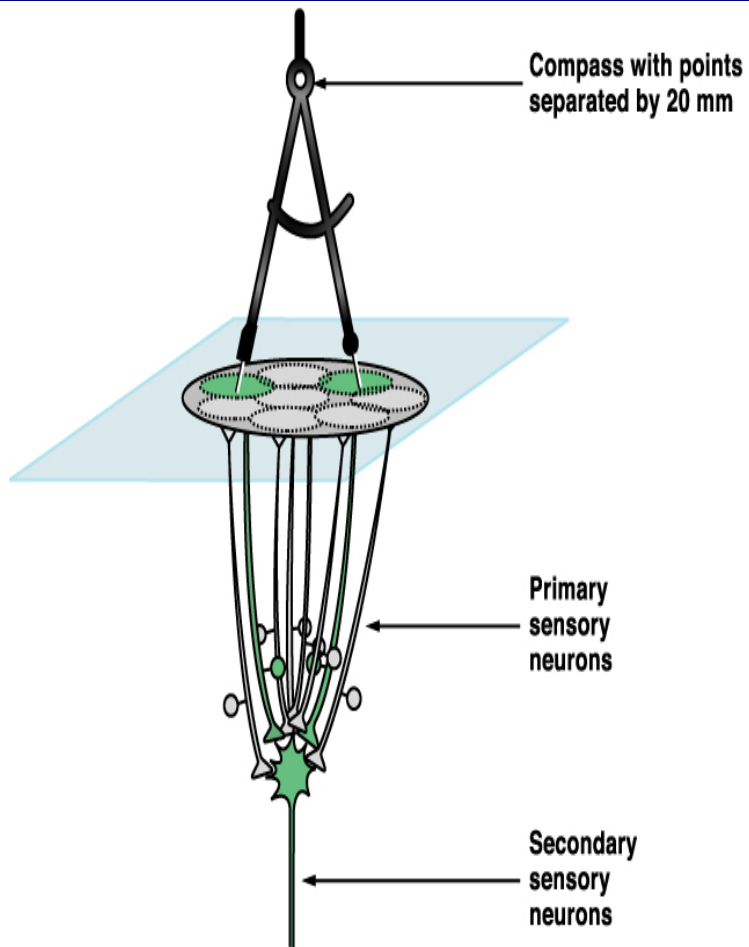
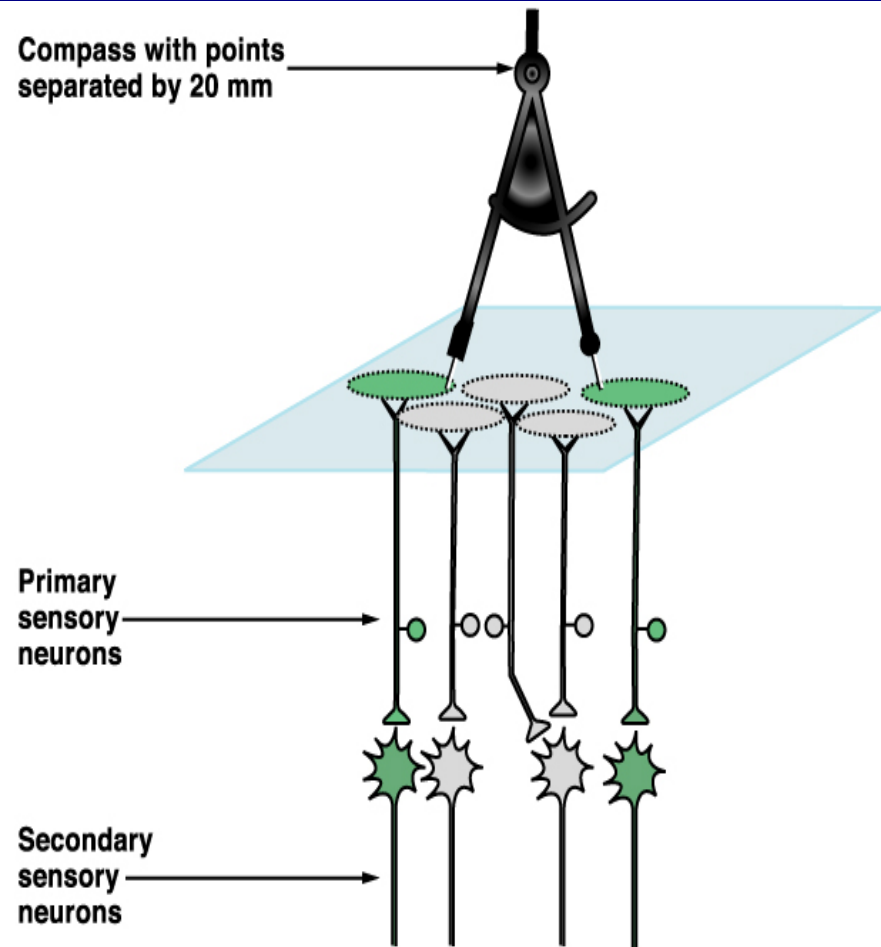


Figure 46-2



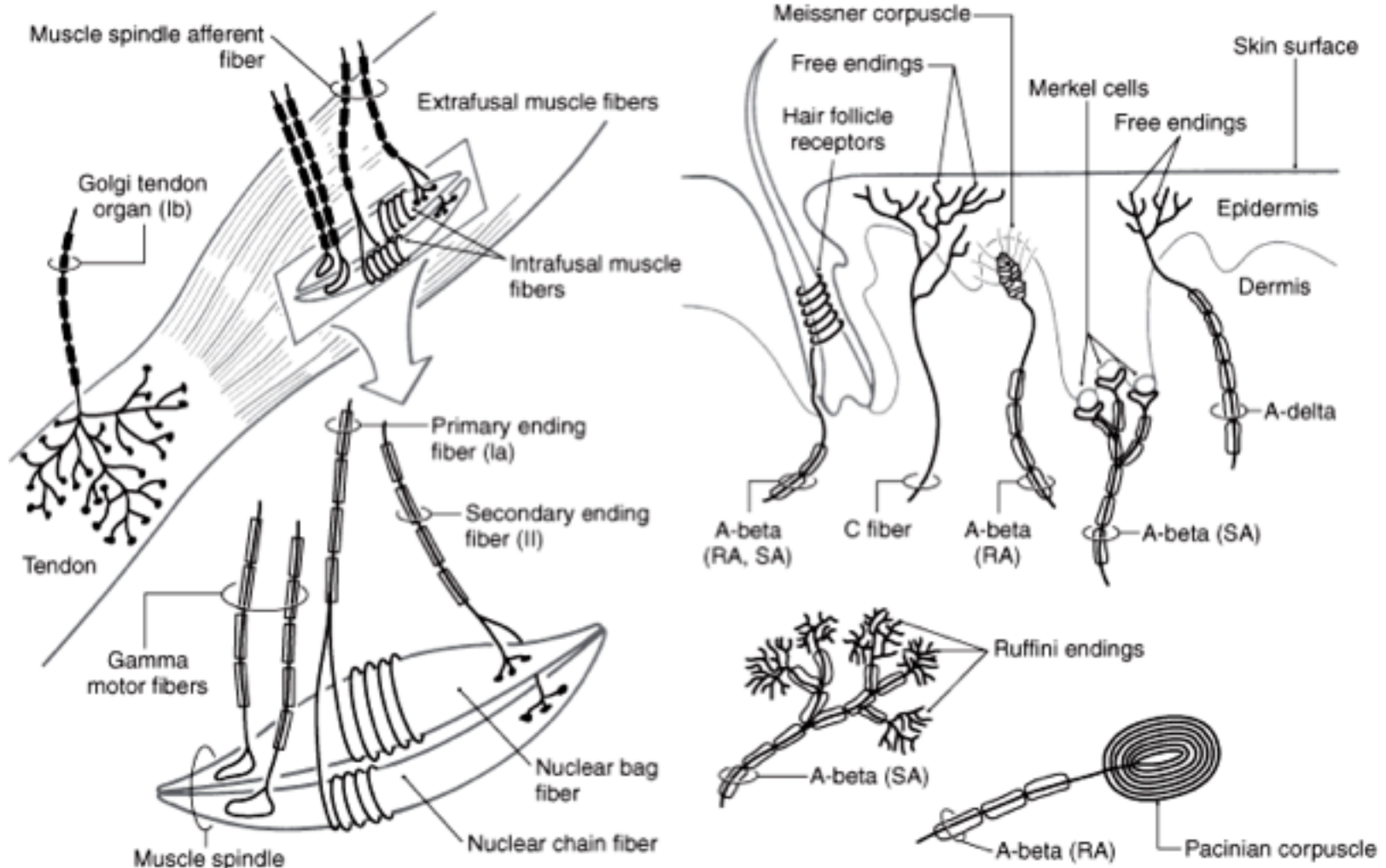
One signal goes to the brain

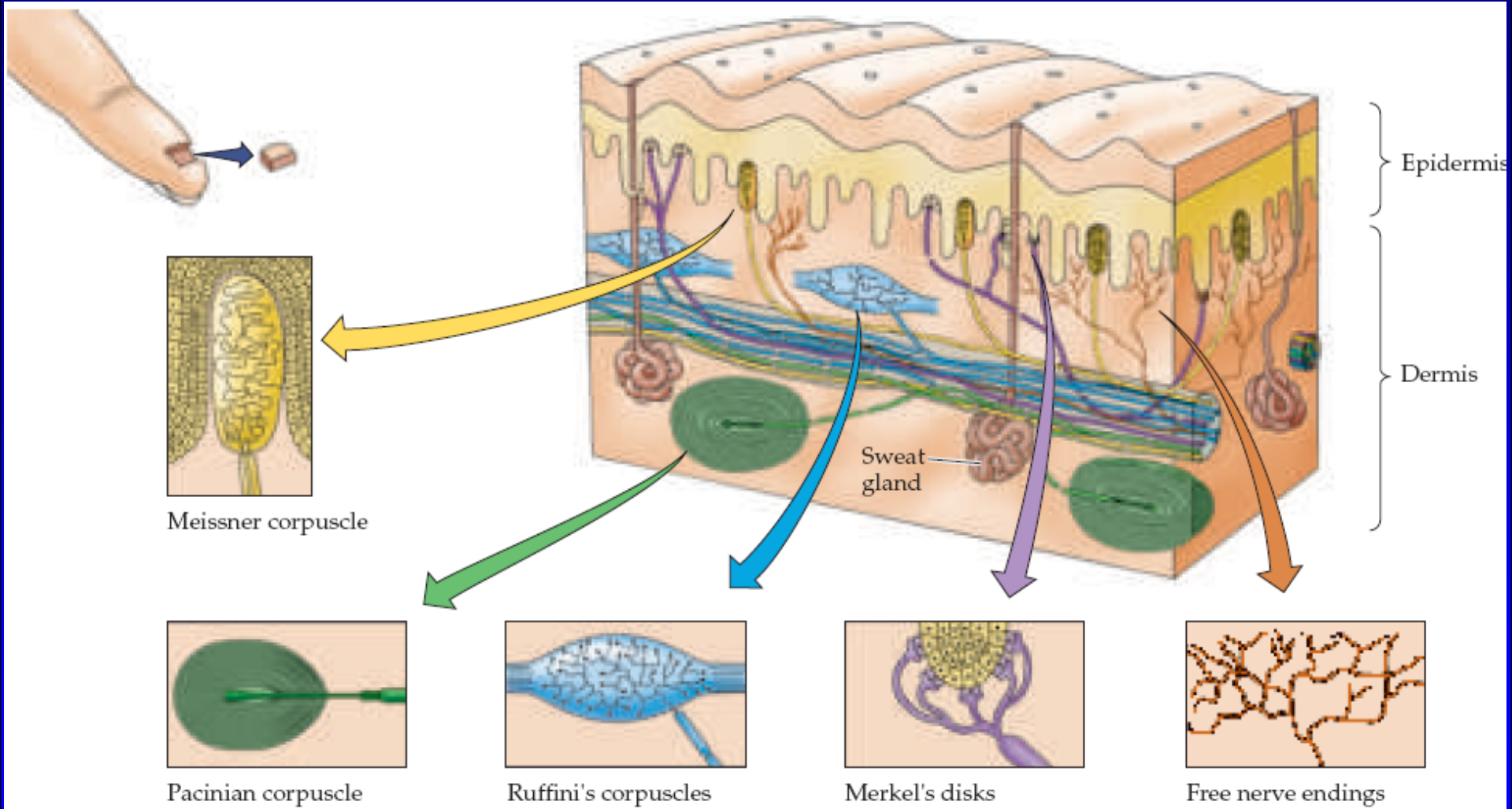


Two signals go to the brain

Physiology of somato-sensory

Sensations receptors

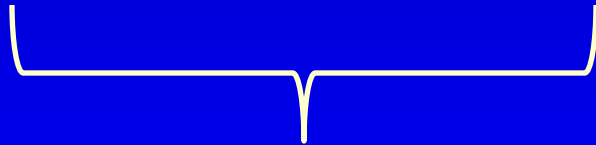




Somato-sensory modalities

Fast

- 2-point discrimination
- Vibration
- Proprioception



**Posterior Column-Medial
lemniscus**

**Pathway
(PCML)**

Slow

- Crud touch (itch & rub)
- Temperature
- Pain

Sensations modalities

Fast

- 2-point discrimination
- Vibration
- Proprioception

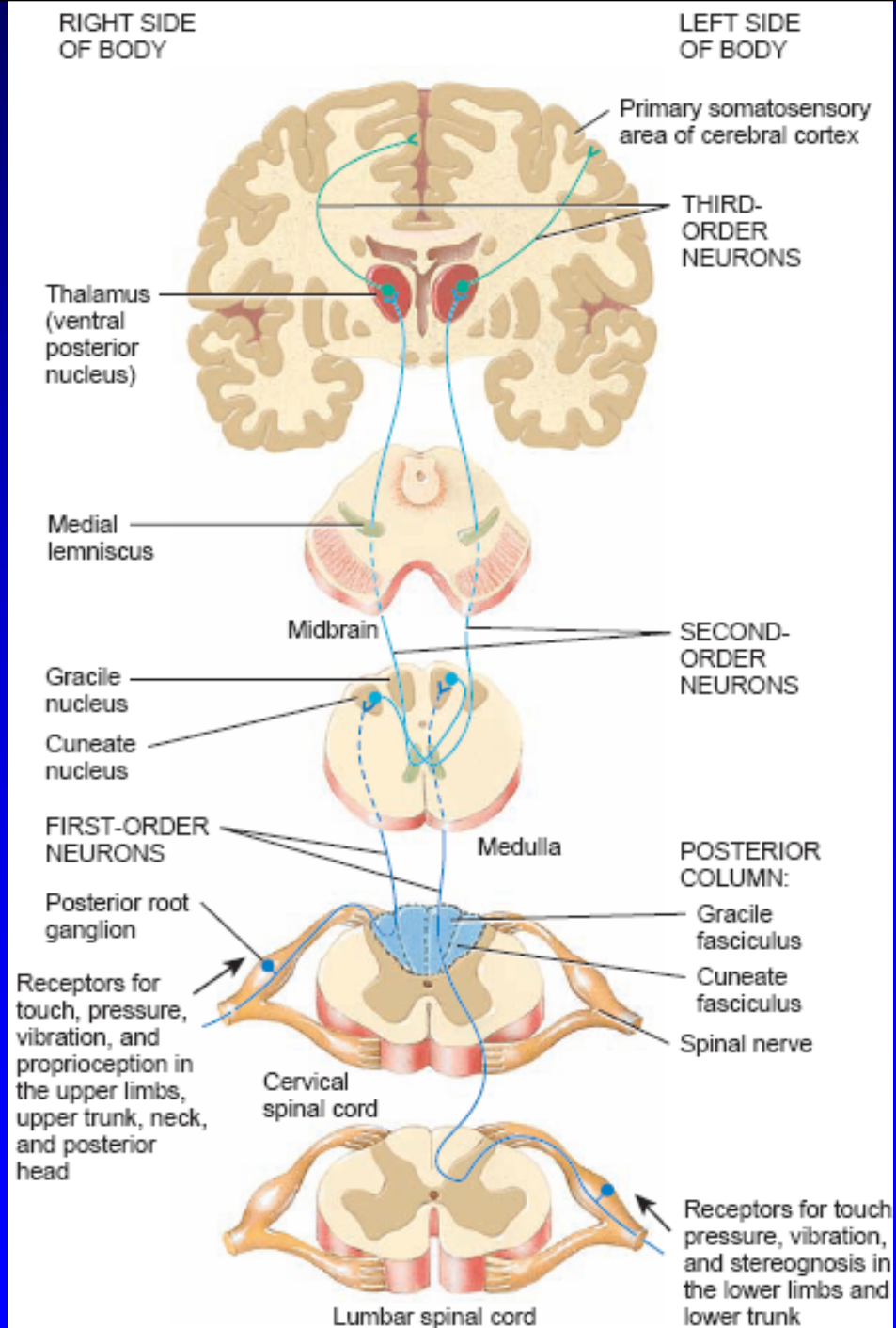
Slow

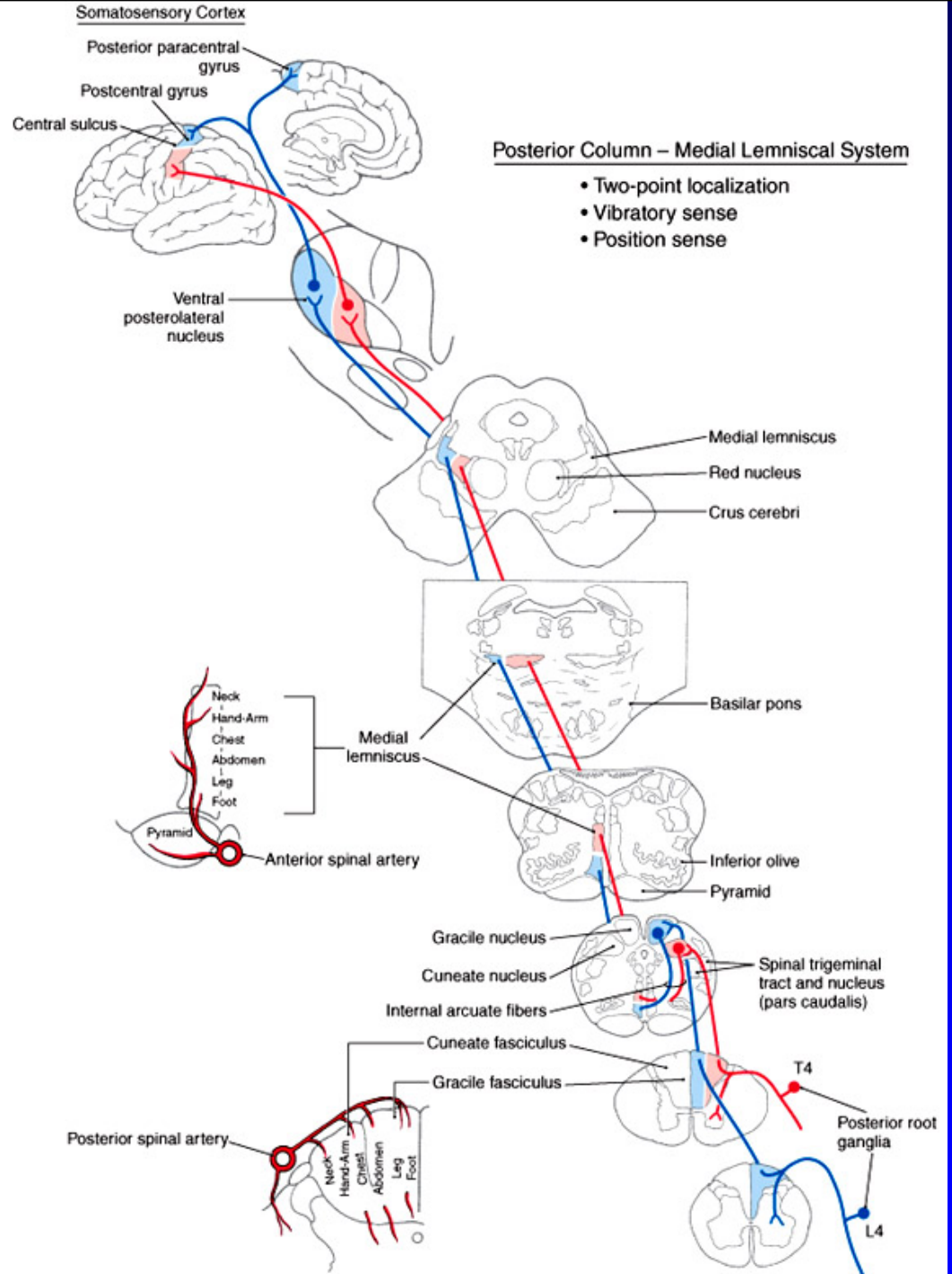
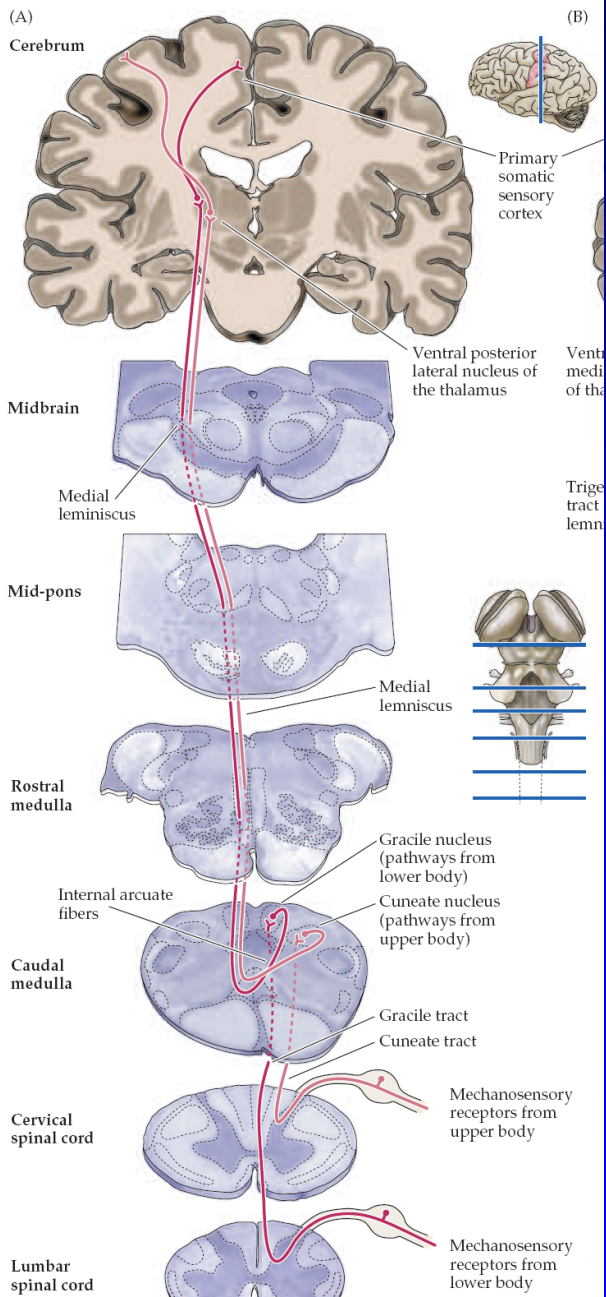
- Temperature
- Crud touch (itch & rub)
- Pain



Antero-lateral system (ALS)
Other name: Spinothalamic
pathway

Posterior Column-Medial lemniscus Pathway (PCML)





Central sulcus

PRIMARY SOMATOSENSORY
AREA (postcentral gyrus)

SOMATOSENSORY
ASSOCIATION AREA

Parietal lobe

COMMON
INTEGRATIVE
AREA

WERNICKE'S AREA

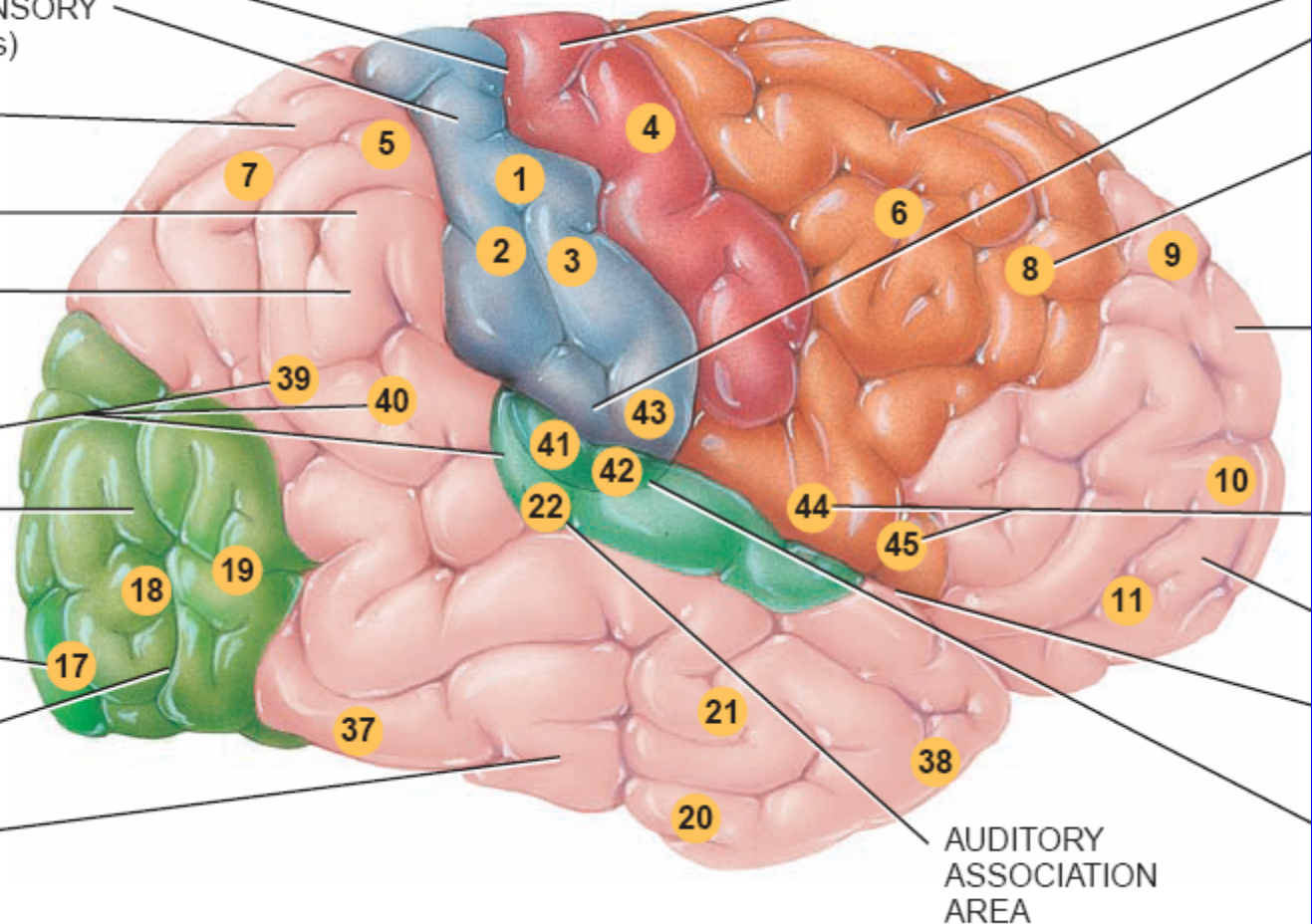
VISUAL
ASSOCIATION
AREA

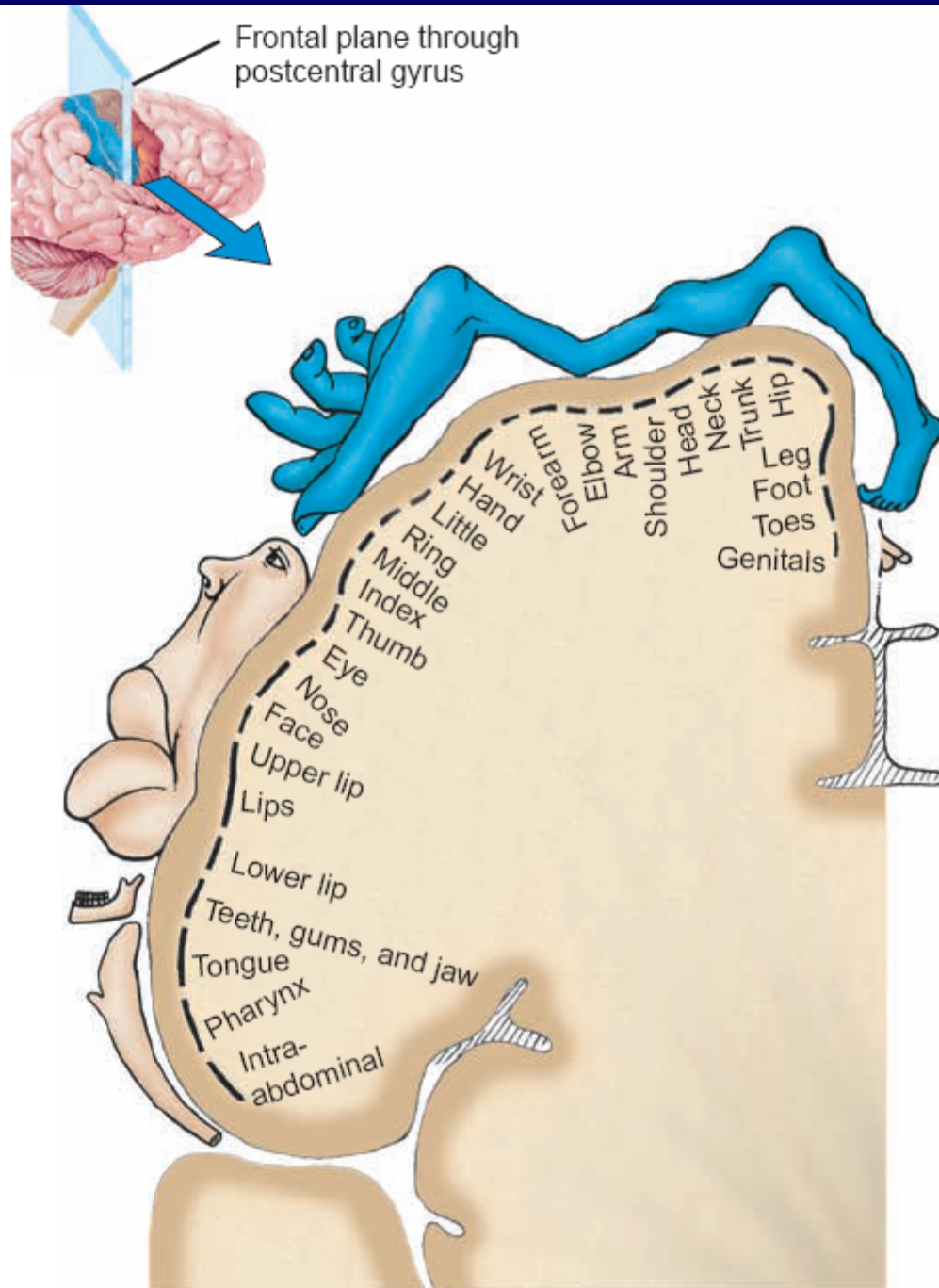
PRIMARY
VISUAL
AREA

Occipital lobe

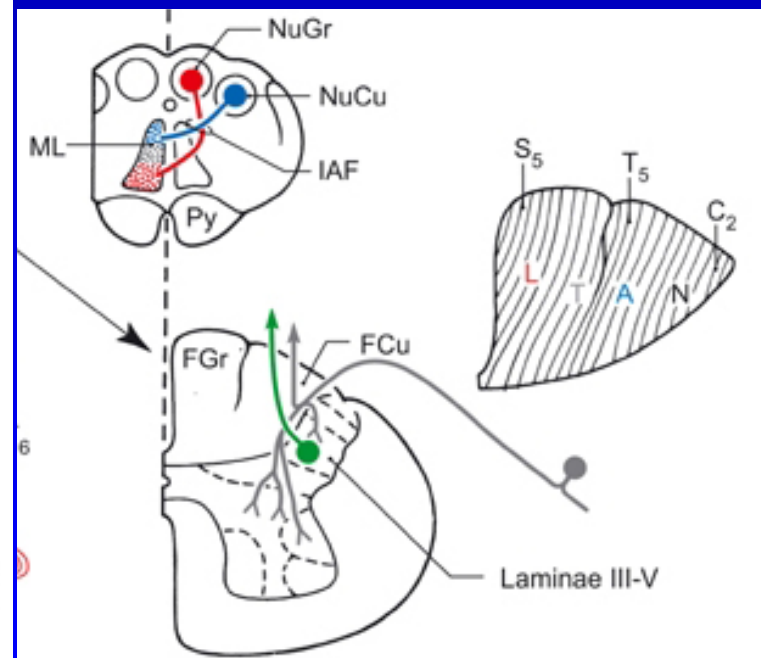
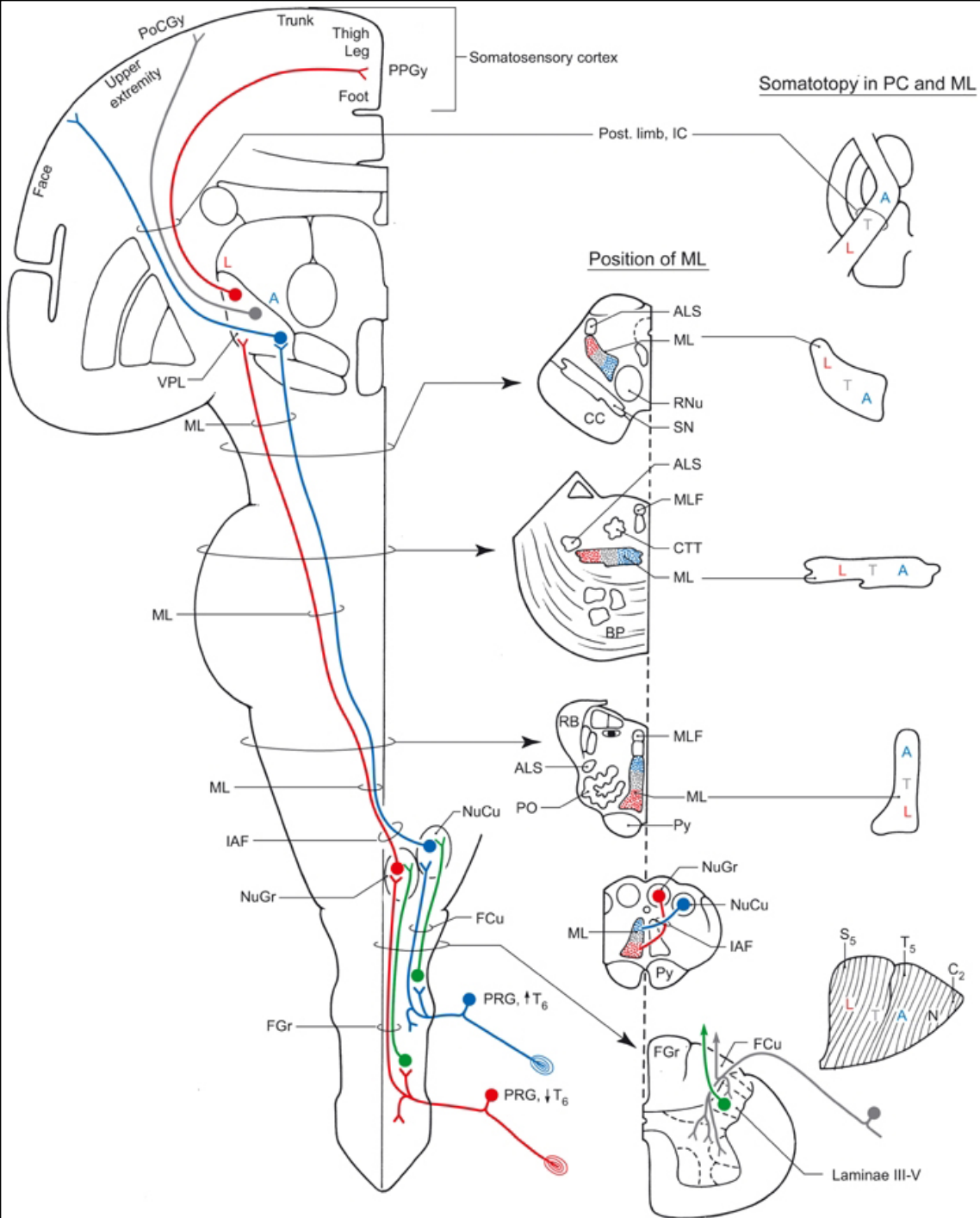
Temporal lobe

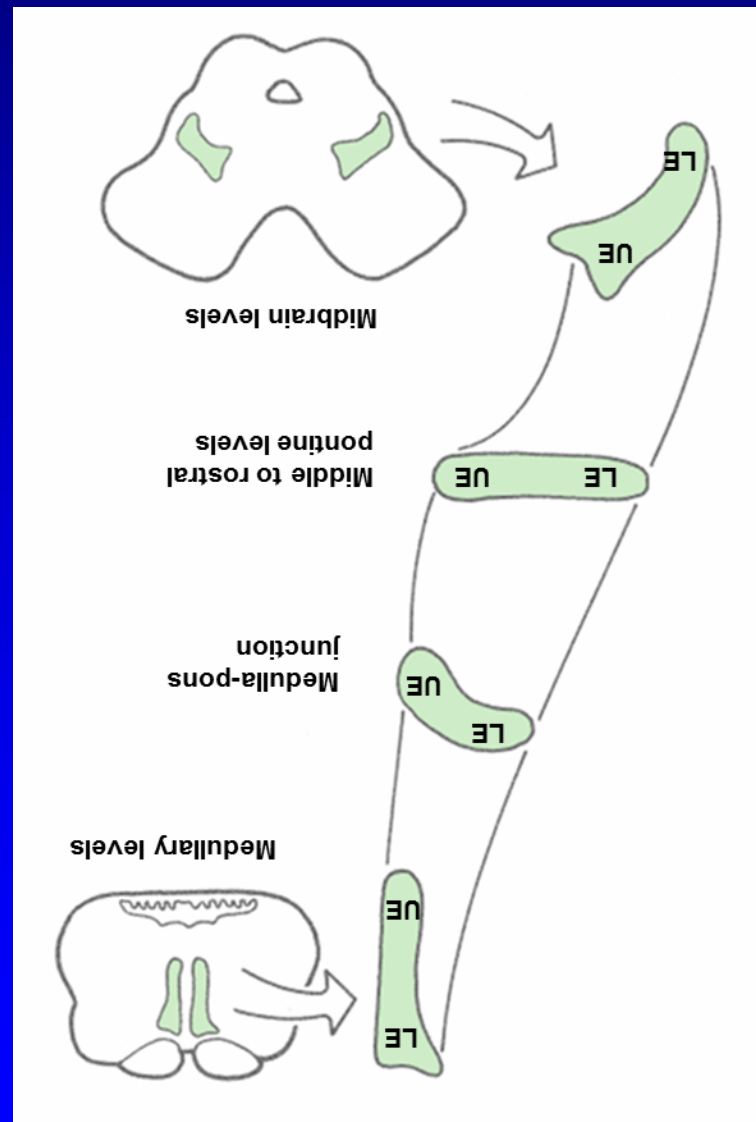
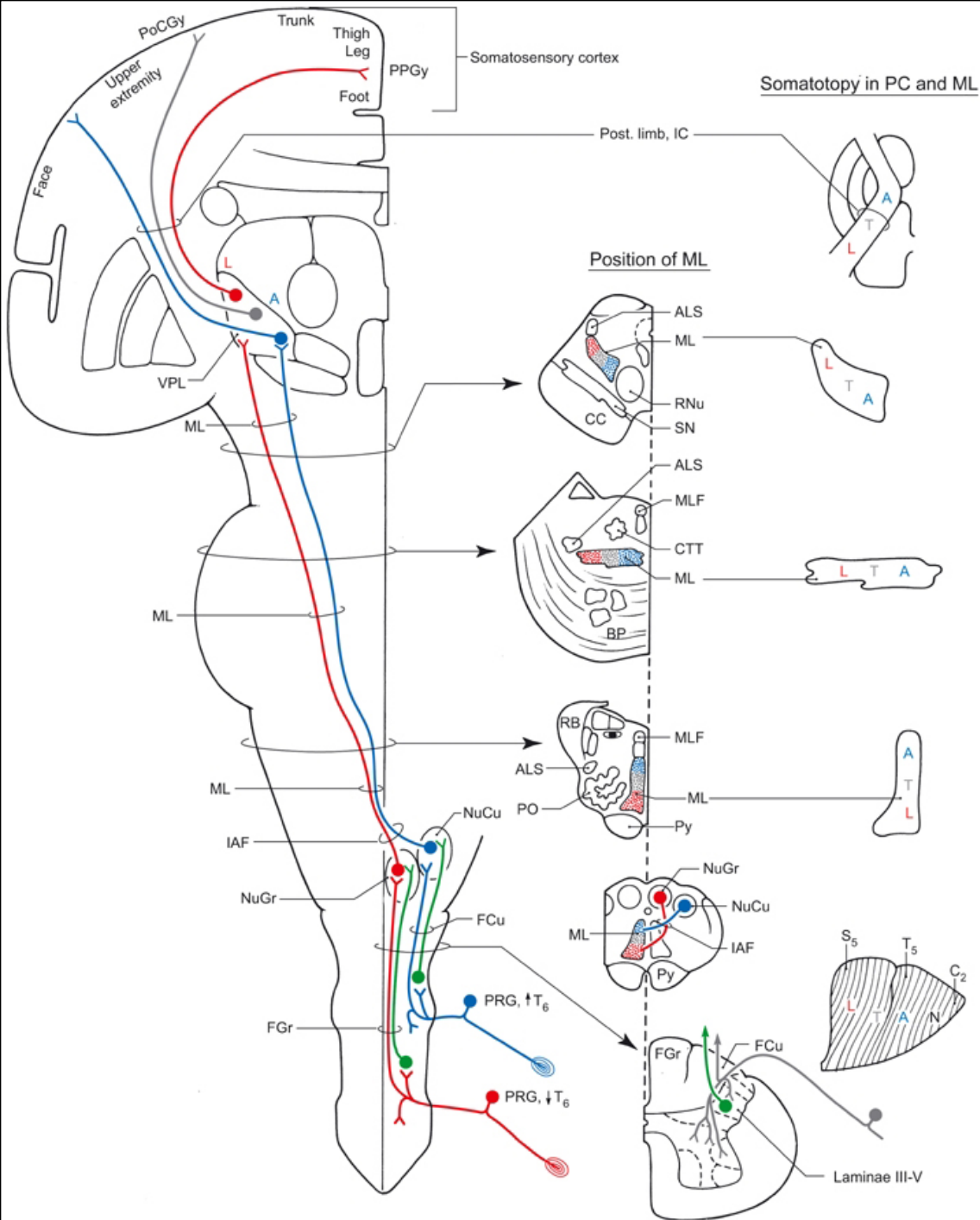
POSTERIOR





Somatotopic organization of (PCML)





PCML Function

- 2-point discrimination
- Vibration
- Proprioception

❖ **STEREOGNOSIS**

❖ **GRAPHESTHESIA**

❖ **Help in movement and Weight
recognition**

PCML lesion associated symptoms

- Loss of 2-point discrimination sensation
- loss of Vibration sensation
- Loss Proprioception sensation

❖ **ASTEREOGNOSIS / STEREOGNOSIA**

❖ **AGRAPHESIA**

❖ **ABAROGNOSIS**

❖ **SENSORY ATAXIA**

Antero-lateral system (ALS)

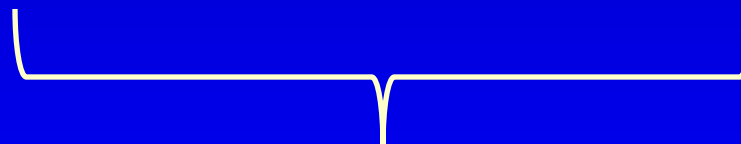
Sensations modalities

Fast

- 2-point discrimination
- Vibration
- Proprioception

Slow

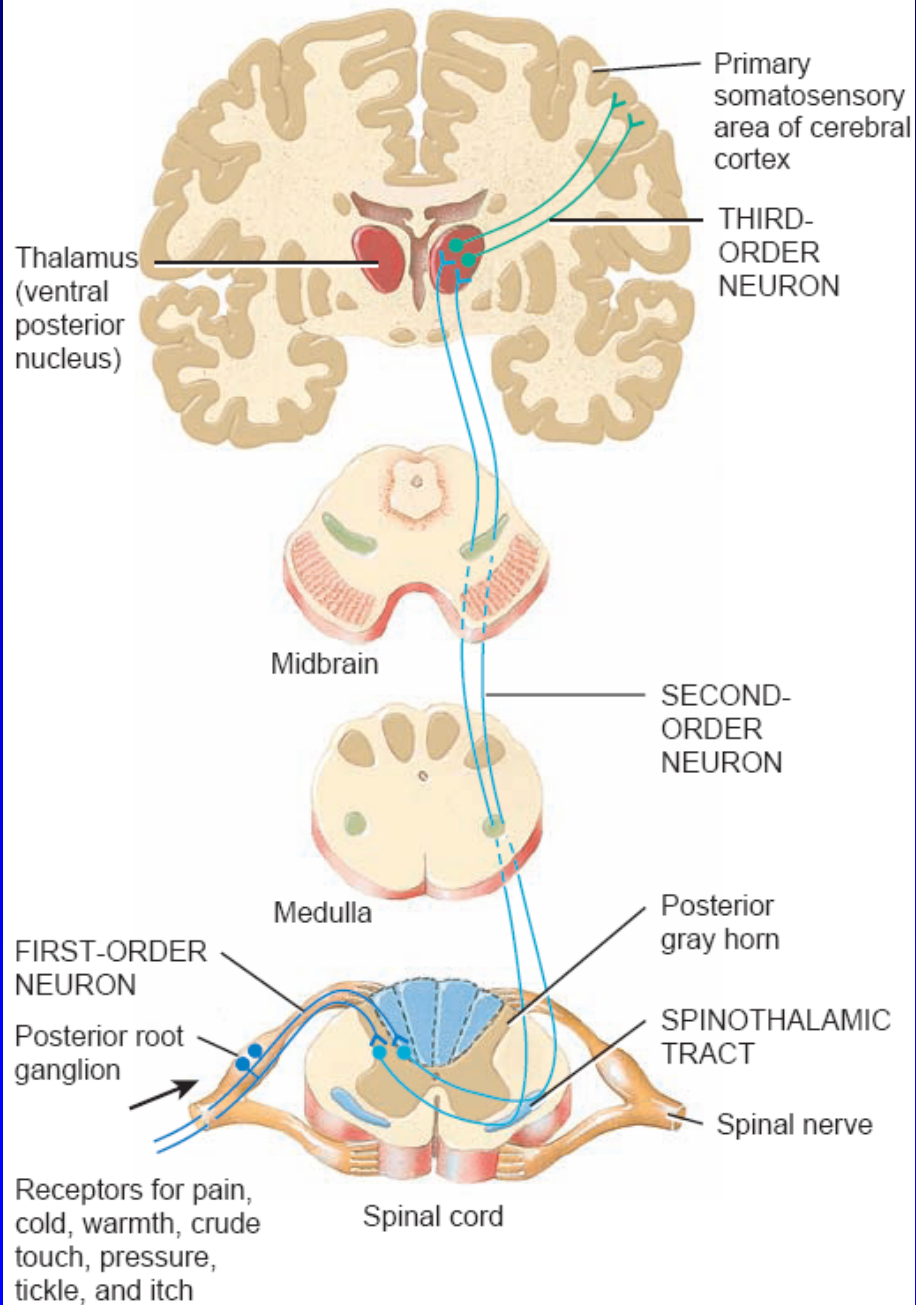
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- Crud touch (itch & rub)
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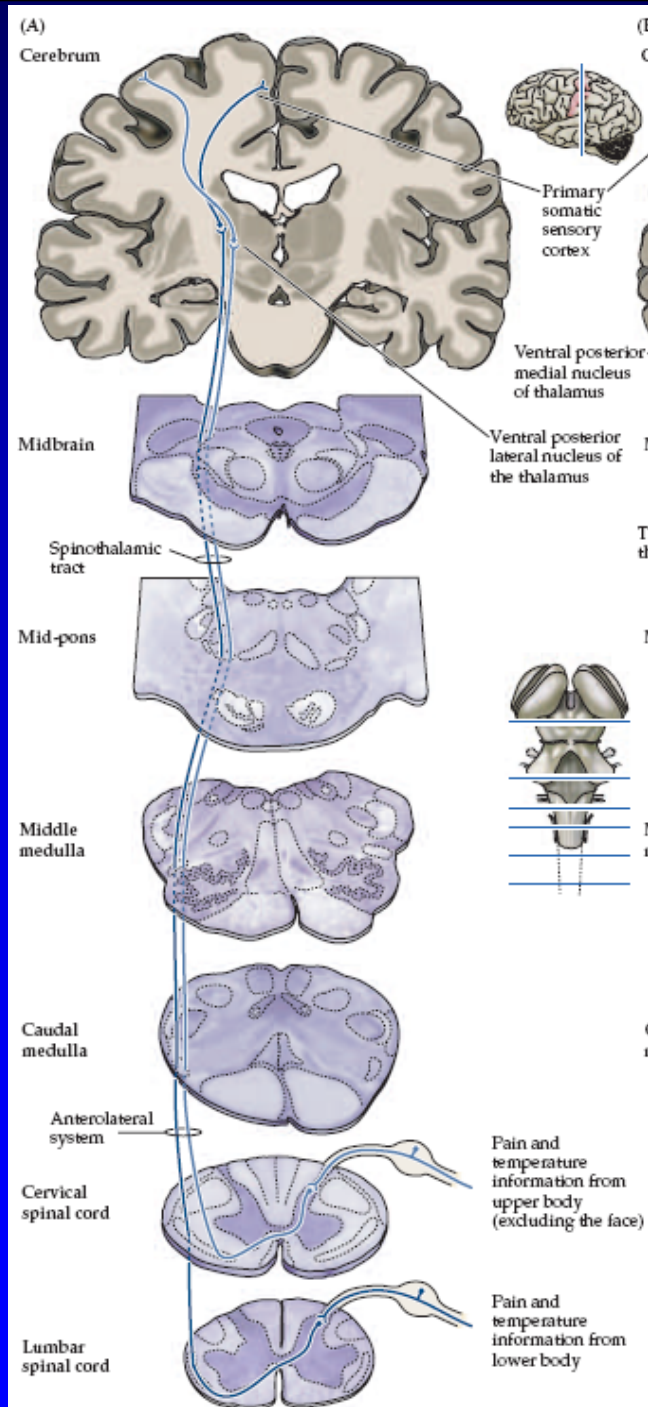


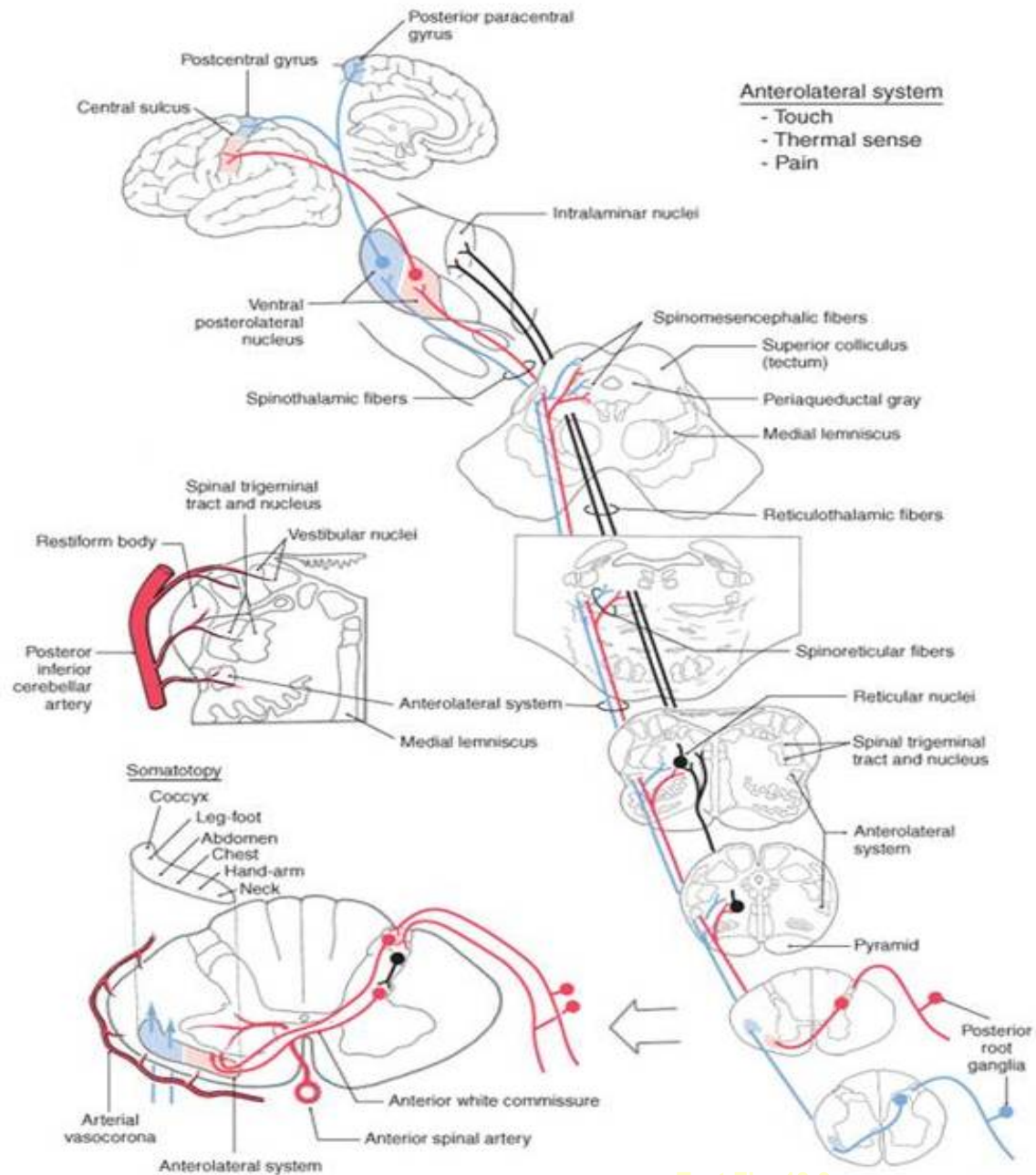
Antero-lateral system (ALS)
**Other name: Spinothalamic
pathway**

RIGHT SIDE
OF BODY

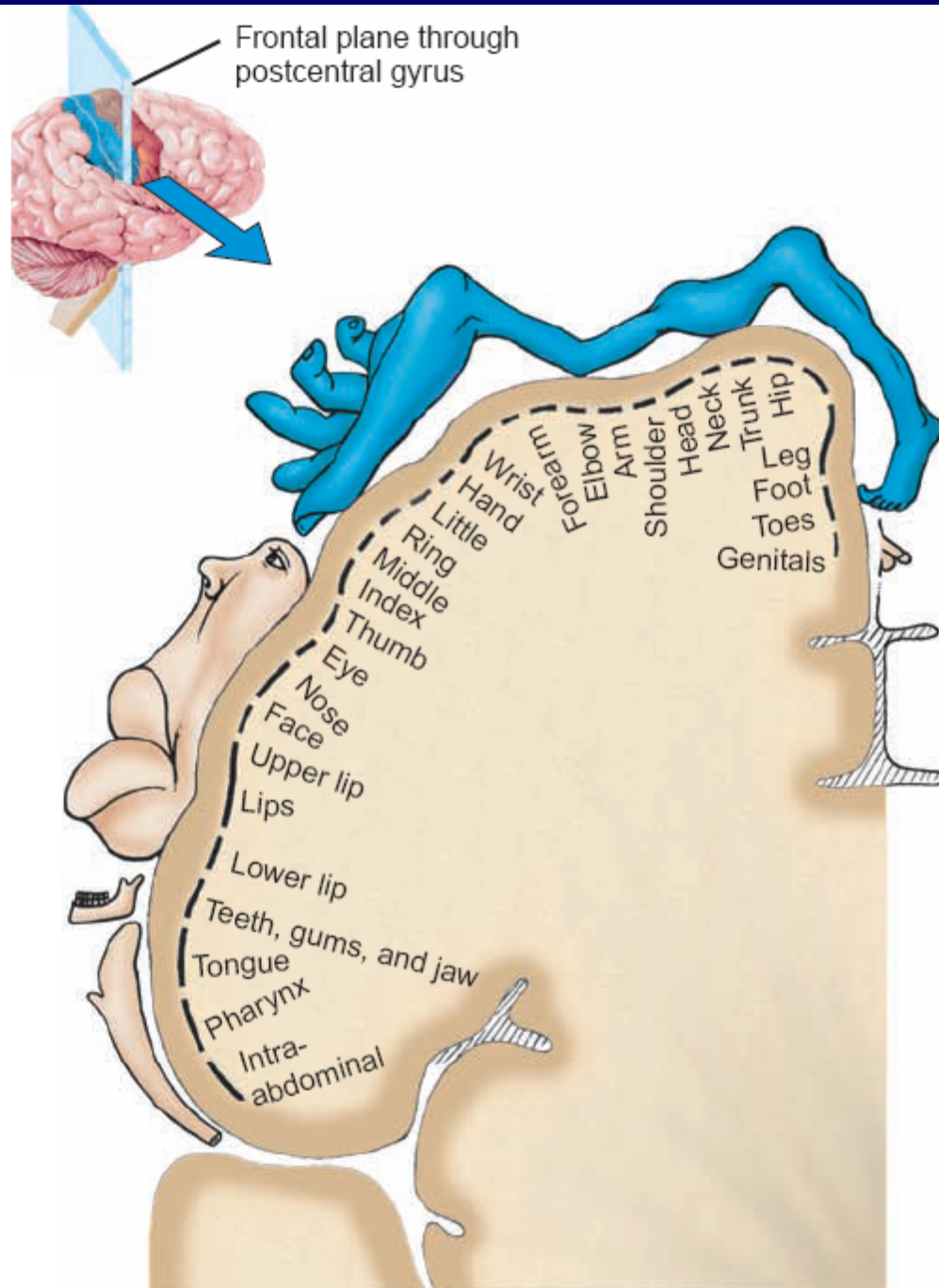
LEFT SIDE
OF BODY







Text Fig. 18-9



Case Study

