

In The Name Of GOD

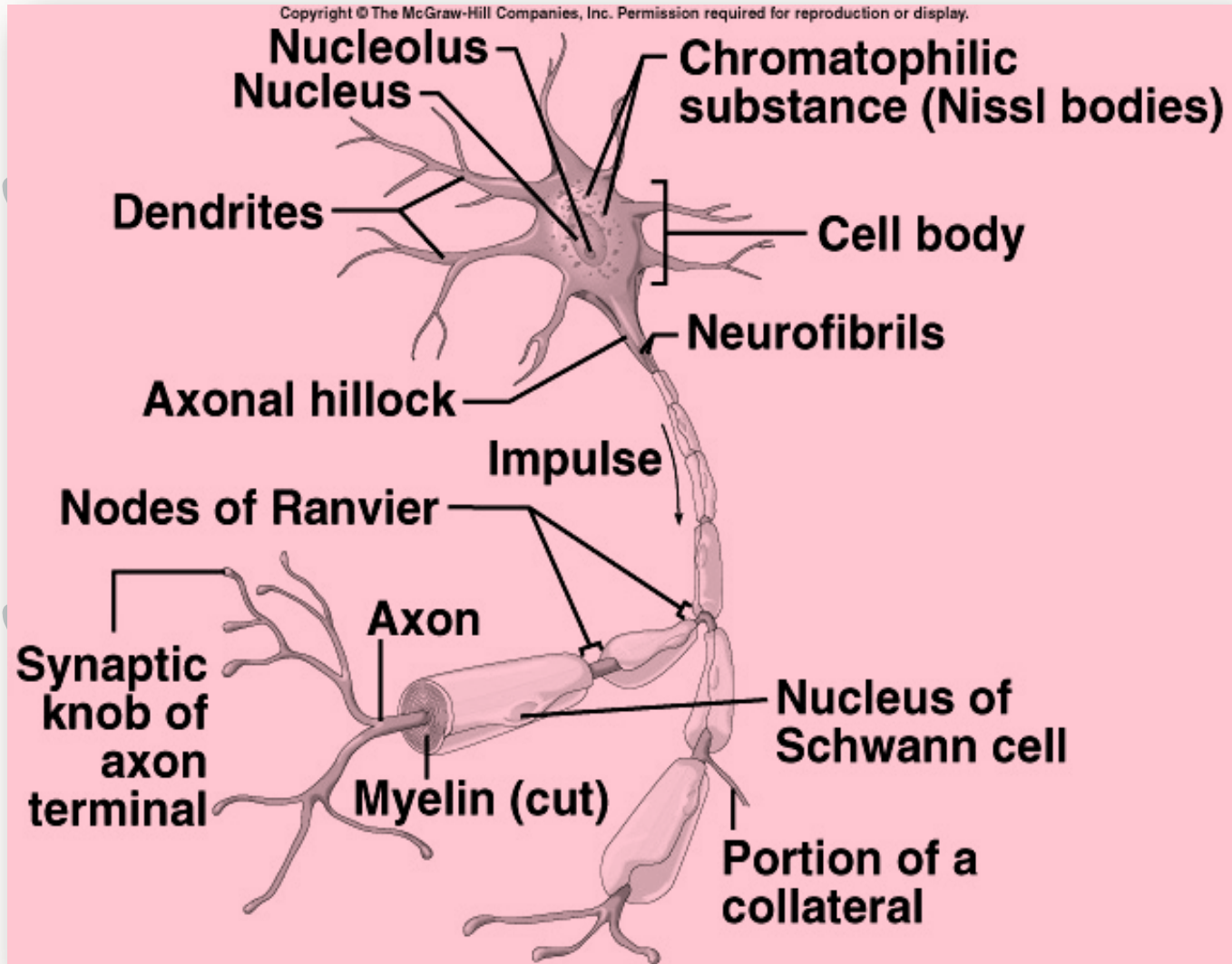
Neurophysioanatomy

For Medicine Students

By

Dr. Saeednia

Structure of a Neuron



Afferent /
Ascending Tracts





General sensory tract

Somatic: Superficial / Deep
Visceral

In Trunk & Limbs
In Head & Neck

Special sensory tract

Afferent tracts:

special sensory tract

Visual

Auditory

Olfactory

Taste

Equilibrium

General sensory tract in trunk & limbs

Somatic: Superficial / Deep

Visceral

A vertical column of seven light green leaf-like icons is positioned on the left side of the slide. Each icon consists of a central stem with three pointed leaves extending upwards and outwards.

Superficial:

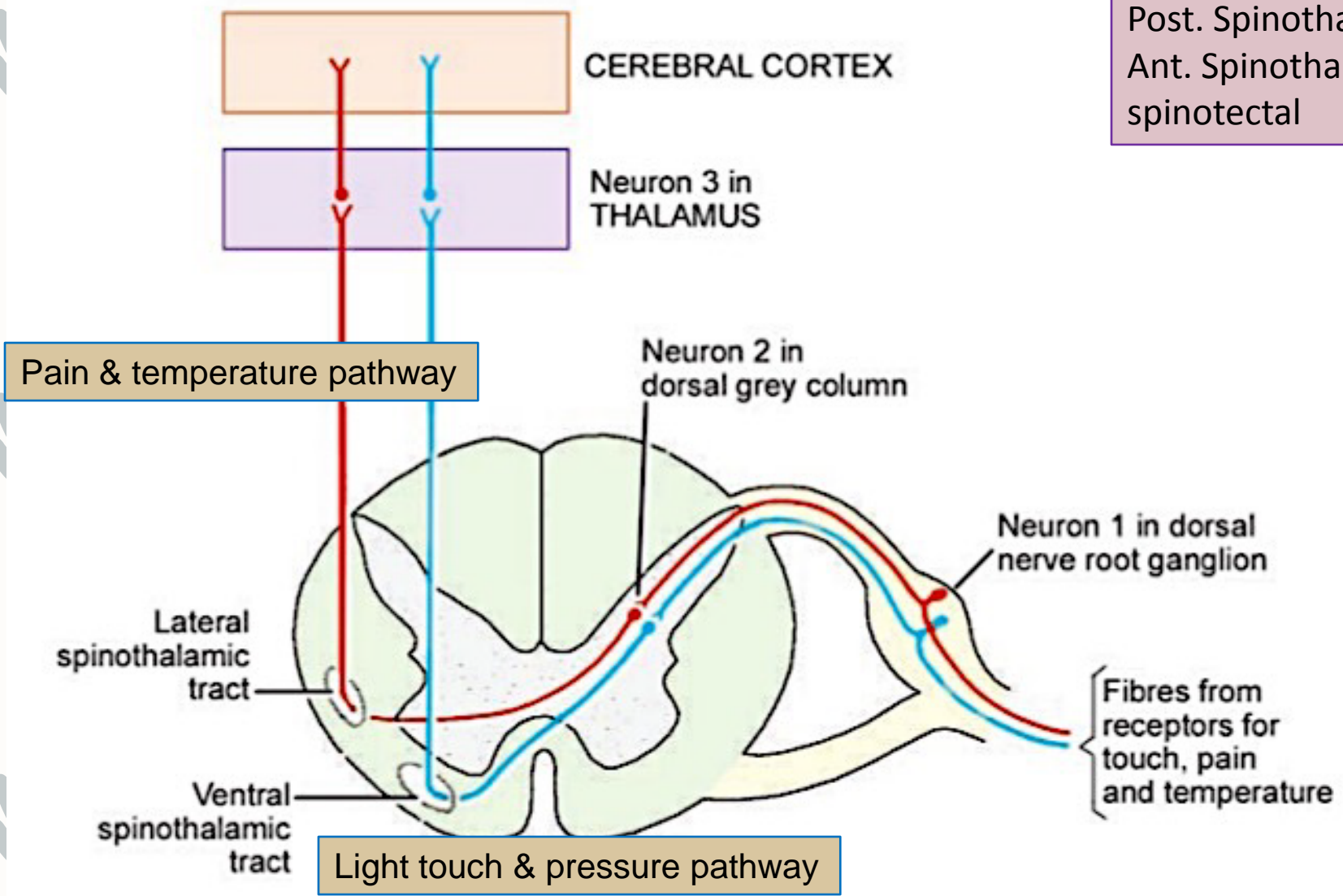
Pain & temperature pathway

Light touch & pressure pathway

Discriminative touch & vibratory sense



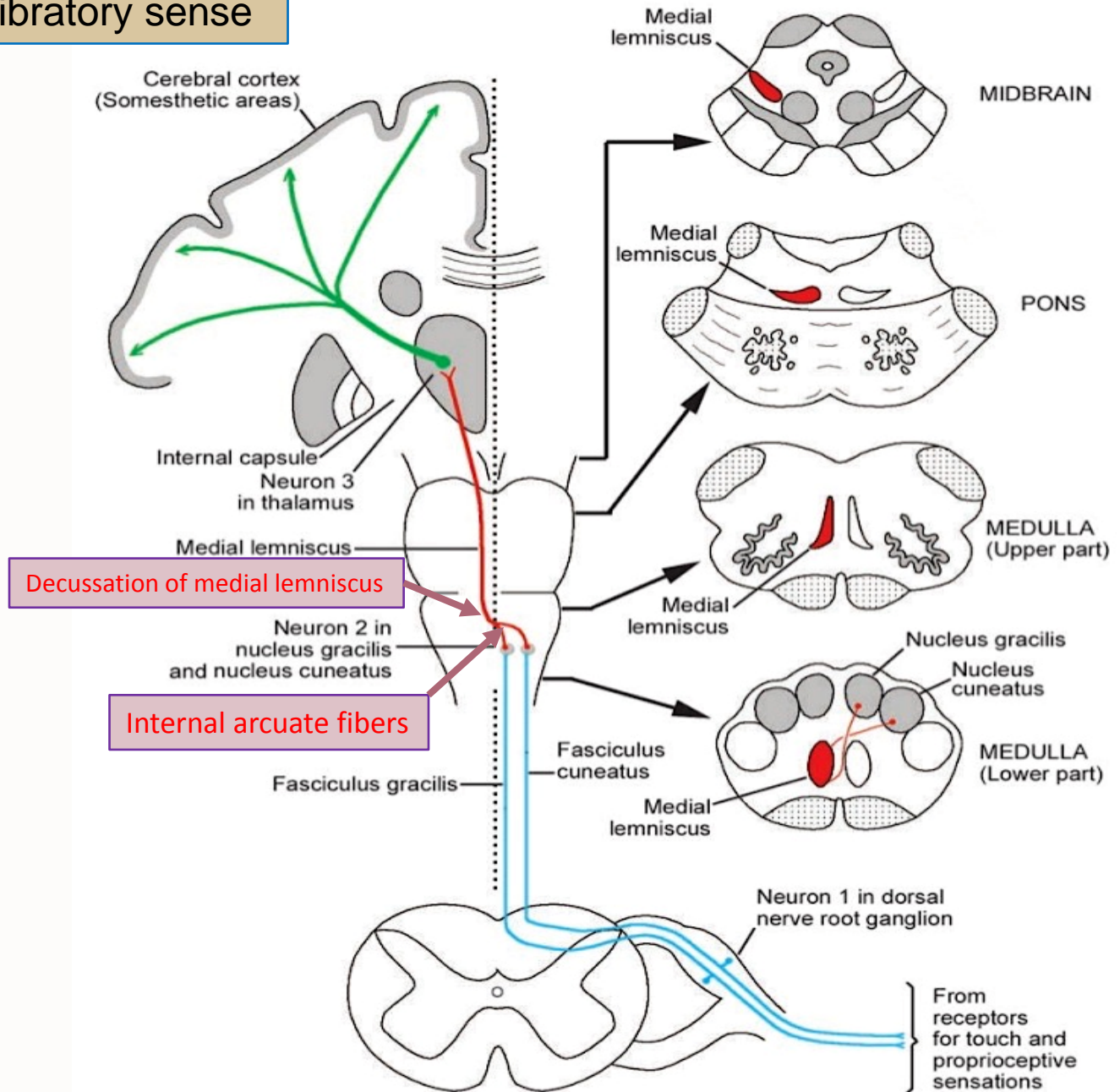
Spinal lemniscus:
 Post. Spinothalamic
 Ant. Spinothalamic
 spinotectal



50.5: Scheme to illustrate the main features of the spinothalamic tracts



Discriminative touch & vibratory sense



50.4: Scheme to show the main features of the posterior column—medial lemniscus pathway

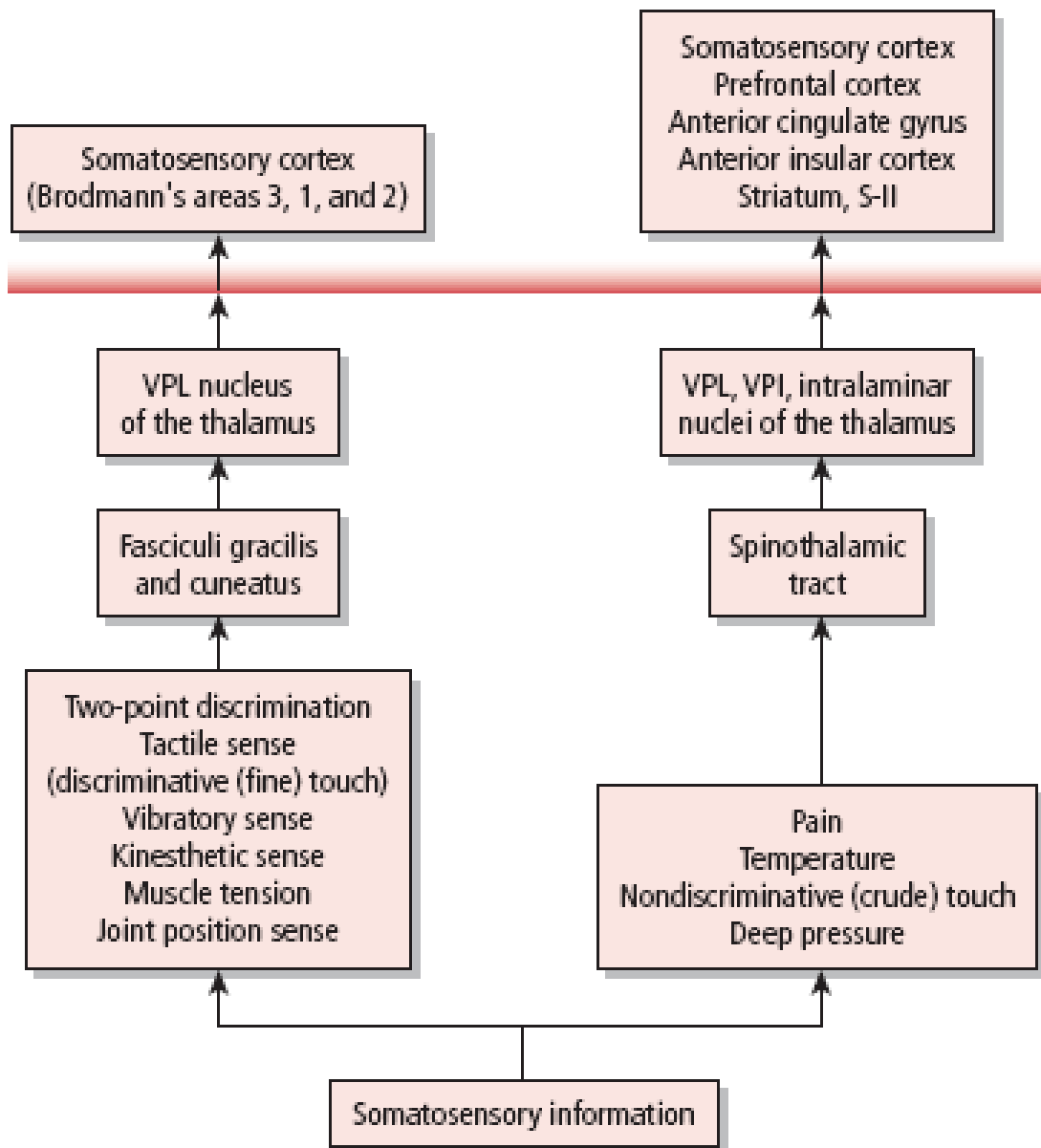


Figure 10.13 • Somatosensory information to consciousness. VPI, ventral posterior inferior; VPL ventral posterior lateral.

Discriminative touch & vibratory sense

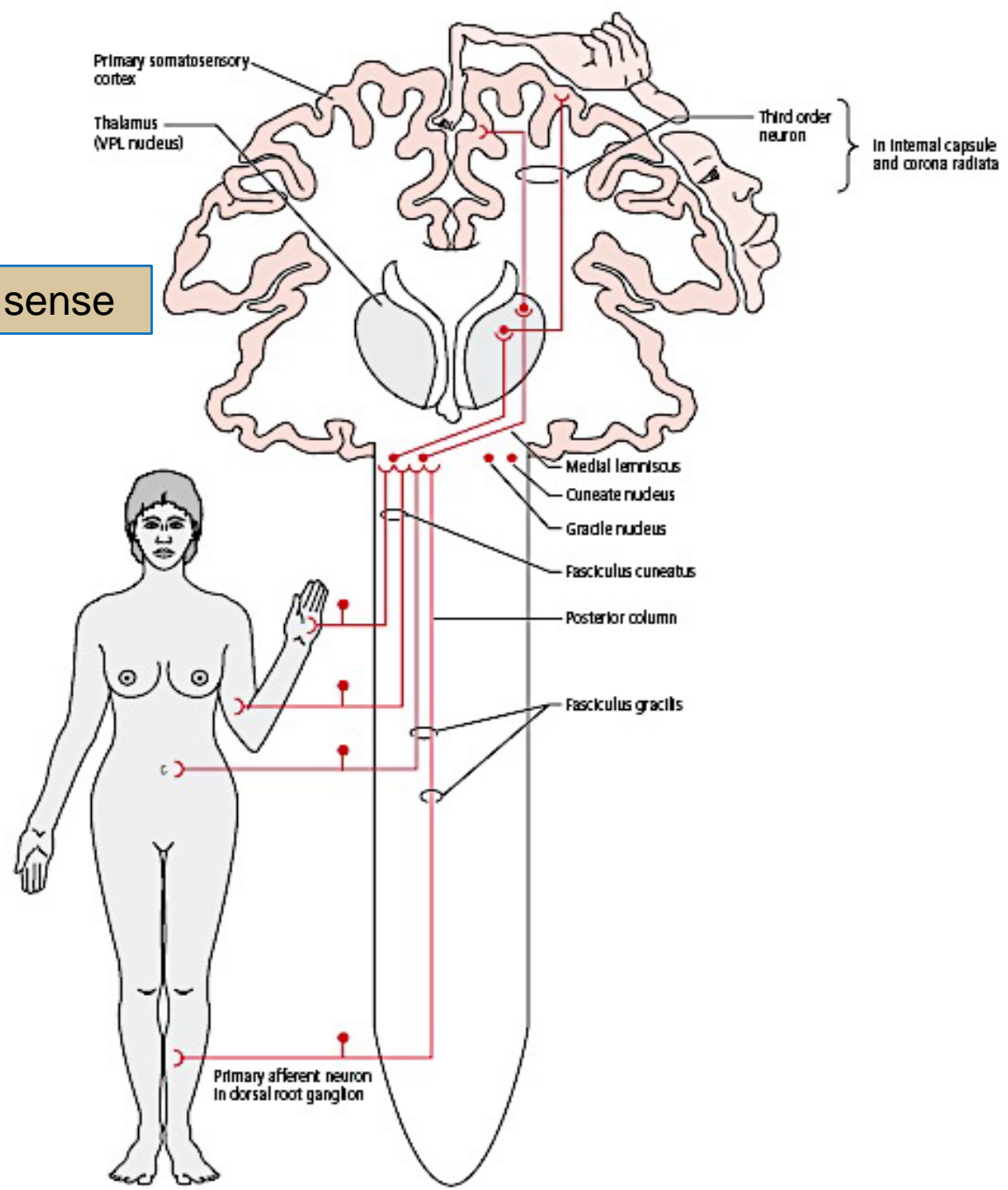


Figure 10.18 • The dorsal column–medial lemniscal pathway relaying discriminative (fine) touch and vibratory sense from the body to the somatosensory cortex. VPL, ventral posterior lateral.



Deep

cerebrum

Proprioceptive conscious sense pathway

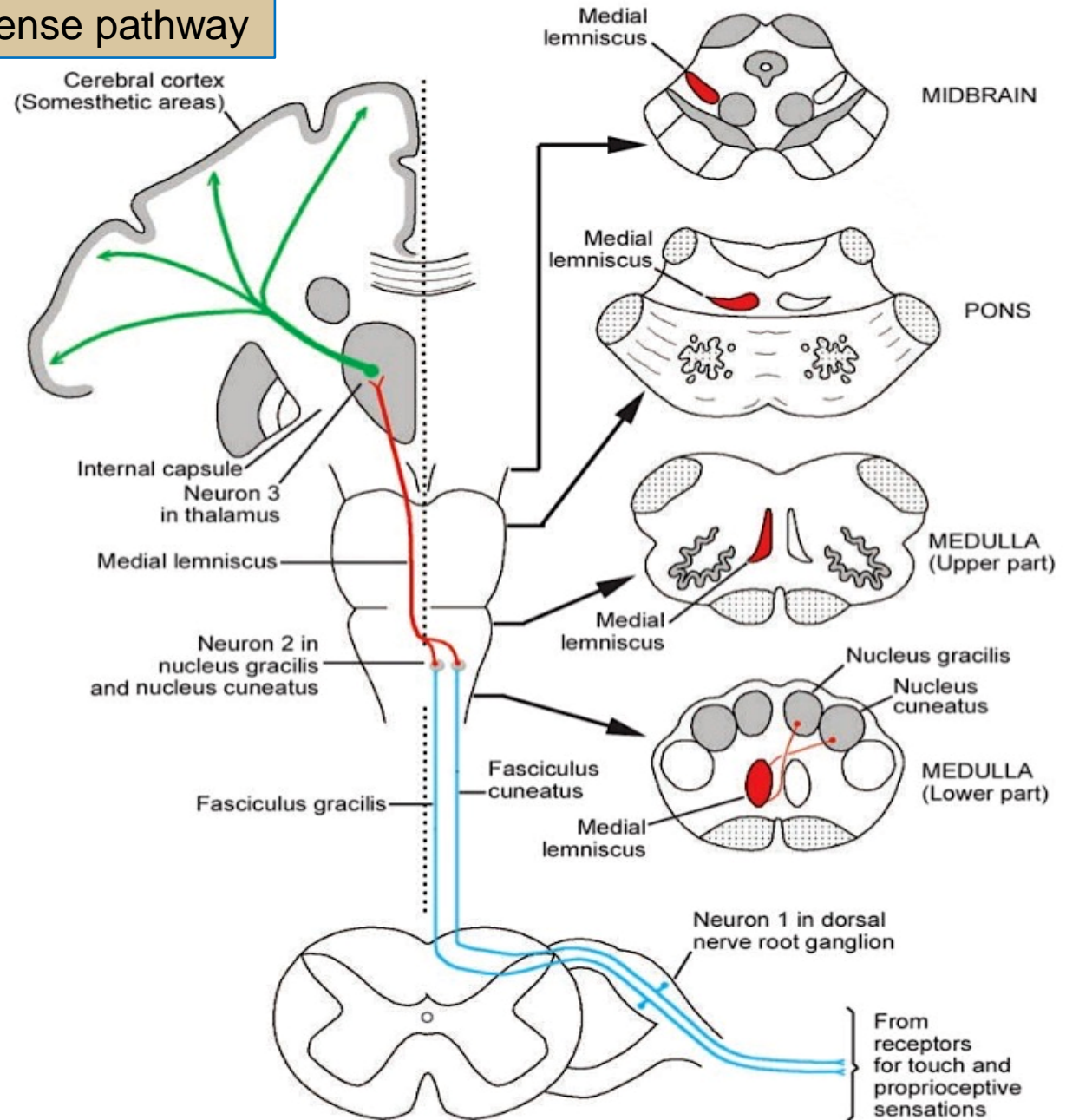
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Discriminative touch & vibratory sense

Proprioceptive unconscious sense pathway

cerebellum

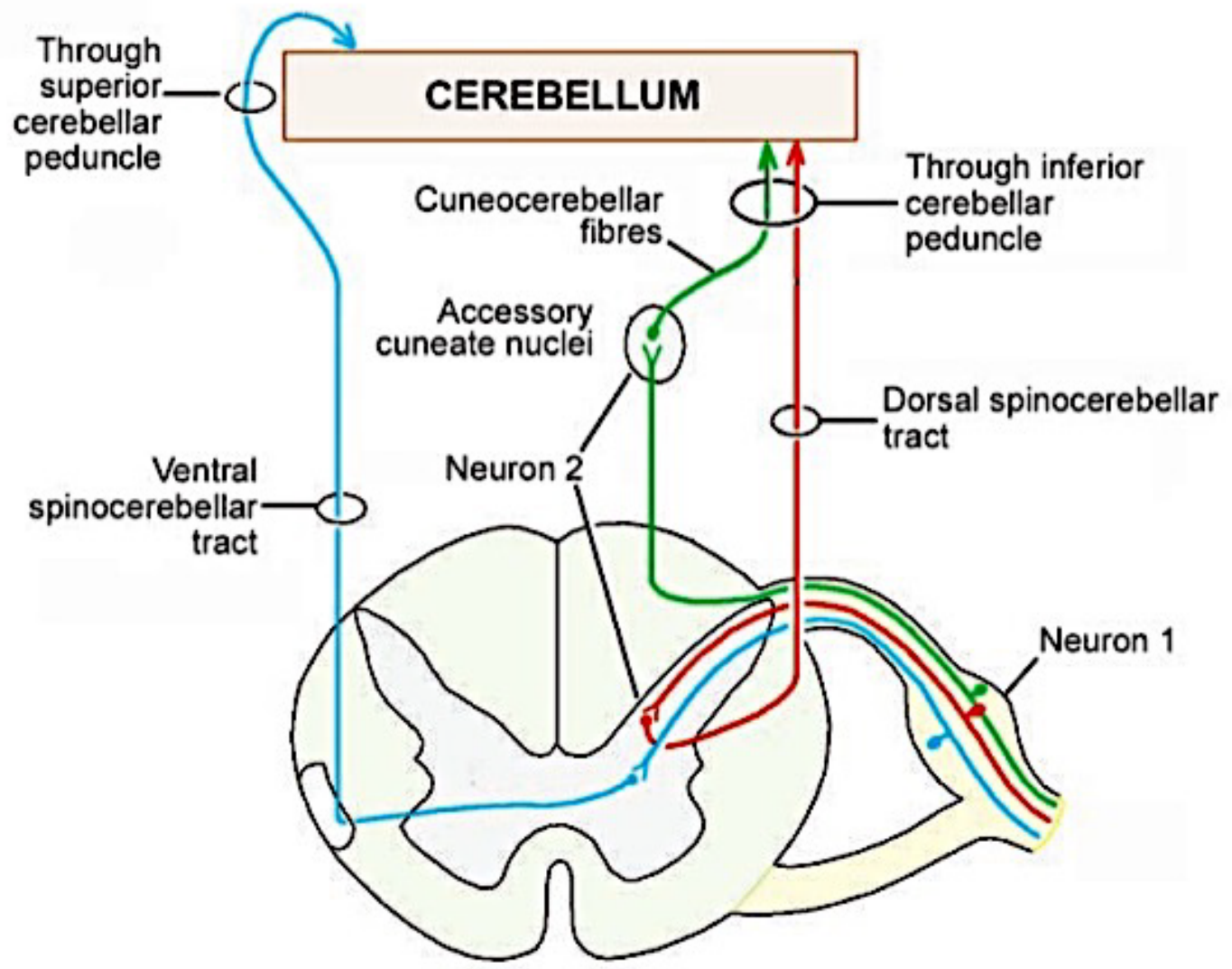
Proprioceptive conscious sense pathway



50.4: Scheme to show the main features of the posterior column—medial lemniscus pathway

Proprioceptive unconscious sense pathway :

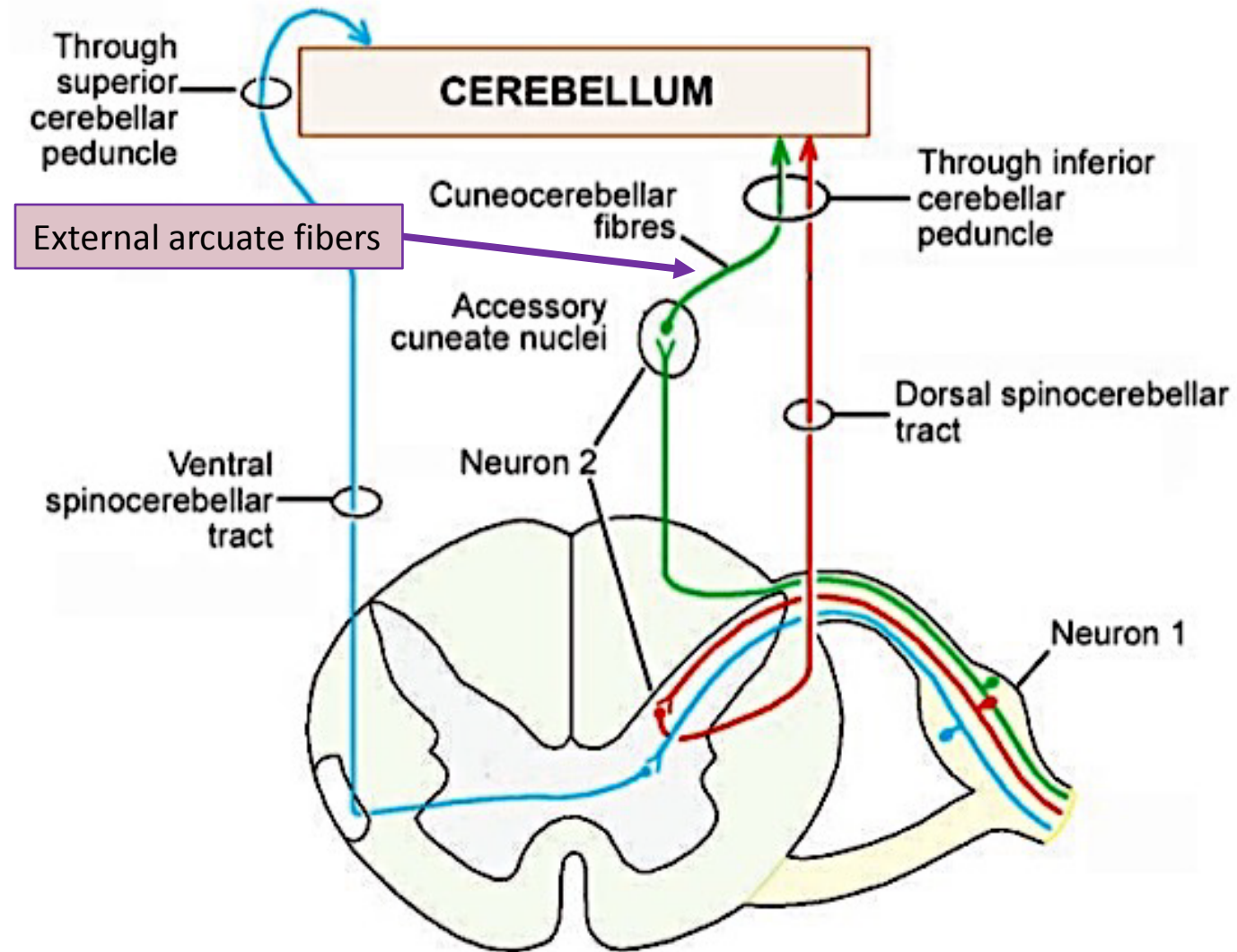
- ❖ Posterior spinocerebellar tract
 - ❖ Anterior spinocerebellar tract
- (lower limb & lower part of trunk)



50.6: Scheme to illustrate the main features of spinocerebellar pathways

Proprioceptive unconscious sense pathway :

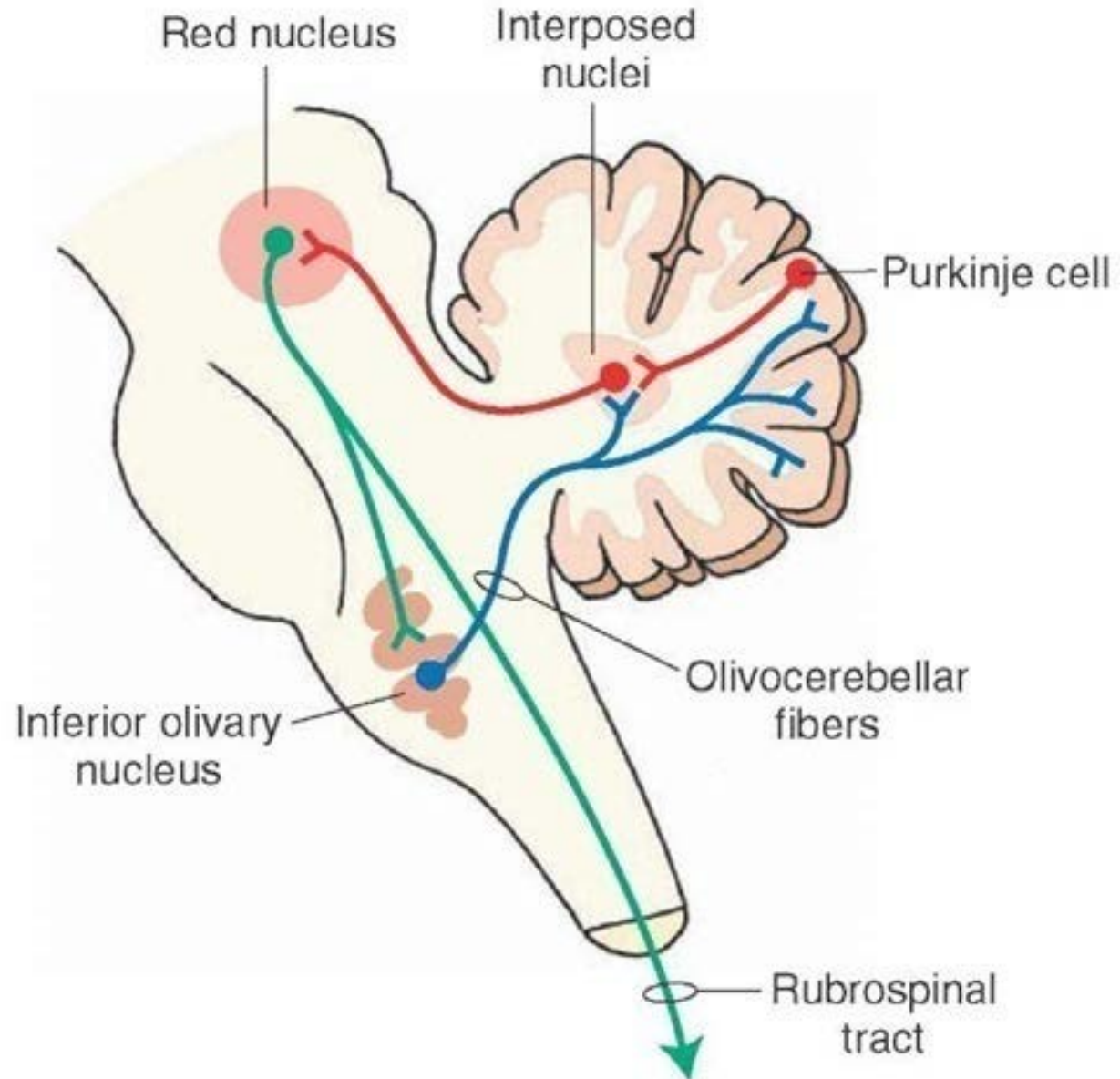
- ❖ Spinocuneateocerebellar tract (neck & upper limb & upper part of trunk)



50.6: Scheme to illustrate the main features of spinocerebellar pathways

Proprioceptive unconscious sense pathway :

❖ Spinoolivocerebellar tract (neck & trunk & limbs)



Visceral

Recurrent pains





General sensory tract

In Trunk & Limbs

In Head & Neck

Special sensory tract

—

Afferent tracts:

General sensory tract in head & neck

Somatic: Superficial / Deep
Visceral

Somatic : superficial (head & neck)

end fibers of
trigeminal nerve
in head & neck



trigeminal
ganglion



sensory nucleus
of trigeminal
nerve



cross midline



trigeminal
lemniscus



thalamus



Somatic : superficial (external & middle ear)

end fibers of 7
& 9 & 10 nerves

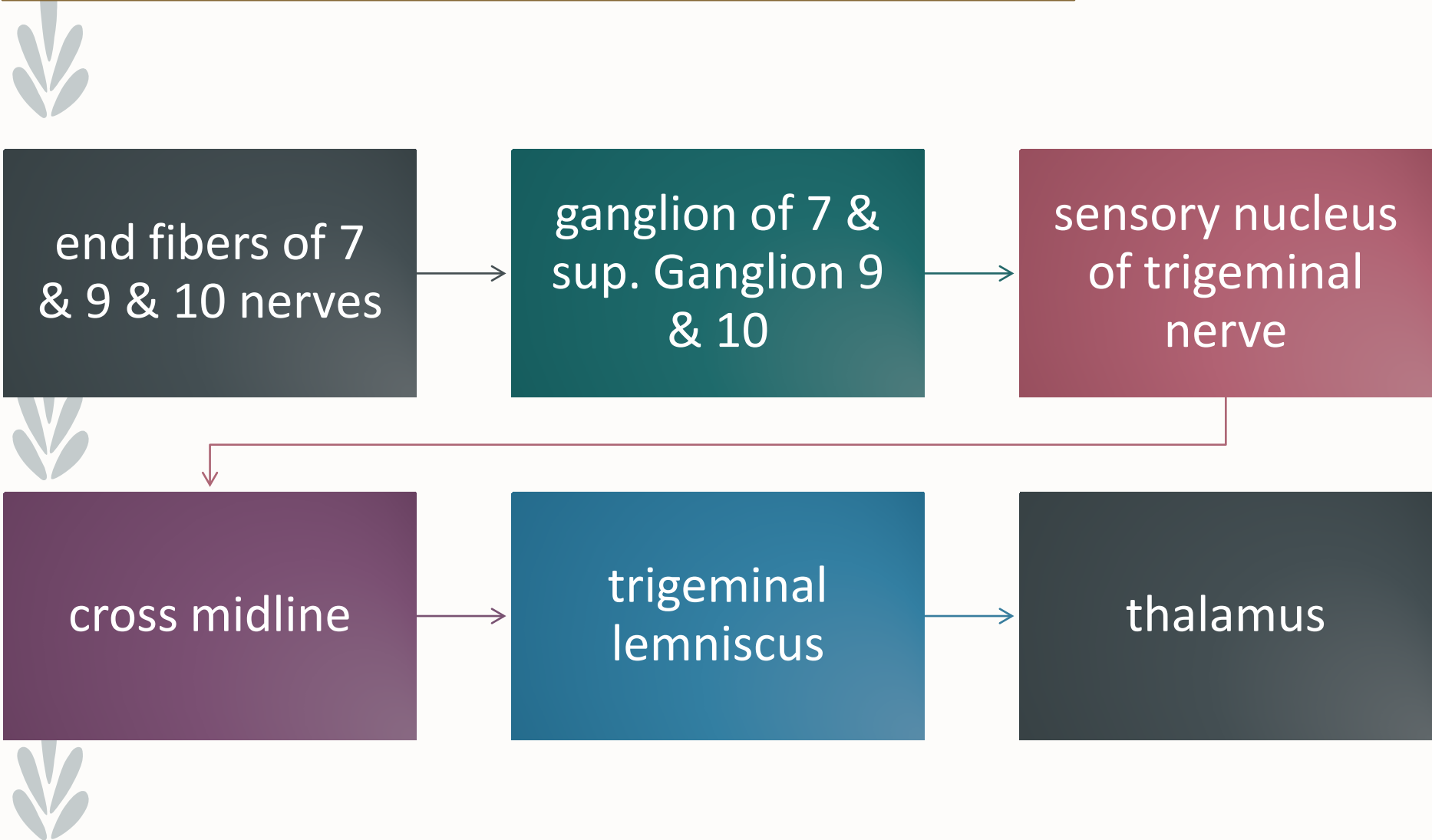
ganglion of 7 &
sup. Ganglion 9
& 10

sensory nucleus
of trigeminal
nerve

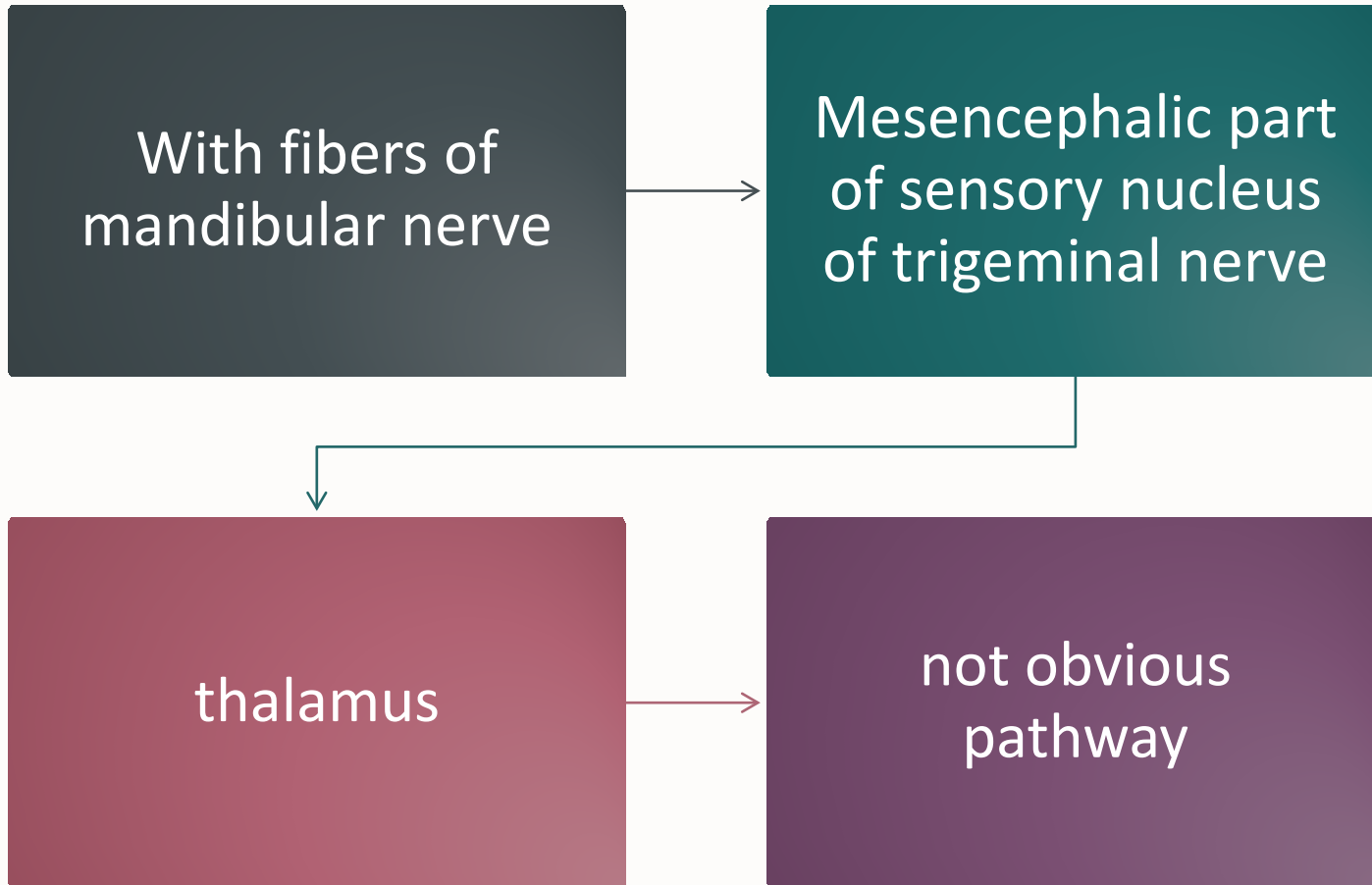
cross midline

trigeminal
lemniscus

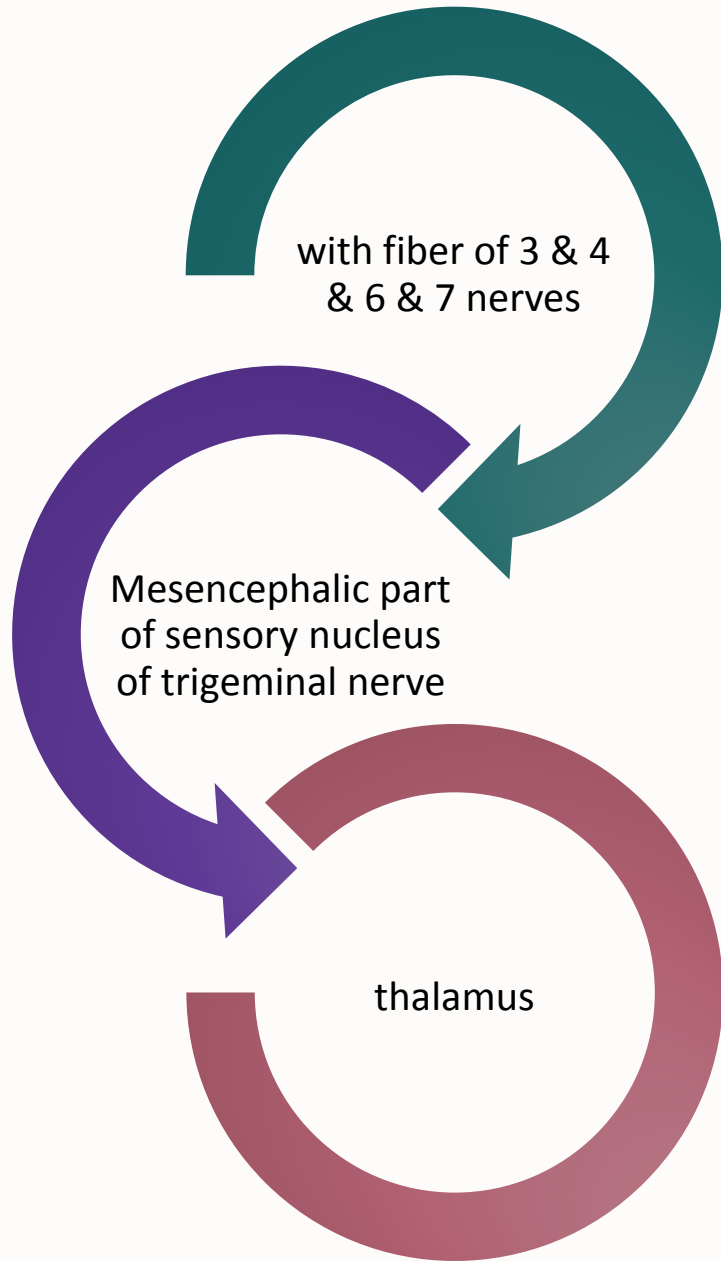
thalamus



Somatic : deep (mastication muscles)



Somatic : deep (fascial & external eye muscles)



General sensory tract in head & neck

Somatic: Superficial / Deep

Visceral

Visceral :visceral sense of head & neck

with fiber
of 9 & 10
nerve

cross
midline

thalamus

inf.
ganglion of
9 & 10
nerve

solitary
nucleus

special sensory tract

Visual

Auditory

Olfactory

Taste

Equilibrium



Olfactory pathway

Olfactory pathway:

olfactory hair

1st order neuron = Olfactory mucosa

In roof & sup. 1/3 lateral & medial wall of nasal cavity

Olfactory nerve = 20 nerve in each side

Cribriform plate

Olfactory bulb / mitral cells = 2 order neuron

Olfactory tract

➤ lateral olfactory stria

Prepiriform cortex + preamygdaloid (primary olfactory cortex)

/ entorhinal area (second olfactory cortex in parahypocampus)

➤ Medial olfactory stria

Ant. Commissure / olfactory structure of the other side

Note: this pathway directly transfer to cortex

the "piriform lobe" has been described as consisting of the cortical amygdala, uncus, and anterior parahippocampal gyrus

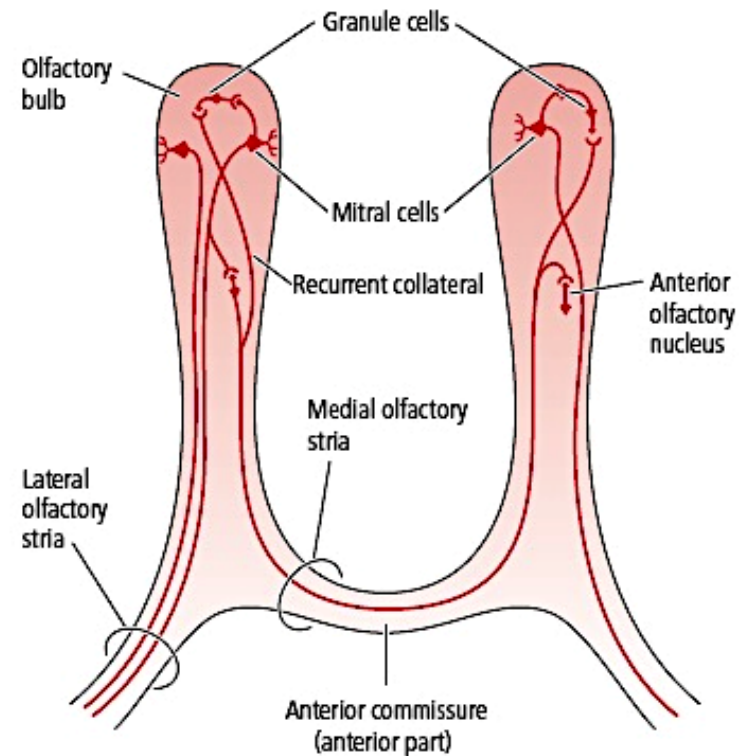
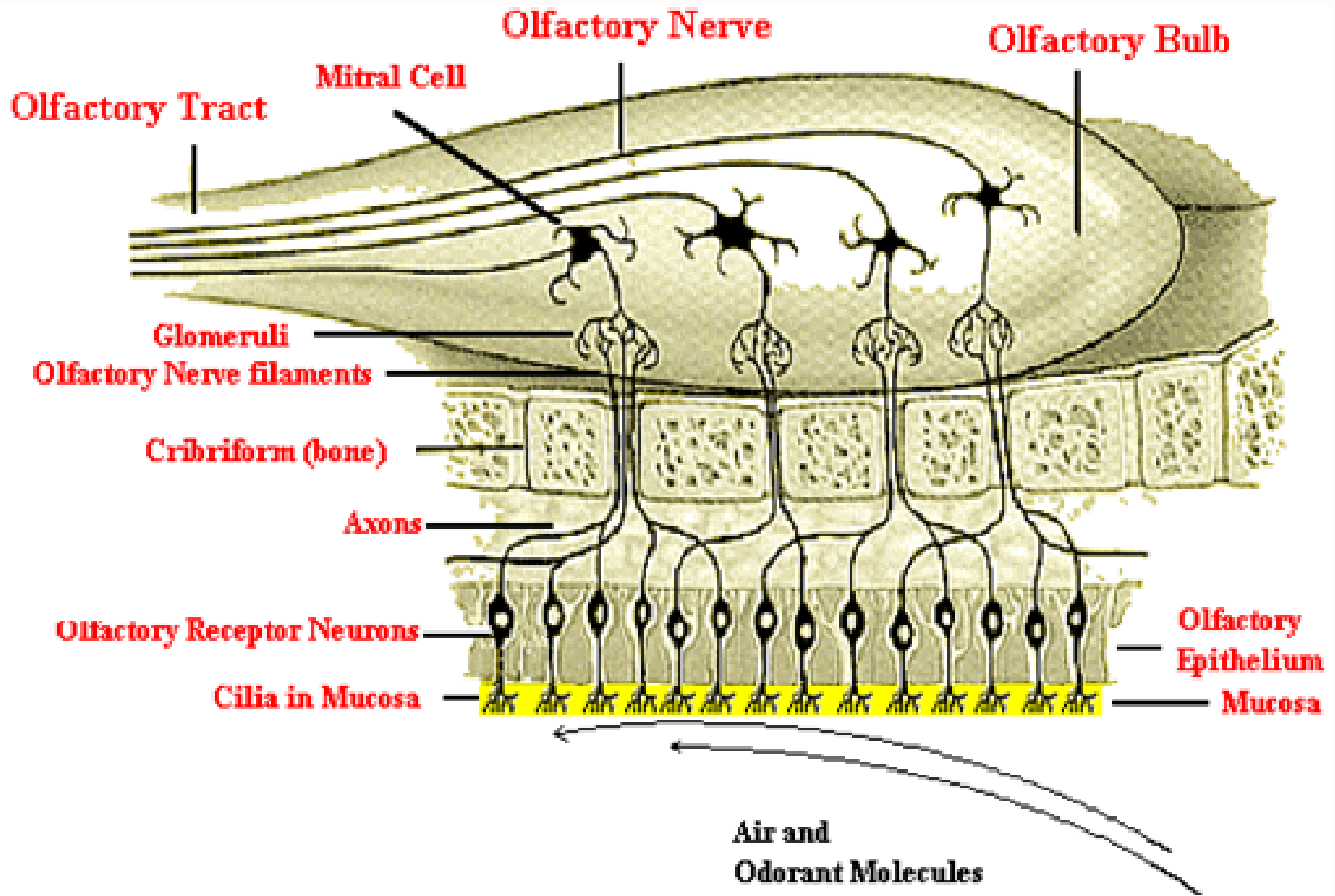
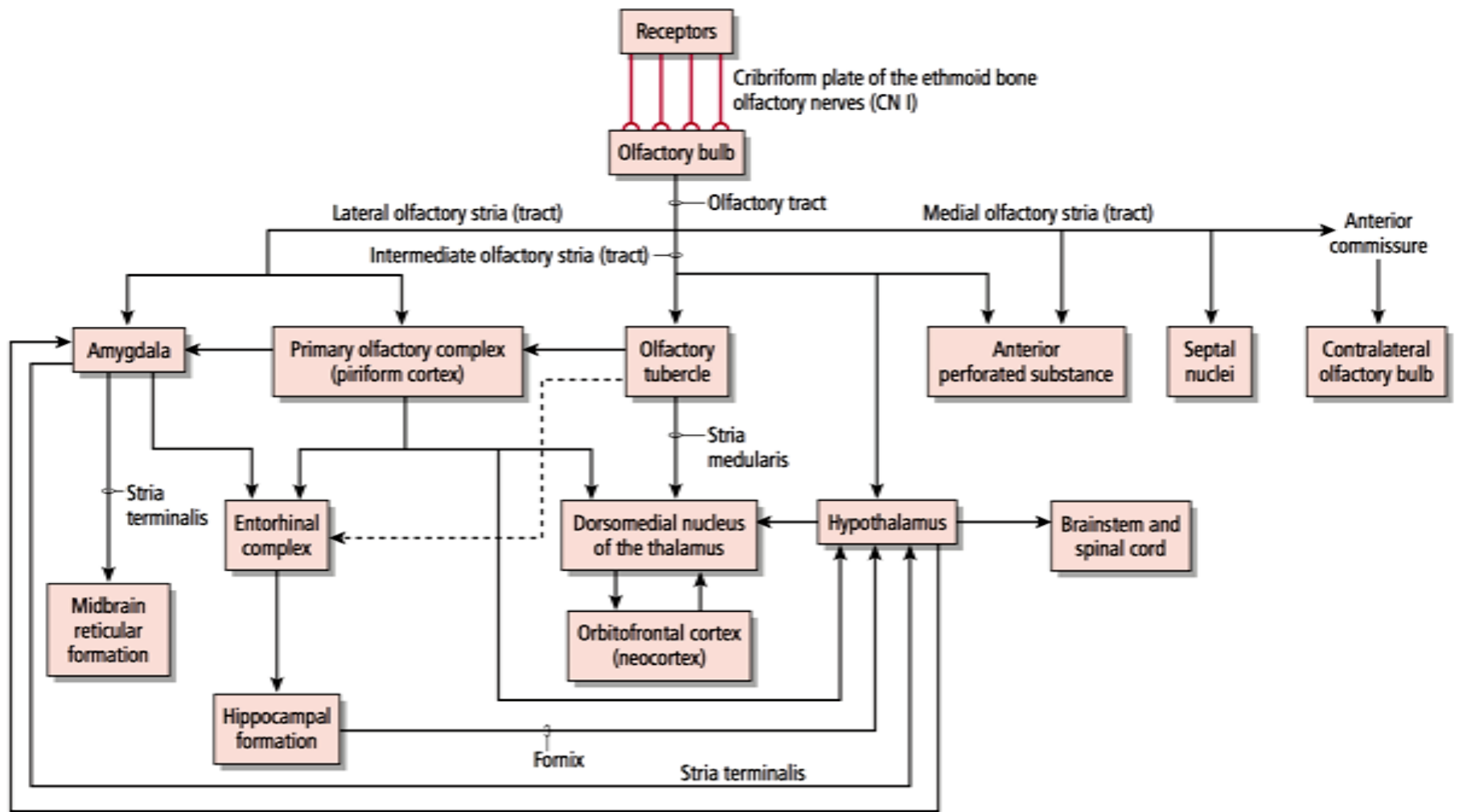


Figure 19.4 • The olfactory bulb, anterior olfactory nucleus, and olfactory tract, and its division into the medial and lateral olfactory striae.





Olfactory reflex:

From olfactory center
To Midbrain
By MLF

Terminate in Nucleus of cranial nerve in
brain stem / spinal cord

Olfactory disorder

Anosmia =

bilateral (allergic) /

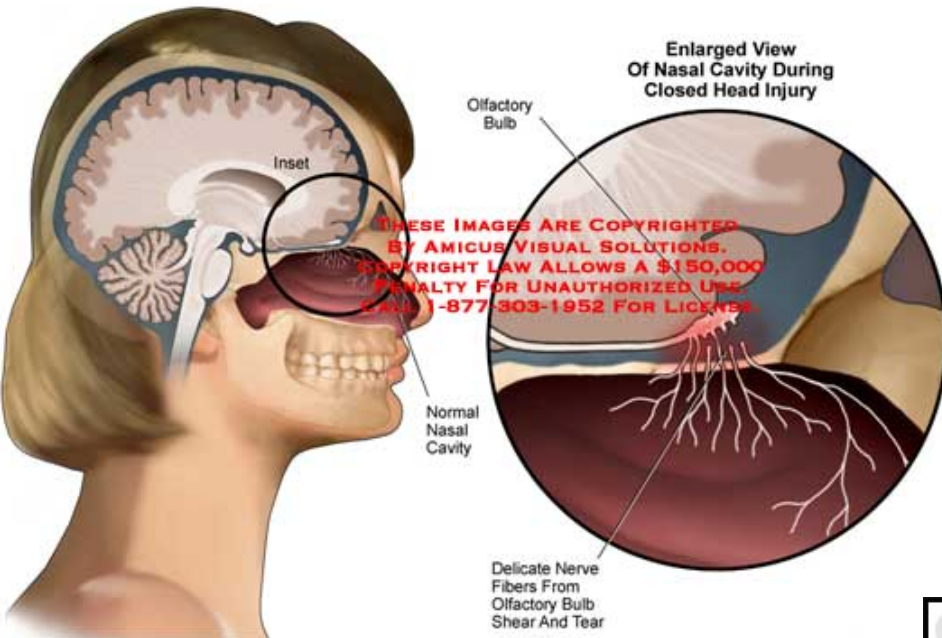
unilateral :

- Ant. Cranial fracture
- Cribriform plate trauma
- Tumor of frontal lobe
- Ant. Cranial cavity meningioma



Anosmia

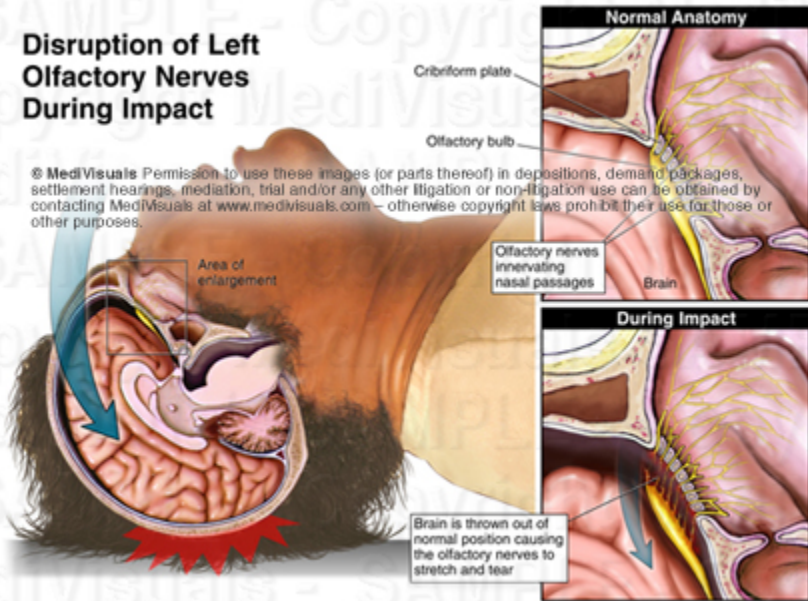
Anosmia, Loss Of Sense Of Smell



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Disruption of Left Olfactory Nerves During Impact

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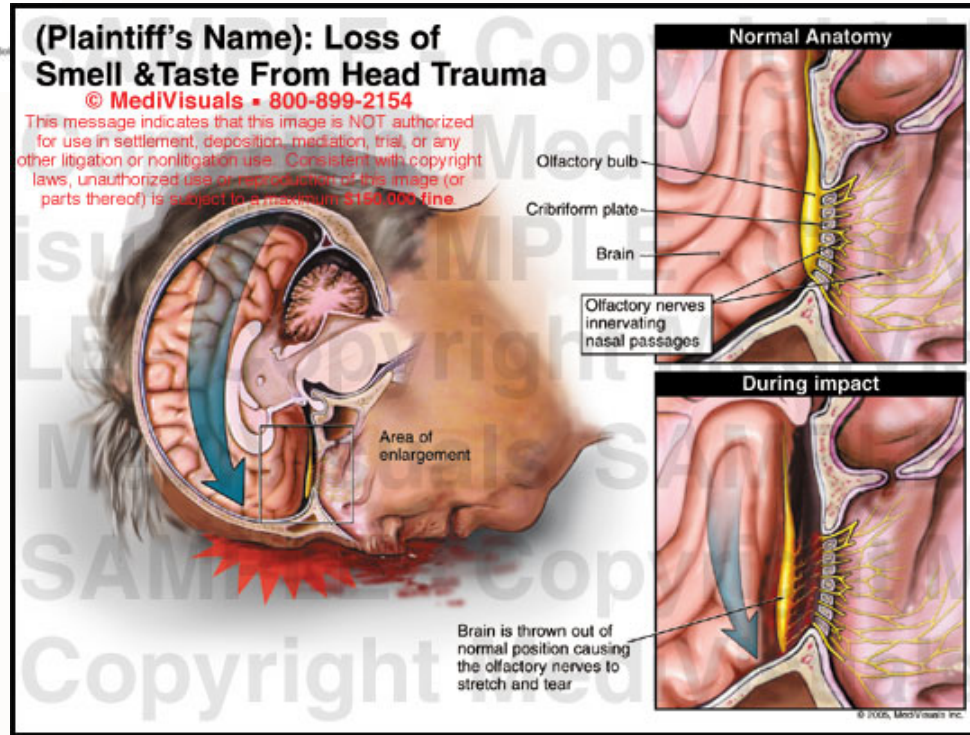


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(Plaintiff's Name): Loss of Smell & Taste From Head Trauma

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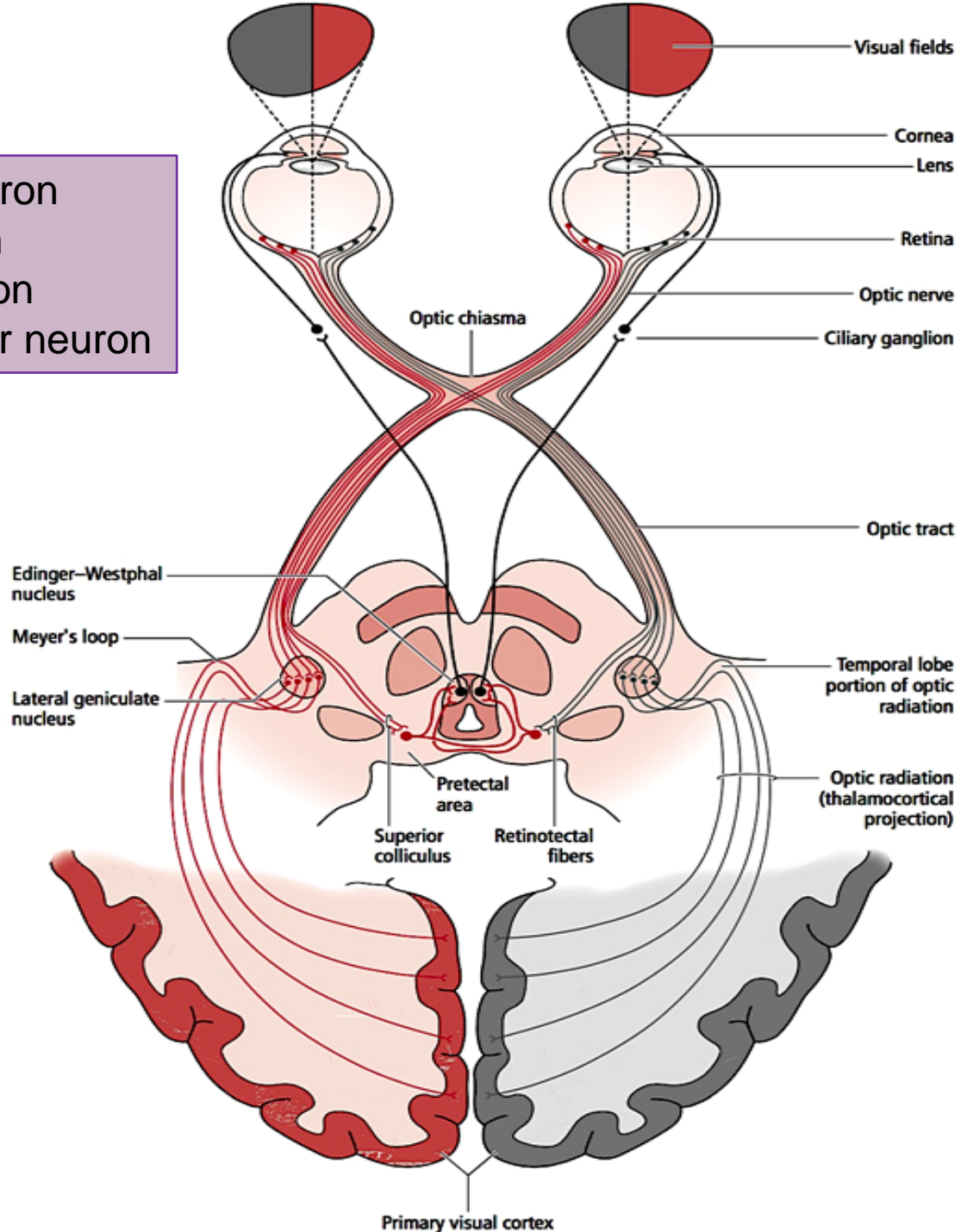


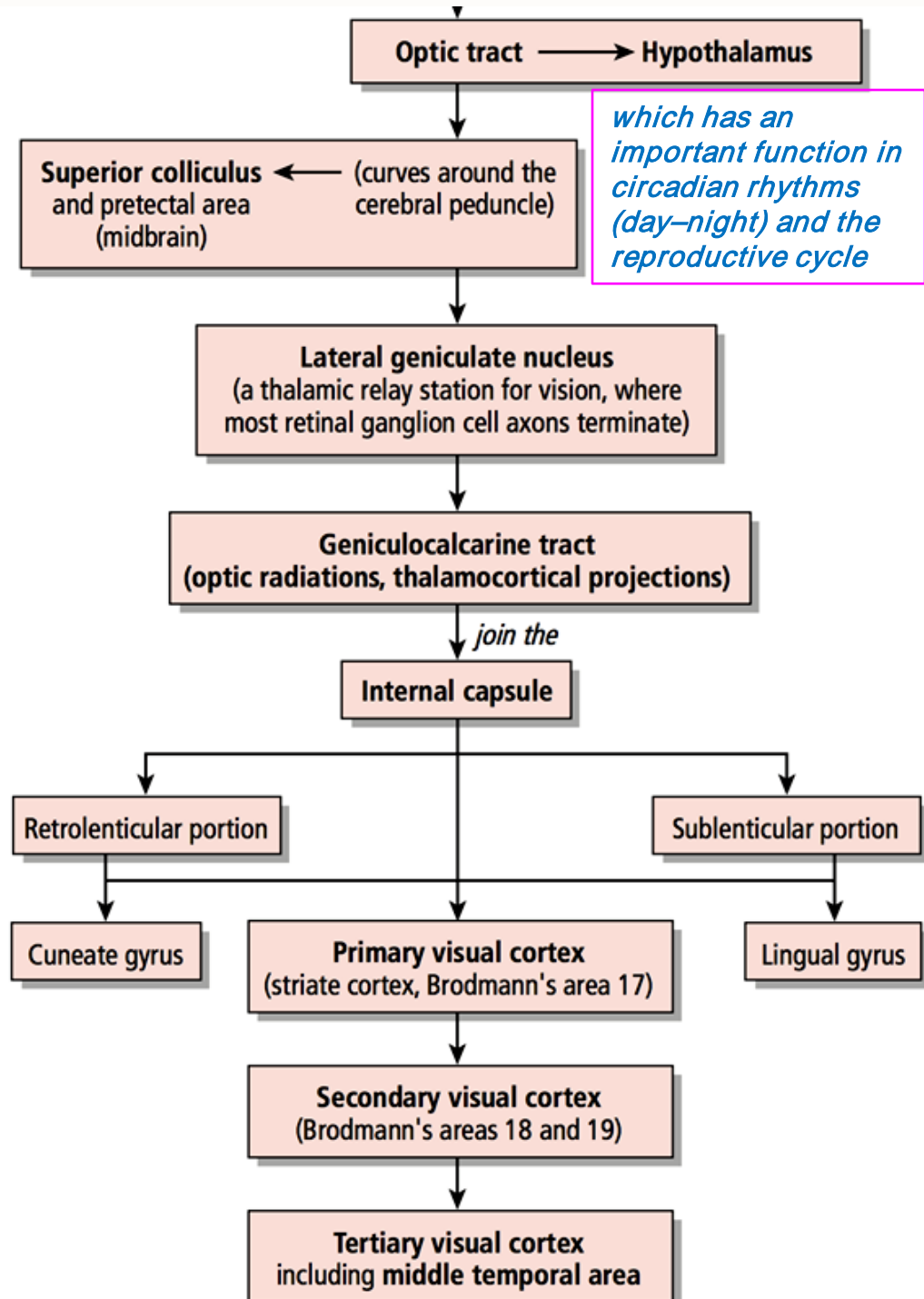
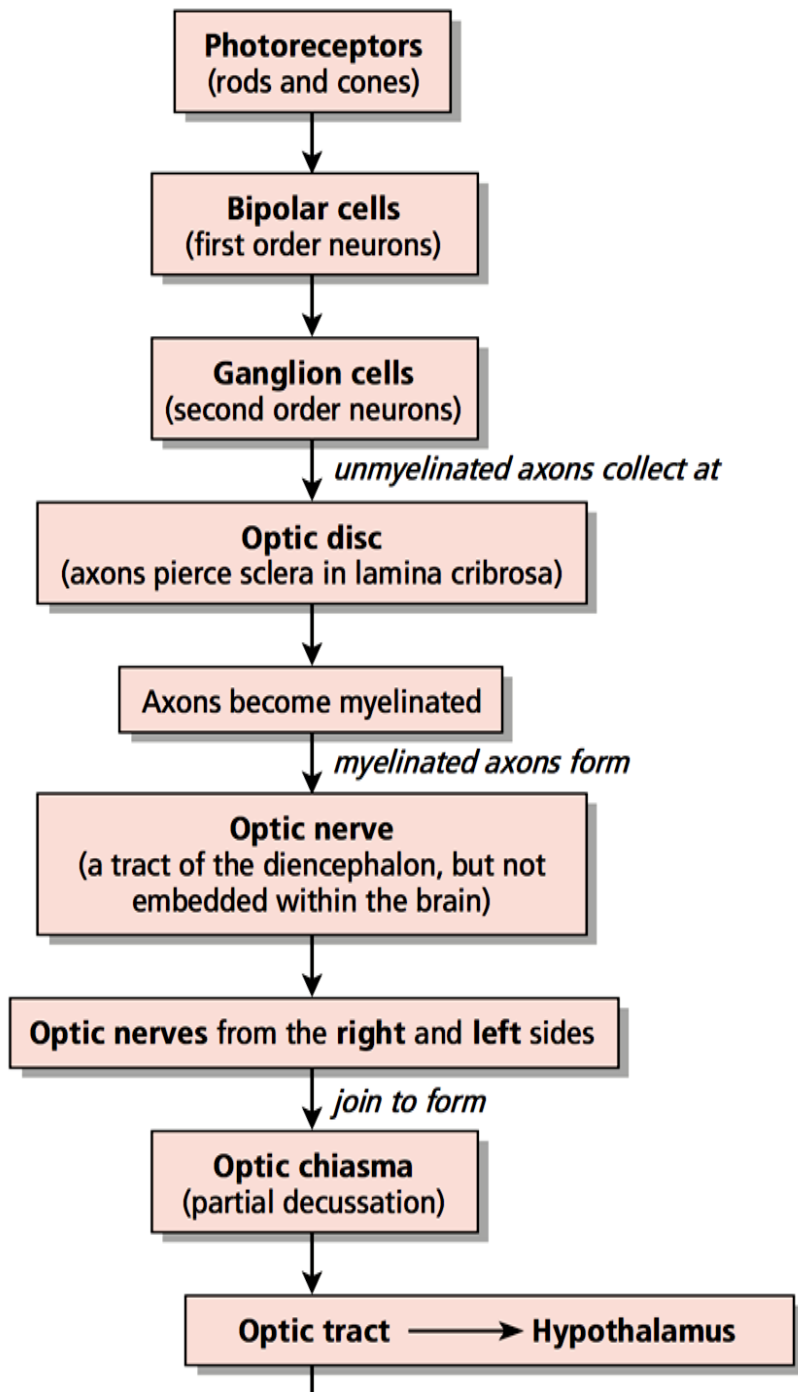
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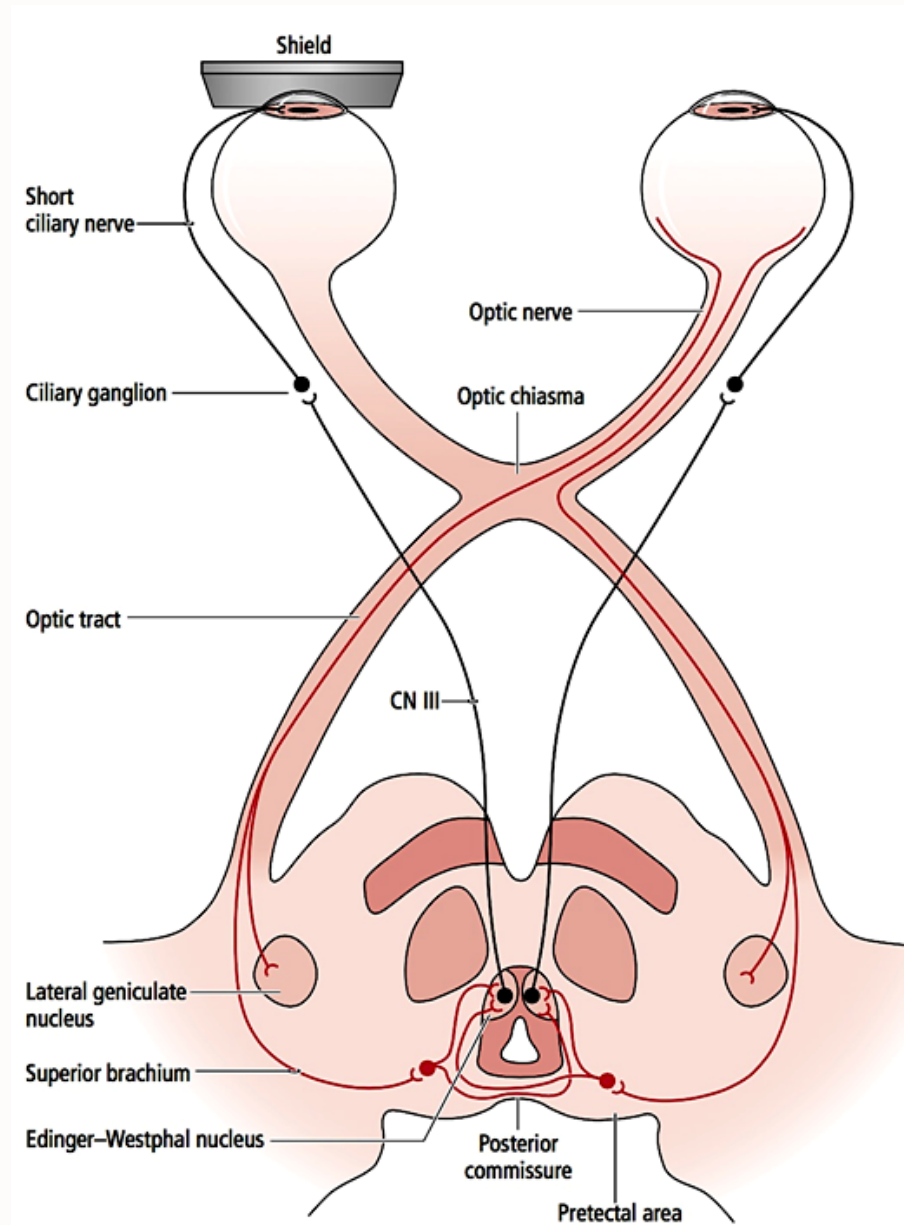
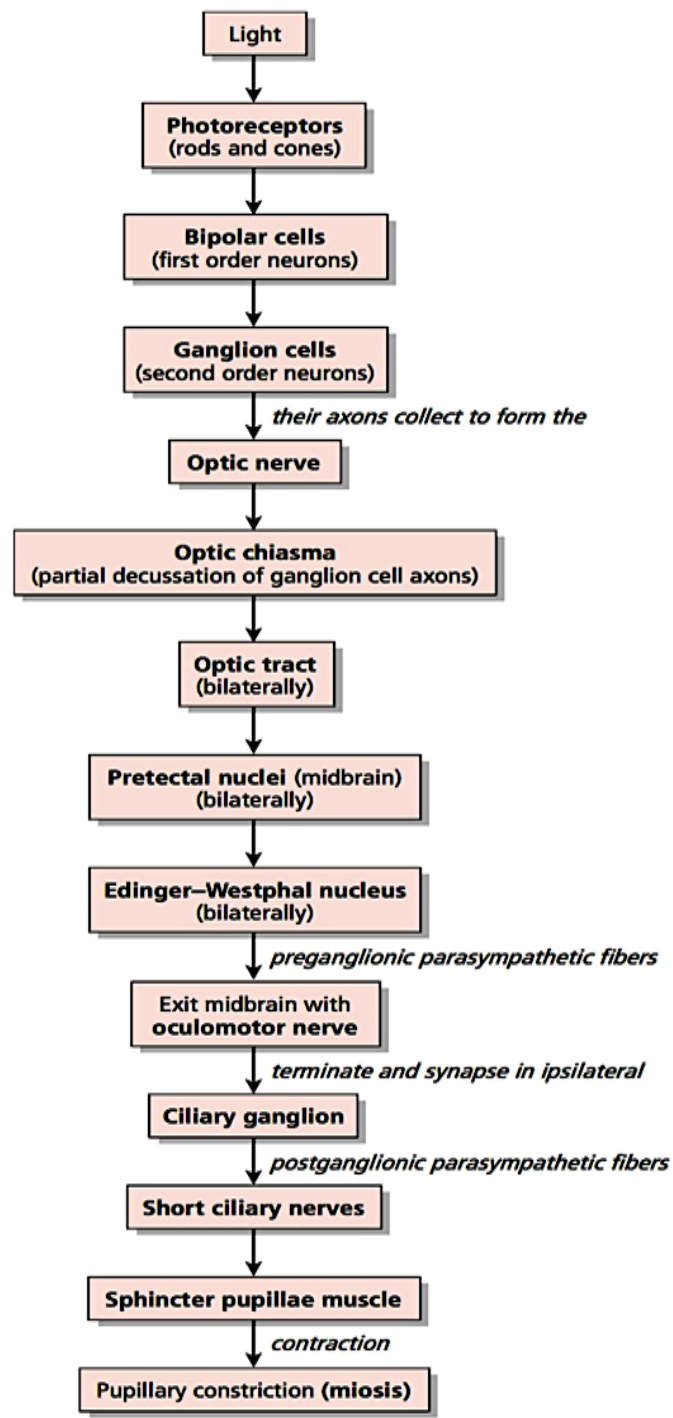
Visual pathway

Cone / rod cells = 1st order neuron
Bipolar cells = 2nd order neuron
Ganglion cells = 3rd order neuron
Lat. Geniculate body = 4th order neuron





Pupillary light reflex pathway

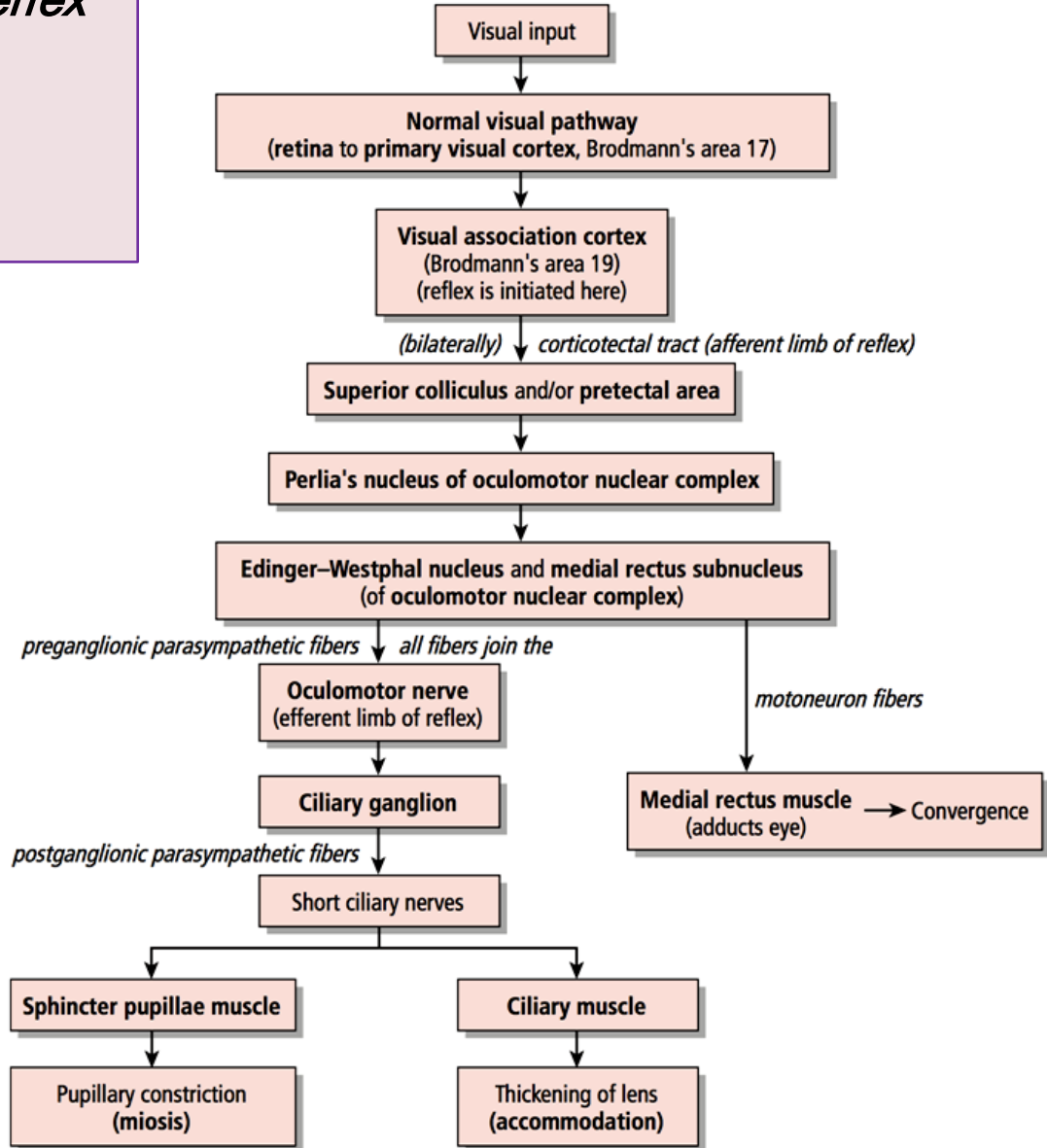
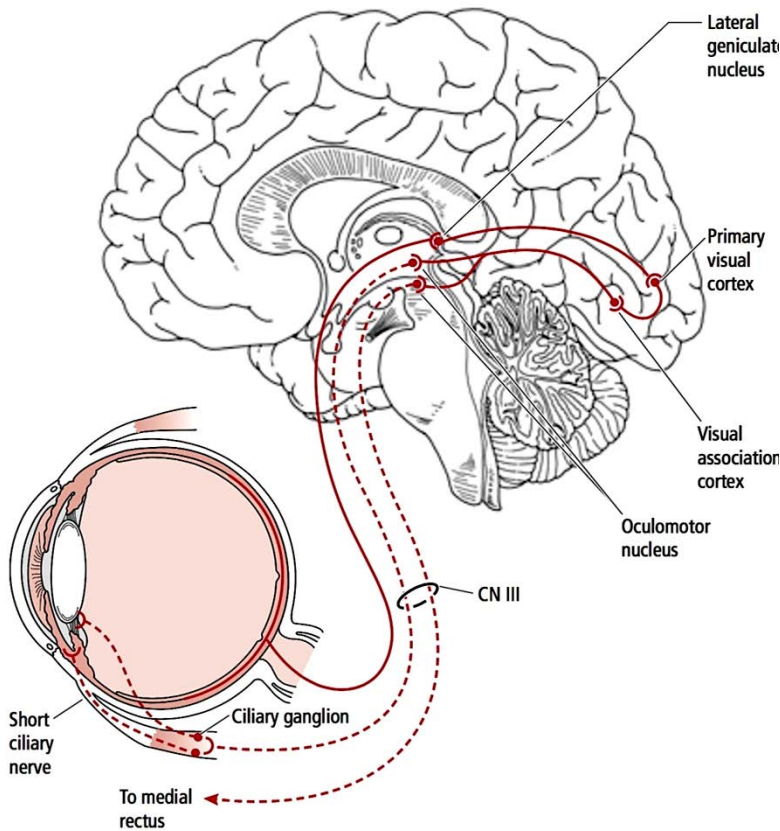


From pretectal nucleus
in midbrain
by MLF
Terminate in Nucleus of cranial nerve
in brain stem / spinal cord

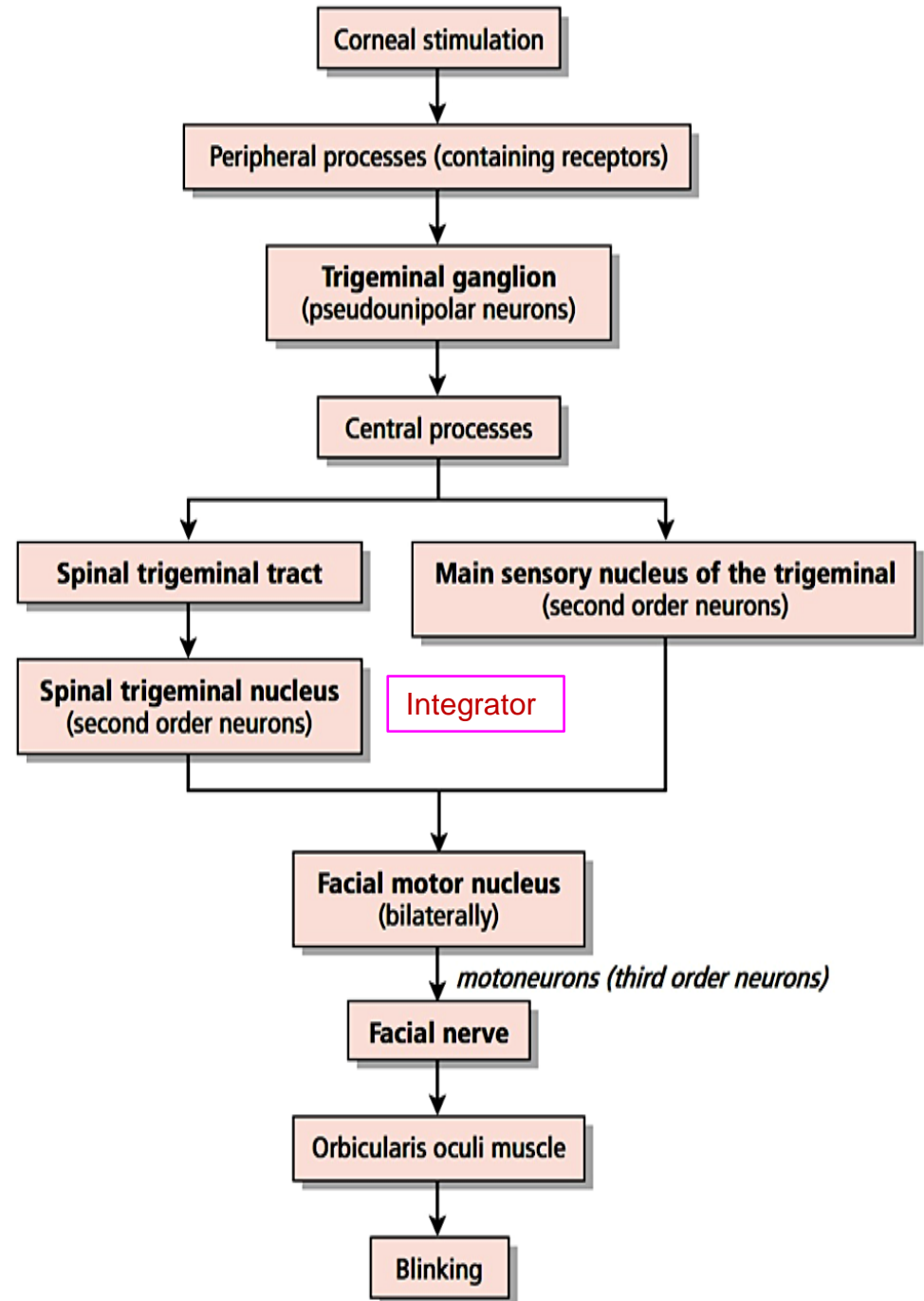
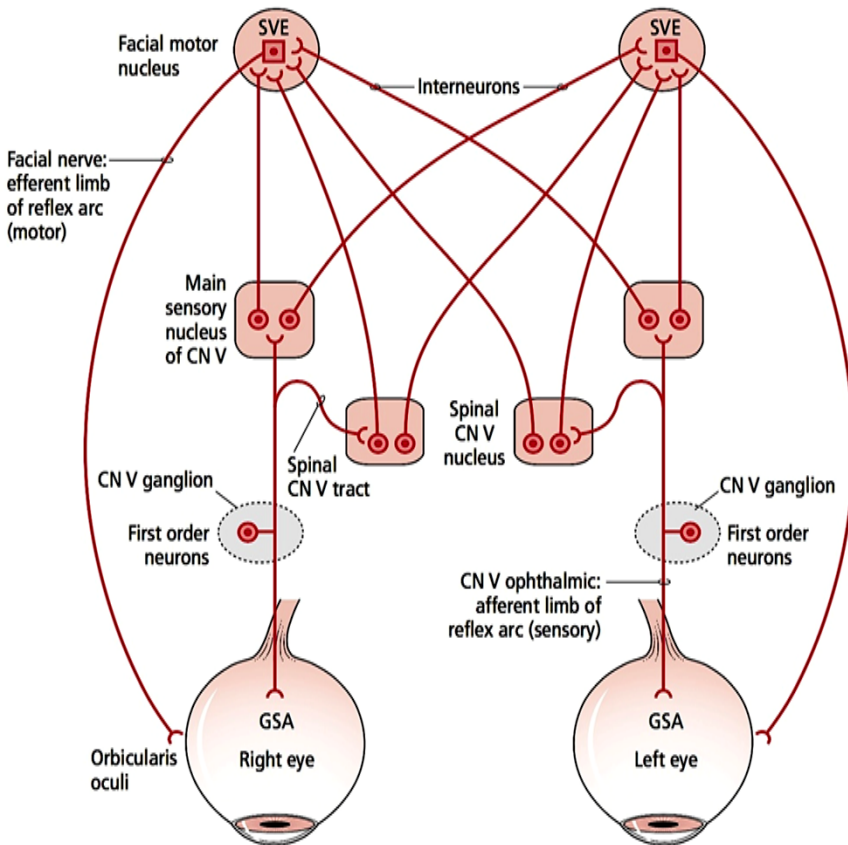
Body visual reflex

Convergence accommodation reflex

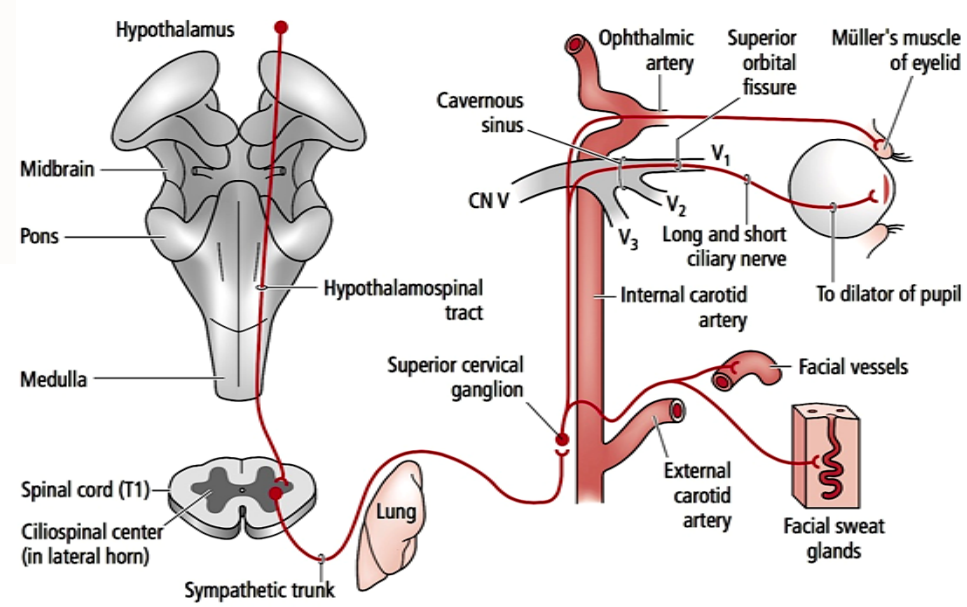
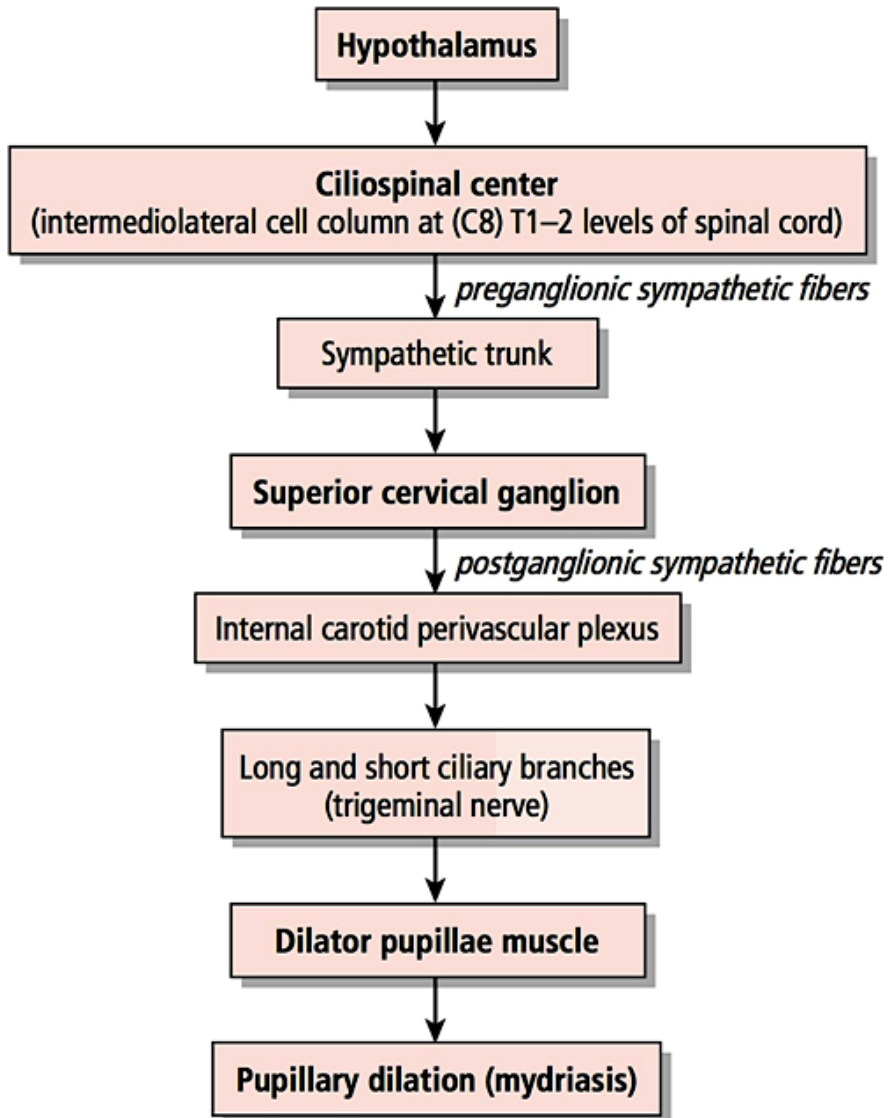
Convergence
Accommodation
Pupillary constriction



Corneal blink reflex



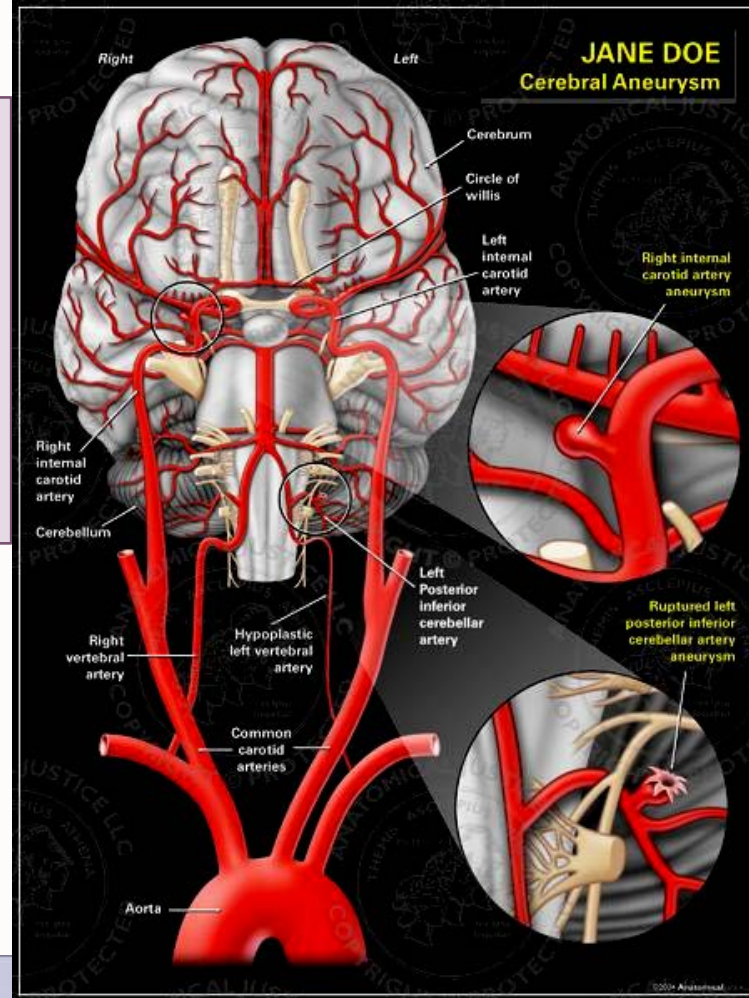
Pupillary dilation reflex





Visual pathway disorder:

Tumor in cerebrum / hypophysis / meninges
 Cerebral vessels trauma = aneurysm of internal carotid artery
 MS = destroy myelin sheath of optic nerve
(note = myelin sheath of optic nerve synthesis by oligodendrocyte Whereas the other myelin sheath of CN synthesis by Schwann cell)

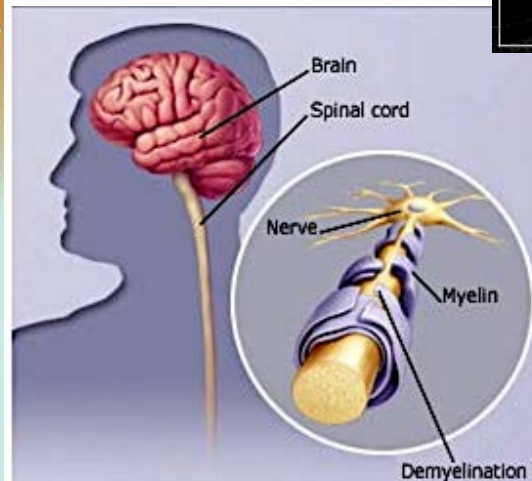
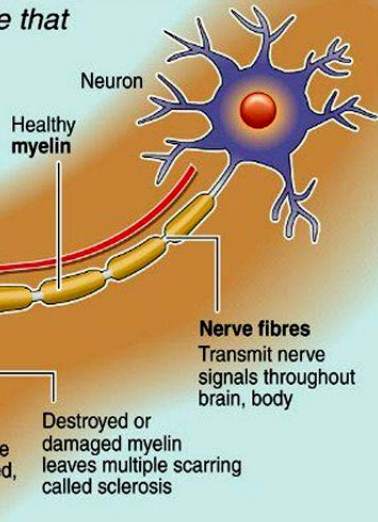


Multiple sclerosis

Degenerative disease that attacks the central nervous system

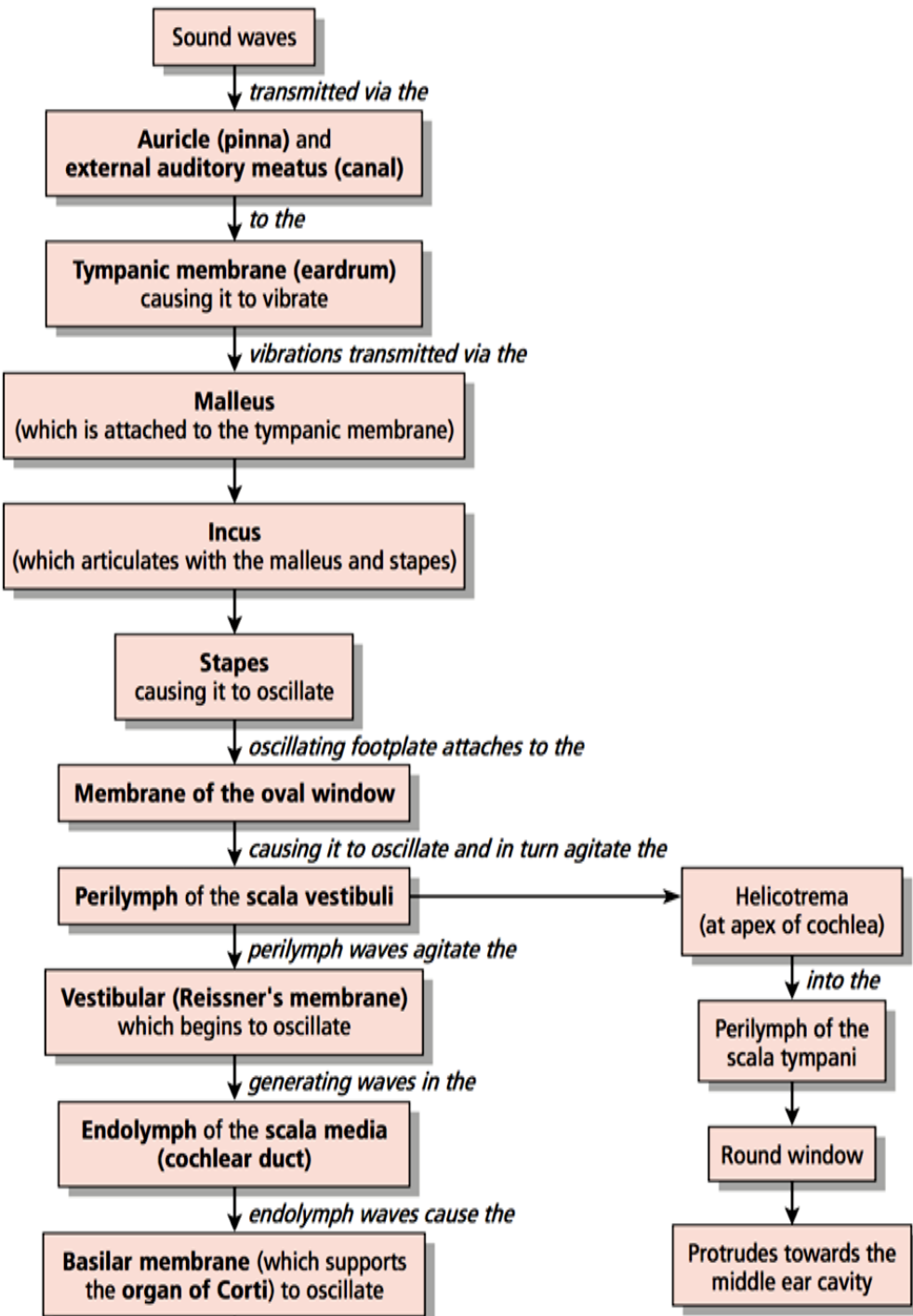
How MS attacks

- ▶ White blood cells attack neurons
- ▶ Affect fatty tissues (*myelin*) around the nerve fibres in brain, spinal cord

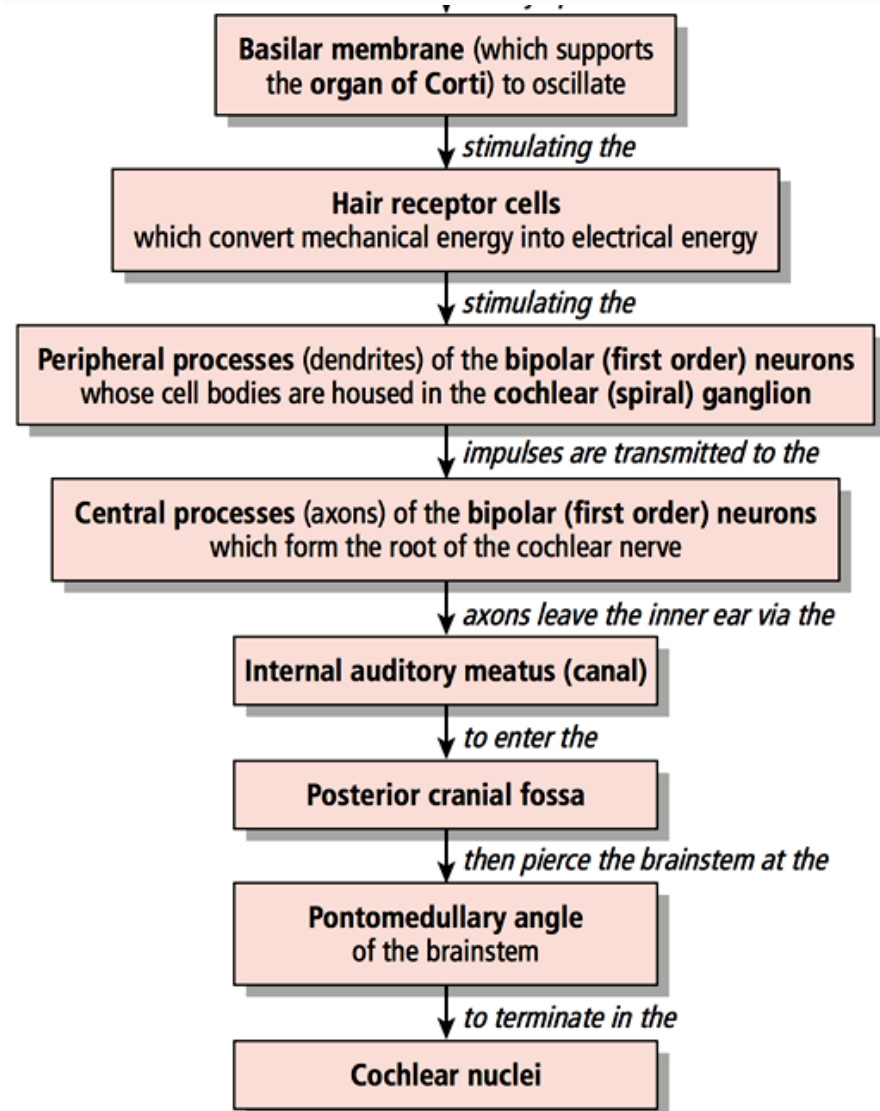




Auditory pathway



Auditory pathway



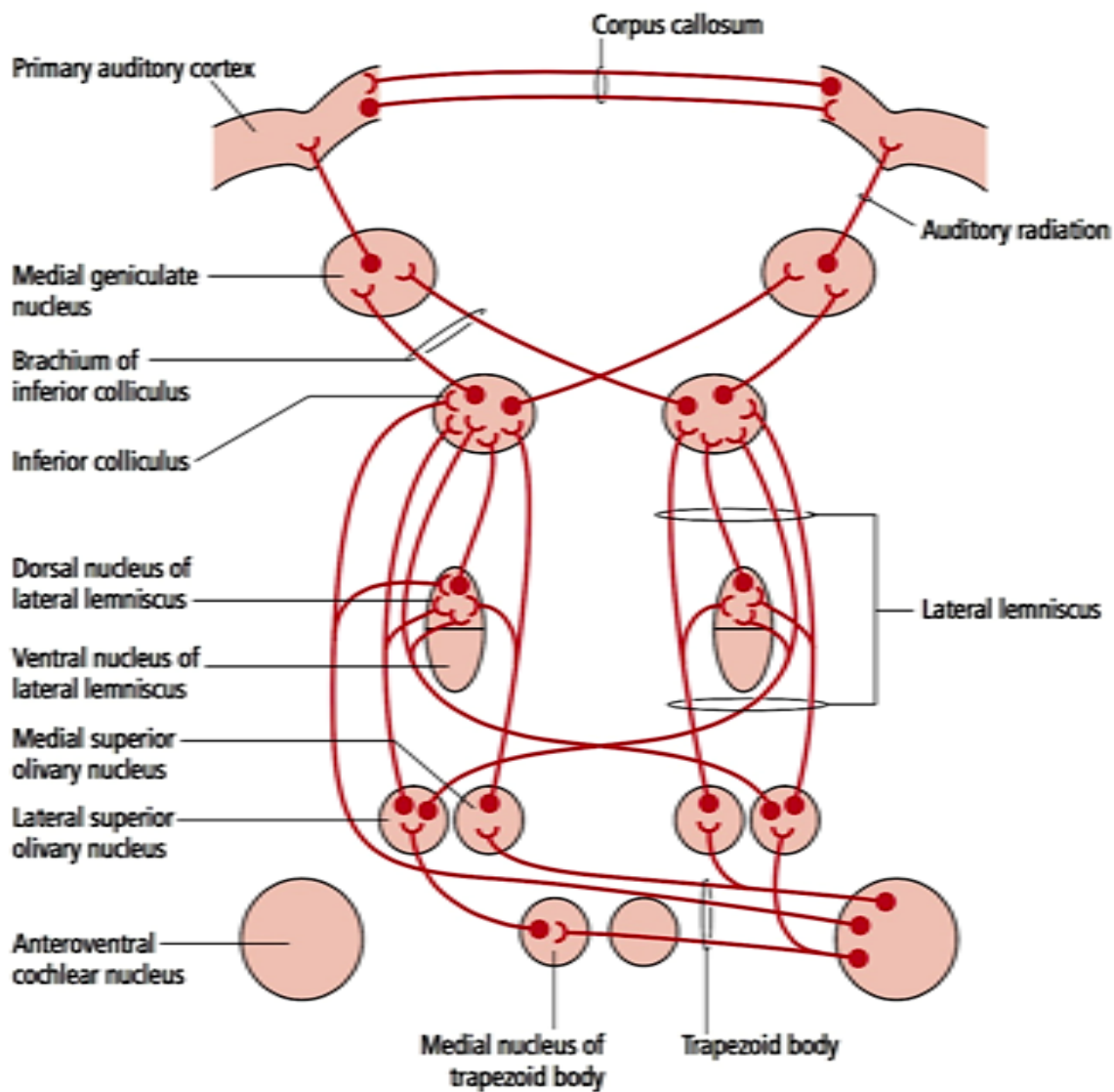


Figure 17.6 • The principal ascending auditory pathways emerging from the anteroventral cochlear nucleus. (Modified from Burt, AM (1993) *Textbook of Neuroanatomy*. WB Saunders, Philadelphia; fig. 12.16.)

Primary auditory cortex = sup. Temporal gyrus
 Secondary auditory cortex

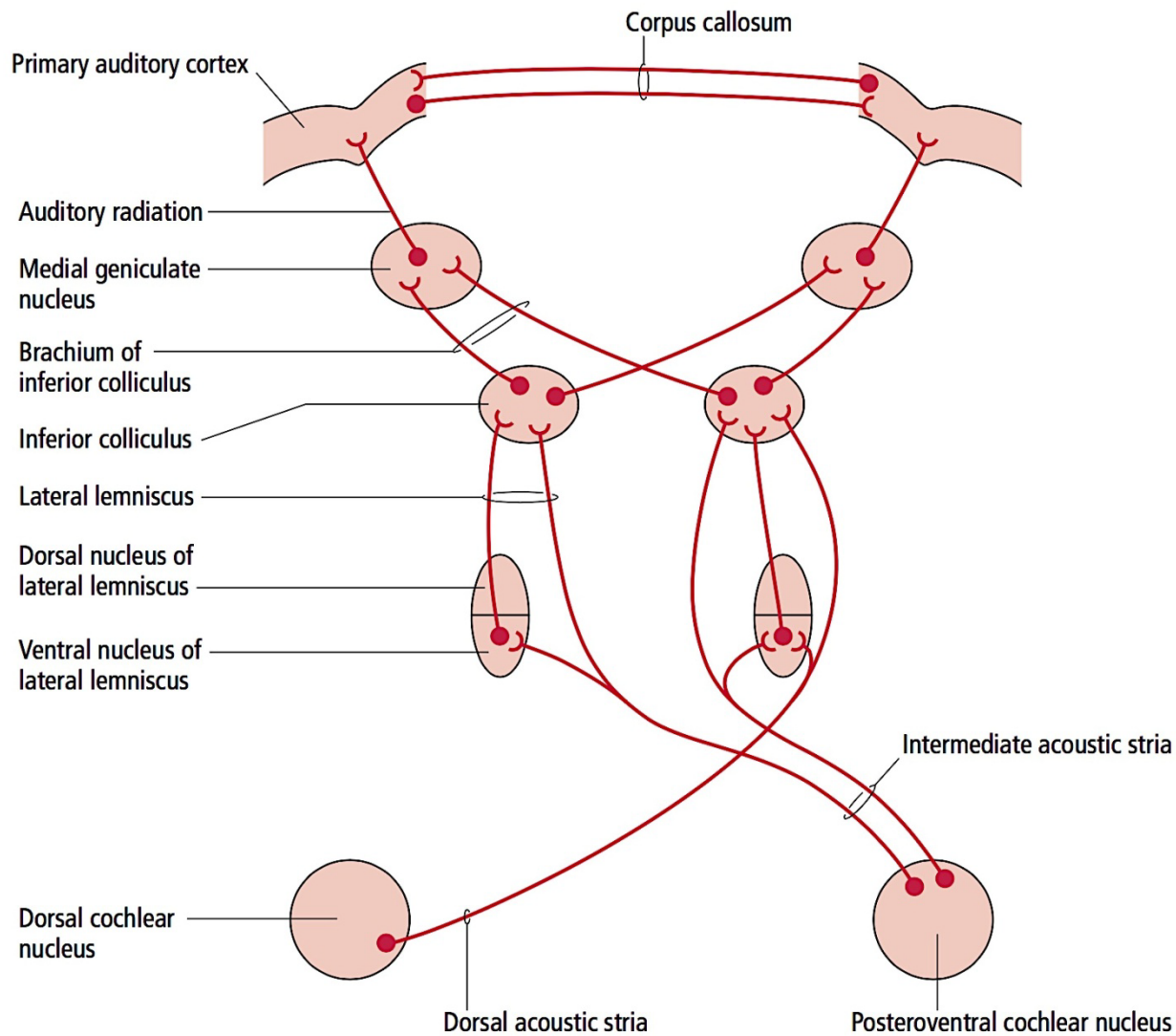


Figure 17.7 ● The principal ascending auditory pathways emerging from the posteroventral and dorsal cochlear nuclei. (Modified from Burt, AM (1993) *Textbook of Neuroanatomy*. WB Saunders, Philadelphia; fig. 12.17.)


From cochlear N. / inf. Colliculus

To cranial & spinal nerve

By (tectospinal / tectoneuclear)



Auditory reflex



Equilibrium pathway

Equilibrium pathway:

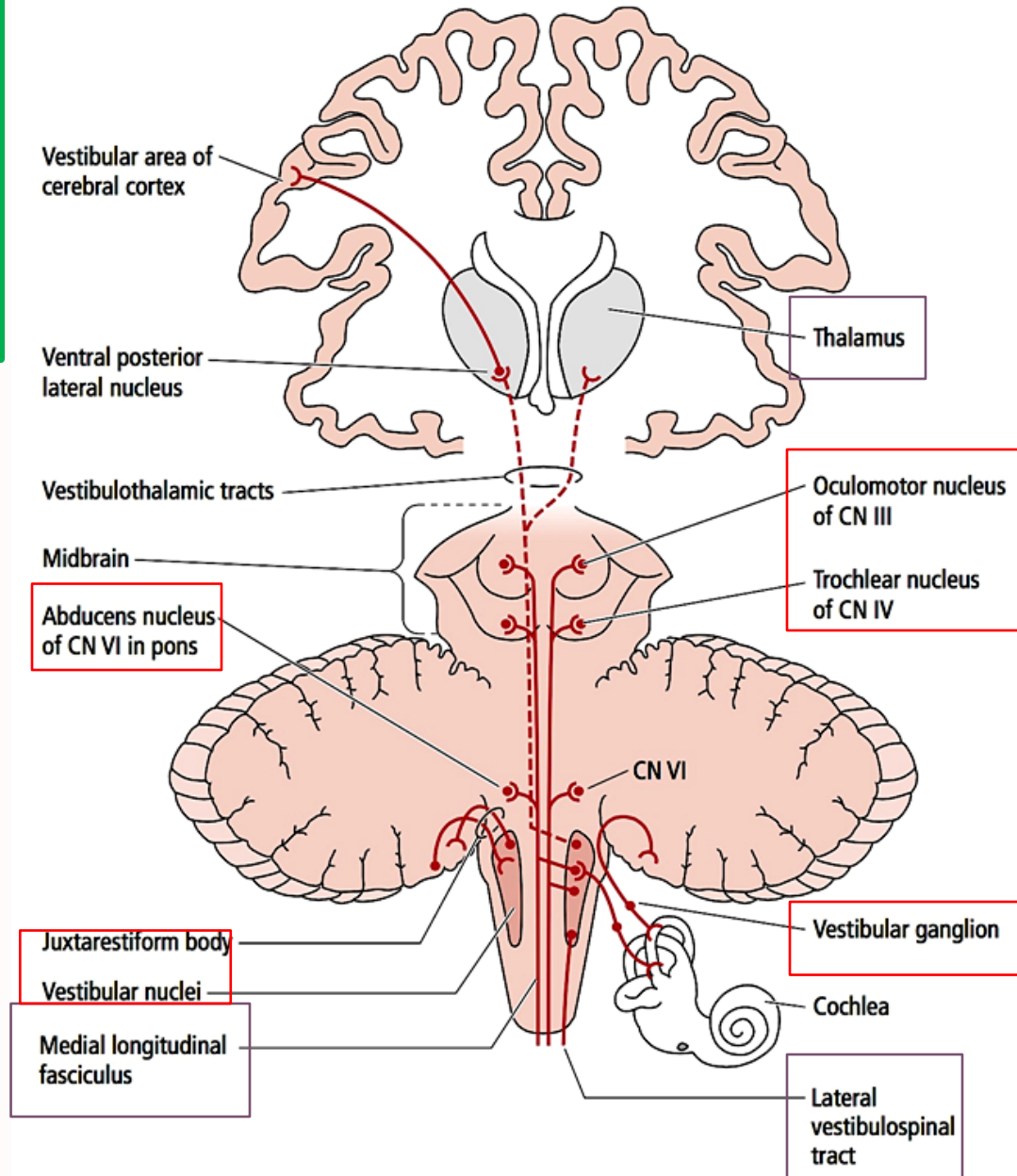
Spinocerebellar tract
Vestibular nerve

Hair cells in semicircular duct / saccule & utricle (bipolar neuron)

Vestibular ganglion (1st order neuron)

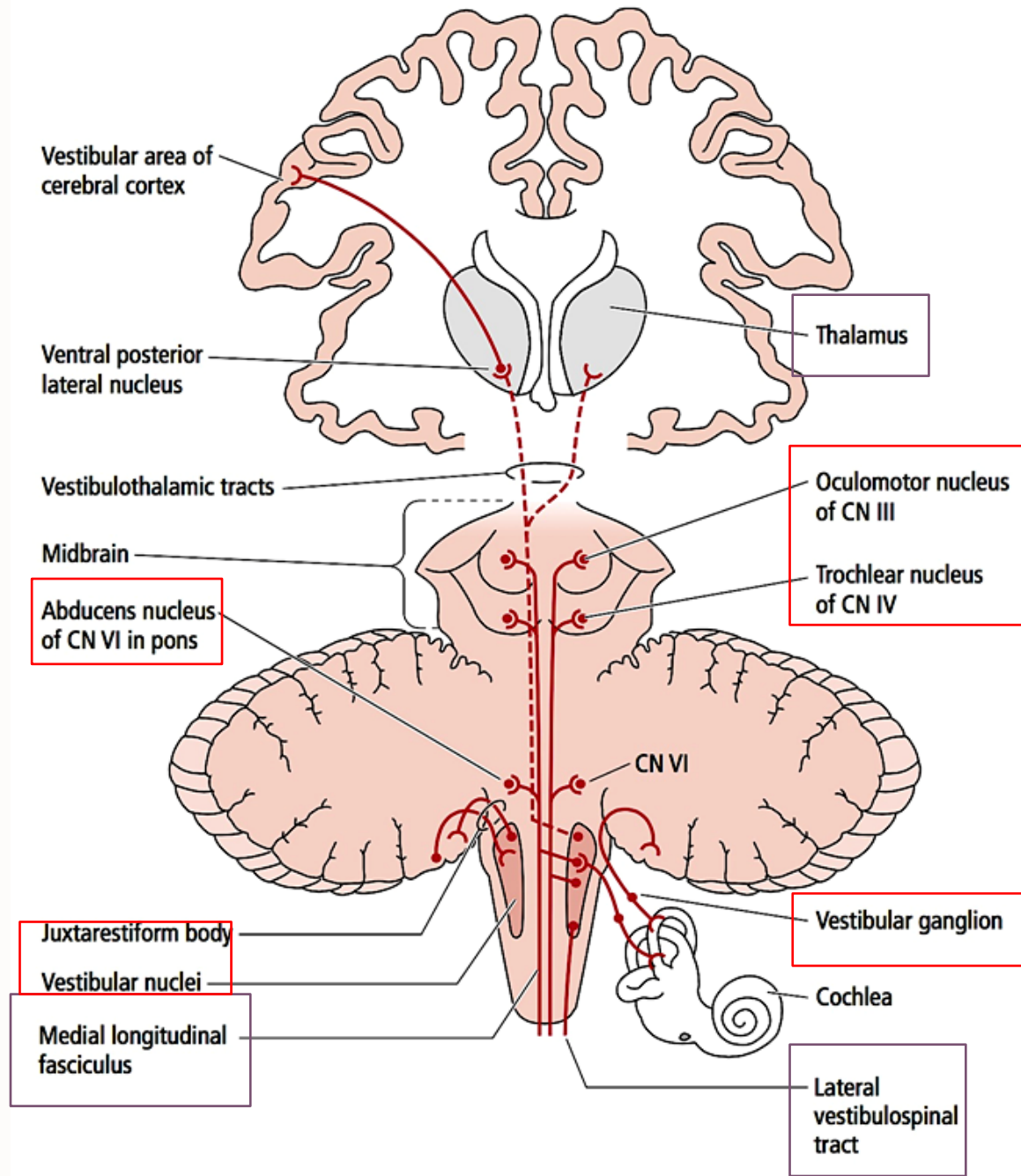
Axon = vestibular nerve

Vestibular nucleus (2nd order neuron)



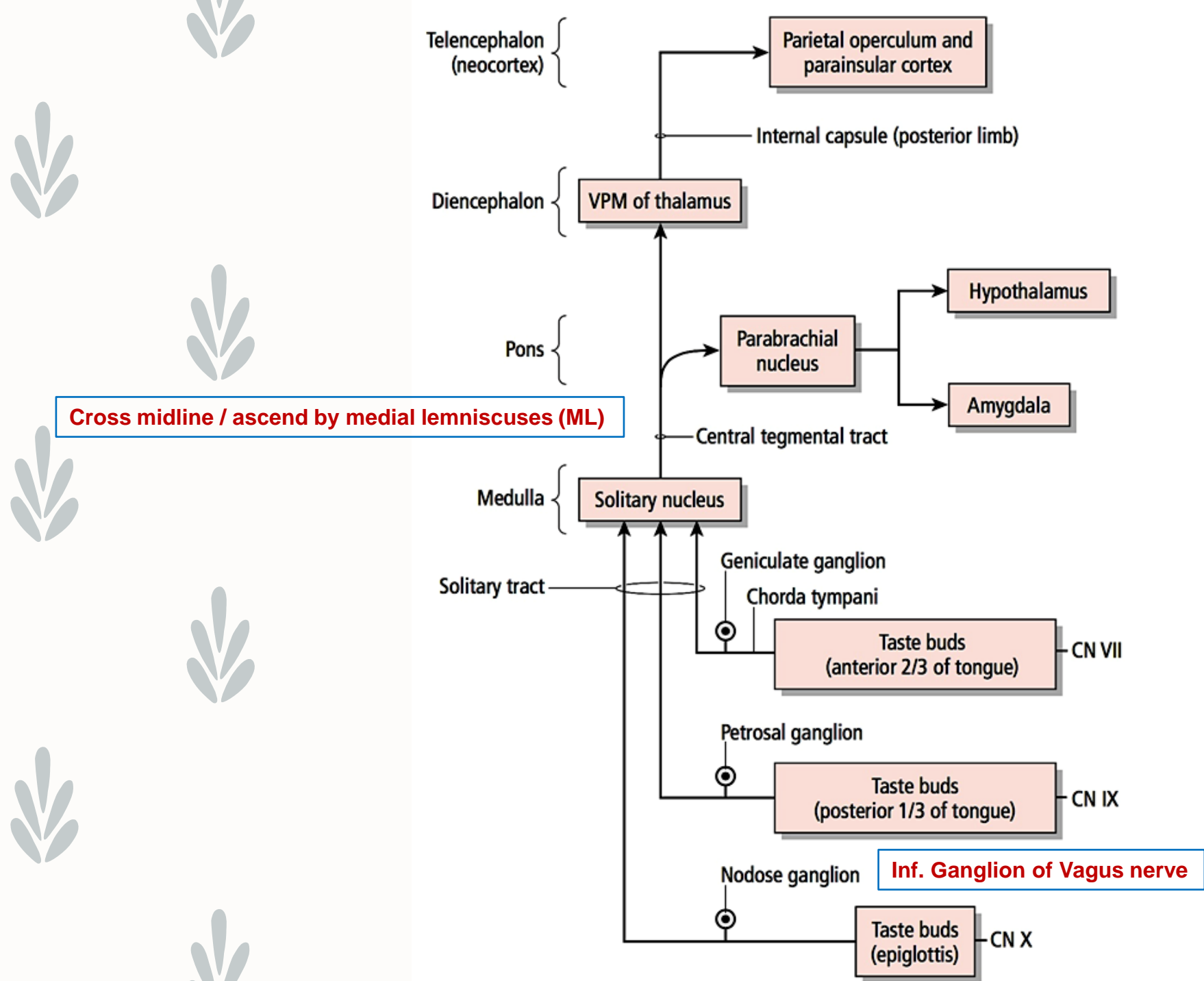
4 pathway:

1. **Inf. Cerebellar peduncle** /Nucleus of cerebellum (fastigil= 3rd order neuron)
2. **Vestibulospinal tract** = control of body movement in response of equilibrium stimulus
3. **MLF**:
Ascending tract: cranial nerve 3/4/6 = coordination of eye movement to head movement
Descending tract: cervical segment of spinal cord = control of head & upper limb movement in Response to equilibrium stimulus
4. **Thalamus nucleus** / parietal lobe = awareness of person situation





Taste pathway



Descending / efferent tracts

from pyramid cells of cerebral cortex

transfer from pyramids of medulla

Pyramidal
pathways:

head & neck
trunk & limb

extrapyramidal
pathways:

Corticospinal tract

Pyramidal pathways: head & neck

Corticospinal tract / corticobulbar tract

➤ *Upper motor neuron:*

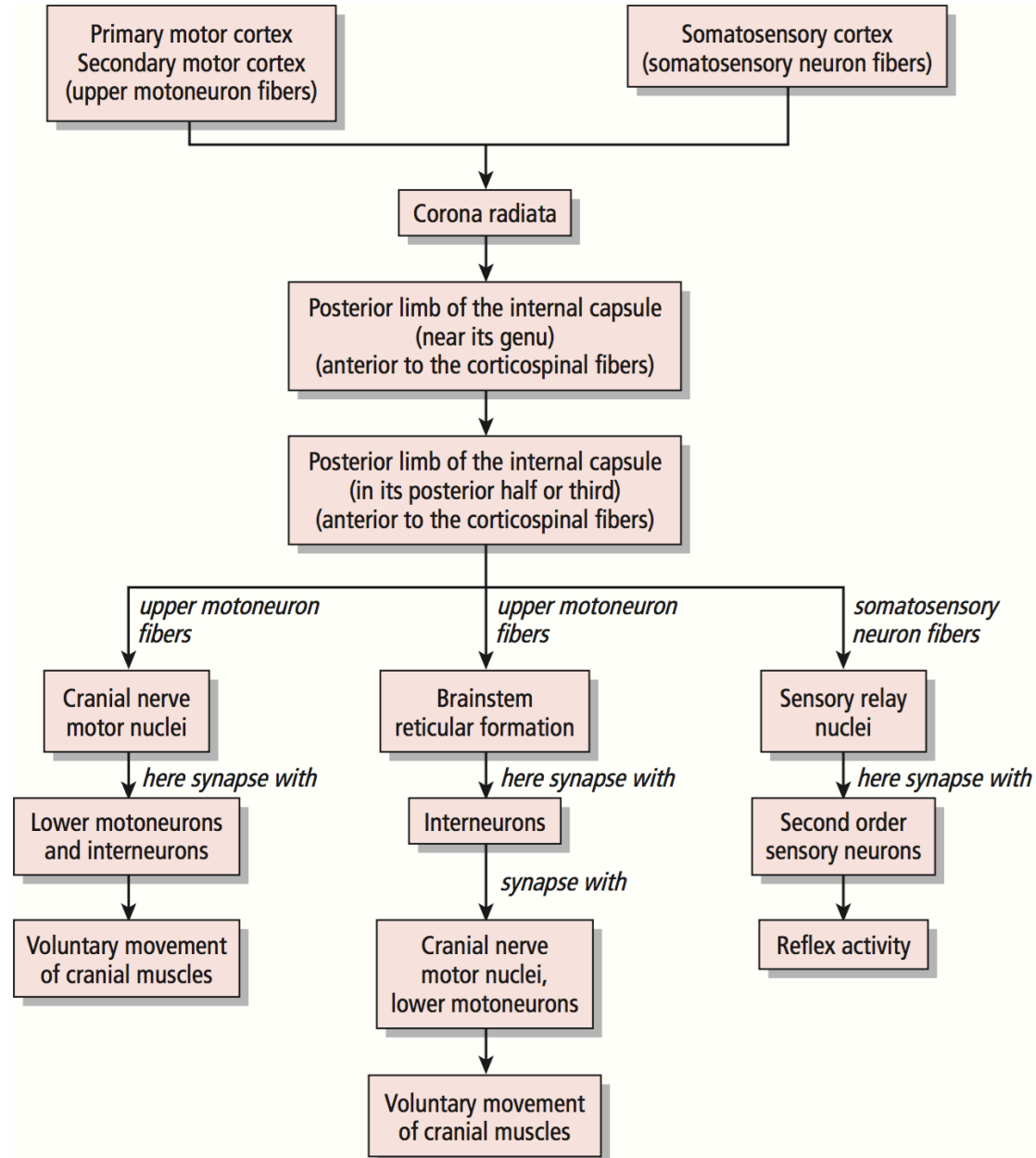
Cerebral cortex
Internal capsule
Brain stem
Cross midline

➤ *Lower motor neuron:*

Cranial nerve nucleus
3/4/5/6/7/9/10/11/12

Function:

Start & control of voluntary movement of head and neck



Corticonuclear tract (facial nucleus)

