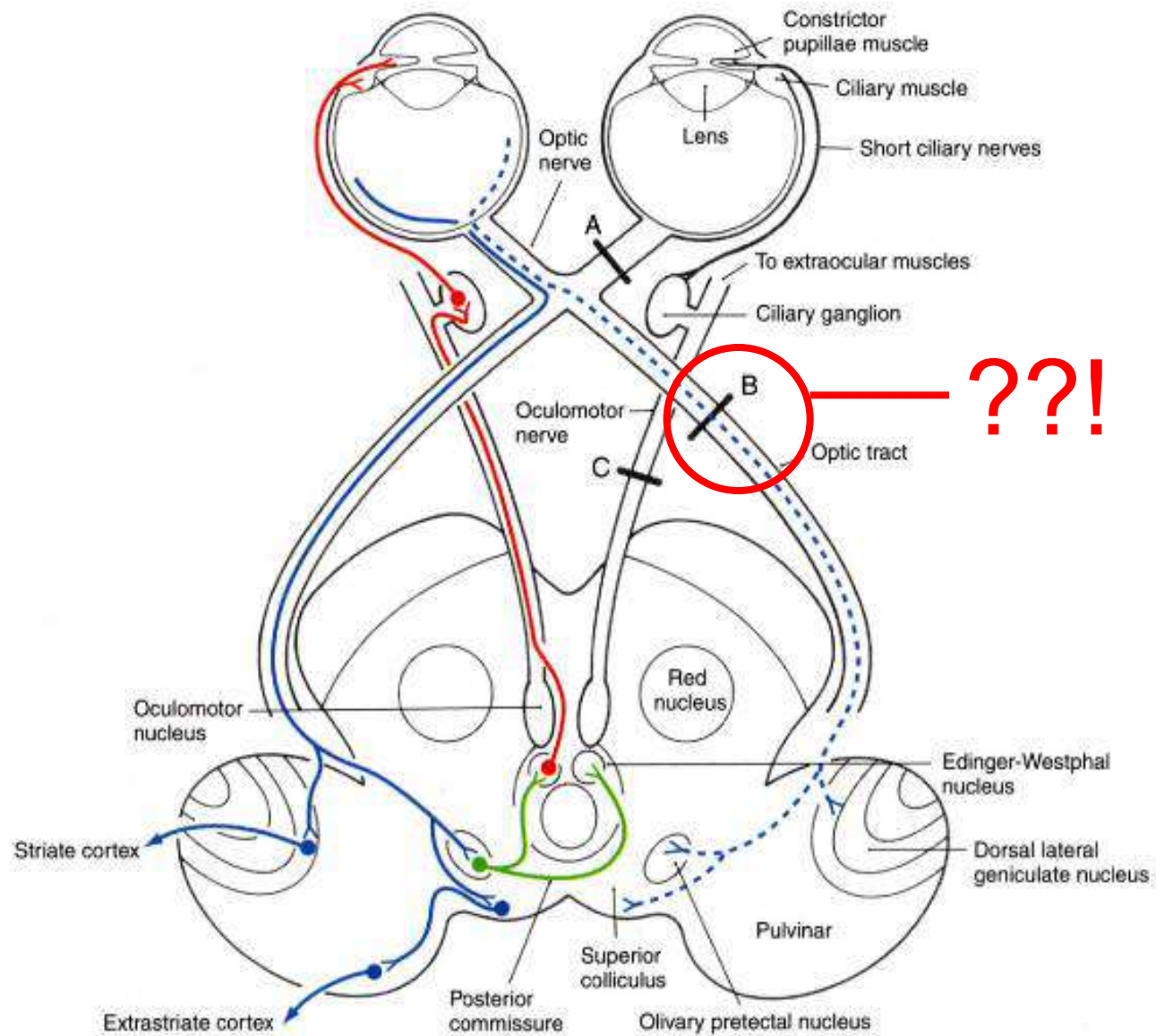


Pupillary Light Reflex

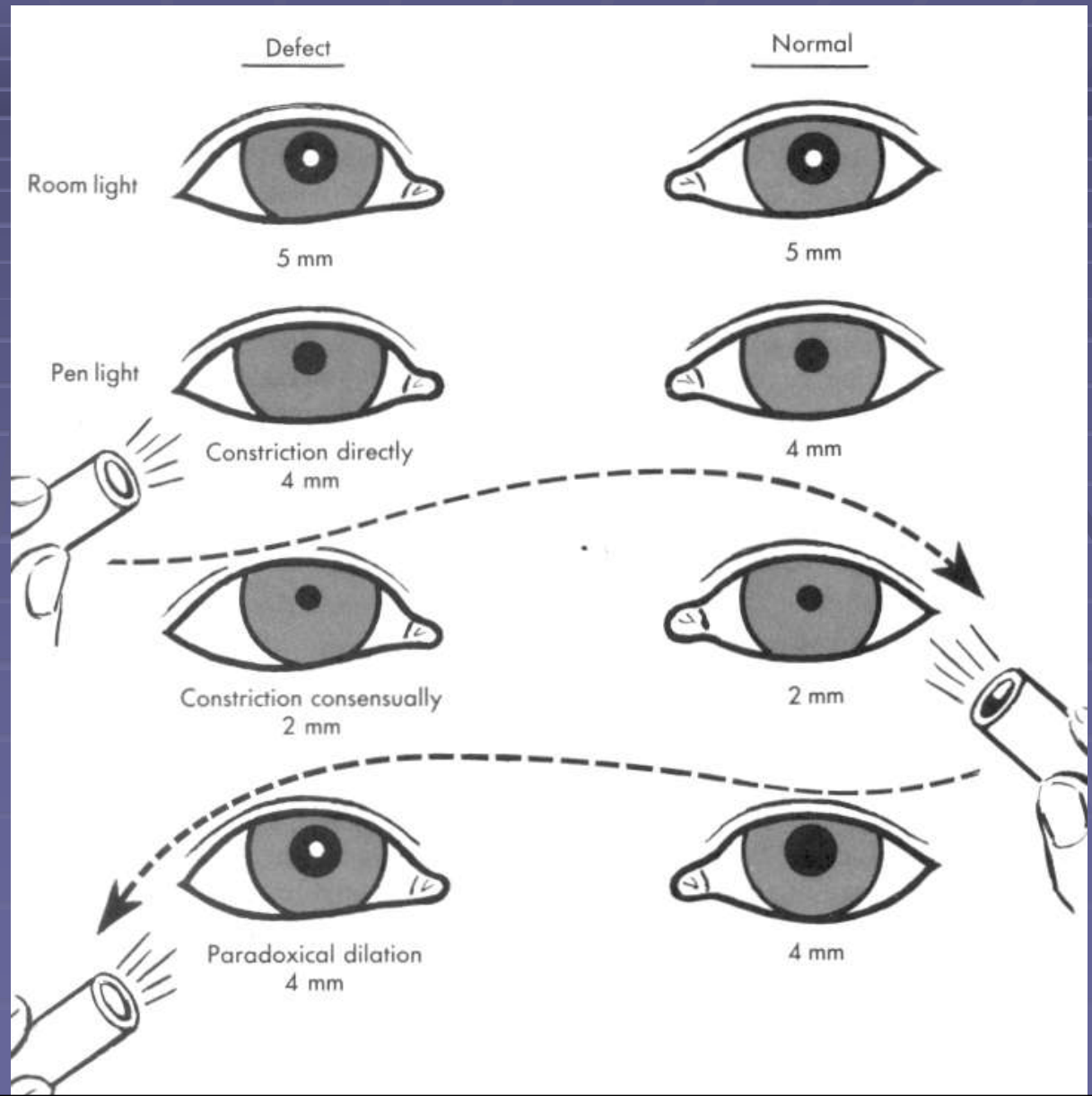


??!

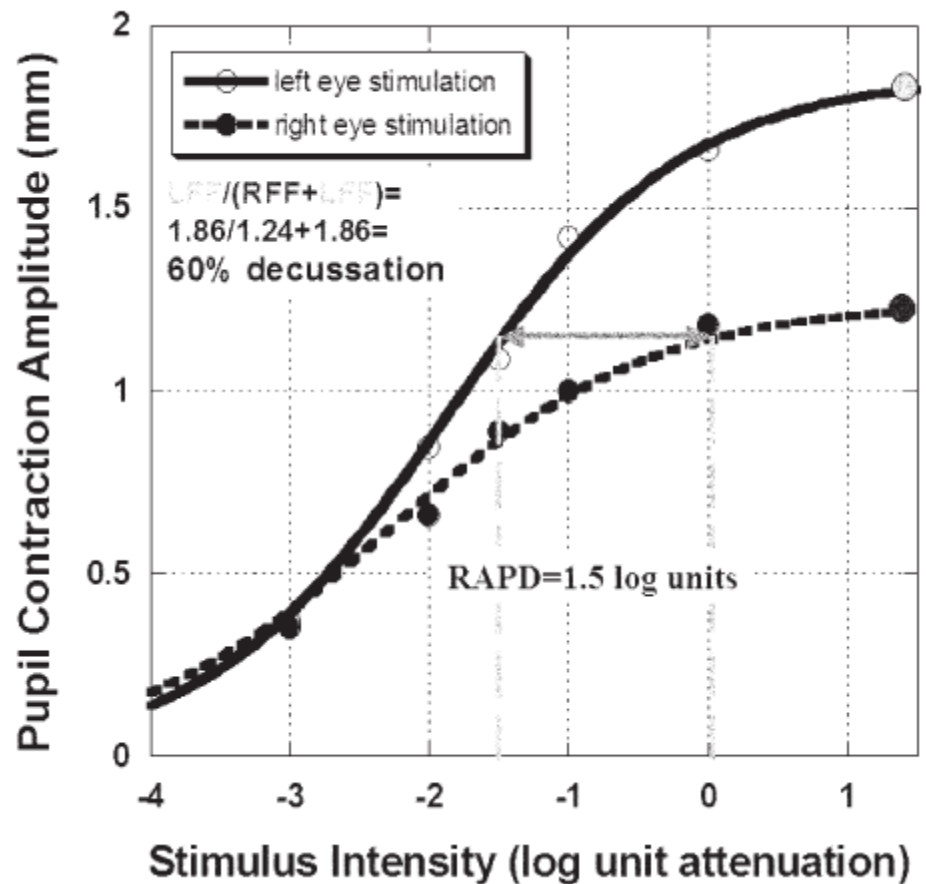
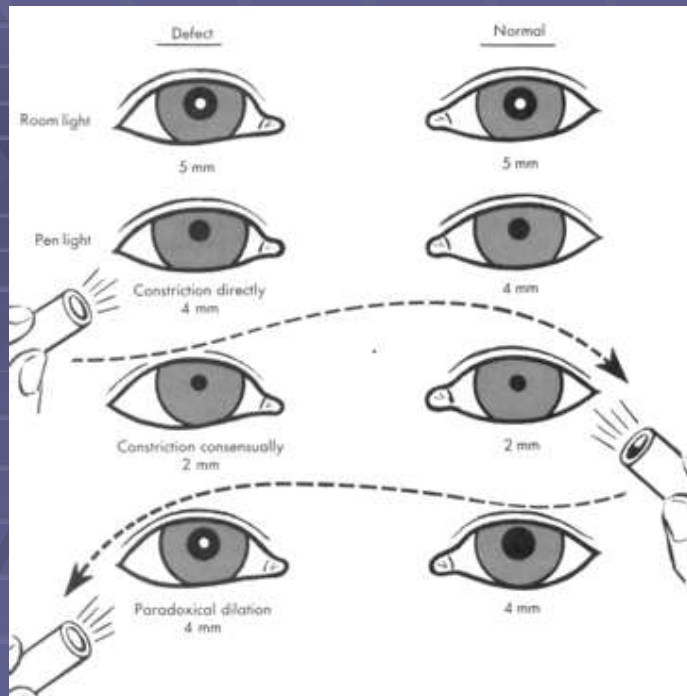
relative afferent pupillary defect
(RAPD)

relative afferent pupillary defect (RAPD)

swinging-flashlight test



relative afferent pupillary defect (RAPD)

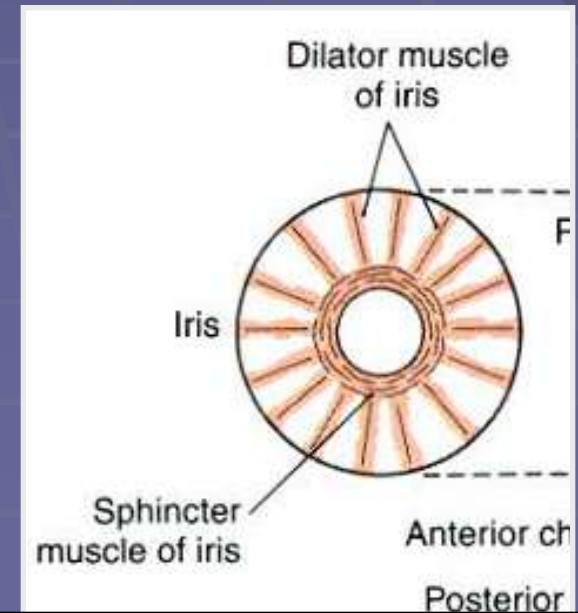
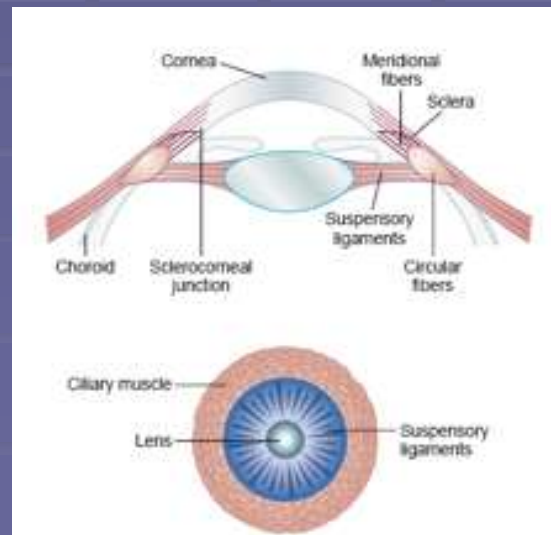
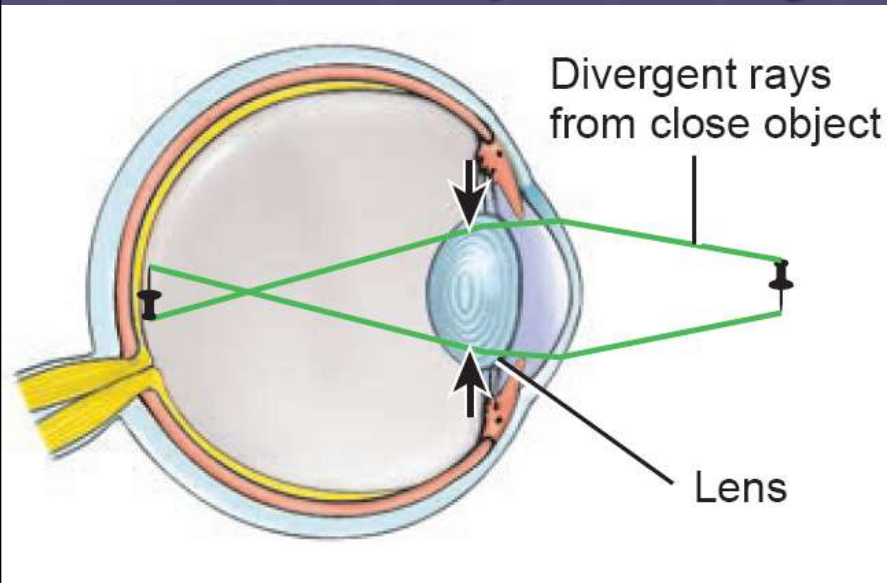


relative afferent pupillary defect (RAPD)

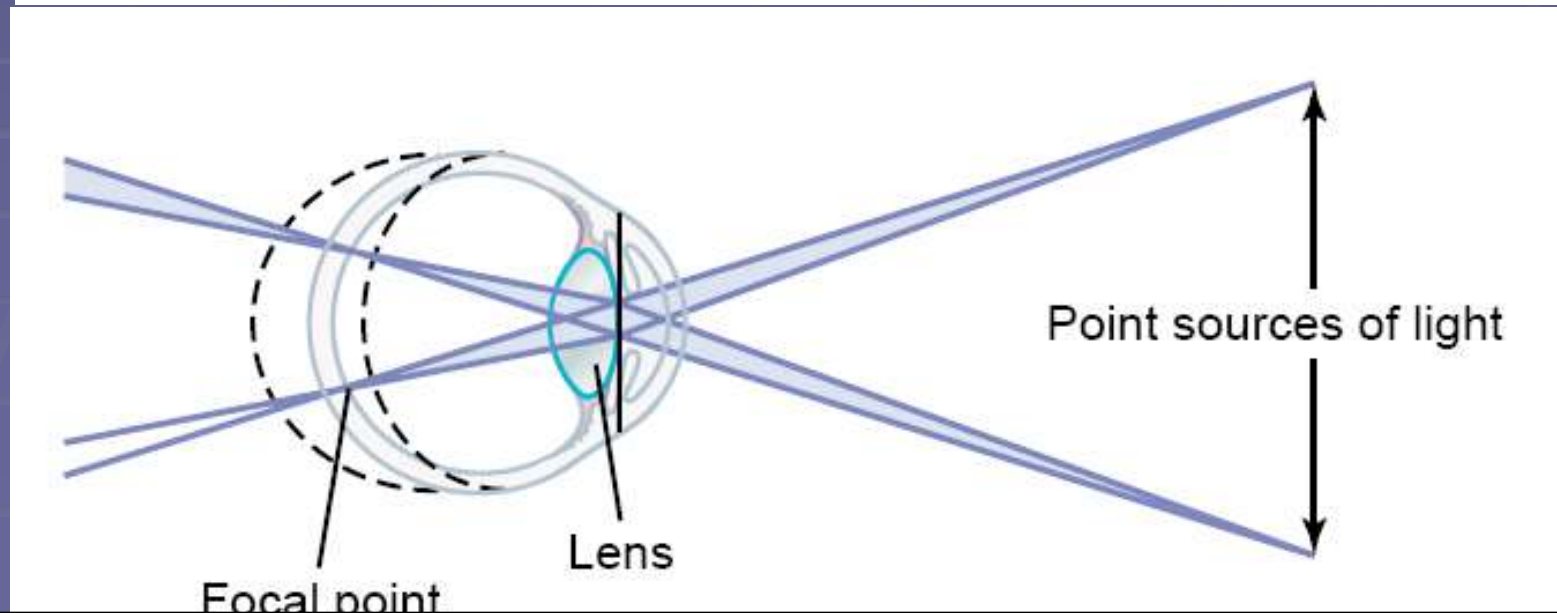
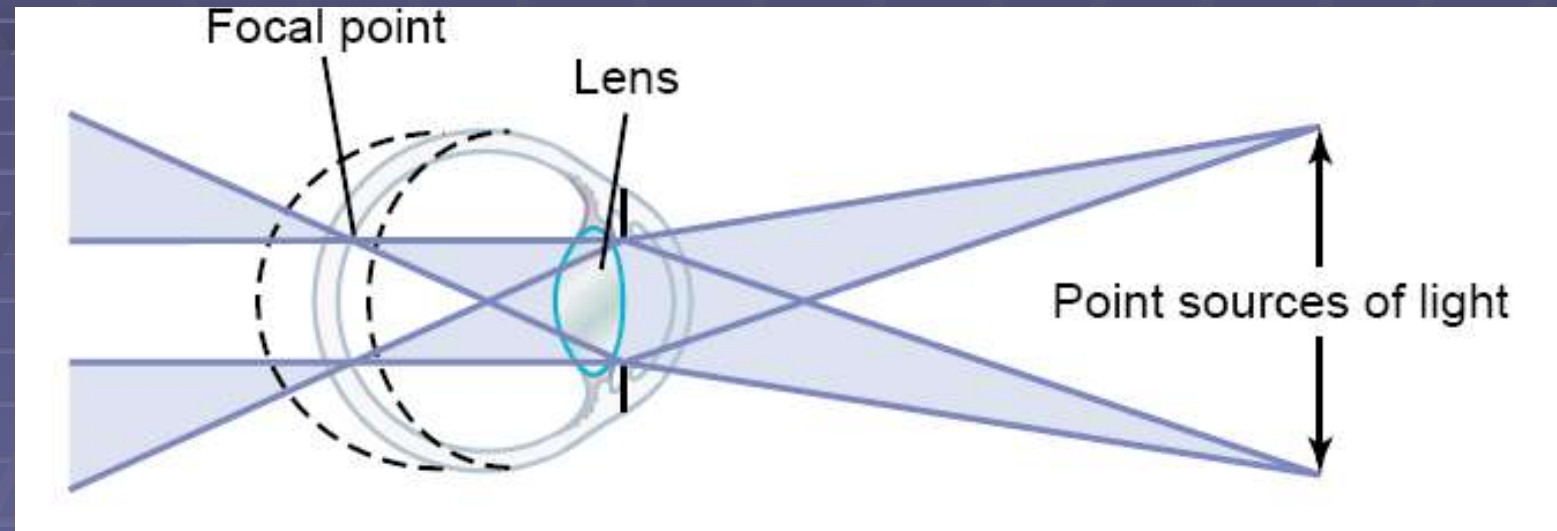
- Usually before the chiasm problem
 - Retinal detachment
 - Ischemic retina
 - Optic nerve : ischemia ,compression neuritis , recovered neuritis ... etc
 - diabetic retinopathy
 - Demyelination (MS)
- Unilateral Optic track lesion
- Unilateral mid brain lesion

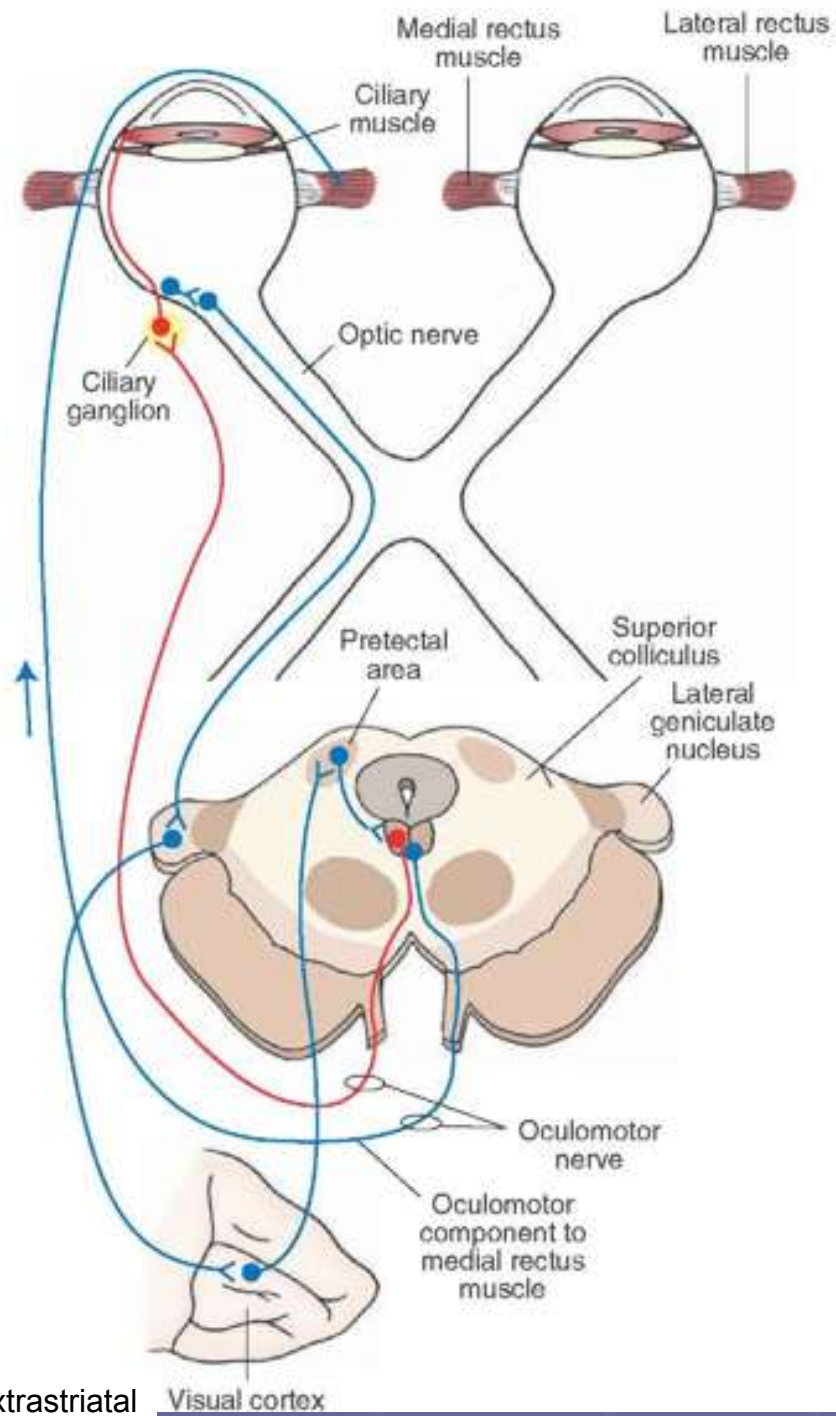
Accommodation and parasympathetic

The pupil near reflex



Pupillary Adjustment





extrastriatal

Visual cortex

light-near dissociation

light-near dissociation

- Adie's tonic pupil
- Damage to the dorsal mid-brain (tectal area) around the cerebral aqueduct "but not the E W nucleus"
 - Stroke
 - Meningitis
 - Tumor
 - Neurosyphilis
 - Diabetic neuropathy
 - Demyelination (MS)
- Dorsal midbrain syndrome
(Parinaud's Syndrome)



Anisocoria

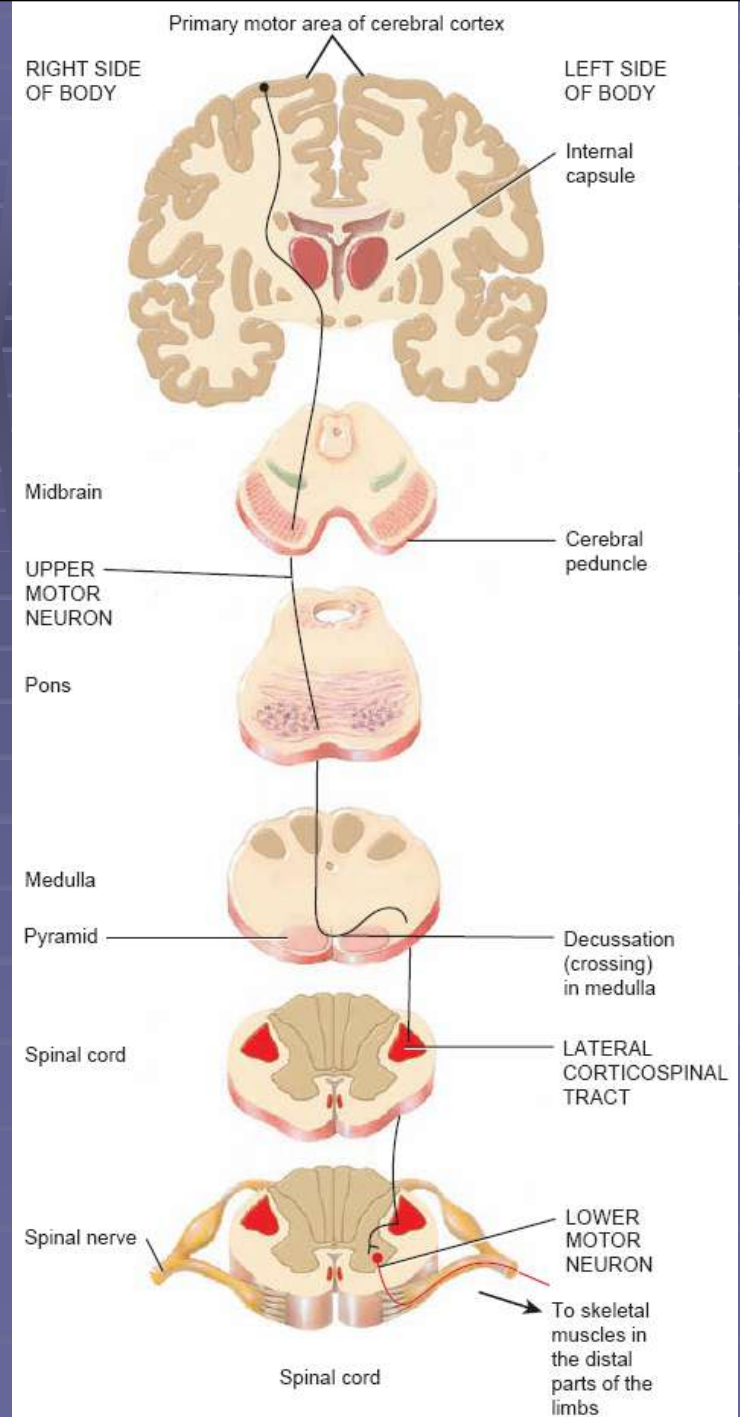
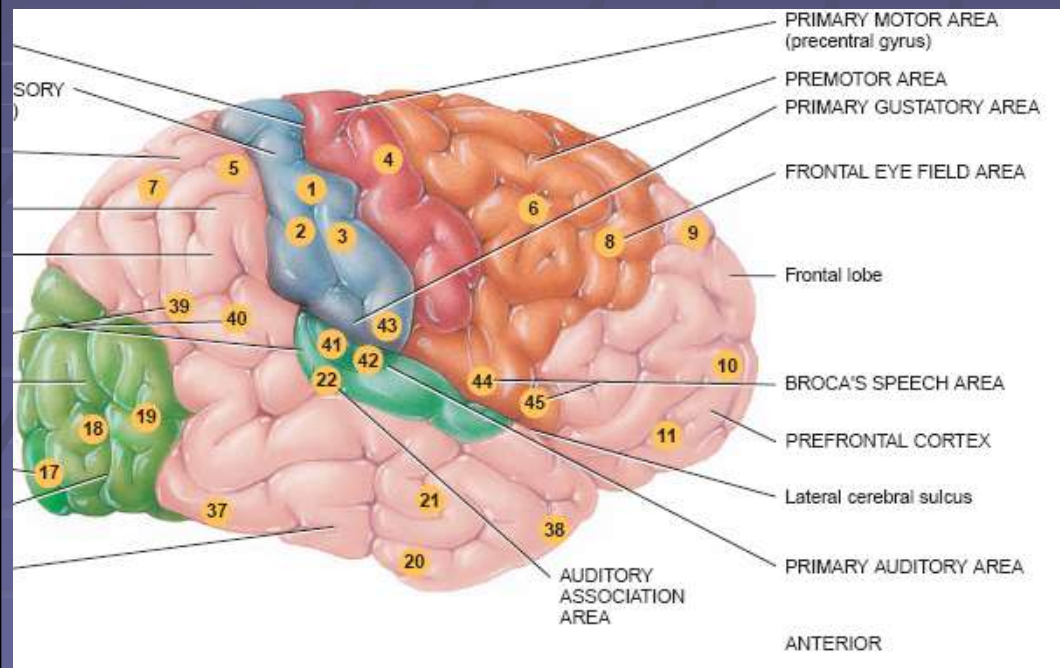


Anisocoria

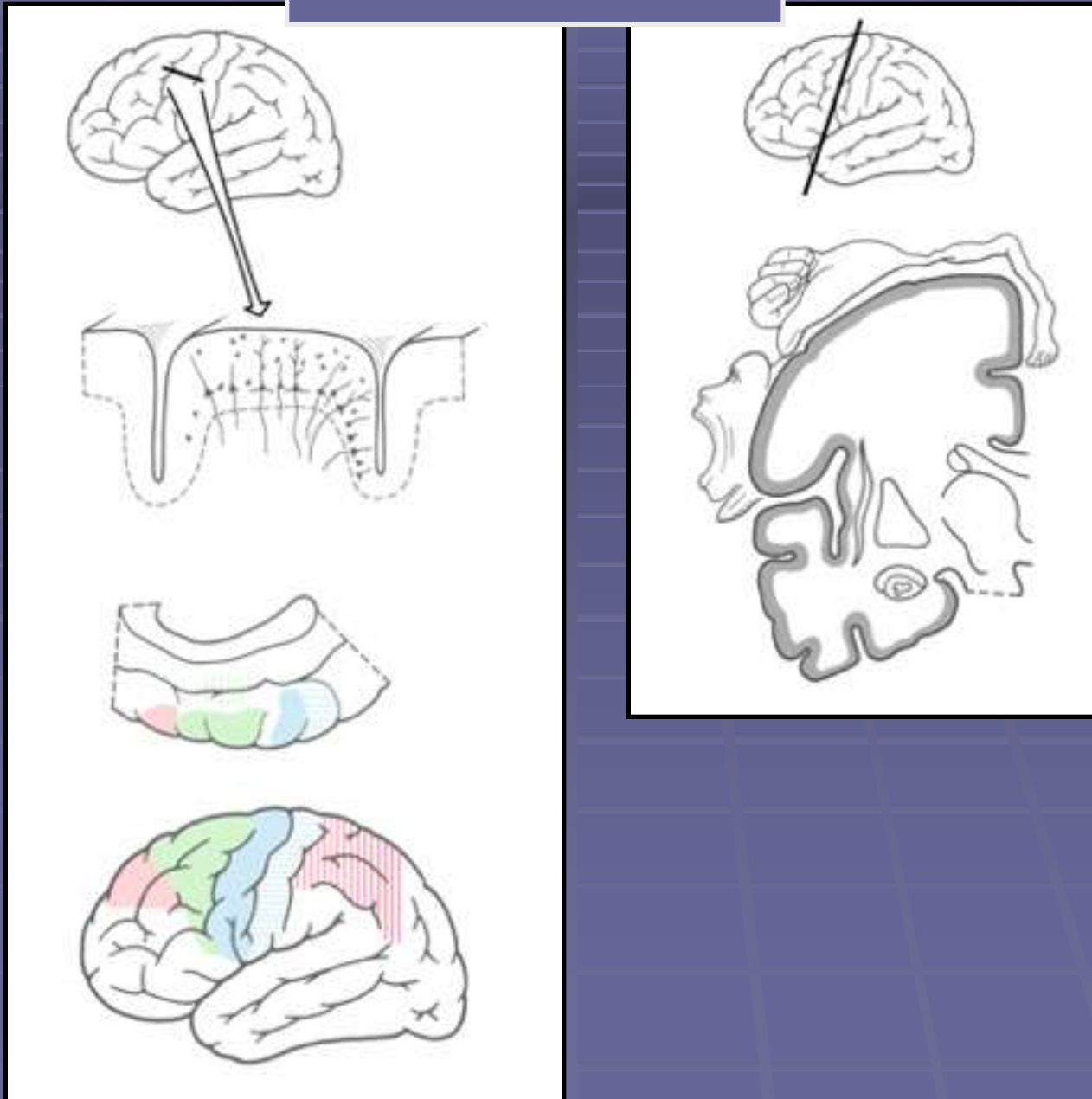
- Efferent pathway or the eye it self
- Adie's tonic pupil
- One side Dorsal midbrain syndrome
- Horner syndrome

Corticospinal and Corticonuclear Projections

Corticospinal pathway

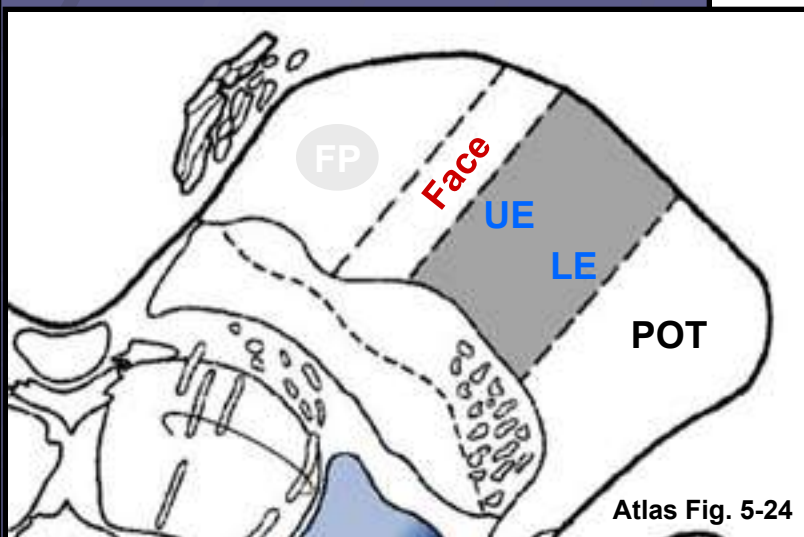
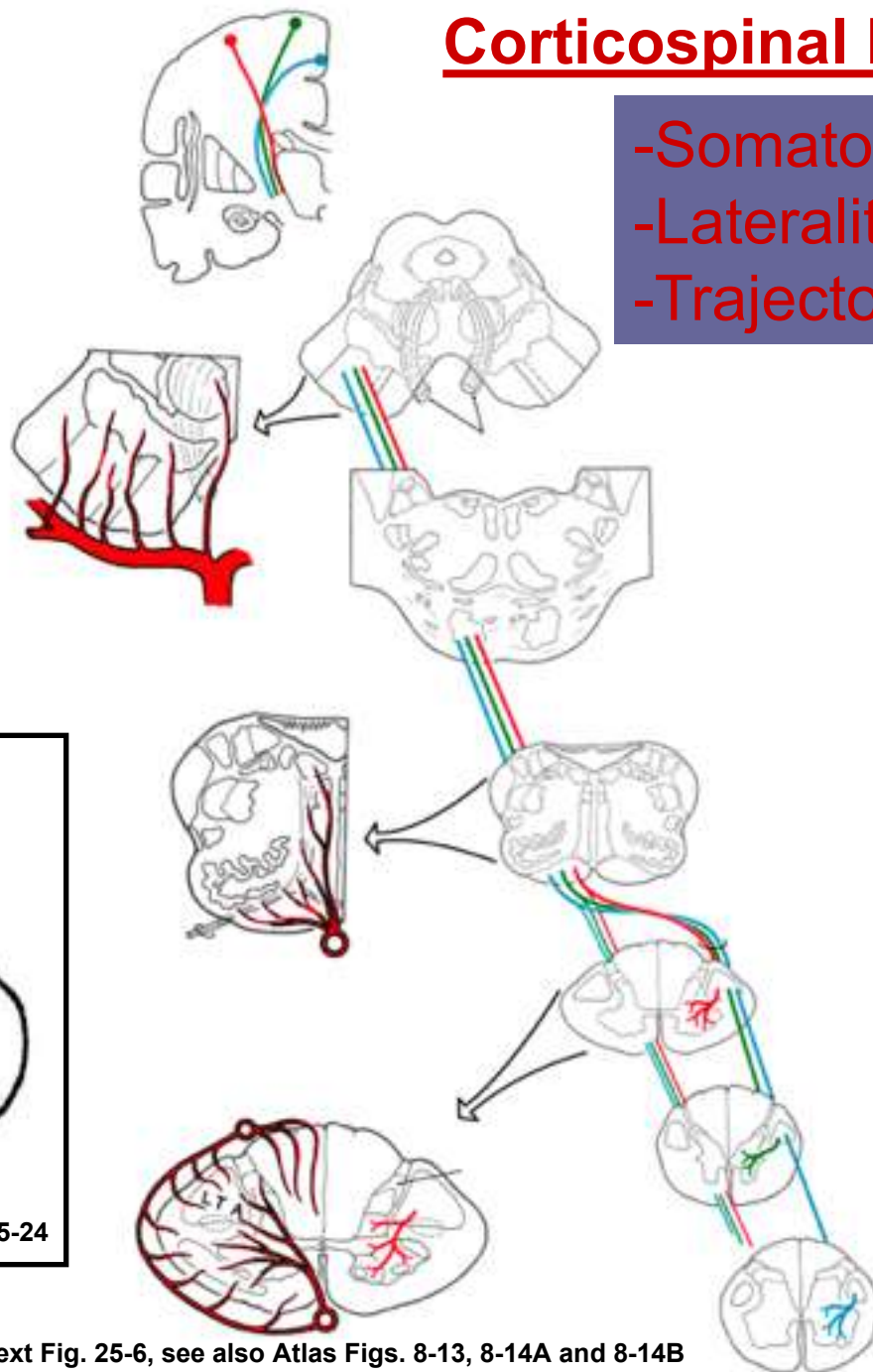
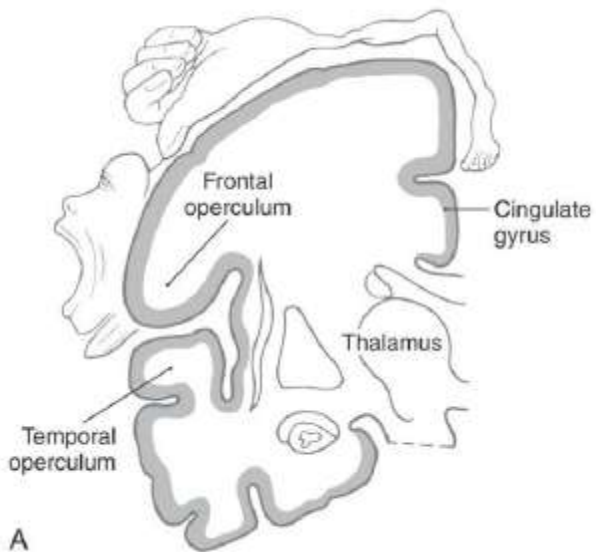


The Motor Cortex



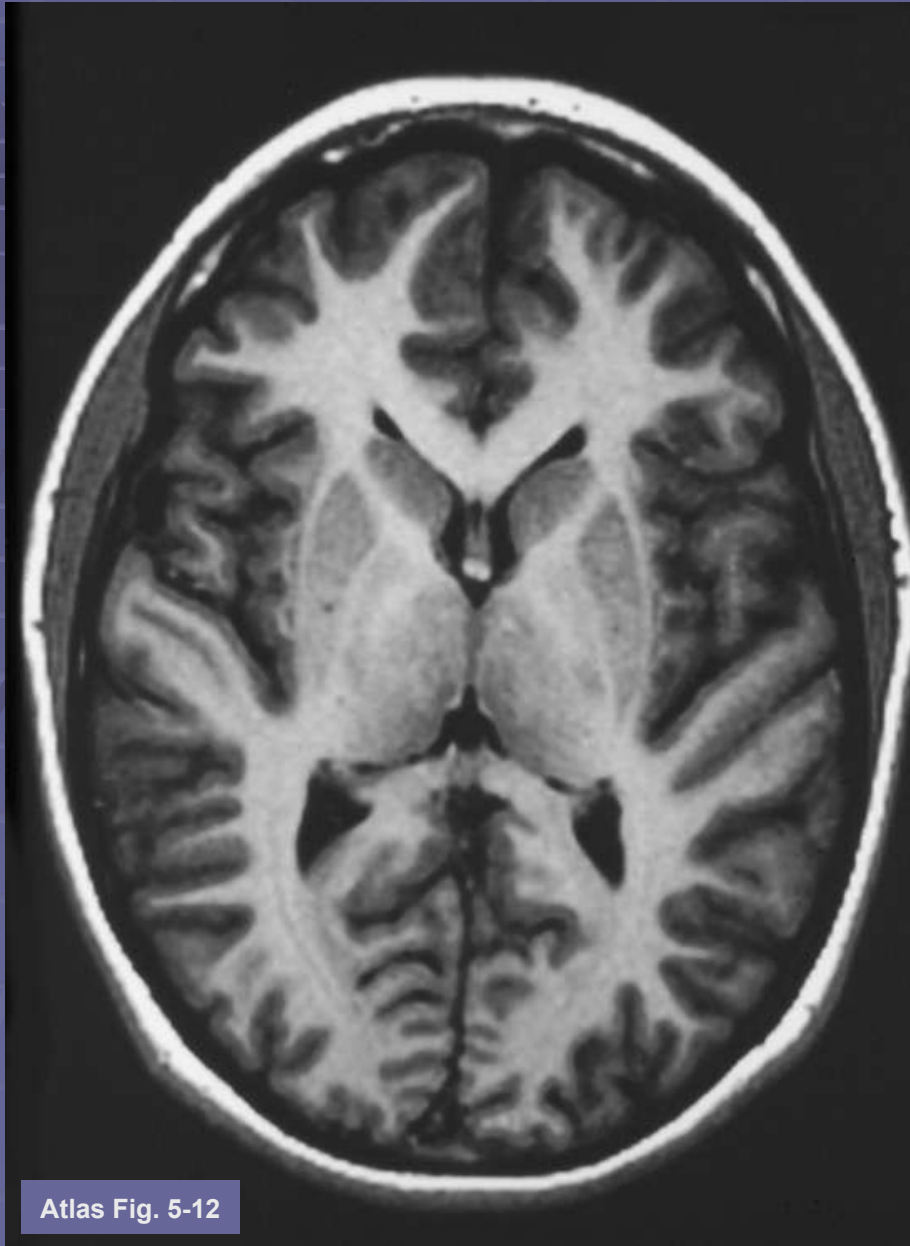
Corticospinal Fibers:

- Somatotopy,
- Laterality,
- Trajectory

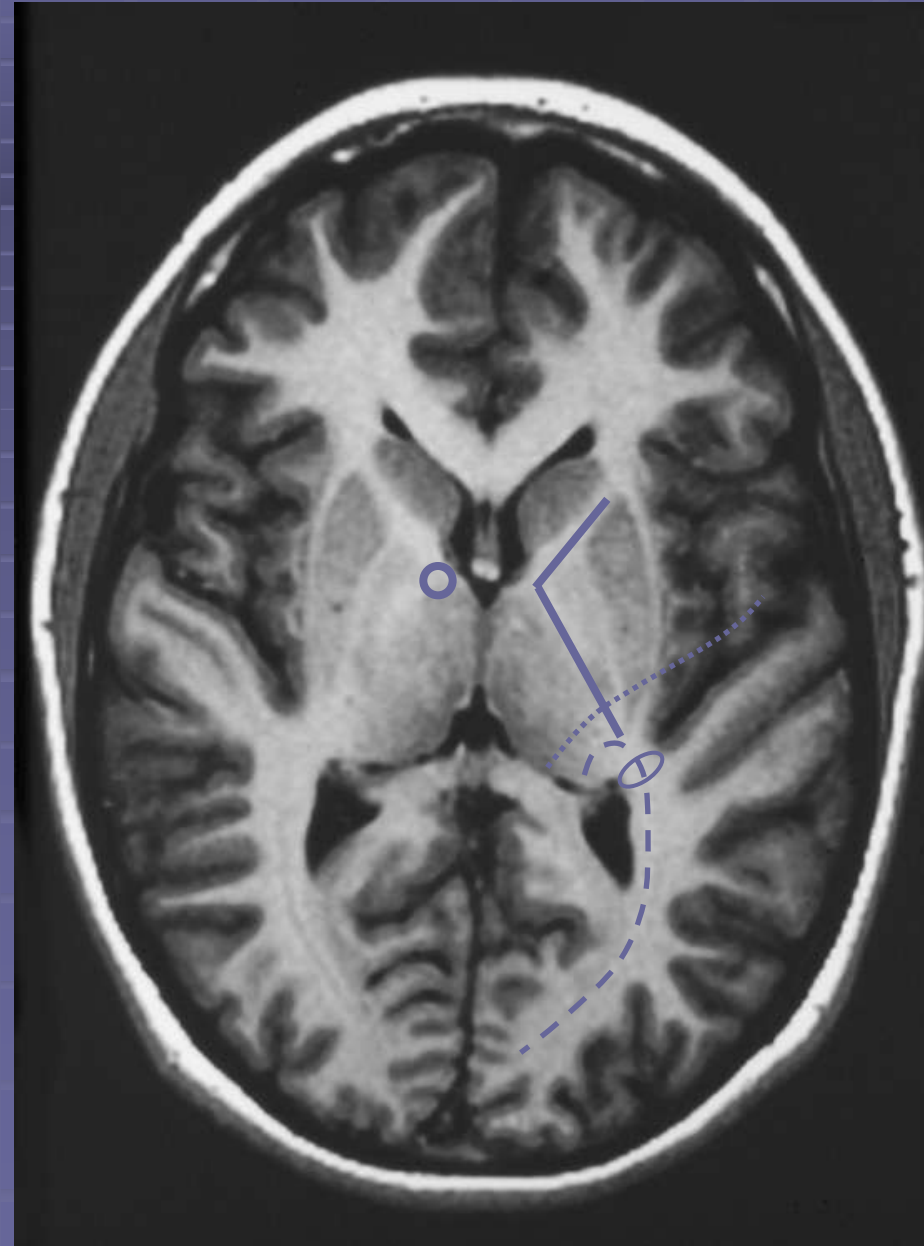


Text Fig. 25-6, see also Atlas Figs. 8-13, 8-14A and 8-14B

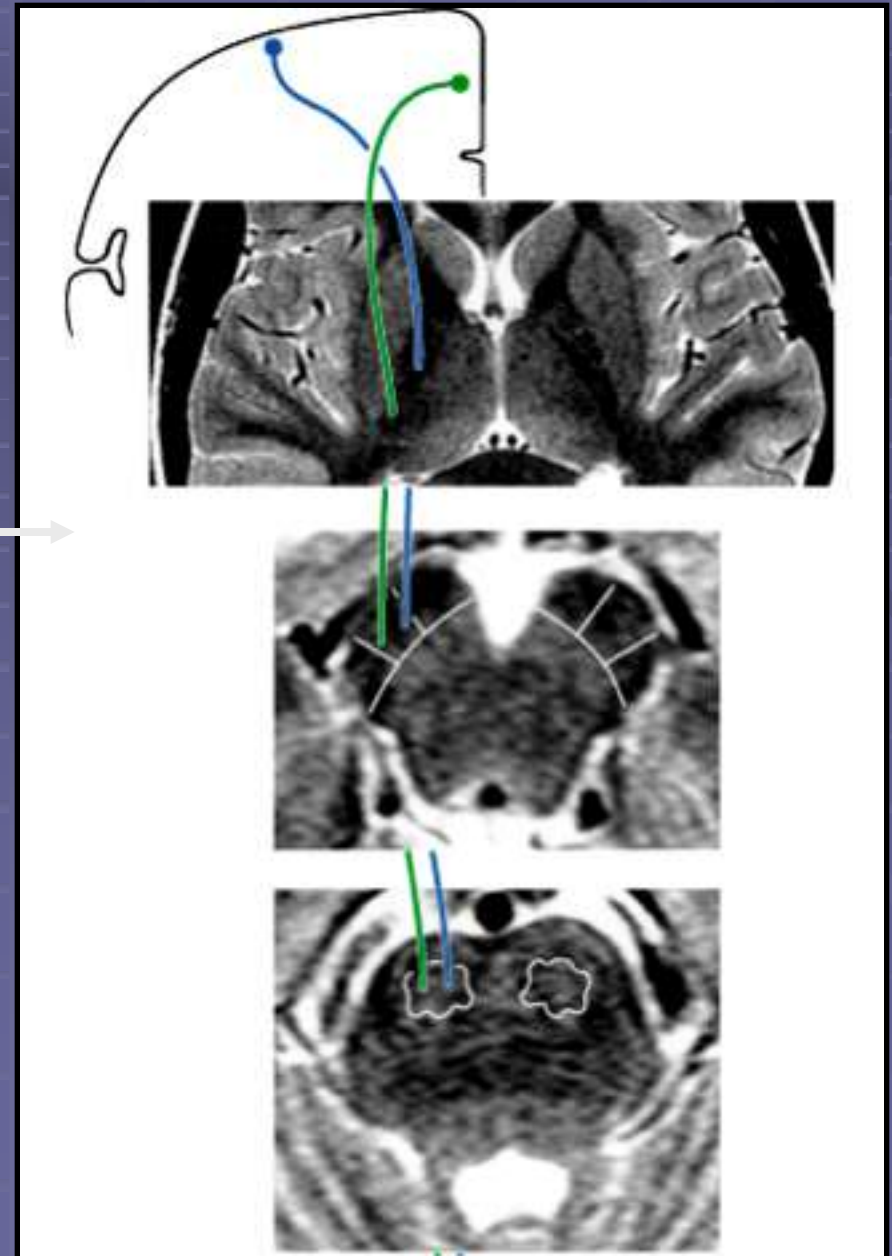
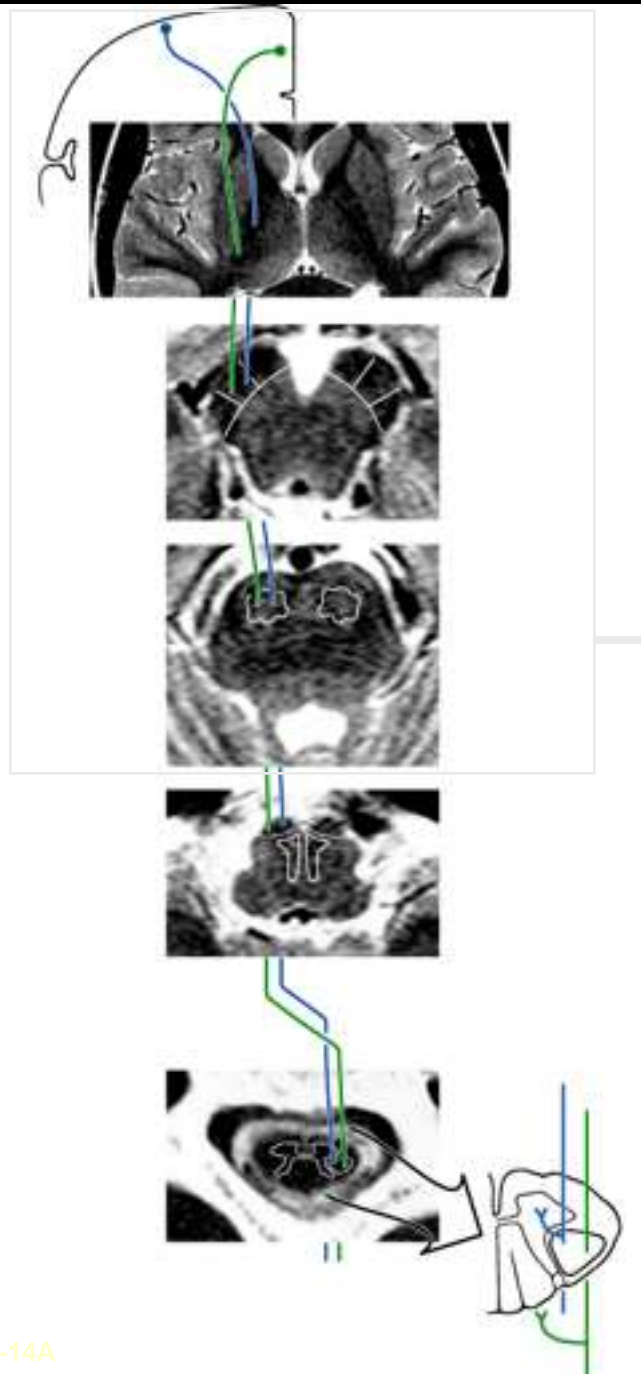
Internal Capsule in MRI



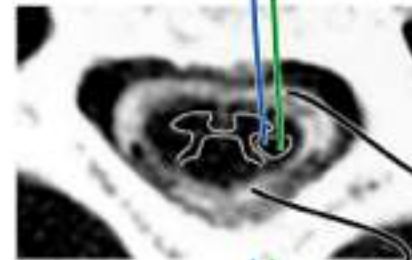
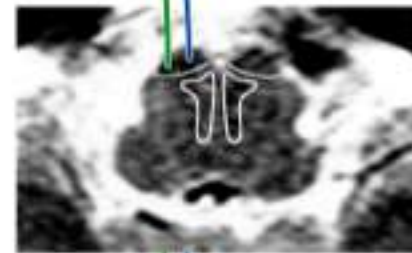
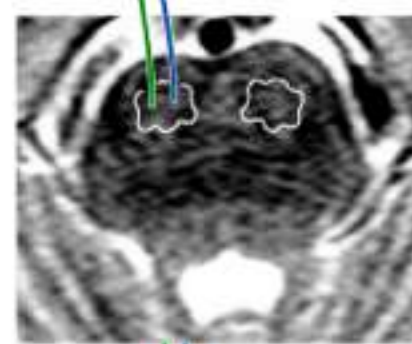
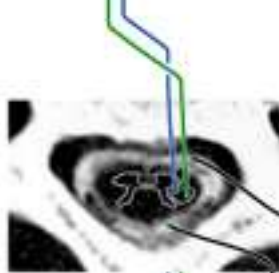
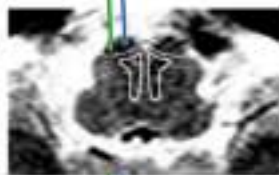
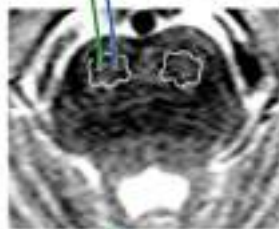
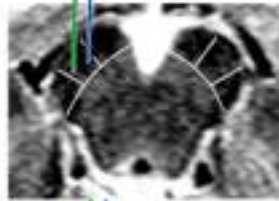
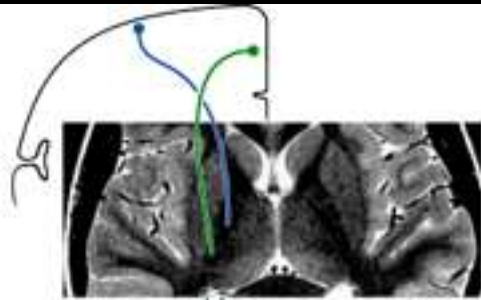
Atlas Fig. 5-12



Corticospinal Fibers In MRI:



Corticospinal Fibers In MRI:



Expanding Extramedullary Lesion

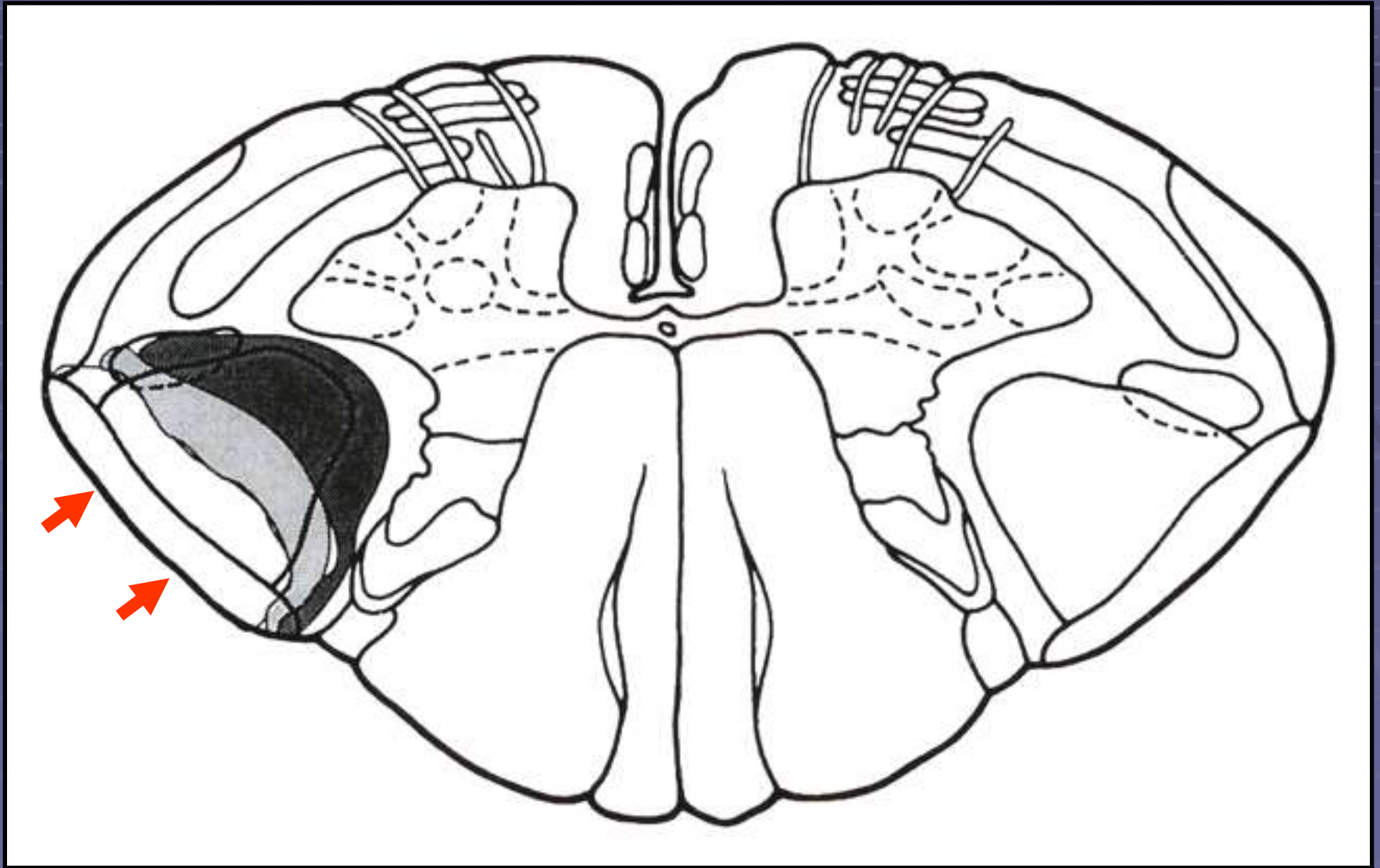
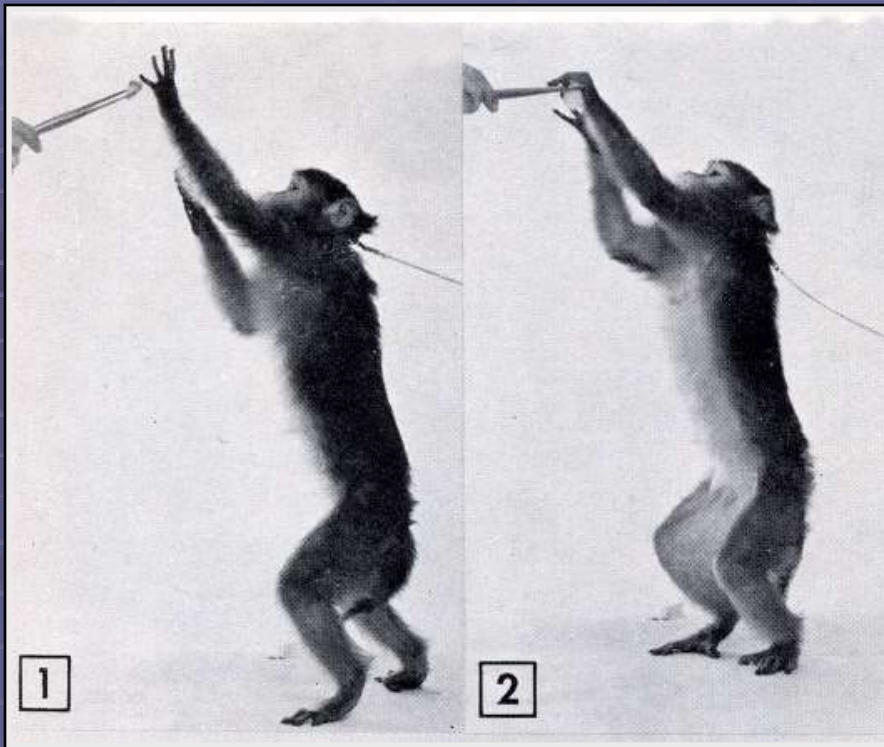


TABLE 16.1

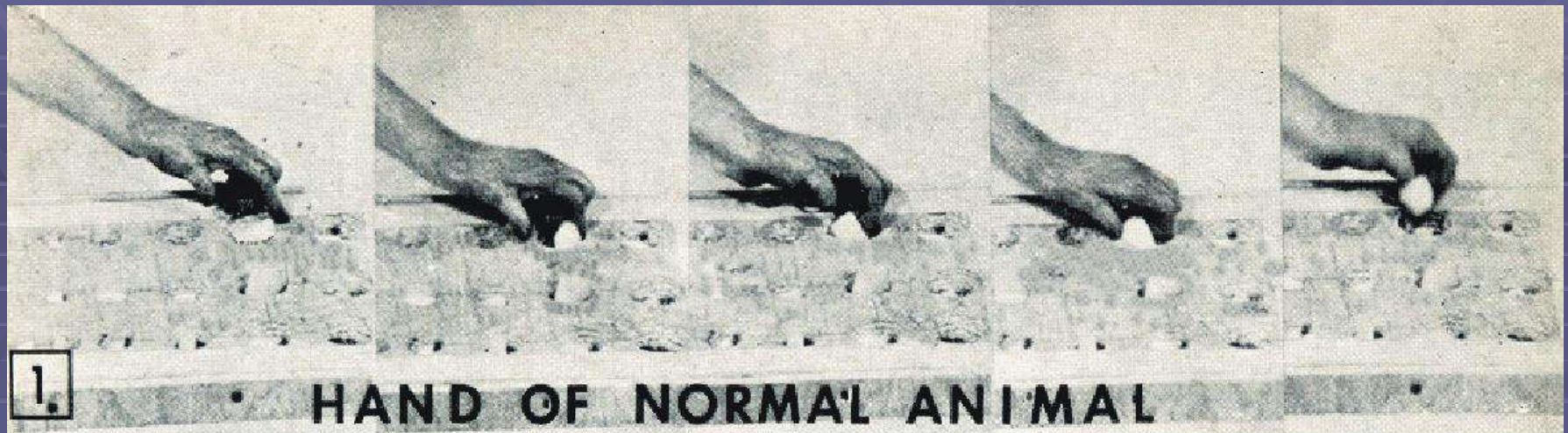
Signs and Symptoms of Upper and Lower Motor Neuron Lesions

<i>Upper Motor Neuron Syndrome</i>	<i>Lower Motor Neuron Syndrome</i>
Weakness	Weakness or paralysis
Spasticity	Decreased superficial reflexes
Increased tone	Hypoactive deep reflexes
Hyperactive deep reflexes	Decreased tone
Clonus	Fasciculations and fibrillations
Babinski's sign	Severe muscle atrophy
Loss of fine voluntary movements	

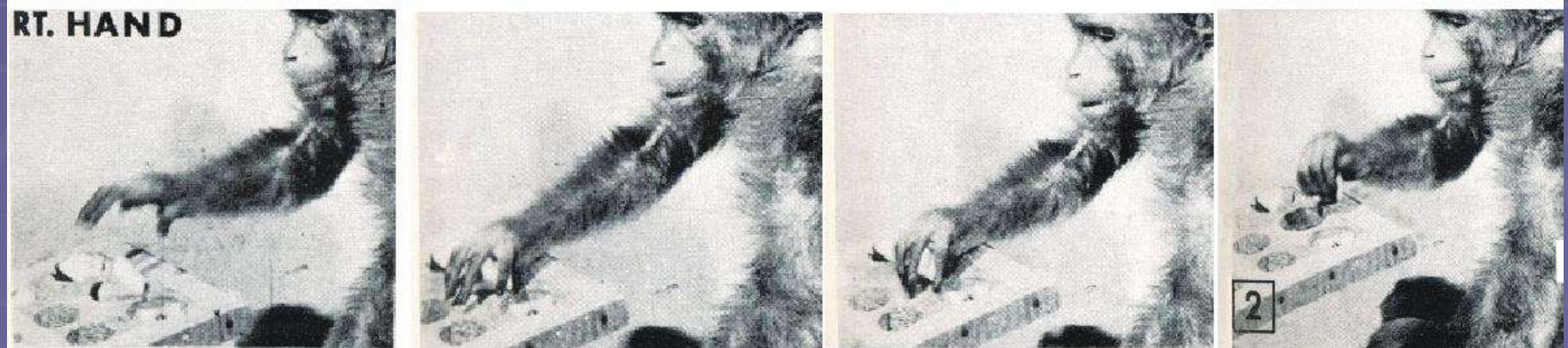
Pyramidotomy



4 DAYS AFTER
BILAT. PYRAMIDOTOMY

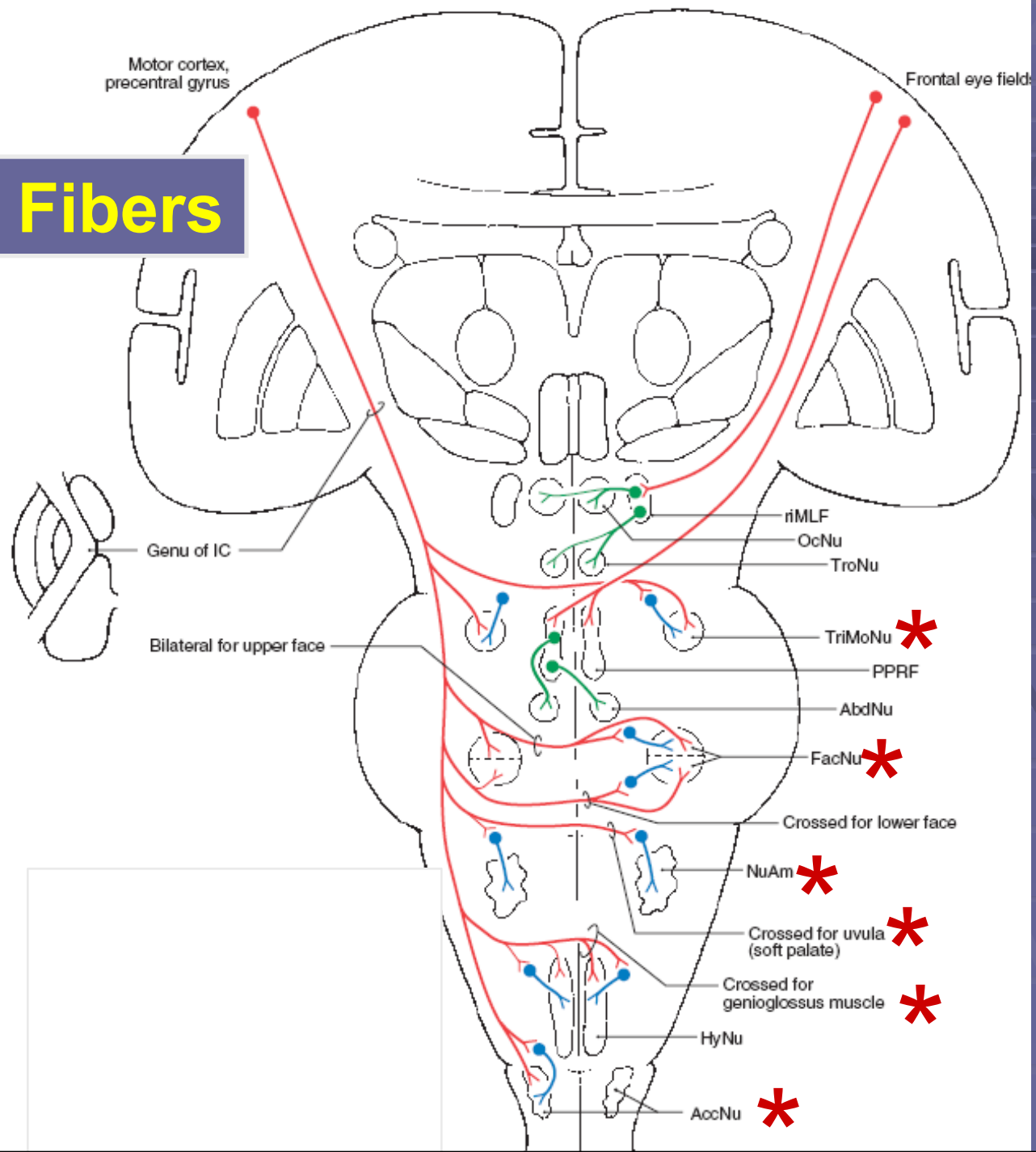
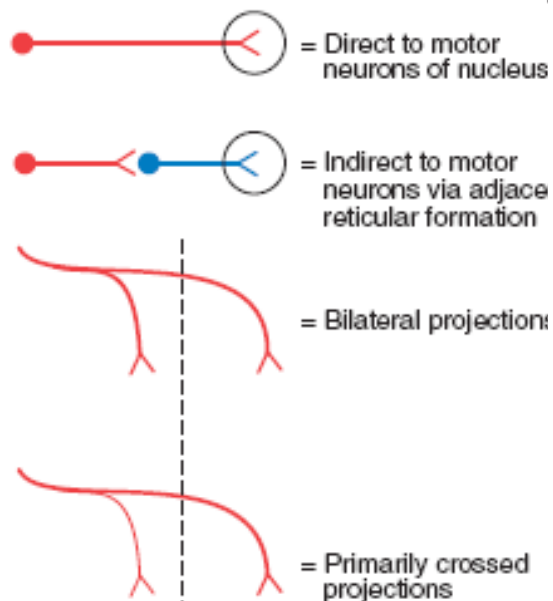


5 months after pyramidal tract lesion:

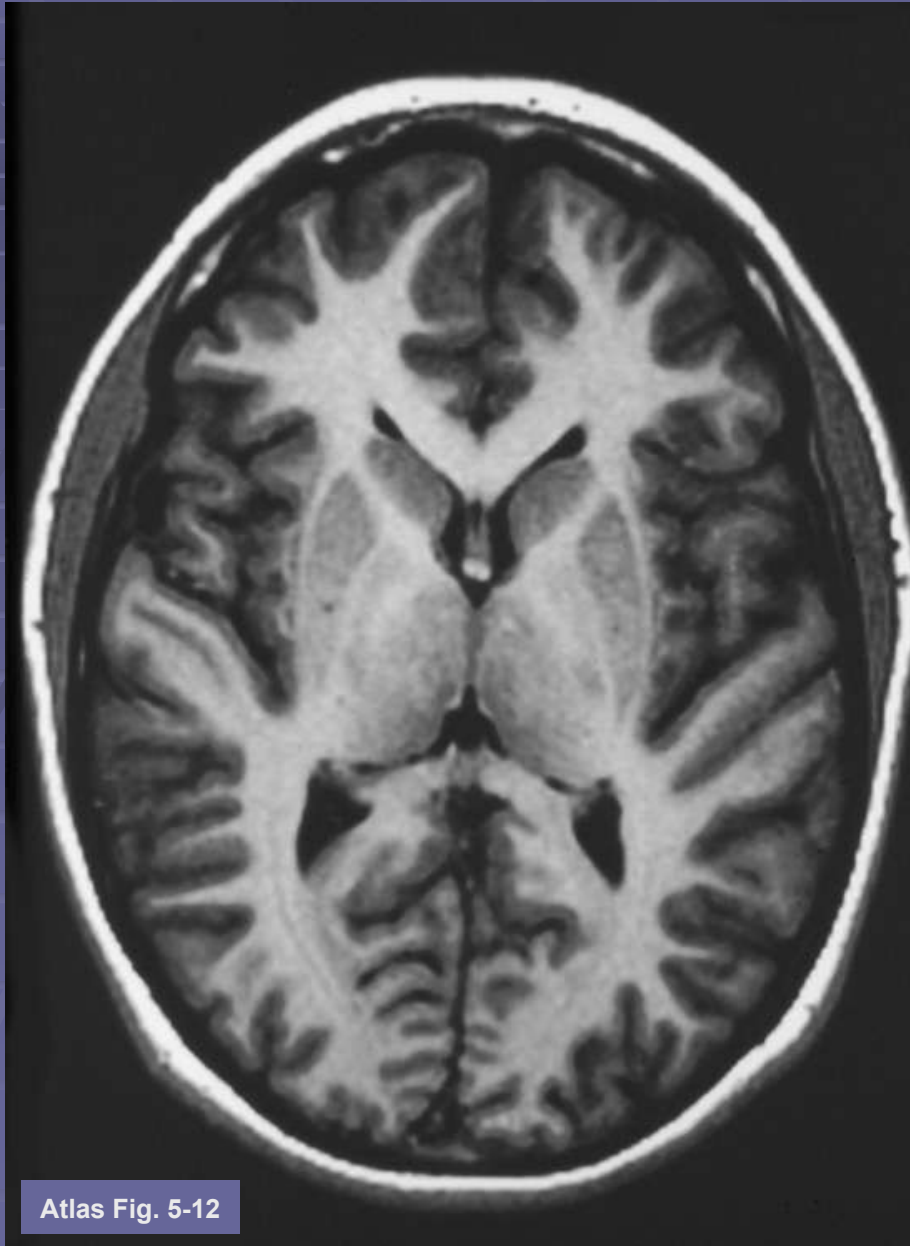


Corticonuclear Projections

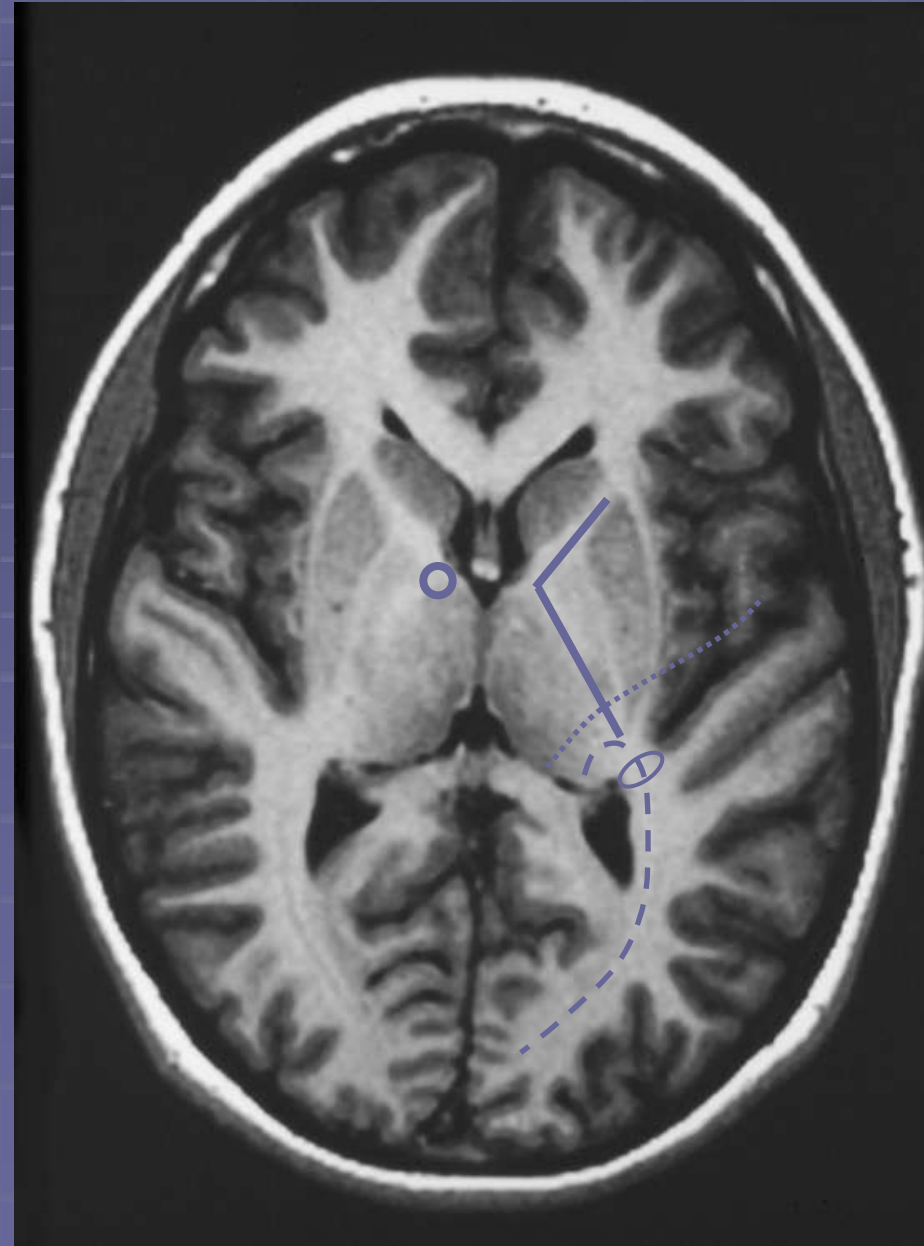
Corticonuclear Fibers



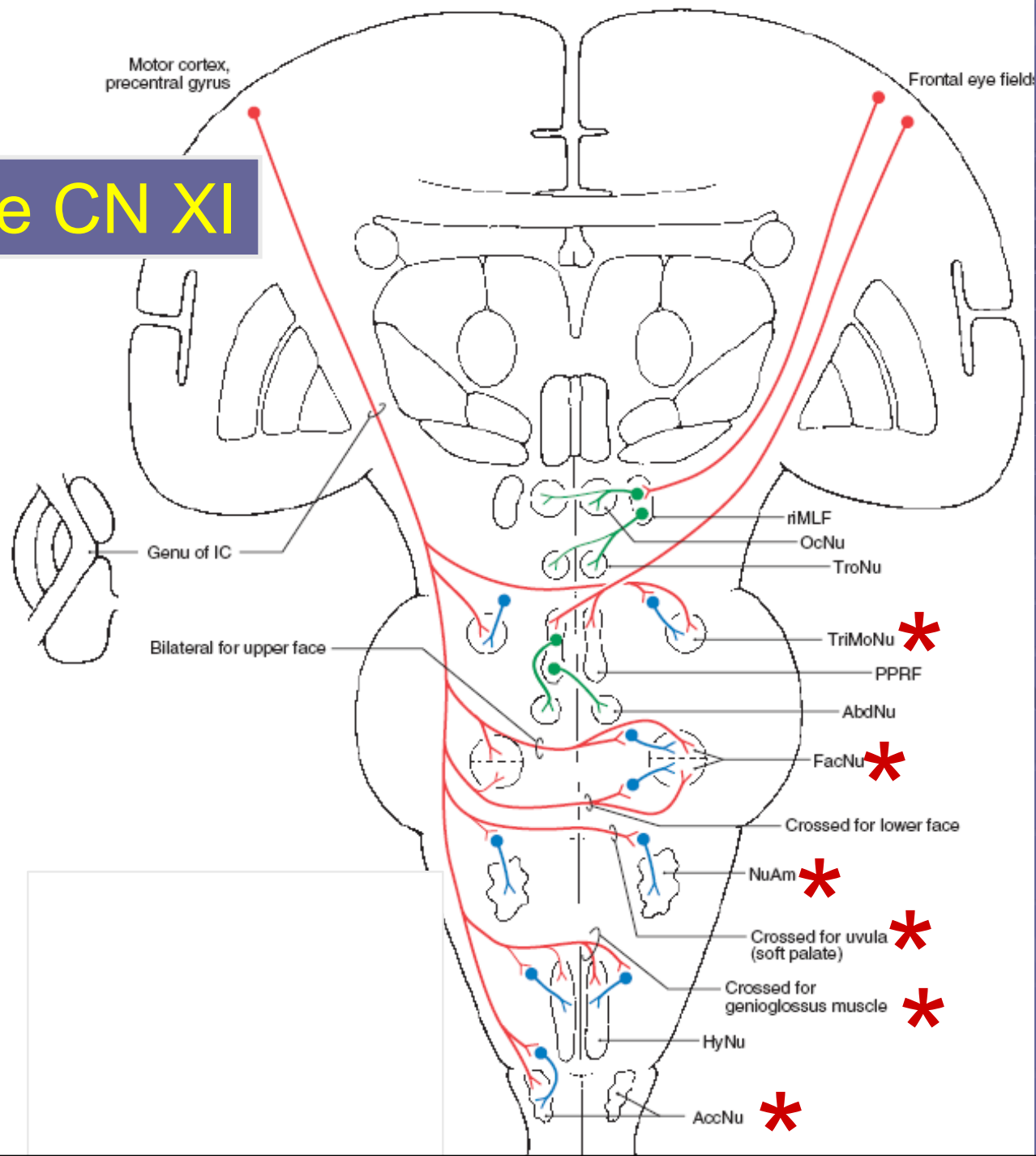
Internal Capsule in MRI



Atlas Fig. 5-12



Accessory Nerve CN XI



—○— = Direct to motor neurons of nucleus

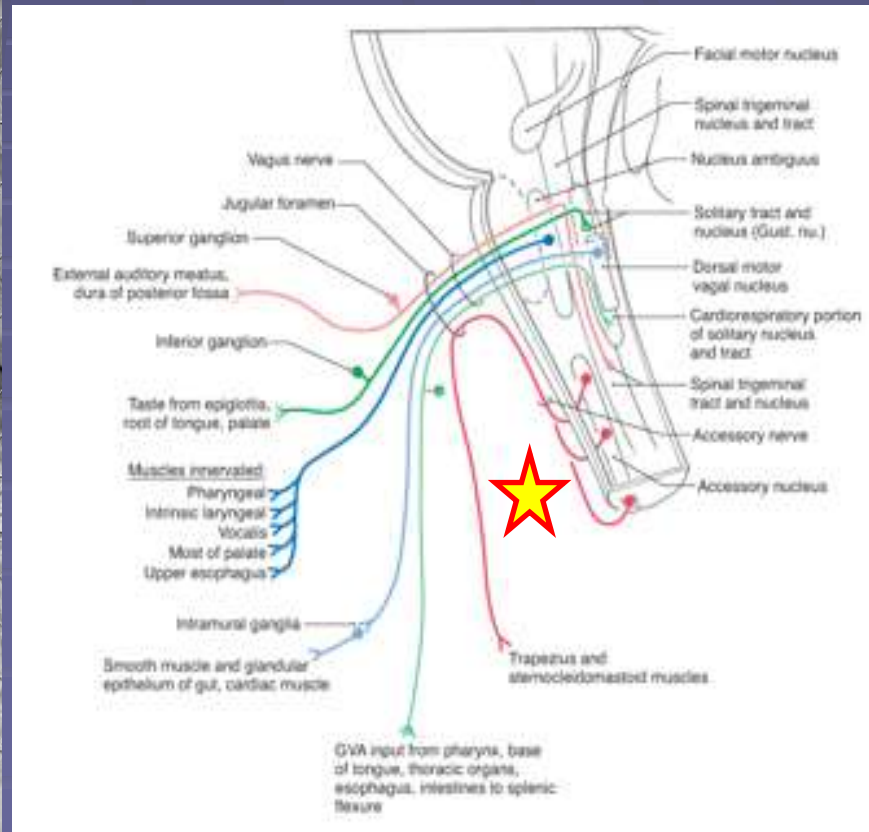
—●—○— = Indirect to motor neurons via adjacent reticular formation

—○—○— = Bilateral projection:

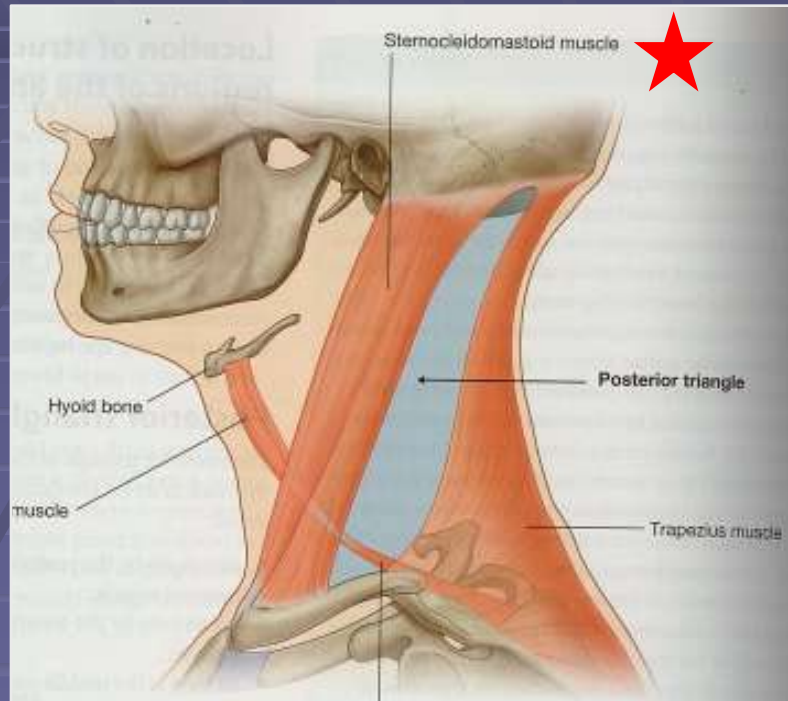
—○—○— = Primarily crossed projections

Accessory Nerve CN XI

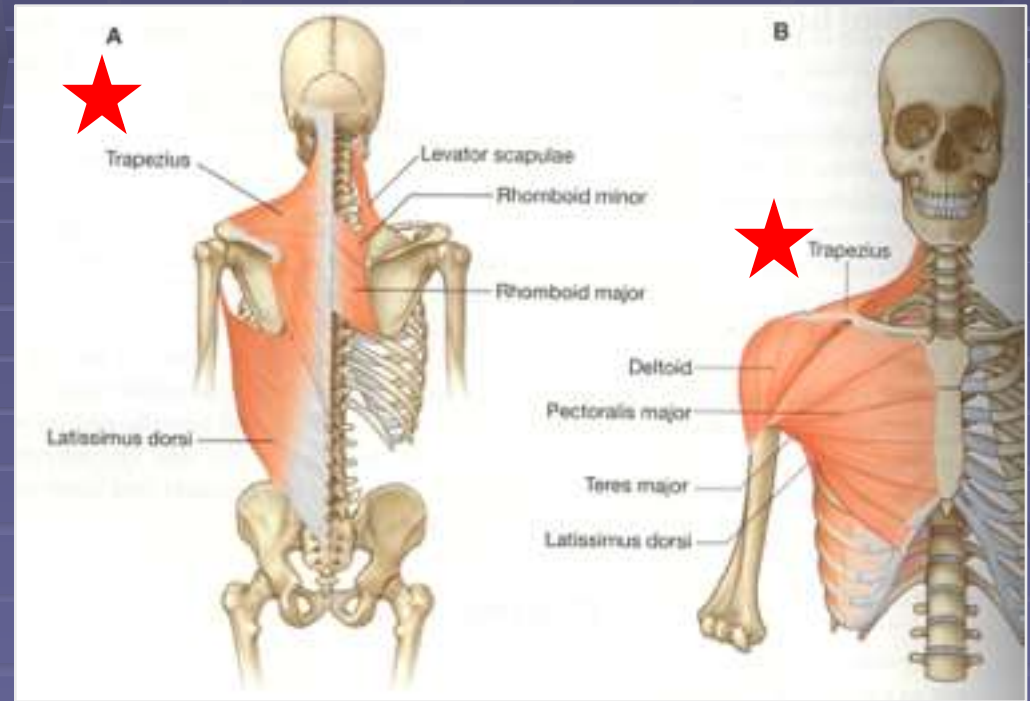
Motor neurons in the cervical spinal cord → Trapezius & sternocleidomastoid muscles



Sternocleidomastoid



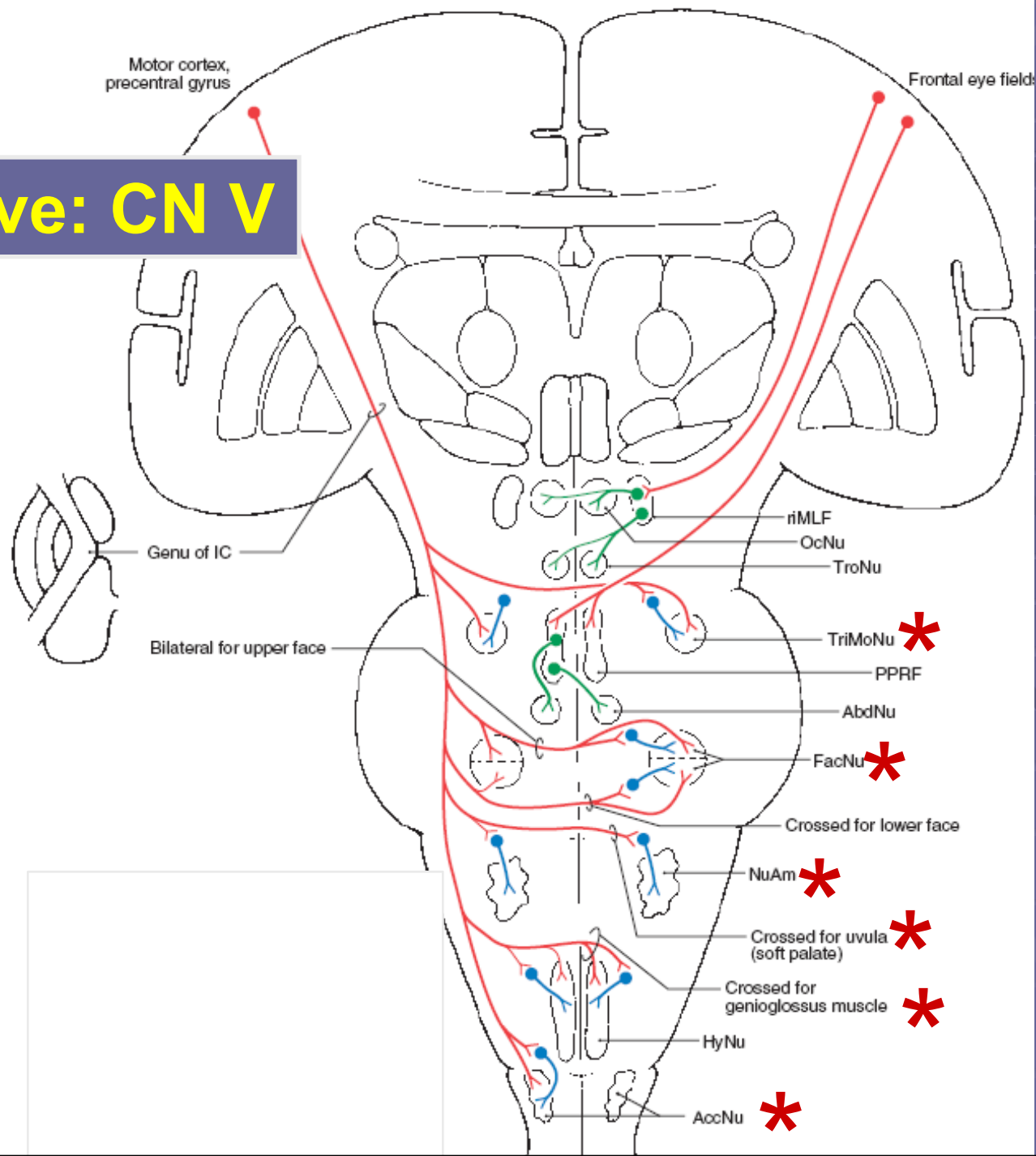
Trapezius



Gray's Anatomy for students: Figs. 8.171 page 920, 7.9 page 614

The sternocleidomastoid will tilt the head towards the shoulder on the same side,
Thereby, rotating the head to turn the face to the opposite direction

Trigeminal Nerve: CN V



● — (Y) = Direct to motor neurons of nucleus

● — (Y) — (Y) = Indirect to motor neurons via adjacent reticular formation

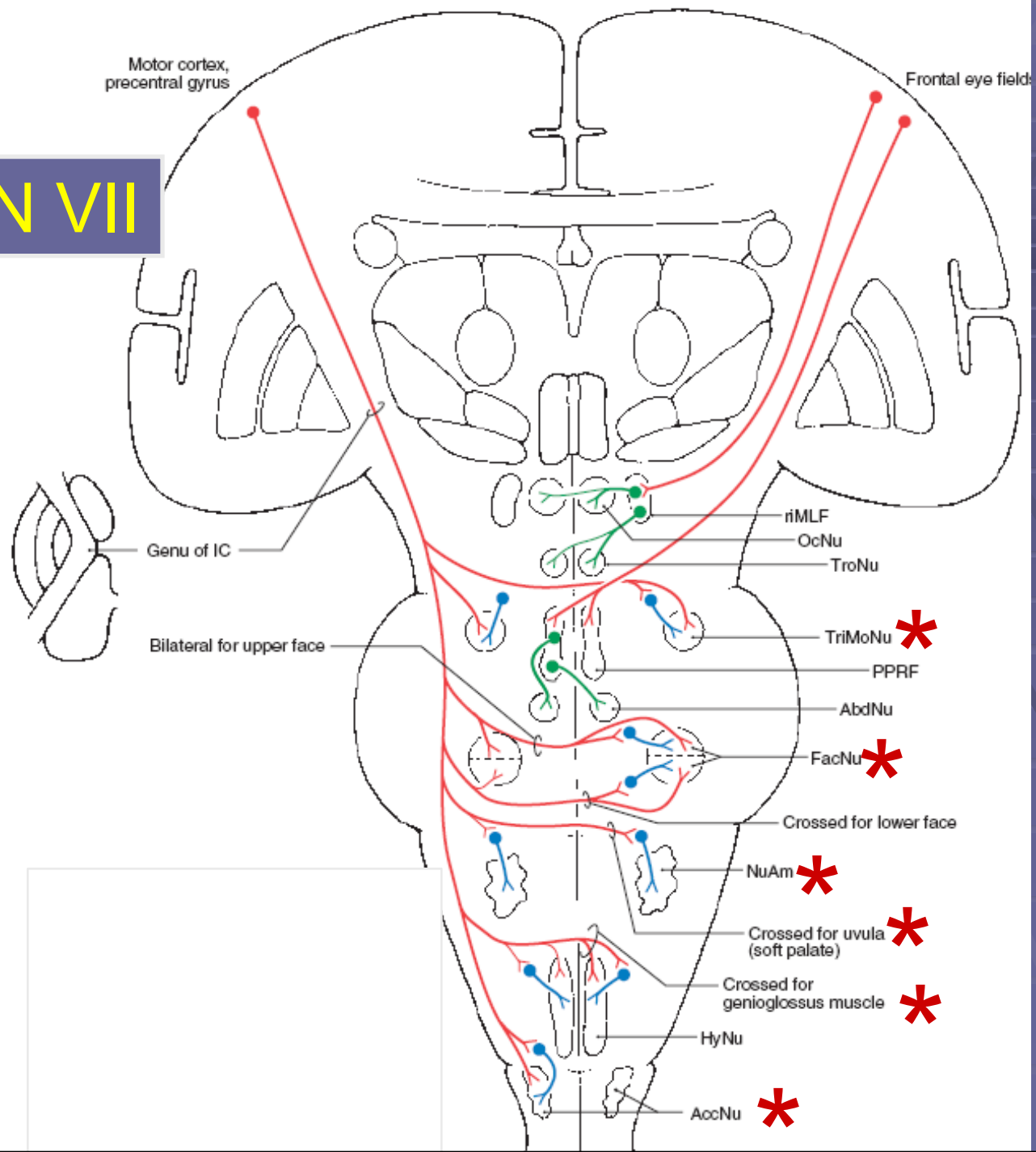
— (Y) — (Y) = Bilateral projection:

— (Y) — (Y) = Primarily crossed projections

Facial Nerve: CN VII



Facial Nerve: CN VII



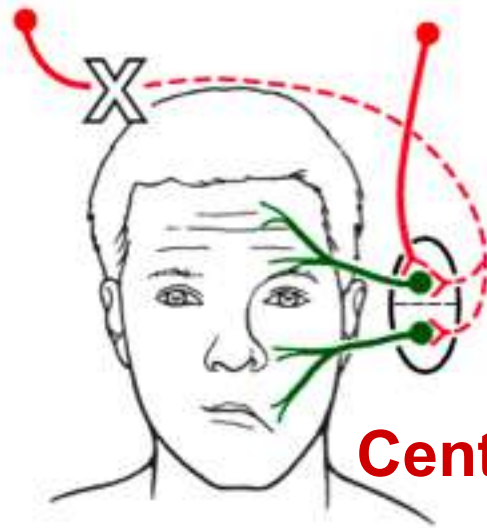
● — ○ = Direct to motor neurons of nucleus

● — ● — ○ = Indirect to motor neurons via adjacent reticular formation

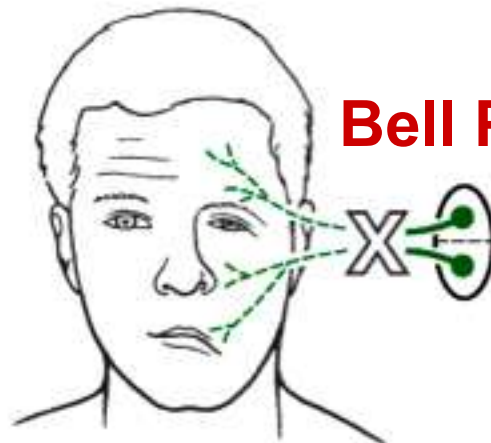
— — — = Bilateral projection:

— — — = Primarily crossed projections

The Facial Nerve

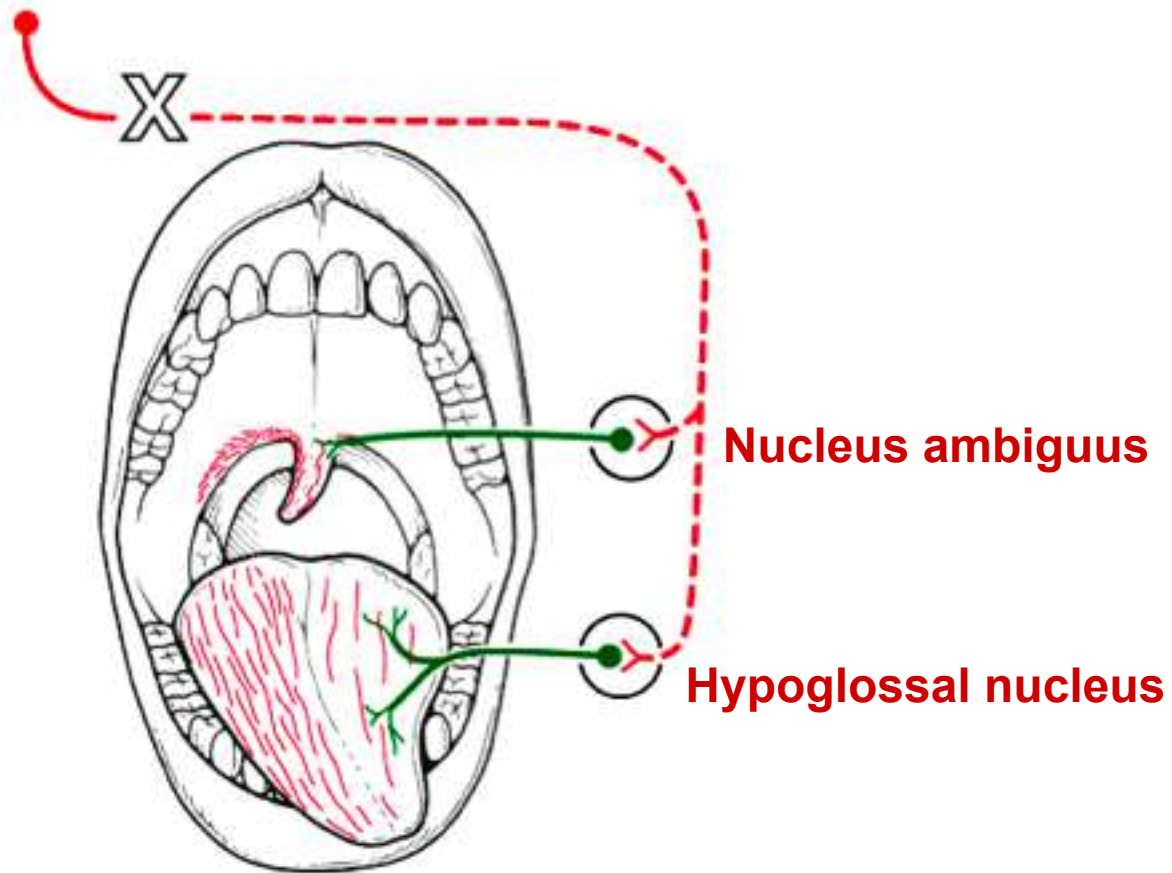


Central Seven



Bell Palsy

Corticonuclear Fibers



Text Fig. 25-15

Lesion of the Hypoglossal Nerve



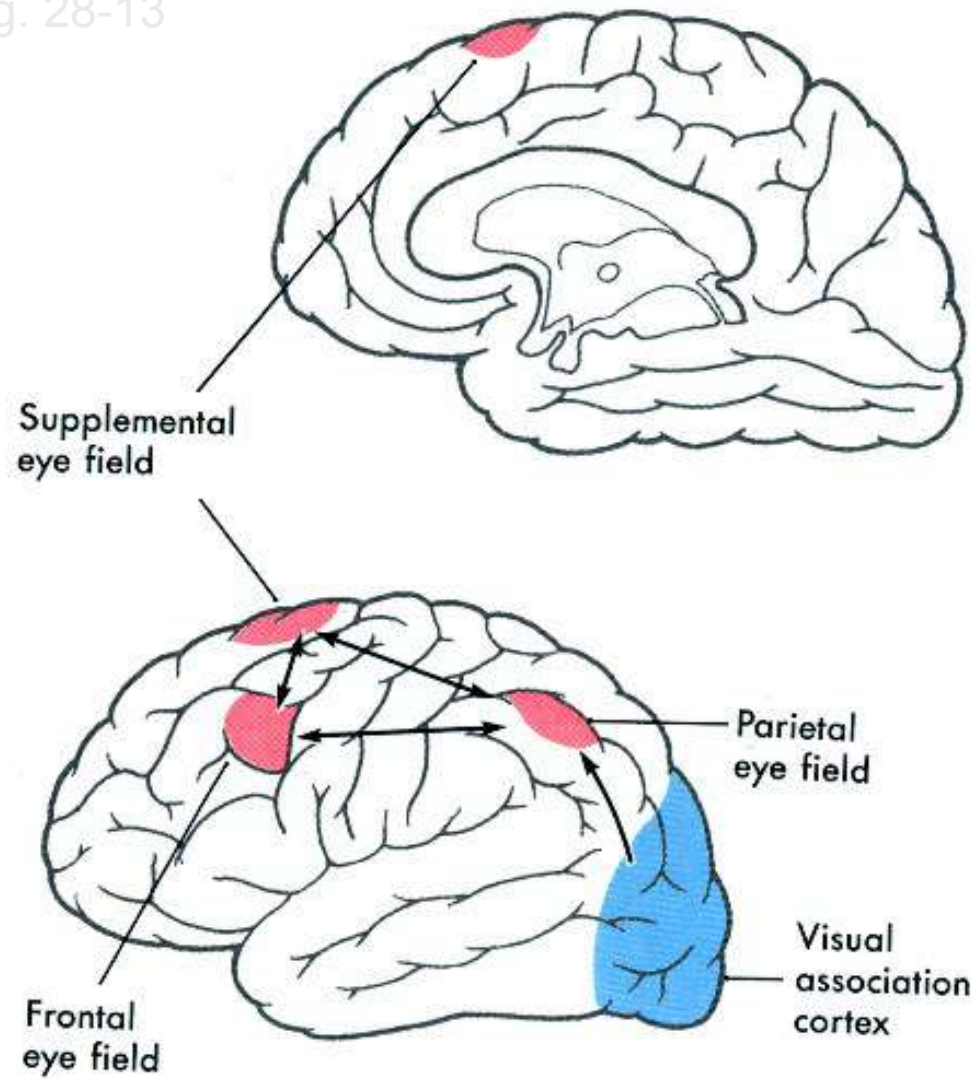
A

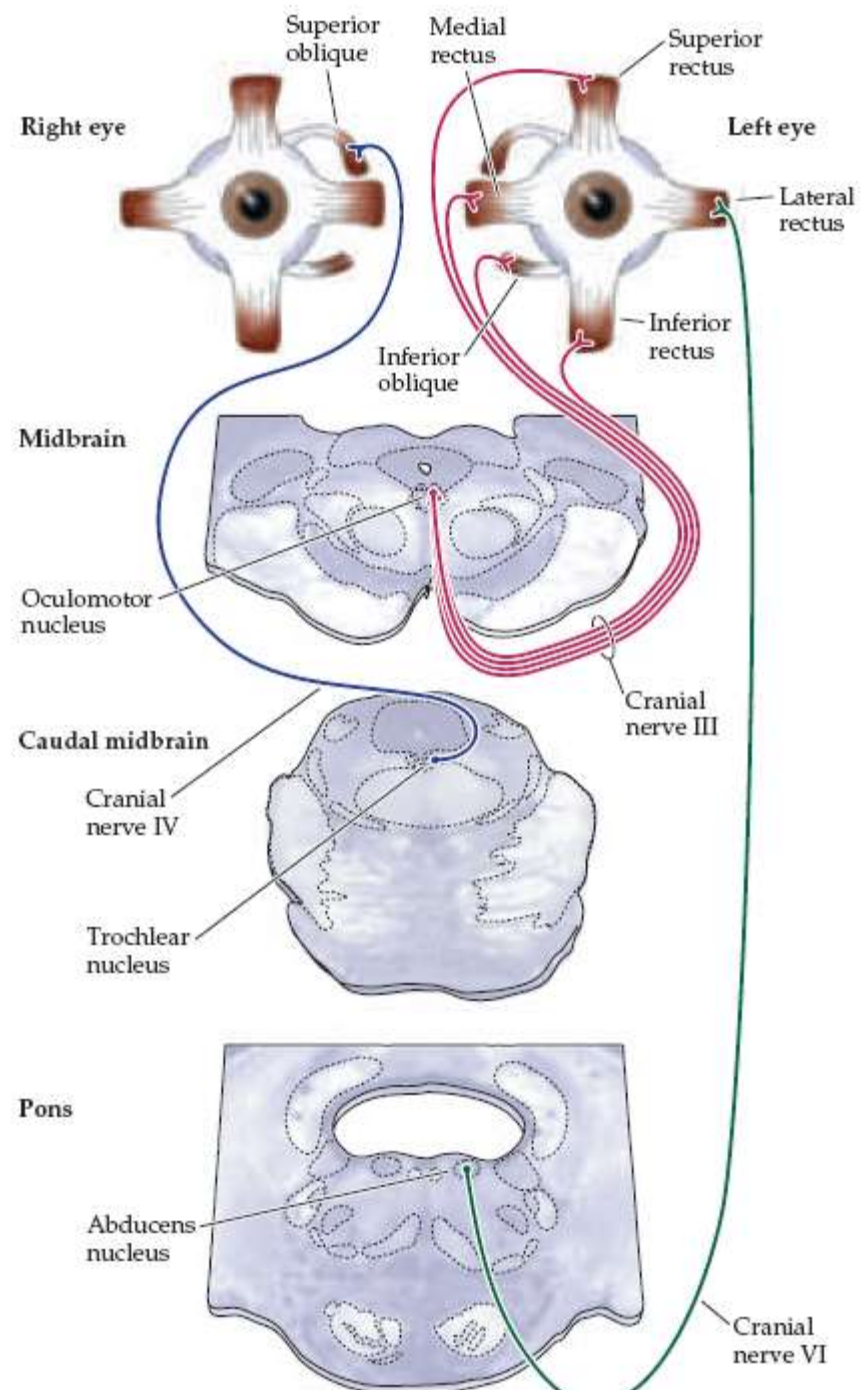
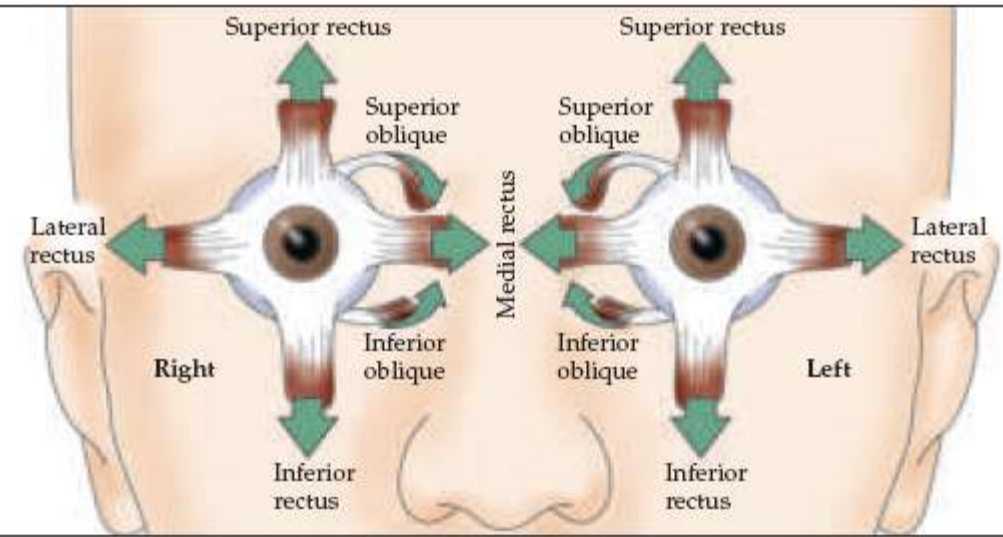


B

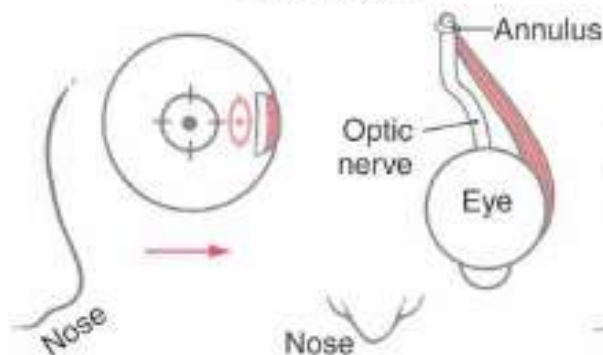
Control of eye movement

Fig. 28-13



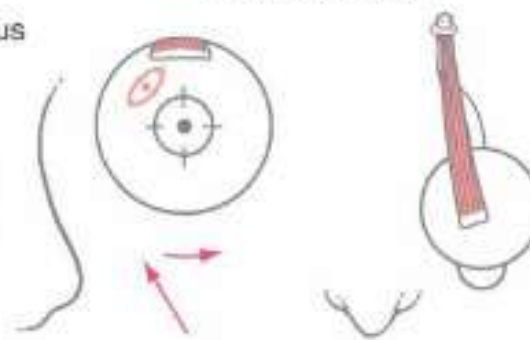


Lateral rectus



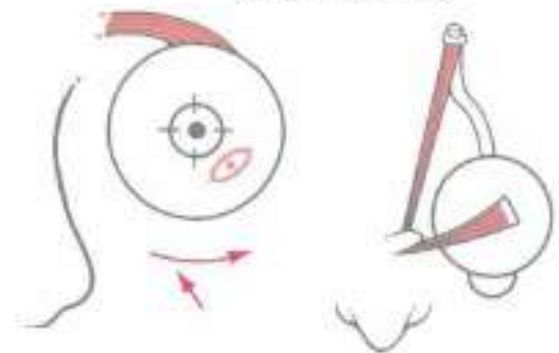
1° - Abduction
To test - look lateral

Superior rectus



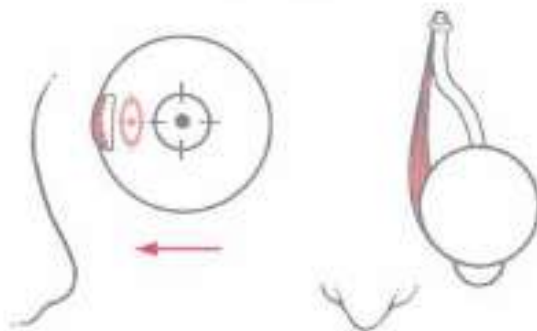
1° - Elevation
2° - Intorsion & adduction
To test - look out then up

Superior oblique



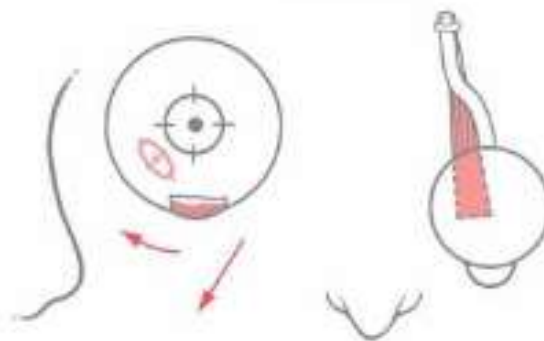
1° - Intorsion
2° - Depression & abduction
To test - look in then down

Medial rectus



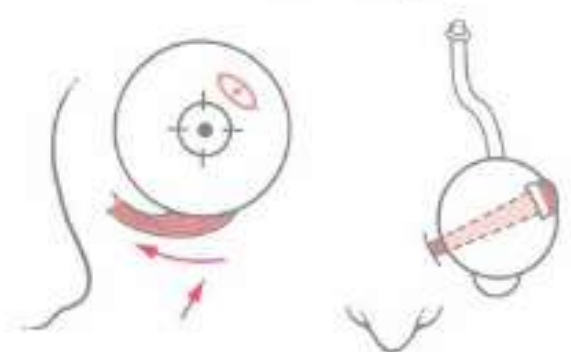
1° - Adduction
To test - look medial

Inferior rectus



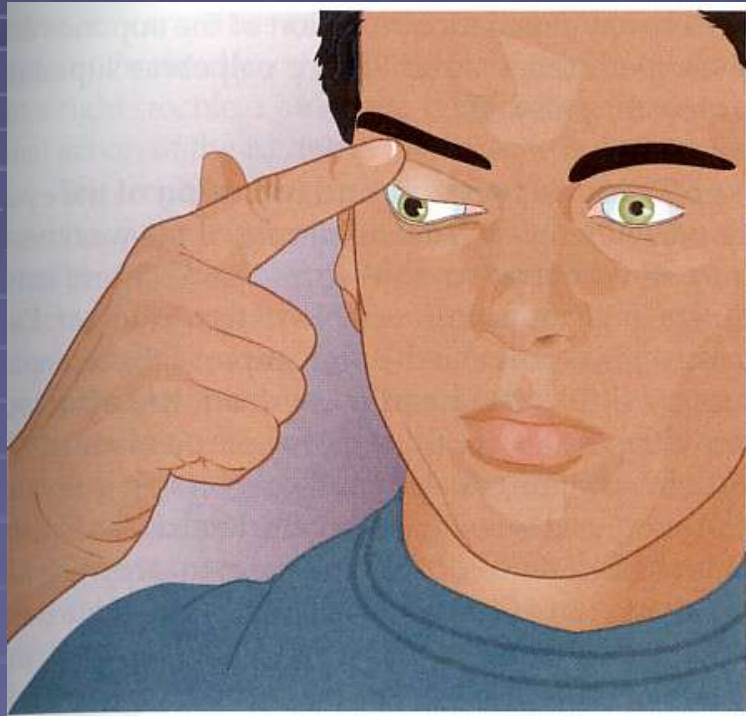
1° - Depression
2° - Extorsion & adduction
To test - look out then down

Inferior oblique



1° - Extorsion
2° - Elevation & abduction
To test - look in then up

Third Nerve Palsy



Eye “down and out”

Trochlear Nerve Palsy

Note: Right eye

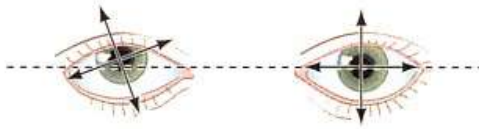
- Instead of intorsion and depression action of superior oblique
- See extorsion and elevation

Observe how the axes over the right eye shift when patient generates a compensatory head movement

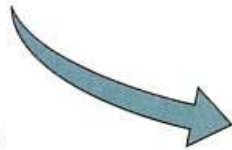
Attempted Correction:

- Patient tilts head to her left
- Tucks chin to foveate on object
- Left eye will align accordingly

(A) Right trochlear nerve (CN IV) palsy

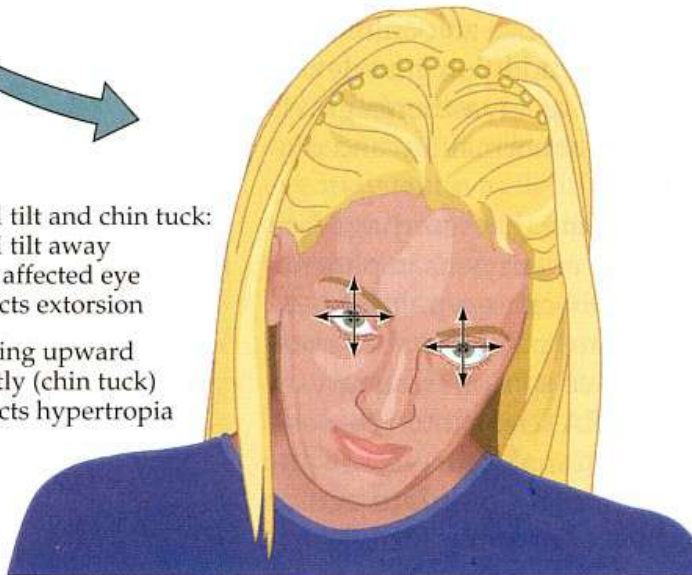


Head upright:
Hypertropia
and extorsion
in affected eye
(extorsion is not
usually visible to
examiner)



Head tilt and chin tuck:
Head tilt away
from affected eye
corrects extorsion

Looking upward
slightly (chin tuck)
corrects hypertropia





Abducent nerve injury

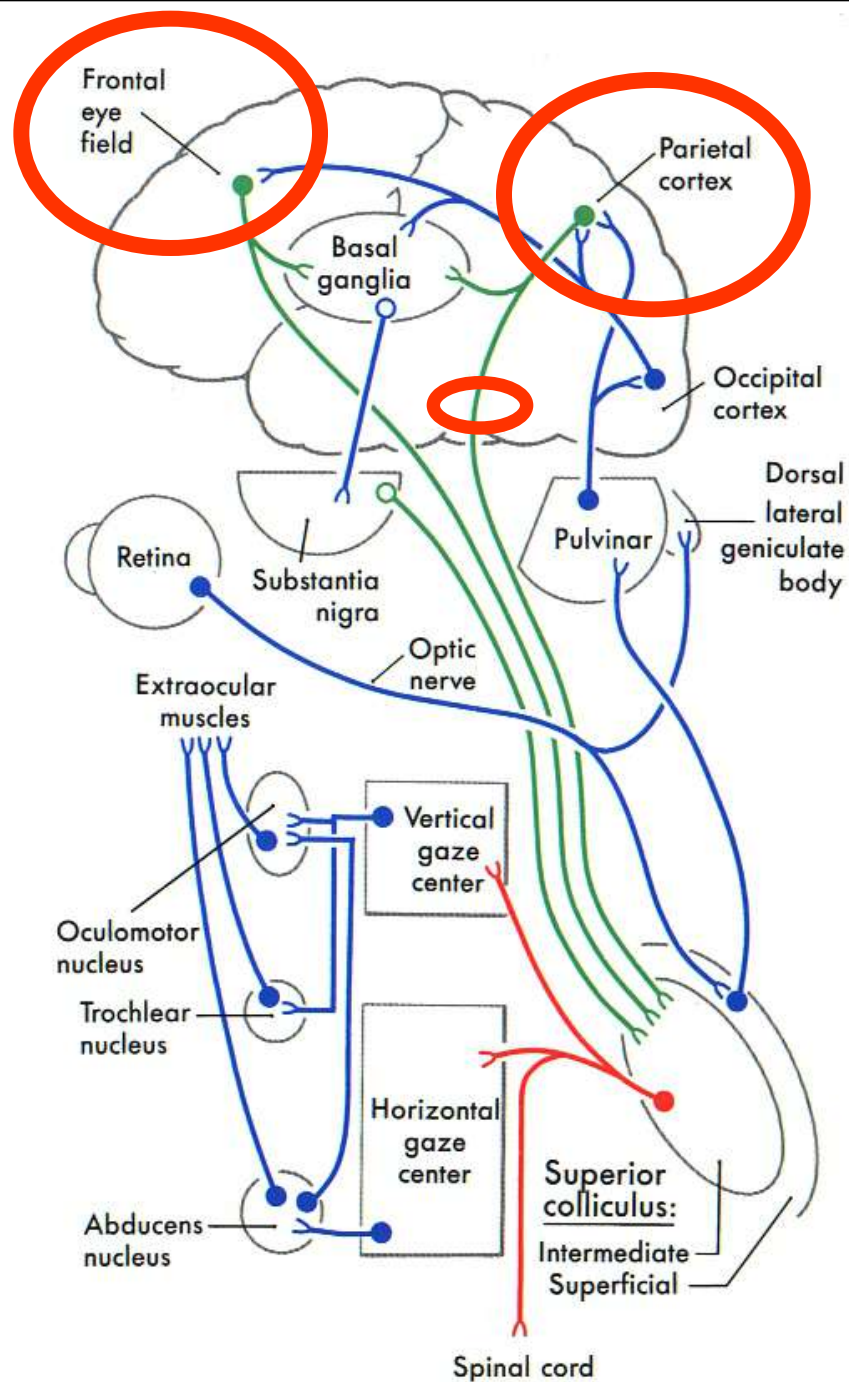
Conjugate Movements:

- 1. Saccadic**
- 2. Tracking (pursuit)**
- 3. Vestibulo-Ocular Reflex**
- 4. Optokinetic Reflex**

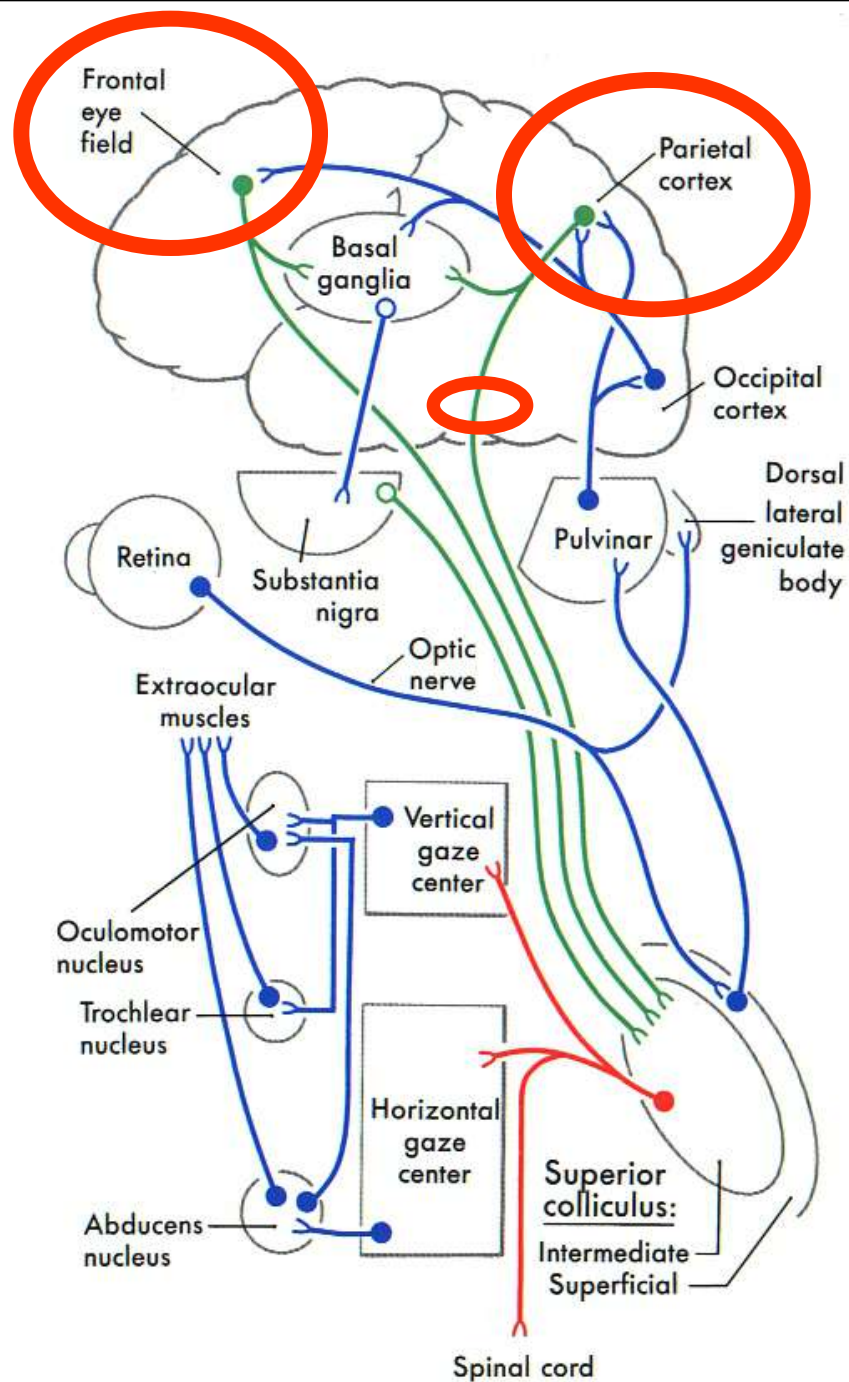
Disconjugate Movements:

5. Vergence

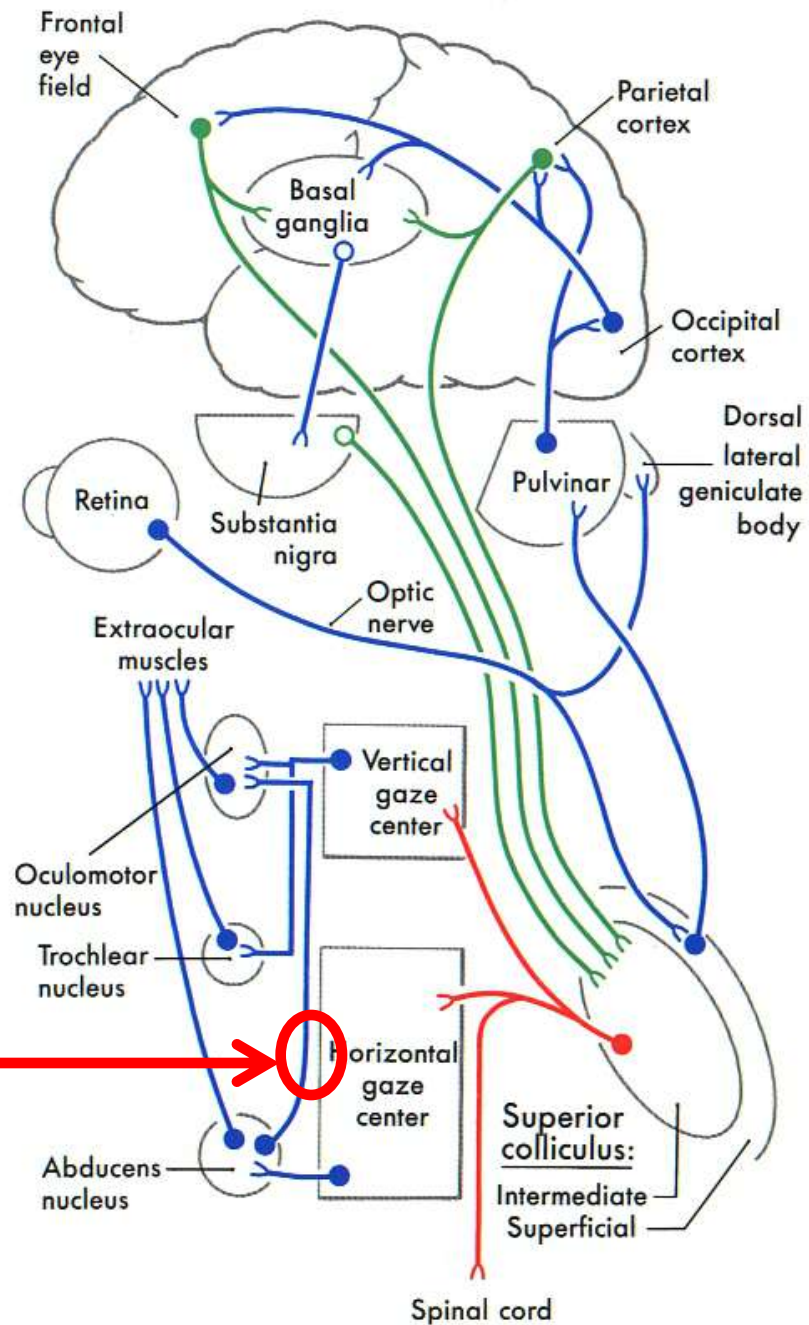
Basic pathway for controlling saccadic eye movements



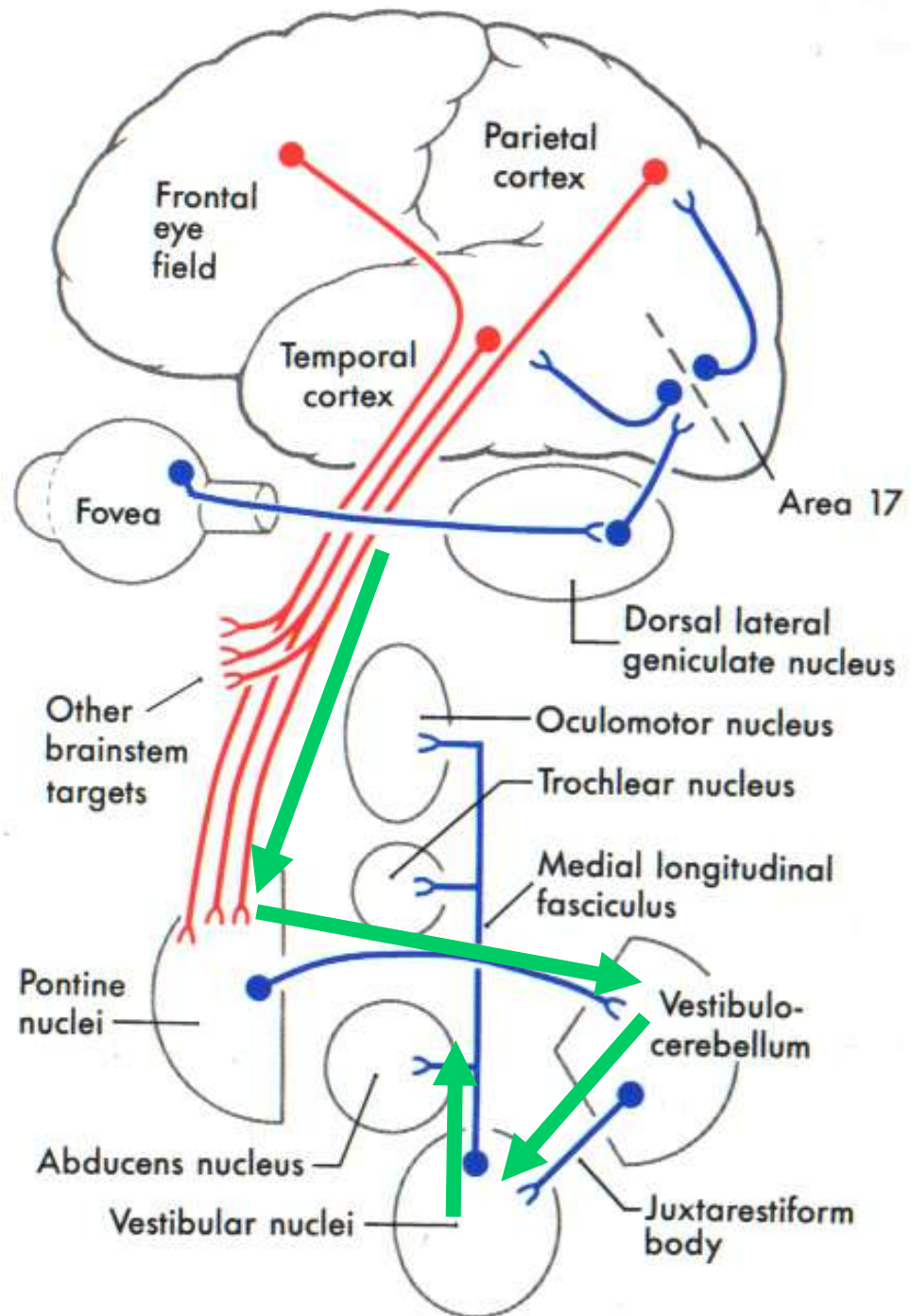
Basic pathway for controlling saccadic eye movements

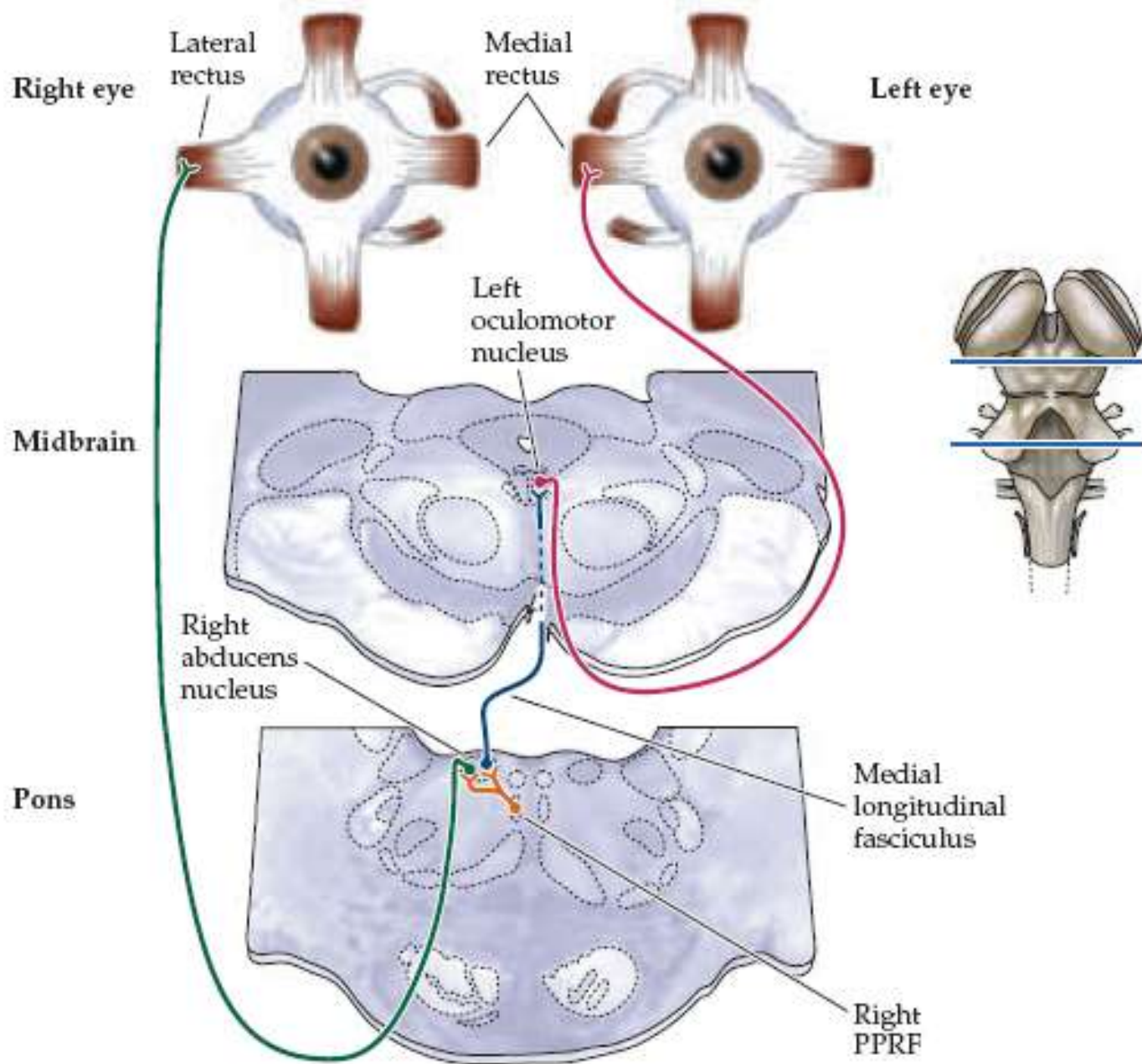


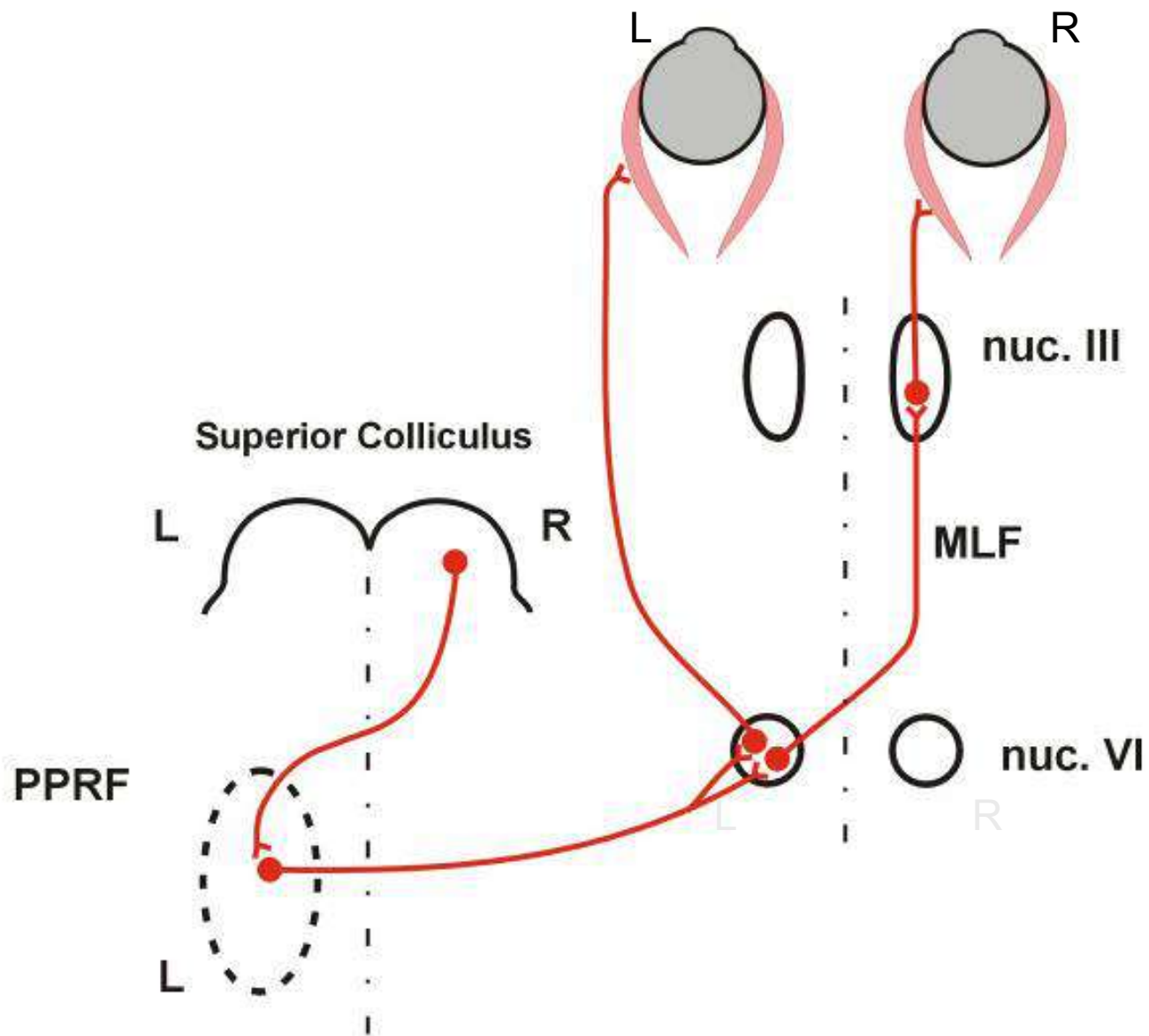
MLF



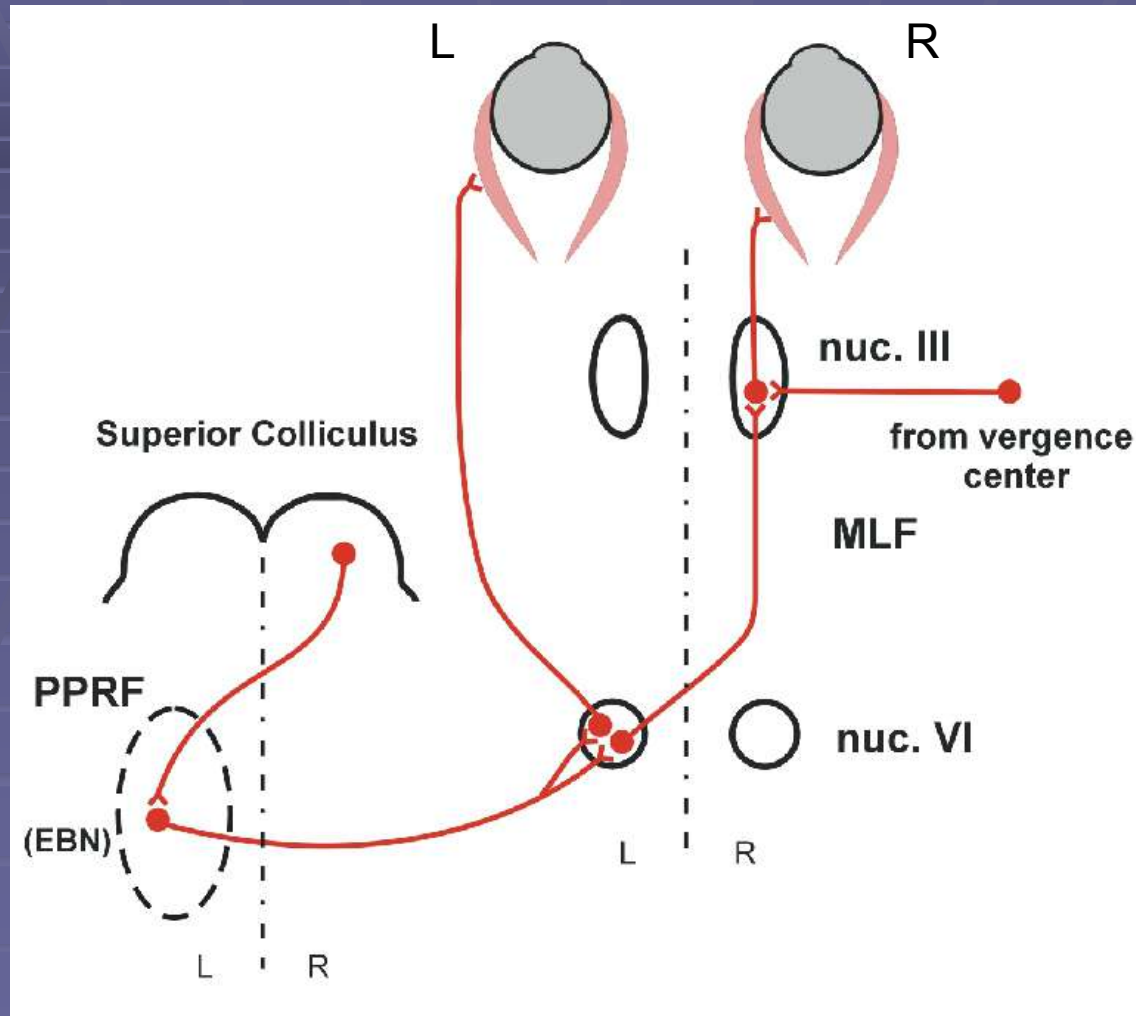
Basic pathway for controlling visual pursuit eye movements





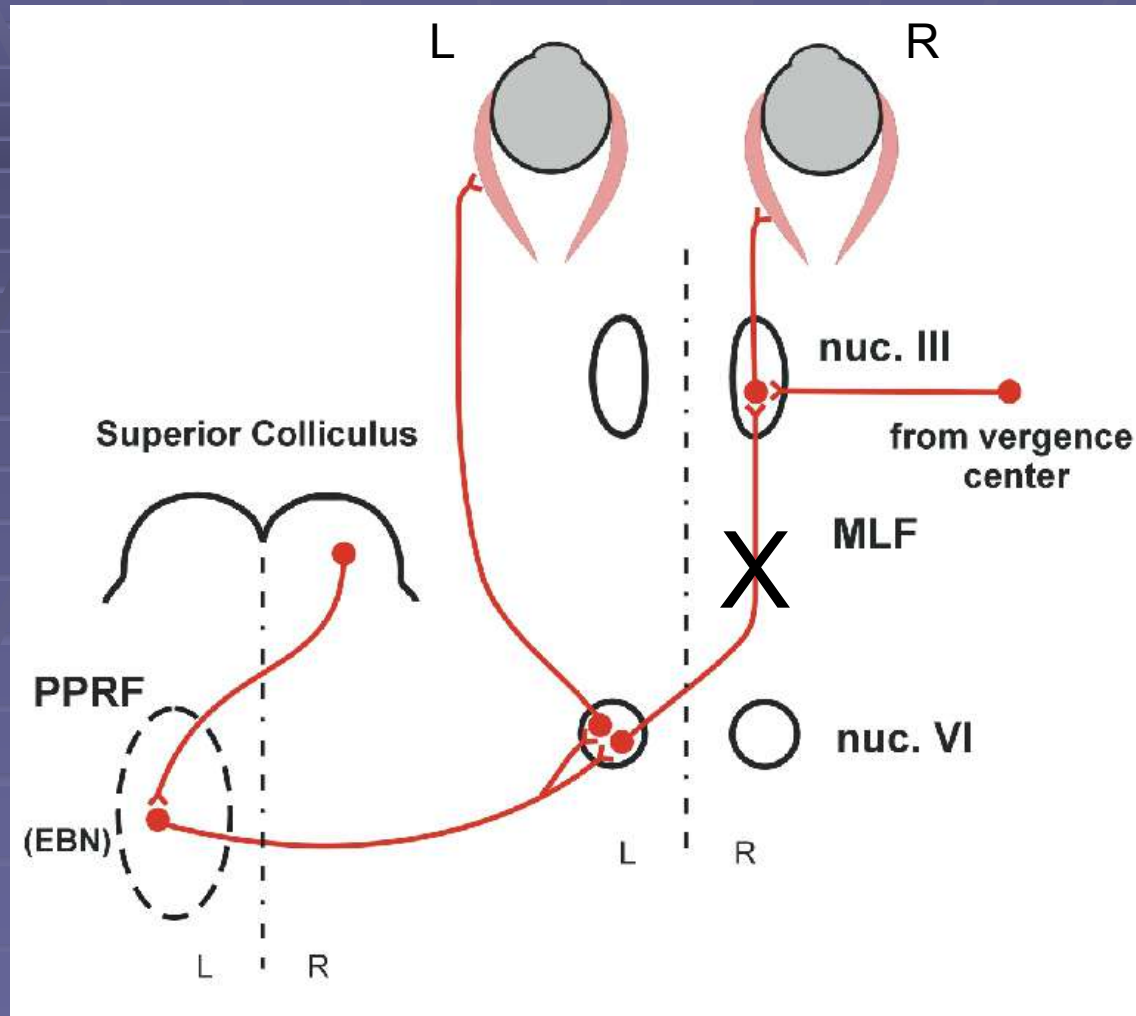


Conjugate
eye
movements



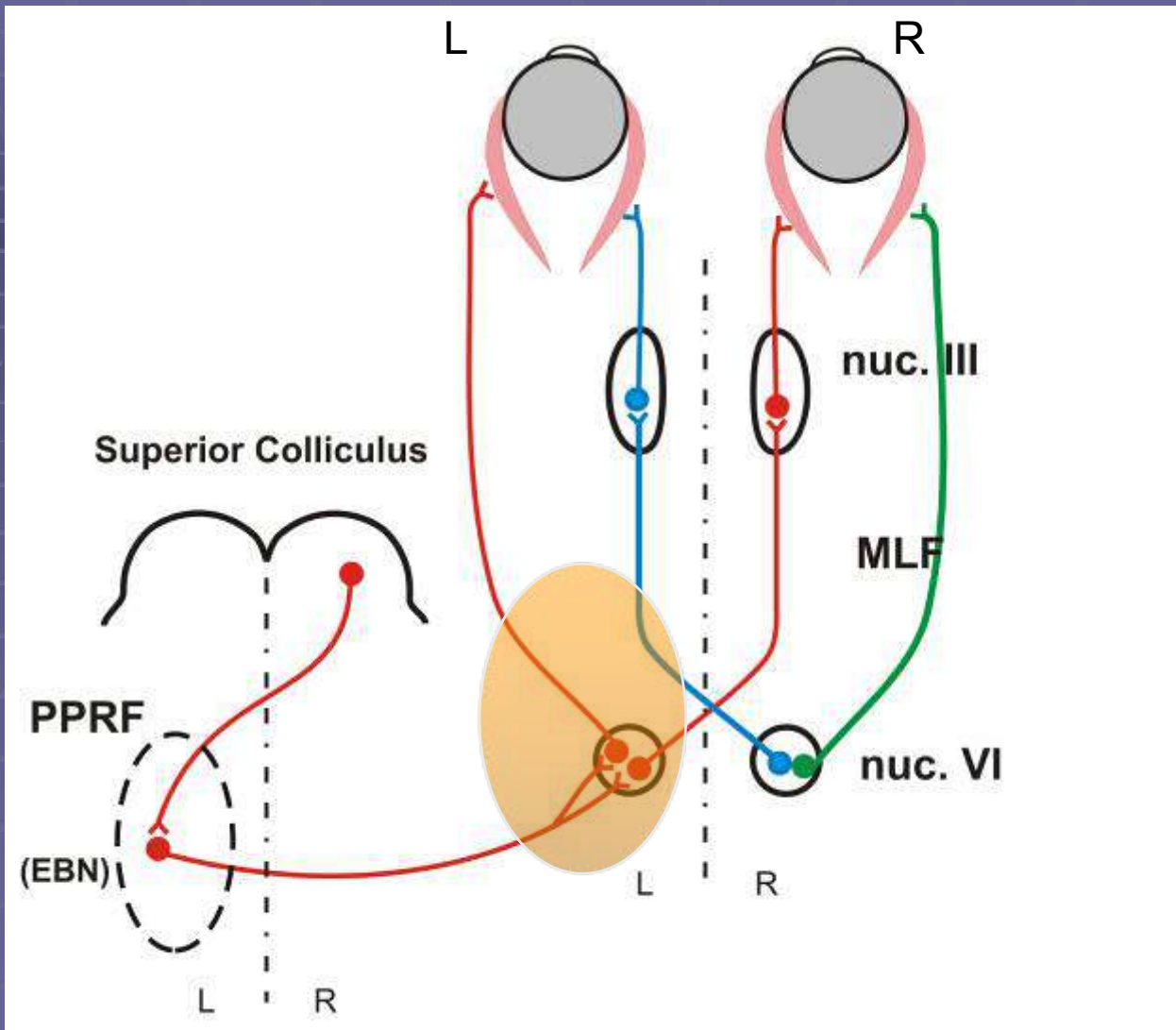
Disconjugate
eye
movements

Conjugate
eye
movements



Disconjugate
eye
movements

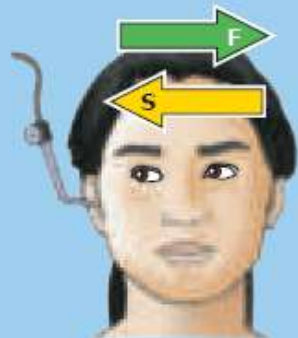
Internuclear Ophthalmoplegia



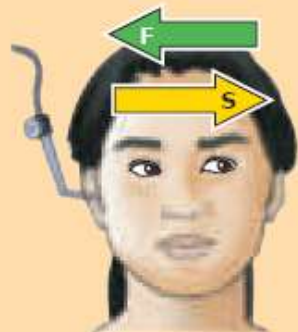
ONE-AND-A-HALF SYNDROME

Ocular reflexes in
conscious patients

(1) Normal



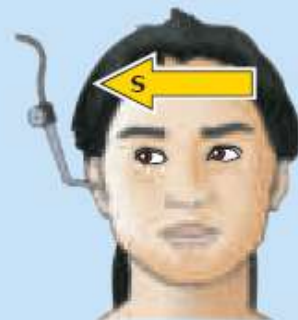
Cold H₂O



Warm H₂O

Ocular reflexes in
unconscious patients

(2) Brainstem intact

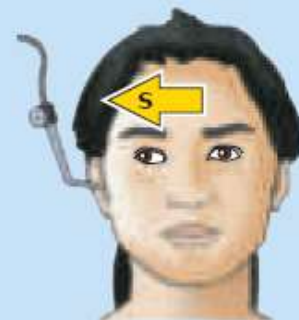


Cold H₂O



Warm H₂O

(3) MLF lesion (bilateral)



Cold H₂O



Warm H₂O

(4) Low brainstem lesion

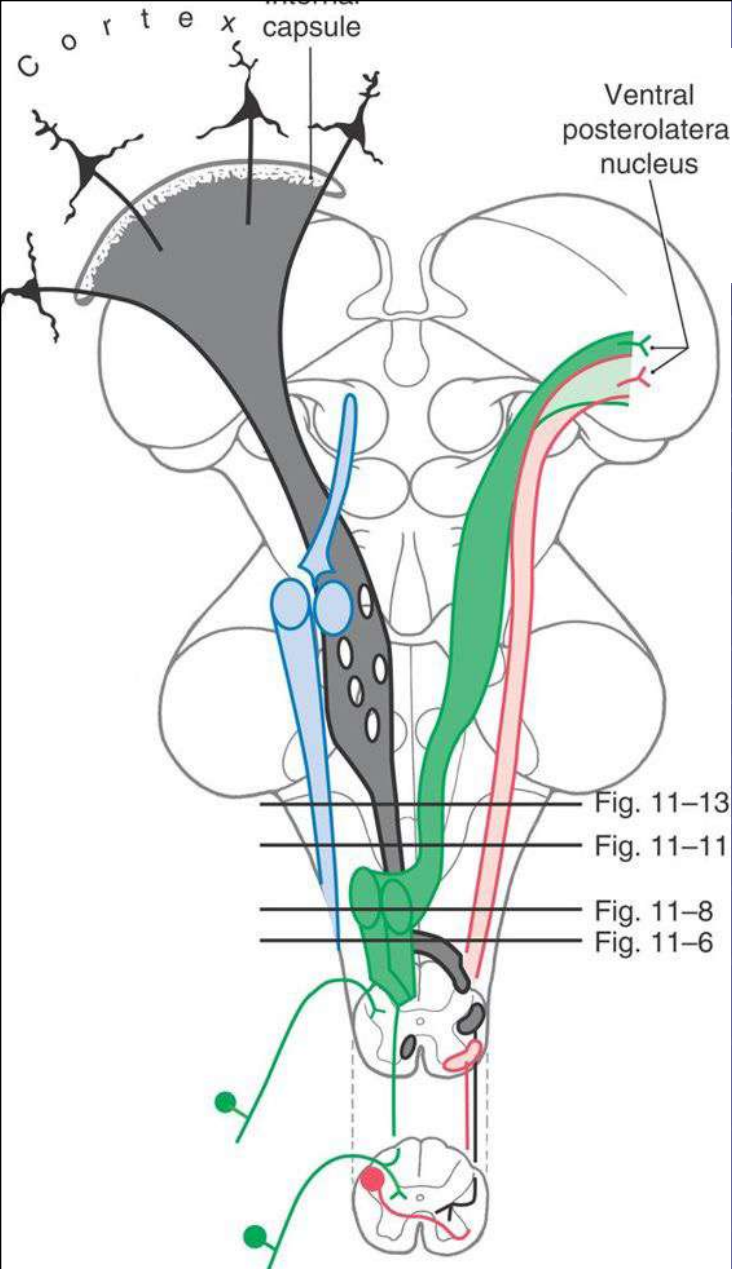


Cold H₂O

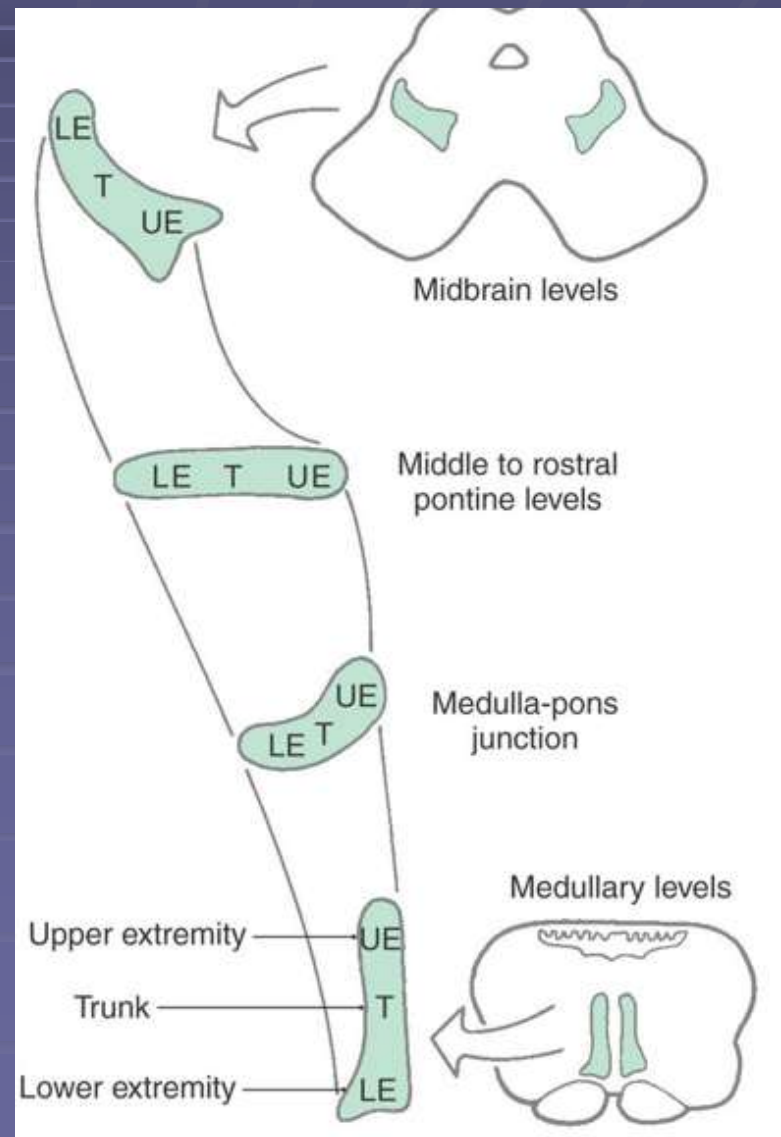


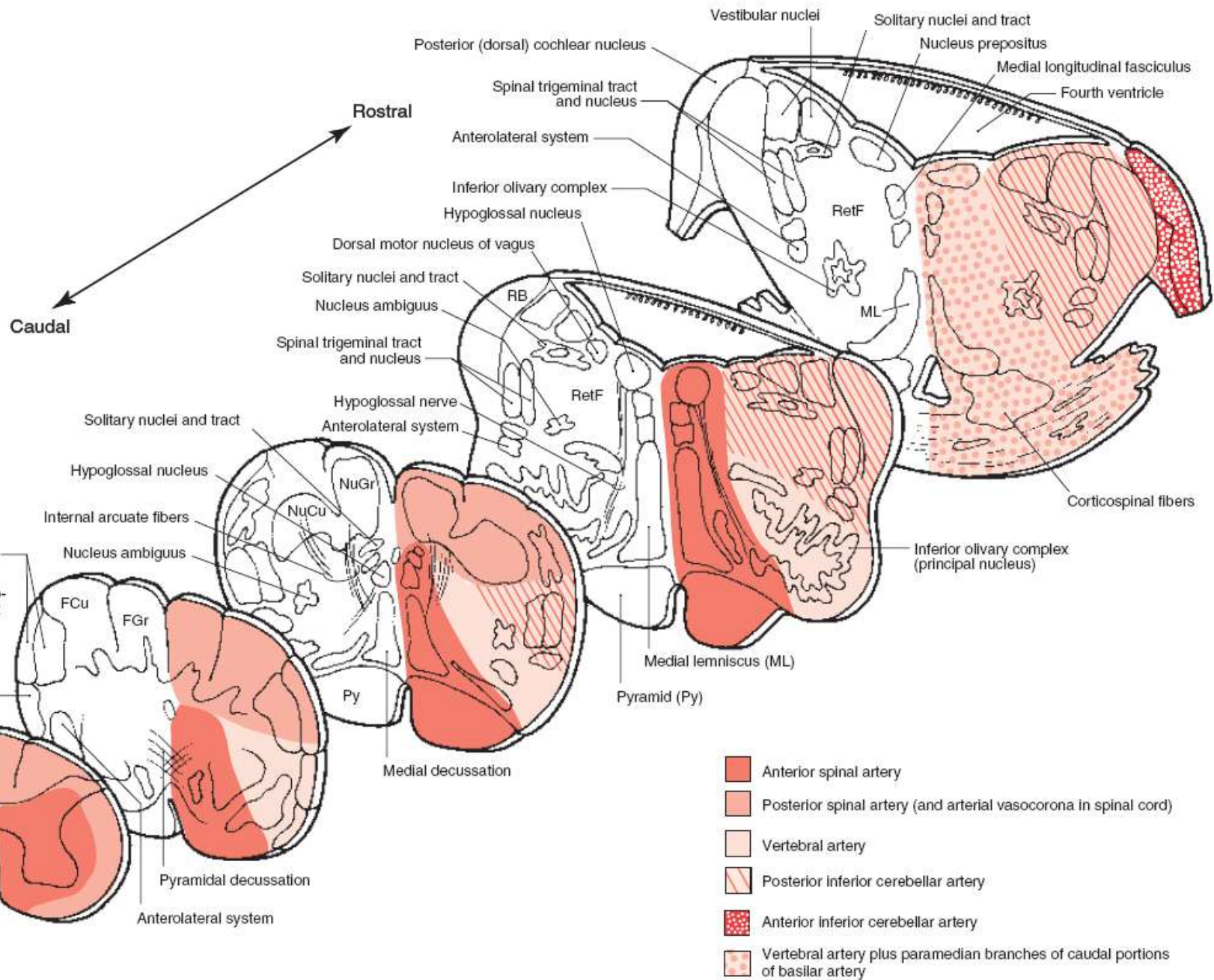
Warm H₂O

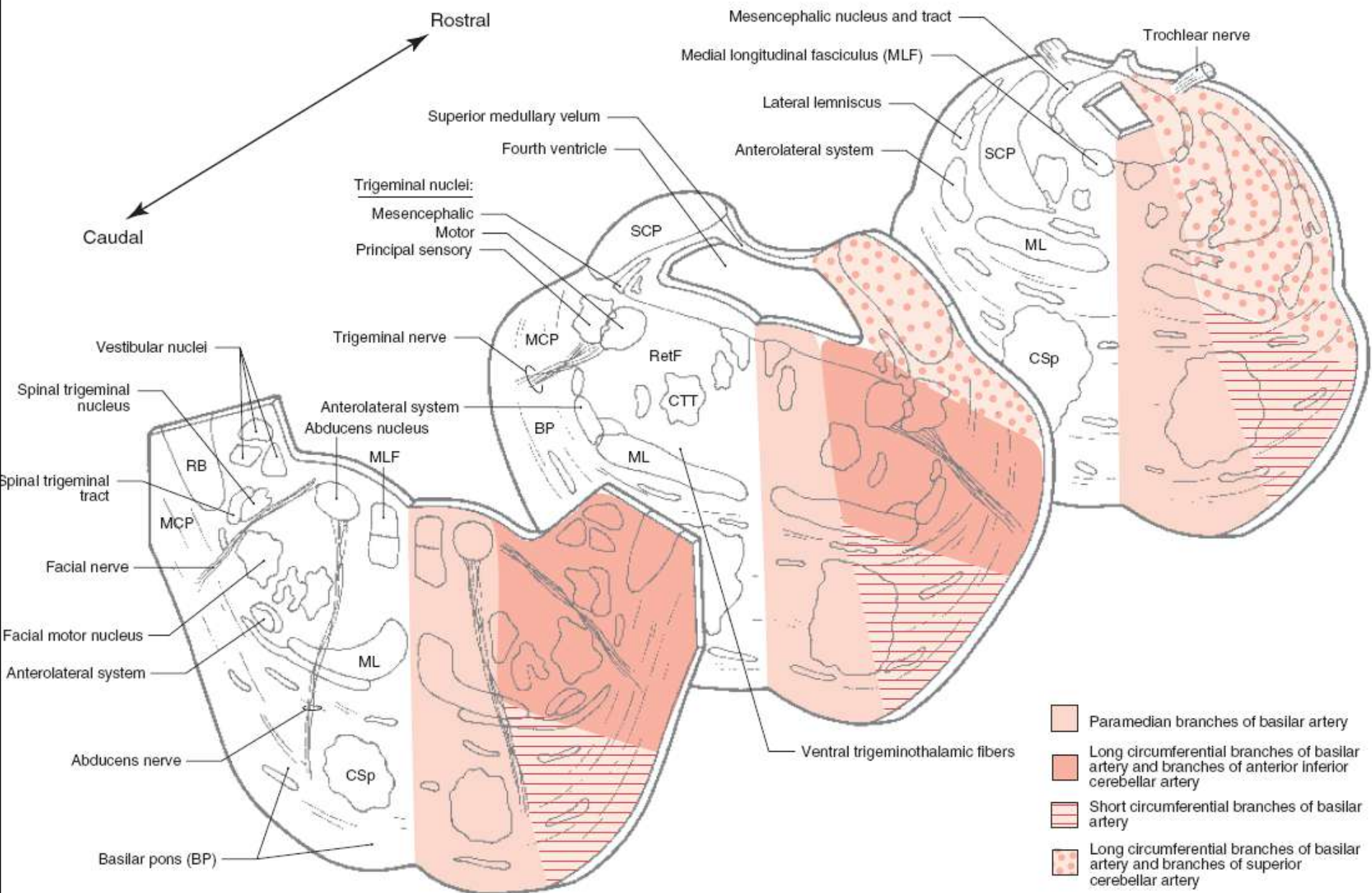
Brainstem Syndromes Involving Corticospinal Fibers and Cranial Nerves



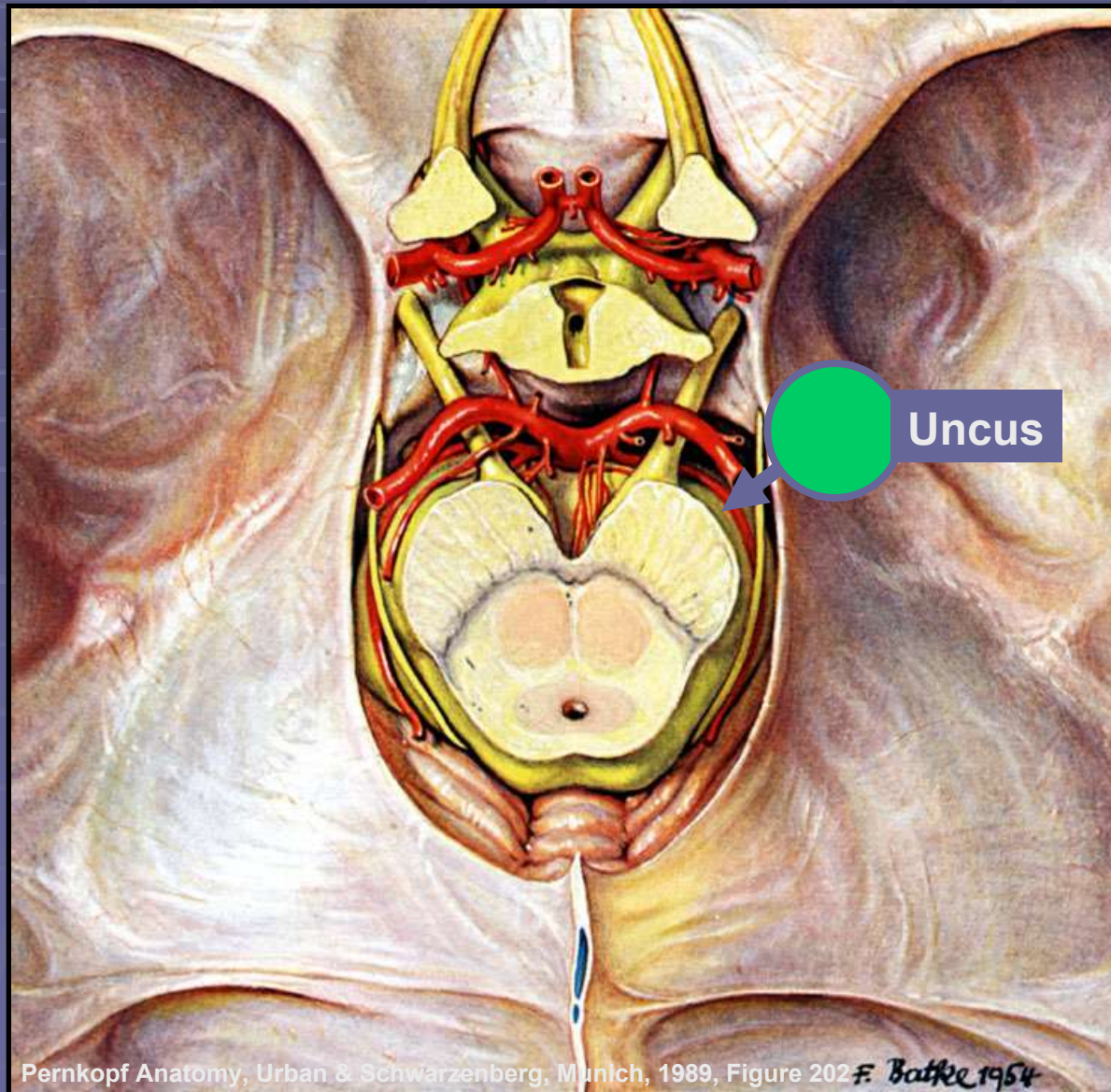
- Corticospinal-pyramidal system
- Trigeminal nuclei
- Posterior column-medial lemniscus system
- Anterolateral system



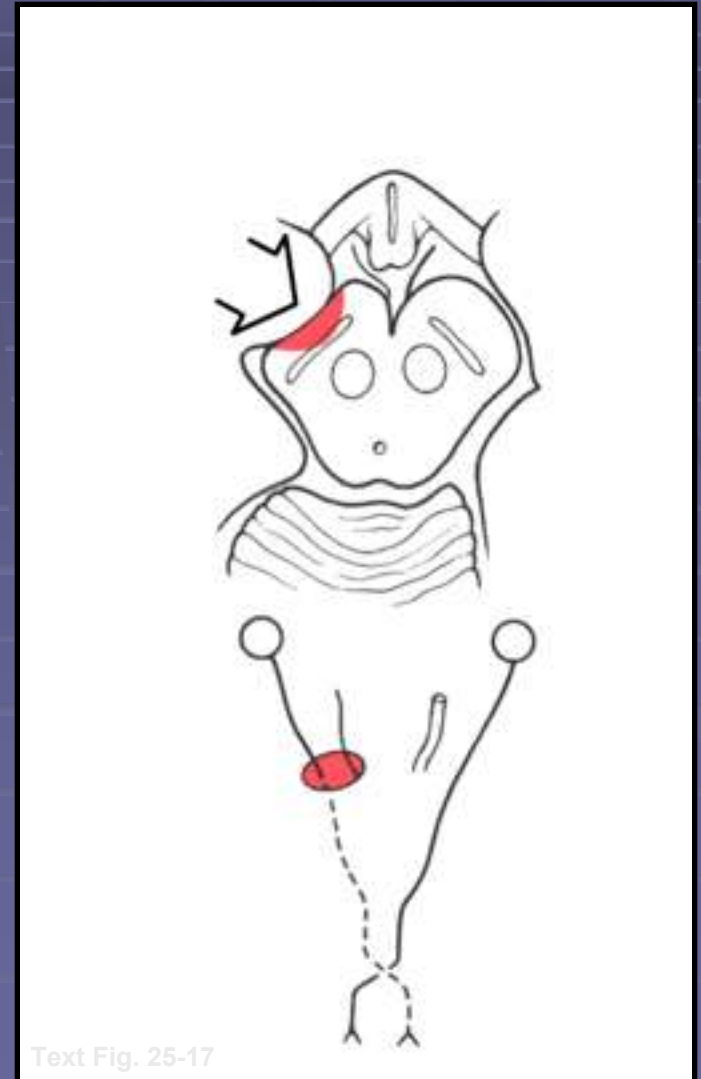
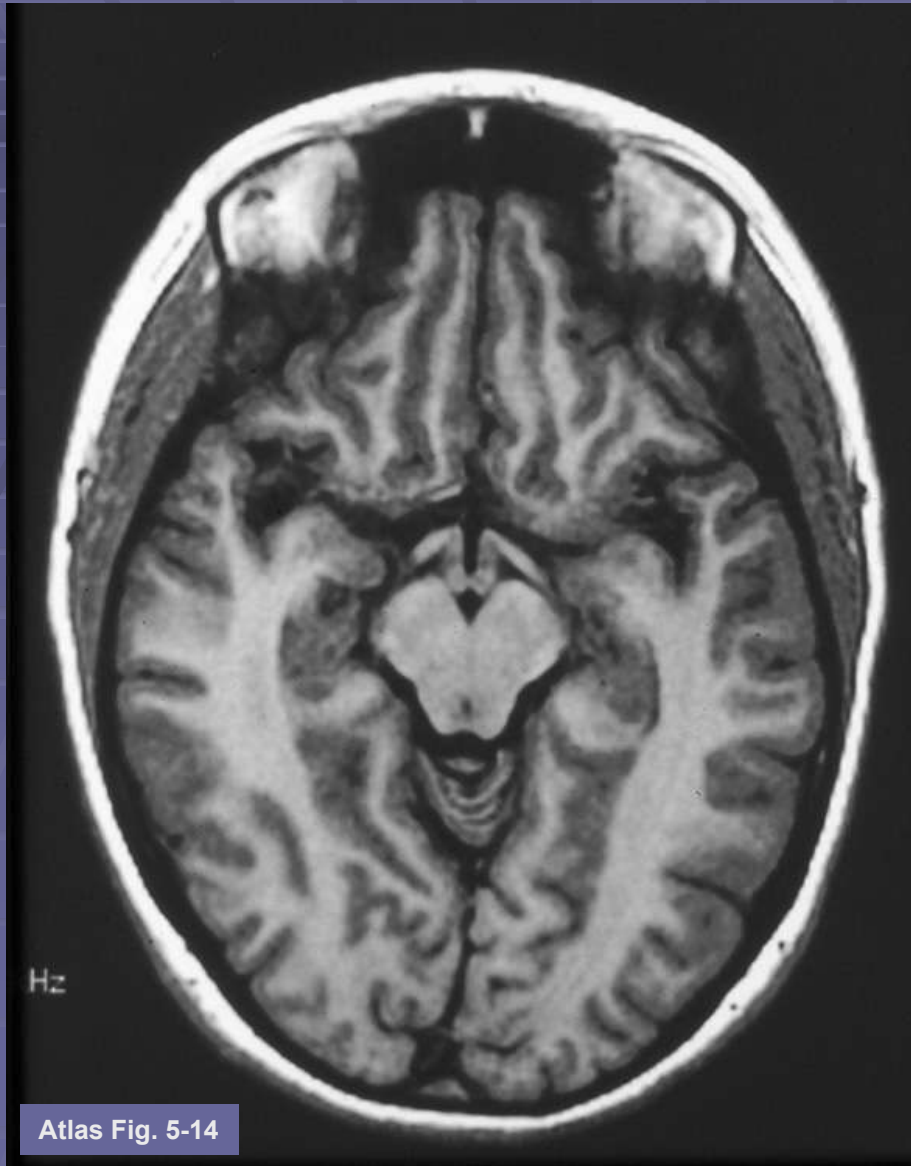




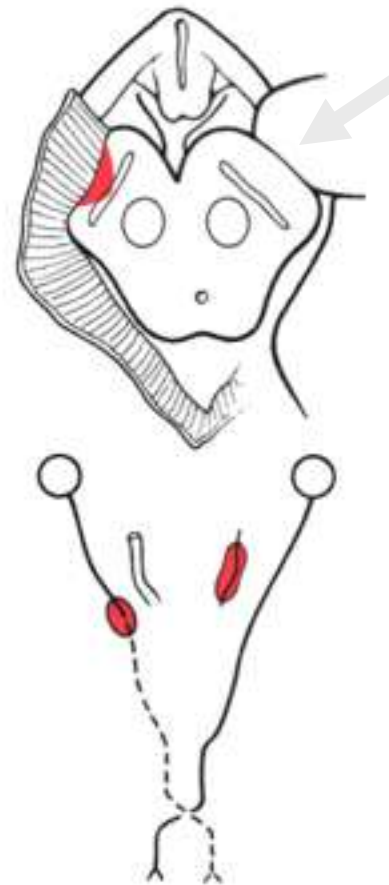
The Uncus and Uncal Herniation



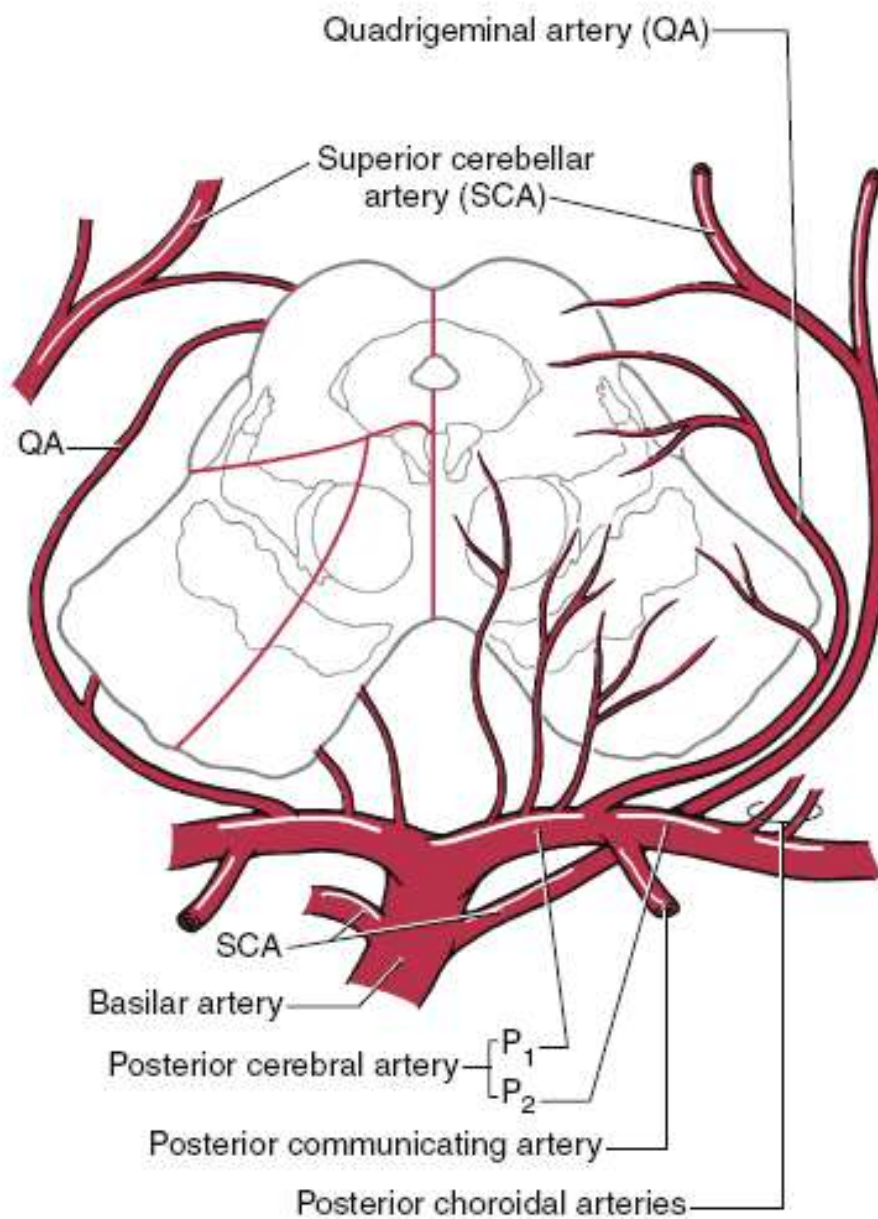
The Uncus and Uncal Herniation

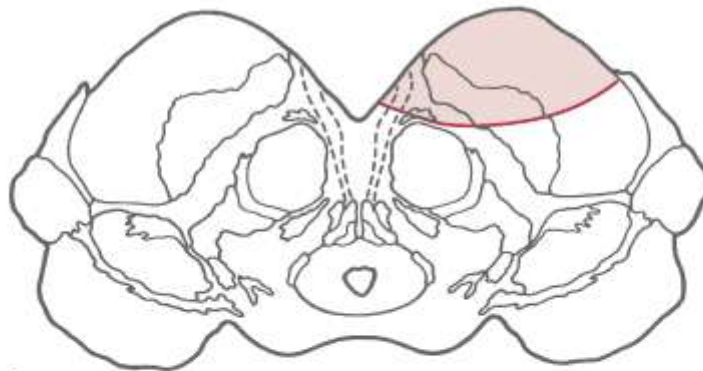


The Kernohan Syndrome

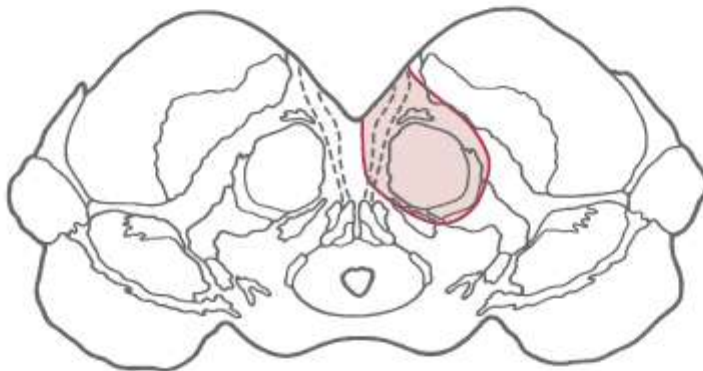


Text Fig. 25-18

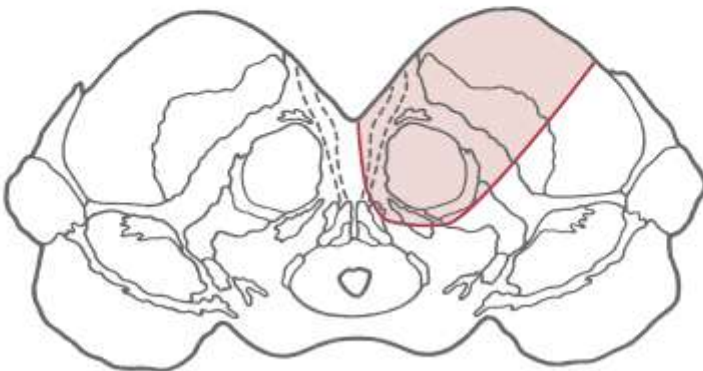




A Weber syndrome



B Claude syndrome



C Benedikt syndrome

SYNDROME	STRUCTURES INVOLVED	CORRESPONDING DEFICIT
Benedikt syndrome (Weber and Claude)	Corticospinal fibers in crus Oculomotor nerve fibers Red nucleus Cerebellothalamic fibers (Medial lemniscus)	Contralateral hemiplegia Ipsilateral oculomotor palsy, dilated pupil, diplopia Contralateral tremor, hyperkinesias Contralateral ataxia (Contralateral loss of vibratory sense, position sense, discriminative touch)
Claude syndrome [†]	Oculomotor nerve fibers Red nucleus Cerebellothalamic fibers (Trochlear nucleus)	Ipsilateral oculomotor palsy, dilated pupil, diplopia Contralateral tremor, hyperkinesias Contralateral ataxia (Weakness of contralateral superior oblique muscle)
Dejerine syndrome (medial medullary)	Corticospinal fibers in pyramid Hypoglossal nerve fibers or nucleus Medial lemniscus	Contralateral hemiplegia Ipsilateral deviation of tongue on protrusion Contralateral loss of vibratory sense, position sense, discriminative touch
Foville syndrome [‡]	Corticospinal fibers in basilar pons Abducens nerve fibers Middle cerebellar peduncle	Contralateral hemiplegia Ipsilateral abducens (lateral rectus) palsy, diplopia Ataxia
Gubler or Millard-Gubler syndrome [§]	Corticospinal fibers in basilar pons Facial nerve fibers or nucleus (Anterolateral system) (Trigeminal nerve fibers)	Contralateral hemiplegia Ipsilateral weakness of facial muscles (Impaired pain and thermal sense on contralateral side of body) (Impaired pain and thermal sense on ipsilateral side of face)
Midpontine base syndrome	Corticospinal fibers in basilar pons Trigeminal nerve fibers Middle cerebellar peduncle	Contralateral hemiplegia Ipsilateral paralysis of masticatory muscles; ipsilateral loss of pain and thermal sensations on face Ataxia
Raymond syndrome	Corticospinal fibers in basilar pons Abducens fibers in basilar pons	Contralateral hemiplegia Ipsilateral abducens (lateral rectus) palsy, diplopia
Wallenberg syndrome (lateral medullary, posterior inferior cerebellar artery)	Spinal trigeminal tract Anterolateral system Vestibular nuclei Nucleus ambiguus Restiform body	Ipsilateral loss of pain and thermal sense on face Contralateral loss of pain and thermal sense on the body Vertigo, nystagmus, nausea, vomiting Hoarseness, dysphagia, deviation of the uvula to opposite side on phonation Ataxia
Weber syndrome	Corticospinal fibers in crus Oculomotor nerve fibers Corticonuclear fibers in crus Substantia nigra	Contralateral hemiplegia Ipsilateral oculomotor palsy, dilated pupil, diplopia Contralateral weakness of facial muscles on lower half of face; deviation of the tongue to contralateral side on protrusion; ipsilateral weakness of trapezius and sternocleidomastoid muscles Contralateral Parkinson-like tremor, akinesia

Table 25-1