

# Atlas Lesions

☆ = Unit 1

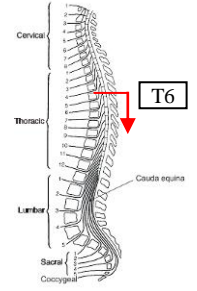
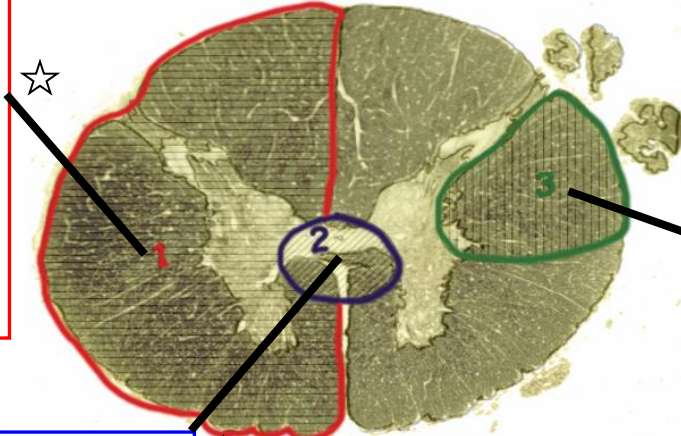
★ = Unit 2

## Thoracic Segment of Spinal Cord Caudal to T6

### Brown-Sequard Syndrome

Cause: Spinal hemi-section

- Fasciculus Gracilis
  - All Ipsilateral
  - Loss of **fine touch** discrimination, **proprioception**, & **pressure**
- Lateral Corticospinal Tract
  - All Ipsilateral
  - **Spastic paralysis**, cutaneous **reflex** loss
  - Positive **Babinski**
- Lateral Spinothalamic Tract (**ALS**)
  - **Contralateral**
  - Loss one segment below
  - Body loss of **Pain & Temperature**
- Anterior Horn Motor Neurons
  - Ipsilateral
  - **Muscle wasting**
- Intermediolateral Cell Column/Descending Autonomic Tracts
  - **Sympathetic** dysfunction
- Lateral Vestibulospinal Tracts
  - **Fall** to lesion side



### Motor Deficits (masking ataxia)

Cause: Meningioma on lateral funiculus

- Lateral Corticospinal Tract
  - All Ipsilateral
  - **Spastic paralysis**
  - Hyperactive **deep tendon** reflexes
  - **Cutaneous reflex** loss
  - Positive **Babinski**
  - **Clonus**

### Syringomyelia

Cause: Cavitation of spinal cord

- Anterior White Commissure/ Crossing Fibers of Lateral Spinothalamic Tracts
  - Bilateral
  - Body loss of **Pain & Temperature** (over one or several dermatomes)
  - Loss one segment below

## Caudal Medulla

### Fasciculus Gracilis

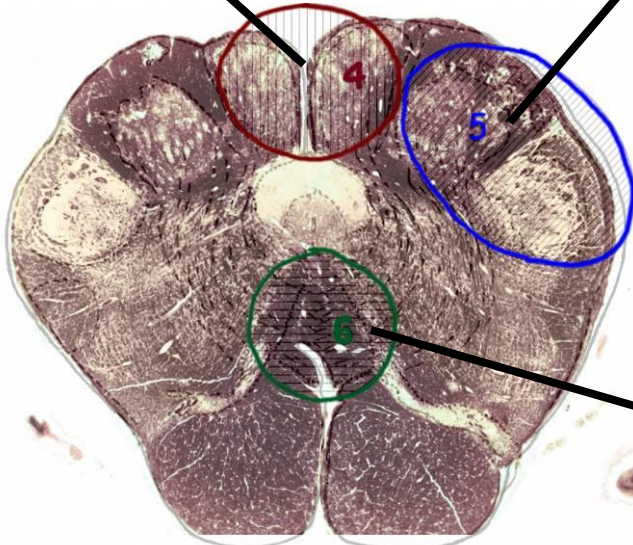
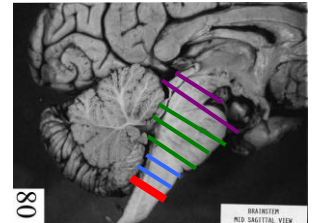
Cause: Tabes dorsalis after contracting syphilis

- Fasciculus Gracilis
  - Bilateral
  - **Fine touch** discrimination, conscious **proprioception**, & **deep pressure** loss (T6-S5)
  - Positive **Romberg**

### Dorsolateral Medulla

Cause: meningioma

- Fasciculus / Nucleus Cuneatus
  - All Ipsilateral
  - **Fine touch** discrimination, conscious **proprioception**, & **deep pressure** loss (C2-T6)
- Lateral (accessory) Cuneate Nucleus/Cuneocerebellar tract/posterior spinocerebellar tract
  - All Ipsilateral
  - **Ataxia**
  - **Hypotonia**
  - **Abnormal heel-to-shin test**
  - **Unconscious proprioception** loss
- Spinal Nucleus / Tract of CN V
  - All Ipsilateral
  - **Facial pain & some temperature** loss

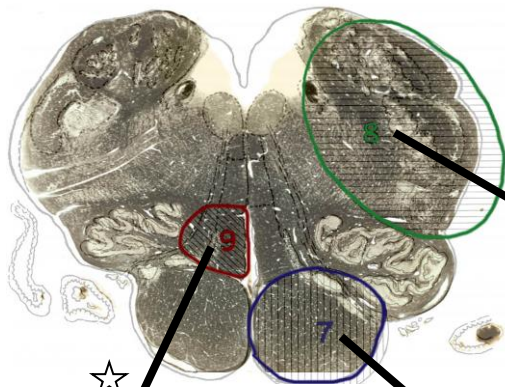


### Centro-Median Medulla

Cause: midline medullary tumor

- Decussation of medial lemniscus / Internal Arcuate fibers
  - Bilateral
  - **Fine touch** discrimination, conscious **proprioception**, & **deep pressure** loss (C2-S5)
- Spinal Nucleus / Tract of CN V
  - Bilateral
  - **Facial pain & temperature** loss

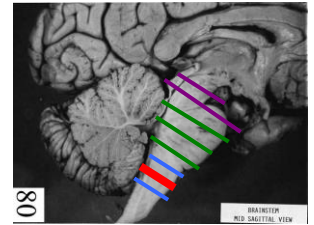
## Mid Medulla



### Wallenberg's Syndrome

Cause: Thrombosis of PICA

- Descending Sympathetic Tracts
  - Ipsilateral
  - **Horner's syndrome** (Anhidrosis, vasodilatation, partial ptosis, miosis)
- Spinal Nucleus / Tract of CN V
  - Ipsilateral
  - **Facial pain & temperature loss**
- Lateral Spinothalamic Tract (**ALS**)
  - **Contralateral**
  - Body loss of **Pain & Temperature**
- Cuneocerebellar tract / Posterior Spinocerebellar tract
  - All Ipsilateral
  - **Ataxia**
  - **Hypotonia**
  - **Abnormal heel-to-shin test**
- Nucleus Ambiguus / Root of CN X
  - Paralysis of pharyngeal constrictors (**dysphagia**)
  - Paralysis of vocal cords (**dysphonia / dysarthria**)
  - Paralysis of ipsilateral soft palate (**uvula deviation away from lesion during phonation**)
- Vestibular nuclei
  - Nystagmus to lesion if lesion is irritating (due to pressure)



### Medial Lemniscus & CN XII

Cause: intramedullary tumor

- **Medial Lemniscus**
  - All **Contralateral**
  - **Fine touch** discrimination, conscious **proprioception**, & **deep pressure loss** (C2-S5)
- CN XII
  - **Ipsilateral tongue** paralysis
  - Fasciculations & eventual atrophy
  - Tongue **deviation to lesion side**

### Inferior Alternating Hemiplegia

Cause: meningioma

- **Pyramidal Tract**
  - All **Contralateral**
  - **Spastic hemiparesis/paralysis**
  - **Jack-Knife**
  - Hyperactive **deep tendon** reflexes
  - **Cutaneous reflex** loss
  - Positive **Babinski**
  - **Clonus**
- CN XII
  - **Ipsilateral tongue** paralysis
  - Fasciculations & eventual atrophy
  - Tongue **deviation to lesion side**

## Rostral Medulla & Deep Cerebellar Nuclei

### Archicerebellar, Midline Cerebellar

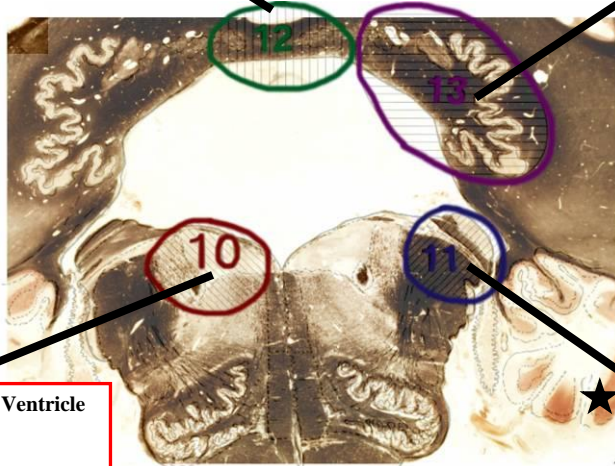
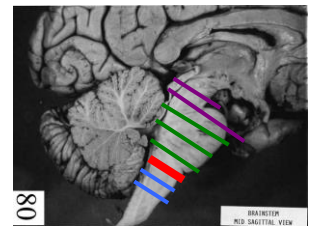
Cause: medulloblastoma

- Fastigial Nucleus (bilateral)
  - Bilateral
  - **Trunkal Ataxia**
  - **Abnormal head rotation**
  - **Nystagmus**
  - **Vertigo**

### Lateral Zone (Hemispheric)

Cause: tumor

- Globose, Emboliform, & Dentate
  - Ipsilateral **intention tremor**
  - **Ataxia** (broad **gate**, **no tandem walking**)
  - **Hypotonia**
  - **Dysmetria** **Under/overshoot a target**
  - **Dysarthria** **Unclear speech**
  - **Nystagmus**
  - **Dysidiadochokinesia**
  - **Decomposition of movement**



### Rostral Medulla, 4<sup>th</sup> Ventricle

Cause: Tumor

- Nucleus Solitarius
  - Ipsilateral taste decrease
- Inf. Salivatory Nucleus
  - Decreased salivation
- Vestibular nuclei
  - Nystagmus to lesion if lesion is **irritating** (due to pressure)
  - Nystagmus opposite lesion if **destructive** – **fall to lesion side**

### ICP & Cochlear Nucleus

Cause: PICA thrombus or tumor

- Inferior Cerebellar Peduncle
  - All Ipsilateral
  - **Ataxia**
  - **Hypotonia**
  - **Abnormal heel-to-shin test**
- Cochlear Nucleus
  - **Ipsilateral deafness**



## Caudal Pons

### Facial Colliculus

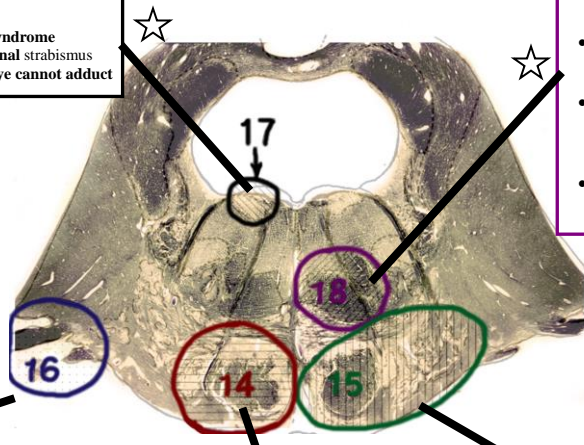
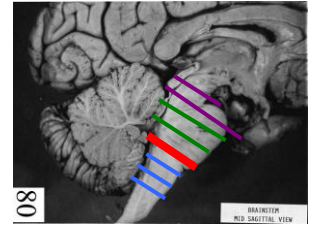
Cause: ependymal tumor on floor of 4<sup>th</sup> ventricle

- Internal Genu of CN VII
  - All Ipsilateral
  - **Facial paralysis**
  - **Hyperacusis**
- CN VI Nucleus
  - **Lateral Gaze Syndrome**
  - **Ipsilateral internal strabismus**
  - **Contralateral eye cannot adduct**

### ML, Ventral Acoustic Stria, CN VI, & CN V

Cause: Thrombosis of basilar artery branch or tumor

- Medial Lemniscus
  - All Contralateral
  - **Fine touch discrimination, conscious proprioception, & deep pressure loss (C2-S5)**
- CN VI Root
  - Ipsilateral **internal strabismus**
  - **Diplopia**
- Some crossed trigeminothalamic fibers in ML
  - Diminished **Pain & Temperature** on Contralateral face
- Ventral Acoustic Stria
  - Bilateral hearing loss with more contralateral loss



### Acoustic Neuroma

Cause: Abnormal Schwann cell proliferation

- CN VIII
  - Ipsilateral **deafness**
  - **Vertigo**
  - **Unsteadiness**
  - **Nystagmus**
  - Worsened condition **fall to lesion side**
- CN VII
  - All Ipsilateral
  - **Facial paralysis**
  - **Hyperacusis**
  - Parasympathetic loss
    - Dry eye
    - Decreased salivation

### Middle Alternating Hemiplegia

Cause: Thrombosis of basilar artery

- Pyramidal Tract
  - All Contralateral
  - **Spastic hemi-paralysis/paresis**
  - **Jack-knife**
  - **Hyperactive deep tendon reflexes**
  - **Clonus**
  - Loss of **cutaneous reflexes**
  - Positive **Babinski** reflex (extensor plantar)
- CN VI Root
  - Ipsilateral **internal strabismus**
  - **Diplopia**

### Millard-Gubler

Cause: expanded thrombosis of basilar artery or tumor lesion

- Pyramidal Tract
  - All Contralateral
  - **Spastic hemi-paralysis/paresis**
  - **Jack-knife**
  - **Hyperactive deep tendon reflexes**
  - **Clonus**
  - Loss of **cutaneous reflexes**
  - Positive **Babinski** reflex (extensor plantar)
- CN VI Root
  - Ipsilateral **internal strabismus**
  - **Diplopia**
- CN VII Root
  - All Ipsilateral
  - **Facial paralysis**
  - **Hyperacusis**
  - Parasympathetic loss
    - Dry eye
    - Decreased salivation

## Mid Pons

### Dorsolateral Mid Pons

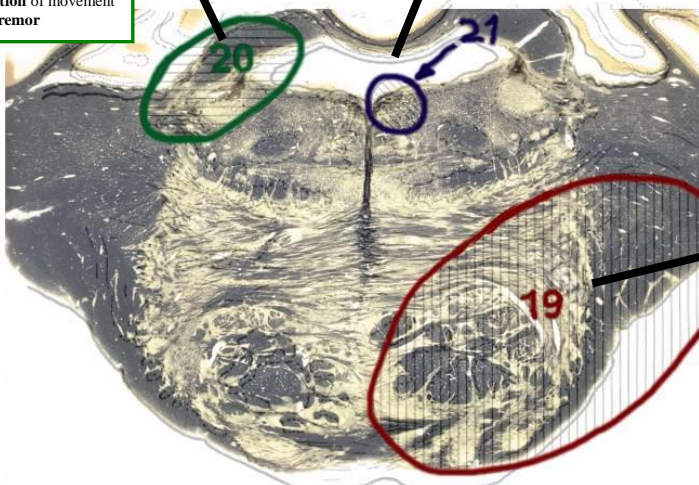
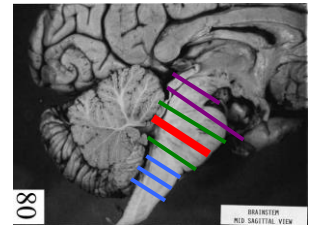
Cause: SCP Thrombosis

- Chief Sensory CN V
  - All Ipsilateral
  - **Fine touch & vibration loss**
- Motor CN V
  - All Ipsilateral
  - Mastication paralysis
  - Jaw deviation to lesion
  - Hyperacusis
- **SCP**
  - All Ipsilateral
  - **Ataxia**
  - **Dyssynergia**
  - **Dysmetria**
  - **Dysdiadochokinesia**
  - **Decomposition of movement**
  - **Intention tremor**

### Internuclear Ophthalmoplegia

Cause: Multiple Sclerosis

- Medial Longitudinal Fasciculus
  - Ipsilateral **eye adduction loss**
    - On lateral gaze looking to side opposite lesion
  - Nystagmus in abducting eye



### Trigeminal Alternating Hemiplegia

Cause: Large tumor in basilar portion of midpons

- Pyramidal Tract
  - All Contralateral
  - **Spastic hemi-paralysis/paresis**
  - **Jack-knife**
  - **Hyperactive deep tendon reflexes**
  - **Clonus**
  - Loss of **cutaneous reflexes**
  - Positive **Babinski** reflex (extensor plantar)
- CN V Root
  - All Ipsilateral
  - **Mastication paralysis**
  - **Jaw deviation** to lesion
  - **Hyperacusis**
  - **Facial anesthesia** (pain, temp, fine touch, proprioception, deep pressure)
  - **No corneal reflex**

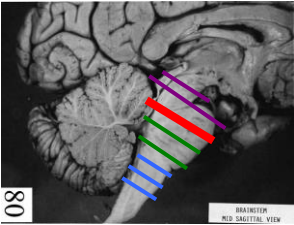
# Rostral Pons

**CN IV Root**  
*Cause: Meningioma*

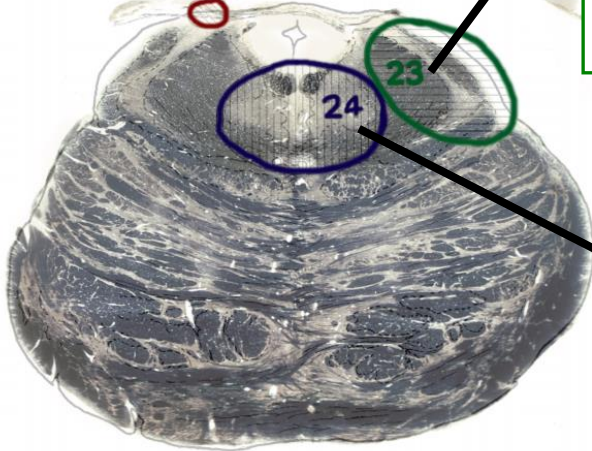
- CN IV Root
  - Ipsilateral eye extorted
  - **Diplopia**
  - Difficulty walking down stairs

**Dorsolateral Rostral Pons**  
*Cause: Meningioma*

- SCP
  - All Ipsilateral
  - **Ataxia**
  - **Dyssynergia**
  - **Dysmetria**
  - **Dysdiadochokinesia**
  - **Decomposition** of movement
  - **Intention tremor**
- Lateral Lemniscus
  - Bilateral hearing loss
  - Greater loss contralaterally
- Lateral Spinothalamic Tract (ALS)
  - Contralateral
  - Body loss of **Pain & Temperature**
- Medial Lemniscus
  - All Contralateral
  - **Fine touch** discrimination, conscious **proprioception, & deep pressure** loss



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**Reticular Core, CTT, & MLF**  
*Cause:*

- Reticular Core
  - Altered consciousness
  - Possible enhanced extensor tone
  - Decerebrate posture
- MLF
  - No **adduction** on lateral gaze

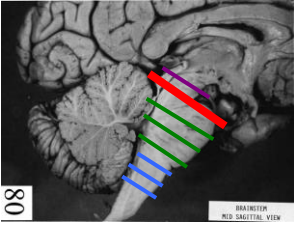
# Caudal Midbrain (Rostral Basilar Pons)

**Inferior Colliculus**  
*Cause: Meningeal tumor*

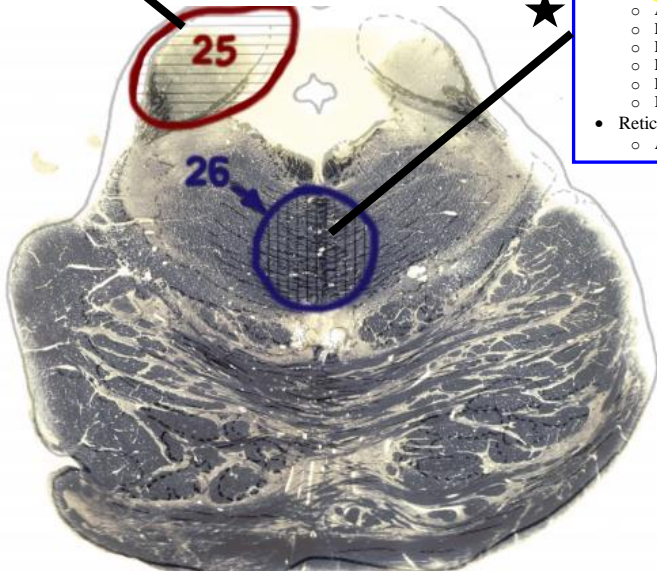
- Inferior Colliculus
  - Bilateral hearing loss
  - Worse on contralateral side

**SCP Decussation & Reticular Formation**  
*Cause: thrombosis of SCA or tumor*

- SCP Decussation
  - **Bilateral**
  - **Ataxia**
  - **Dyssynergia**
  - **Dysmetria**
  - **Dysdiadochokinesia**
  - **Decomposition** of movement
  - **Intention tremor**
- Reticular Formation
  - Altered consciousness



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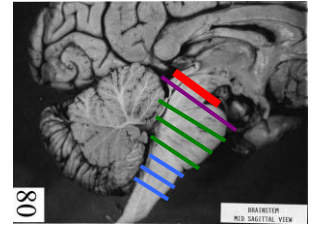
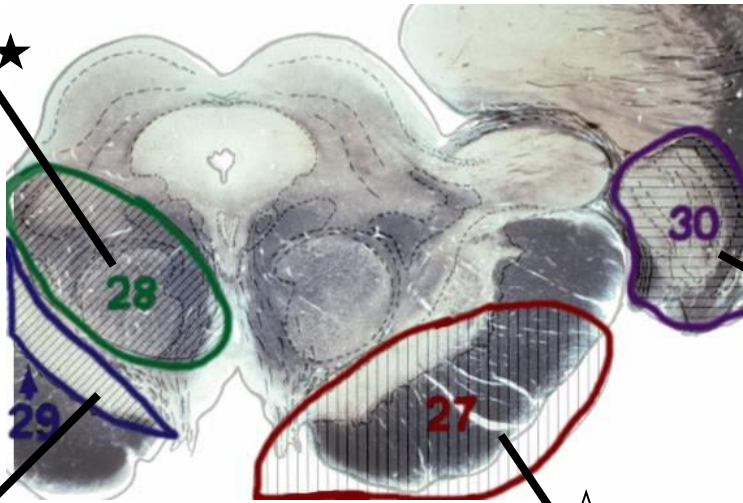


# Rostral Midbrain

## Benedickt's Syndrome

Cause: tumor in tegmentum of rostral midbrain

- SCP & Red Nuc. Rostral to Decussation
  - All Contralateral
  - Ataxia
  - Dyssynergia
  - Dysmetria
  - Dysdiadochokinesia
  - Decomposition of movement
  - Intention tremor
- CN III
  - Ext. strabismus
  - Diplopia
  - Ipsilateral ptosis
  - Mydriasis
- ML, ALS, VTTT
  - Contralateral
  - Body loss of Pain & Temperature
  - Body loss of Fine touch & Proprioception



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## Contralateral Homonymous Hemianopsia

Cause: tumor at base of caudal diencephalon

- Lateral Geniculate
- Termination of Optic Tract
  - Contralateral Homonymous Hemianopsia

## Parkinson's Disease

Cause: loss of dopaminergic neurons

- Substantia Nigra (pars compacta)
  - Contralateral rigidity
  - Cog-wheel movement
  - Resting tremor (pill rolling)
  - Bradykinesia
  - Ataxia
  - Parkinsonian posture

## Superior Alternating Hemiplegia

Cause: Thrombosis of PCA or tumor

- Crus Cerebri (including corticospinal & corticobulbar tracts)
  - All Contralateral
  - Spastic hemi-paralysis/paresis
  - Hyperactive deep tendon reflexes
  - Clonus
  - Positive Babinski reflex (extensor plantar)
  - Lower facial paralysis (forehead wrinkling but cannot smile)
- CN III Root
  - All Ipsilateral
  - Internal strabismus
  - Mydriasis
  - Diplopia
  - Ptosis
  - Direct light reflex loss
  - Consensual light reflex loss (when light shone in contralateral eye)

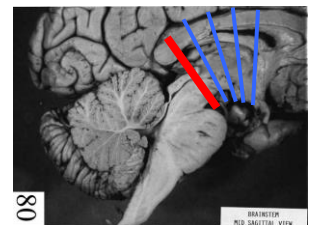
# Diencephalon / Midbrain Transition



## Parinaud's Syndrome

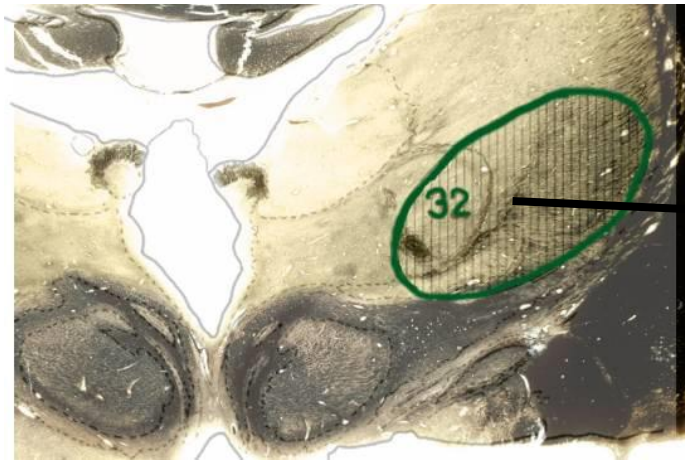
Cause: Pineal gland tumor

- Vertical Gaze Centers
- Rostral Superior Colliculi
  - Upward gaze paralysis (initially)
  - Downward gaze paralysis (later)



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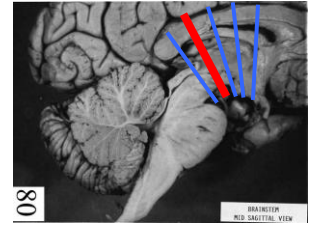
## Caudal Thalamus



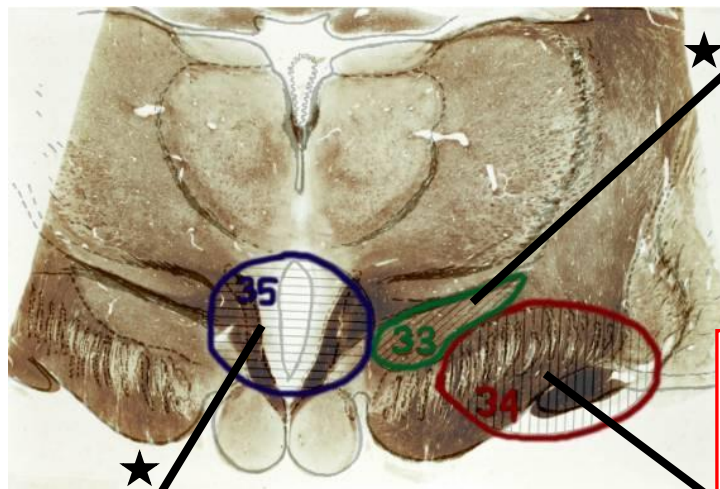
### VPM & VPL Thalamus

Cause: *Thrombosis of PCA*

- VPM & VPL Thalamus
  - All Contralateral
  - **Body & Face Loss**
  - **Fine touch** discrimination
  - Conscious **proprioception**
  - Deep **pressure**
  - Pain & temperature **localization** loss (no lost ability to perceive)
  - **Thalamic Pain**
  - Fine touch & vibration in face (only partial)



## Mid-Thalamus / Sub-Thalamus / Caudal Hypothalamus



### MMT & Post. Hypothalamus

Cause: *Midline tumor in caudal hypothalamus*

- Mammillothalamic Tract
  - Difficulty forming **new memories**
- Posterior hypothalamus
  - **Hypothermia**
  - **Decreased alertness**
  - Possible **somnolence**

### Hemiballism

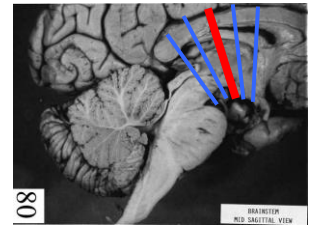
Cause: *thalamosubthalamic artery thrombosis (PCA branch)*

- Subthalamic Nucleus (STN)
  - Contralateral
  - **Hemiballism**
  - **Hypertonia**
  - **Mild hypotonia** of affected muscles

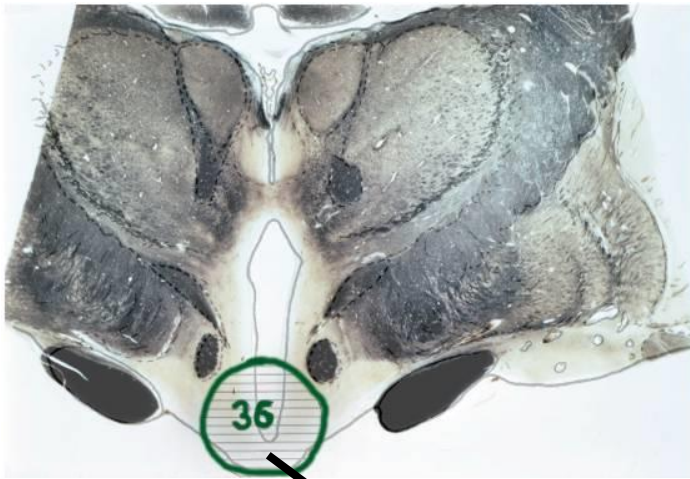
### Internal Capsule & Optic Tract

Cause: *Thrombosis of PCA or tumor*

- Internal Capsule/Cerebral Peduncle
  - All Contralateral
  - **Spastic hemi-paralysis/paresis**
  - Loss of certain **cutaneous reflexes**
  - **Hyperactive deep tendon reflexes**
  - **Clonus**
  - Positive **Babinski** reflex (extensor plantar)
  - **Lower facial paralysis** (forehead wrinkling but cannot smile)
- Optic tract
  - Contralateral homonymous hemianopsia



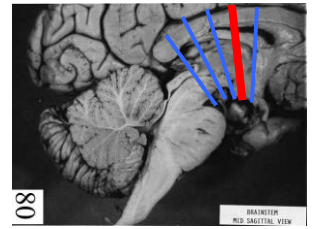
## Rostral-Thalamus / Mid-Hypothalamus



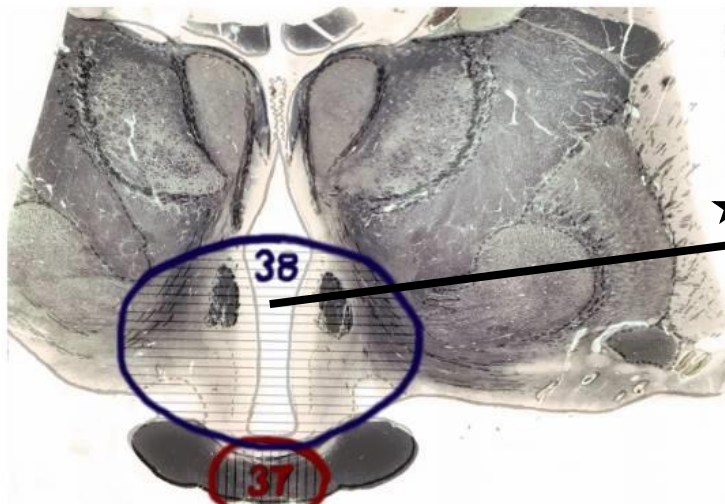
### Arcuate Nucleus

*Cause: midline tumor of hypothalamus*

- Arcuate Nucleus
  - Hyperphagia & Obesity
  - Altered endocrine function
    - GRH, DA
  - Enhanced aggression



## Rostral-Thalamus / Anterior-Hypothalamus



### Anterior Hypothalamus

*Cause: midline tumor of anterior hypothalamus*

- Supraoptic/Paraventricular Nucleus
  - Diabetes Insipidus
  - Thirst, frequent urination
    - ADH
- Anterior area
  - Hyperthermia (POA dysfunction)
- Suprachiasmatic Nuclei
  - PVN
    - CRH, TRH, Oxytocin, ADH
  - POA
    - GnRH
    - Hyperthermia
  - SON
    - Oxytocin, ADH
  - SCN
    - Biorhythms
- Fornix
  - Difficulty forming new memories



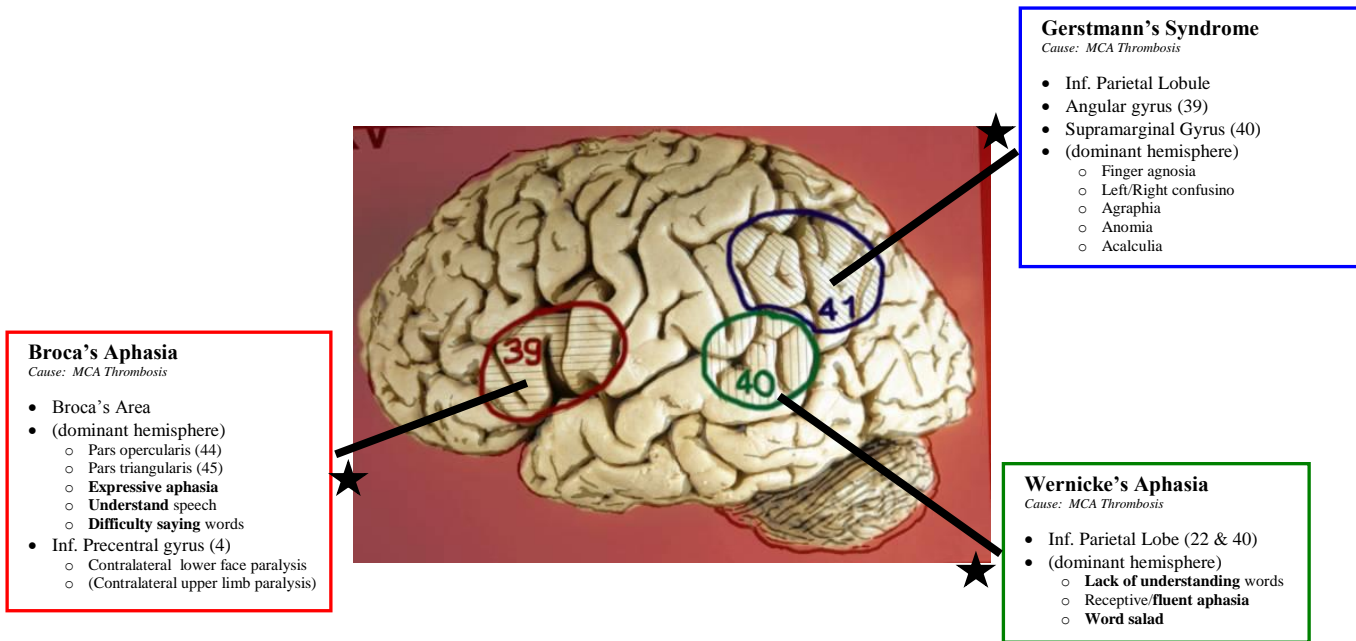
### Bilateral Heteronymous Hemianopsia

*Cause: Herniated pituitary tumor*

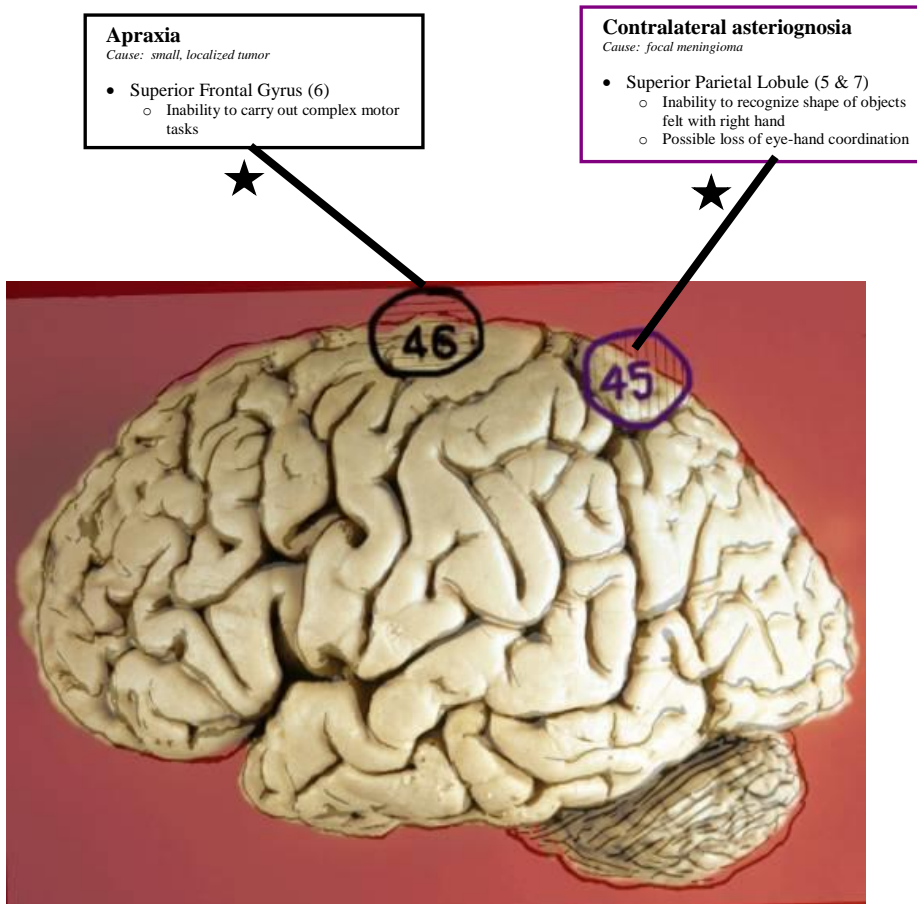
- Optic Chiasm
  - Bilateral Heteronymous Hemianopsia



## Left Cerebral Hemisphere

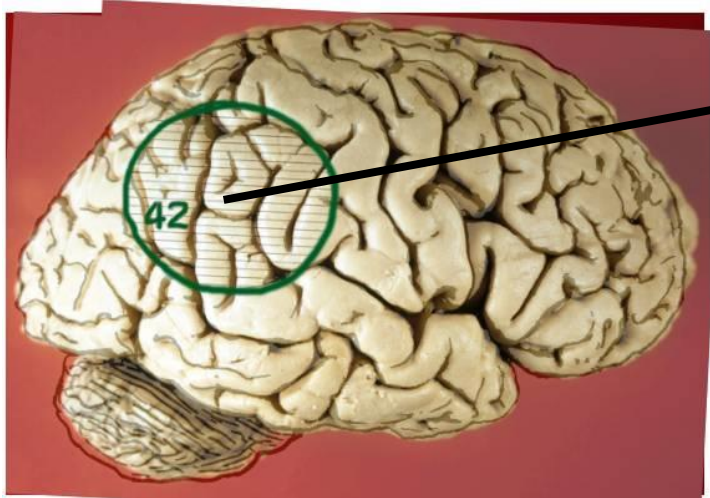


## Left Cerebral Hemisphere (Cont'd)





## Right Hemispheric Wall



### Contralateral Neglect

Cause: Thrombosis of MCA or tumor

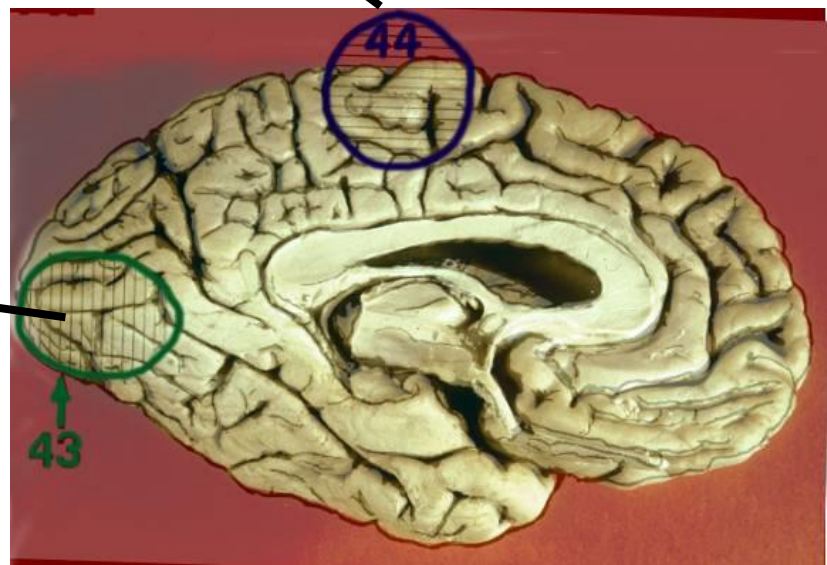
- Inf. Parietal Lobule
- Angular gyrus (39)
- Supramarginal Gyrus (40)
- (non-dominant hemisphere)
  - Neglect of opposite side of body

## Left Medial Cerebral Hemisphere

### Paracentral Lobule

Cause: Meningioma growing laterally

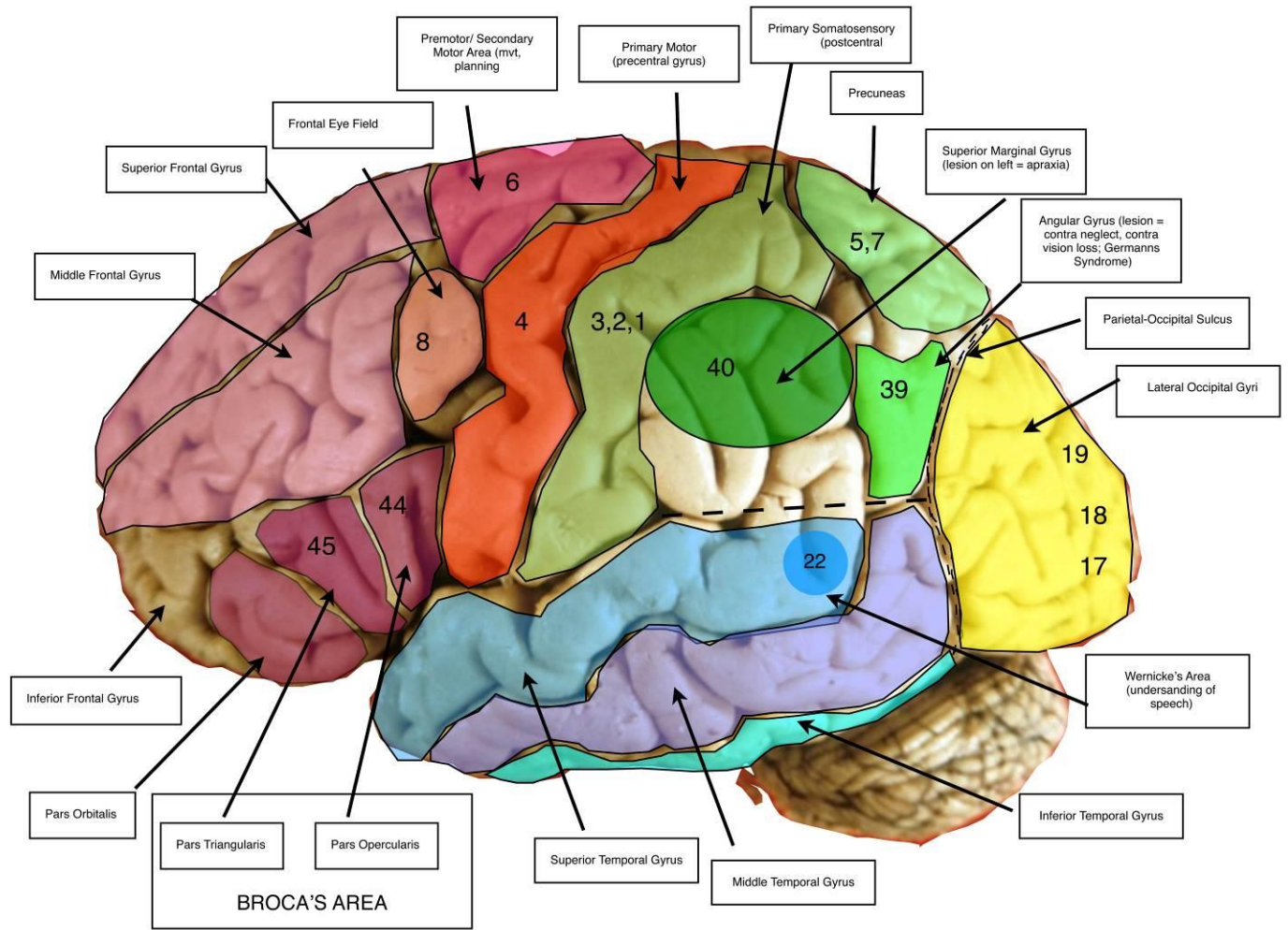
- Paracentral Lobule (3, 1, 2; 4)
- Pre- & Post-central Gyri on medial wall
  - All Contralateral
  - Loss of **fine touch** discrimination, **conscious proprioception**, **deep pressure** of lower limb
  - **Spastic paralysis/paresis**



### Contralateral Homonymous Superior Quadrantopia

Cause: Thrombosis of PCA

- Lingula (17)
  - Contralateral Homonymous Superior Quadrantopia
  - "Pie in the sky"



### Cerebellar Input (Afferents)

1. Dorsal spino-cerebellar tract (DSCT)	GTO & muscle spindles → dorsal root (medial) fasc. gracilis	Nucleus dorsalis of Clarke (C8-L2)	DSCT	Inferior cerebellar peduncle (ICP)	Globose Emboliform (GE)	Cortex Ant. lobe Vermis Post. Lobe Paravermis	Unconscious Proprioception (trunk, lower limbs)
2. Cuneo-cerebellar tract (CCT)	GTO & muscle spindles → dorsal root (medial), fasc. cuneatus	Accessory cuneate nucleus (caudal medulla)	CCT	Inferior cerebellar peduncle (ICP)	Globose Emboliform (GE)	Cortex Ant. lobe Vermis Post. Lobe Paravermis	Unconscious Proprioception (head, neck)
3. Vestibulo-cerebellar tract		Vestibular nuclear complex		Juxtarestiform body (JB)	Fastigial nucleus (F)	Flocculus, nodulus, uvula	Posture & equil. Axial extensors. anti-gravity m., Eye movement
		Vestibular nerve		Juxtarestiform body (JB)		Flocculus, nodulus, uvula	Posture & equil. Axial ext. anti-gravity mus., Eye movement
4. Ponto-cerebellar	Cerebral cortex (F-P & PTO-P)	Pontine nuclei	transverse pontine fibers X	Middle cerebellar peduncle (MCP)	Dentate (D)	Paravermis hemisphere (mossy fibers)	Voluntary Skilled movement
5. Olivo-cerebellar	Cortex Red nu. (CTT) Spinal cord	Inferior olivary nucleus	X Olivo-cerebellar fibers	Inferior cerebellar peduncle (ICP)	Globose Emboliform Dentate (GED)	Hemisphere (climbing fibers)	Learning of motor tasks that require trial & error

### Cerebellar Output (Efferents)

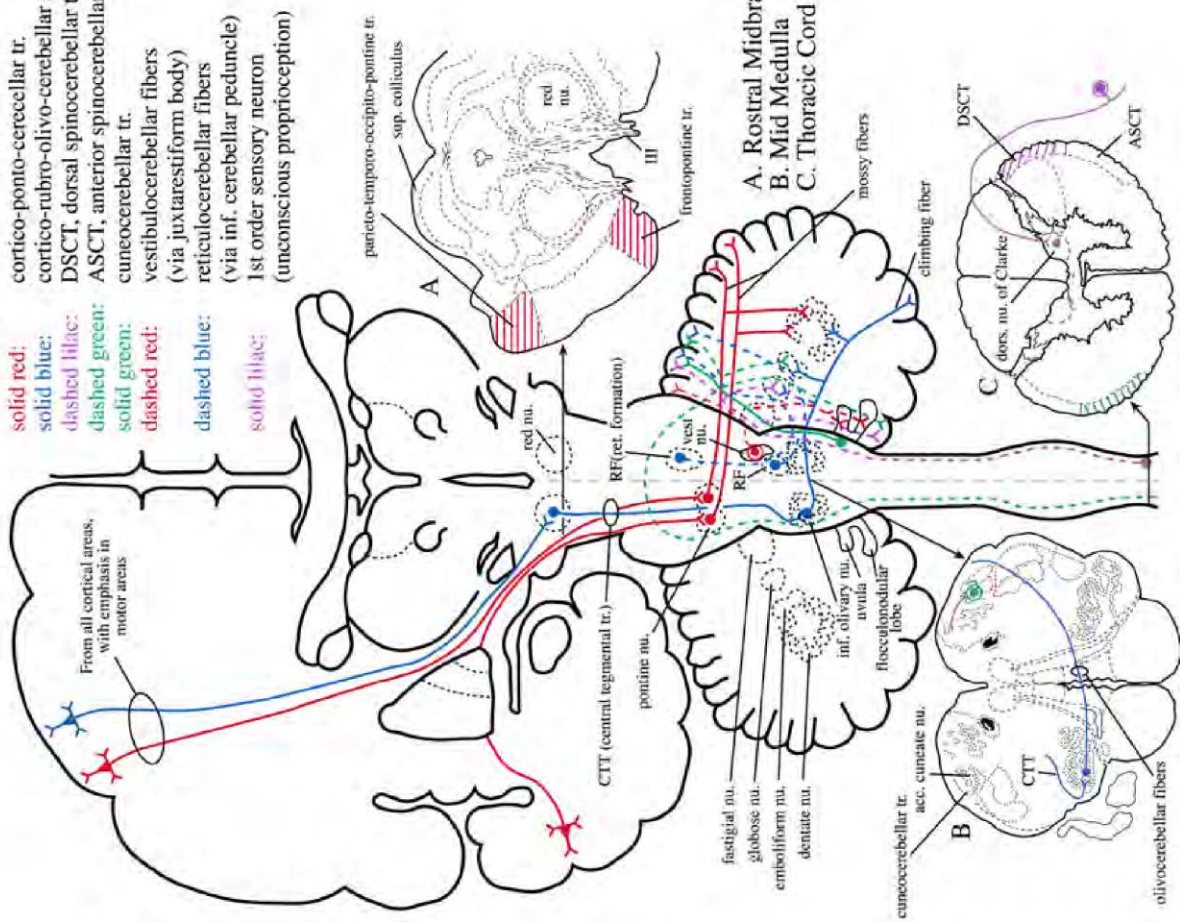
1. Cerebello-rubrothalamic	Globose Emboliform	Superior cerebellar peduncle (SCP)	Cross Caudal midbrain	Red Nucleus → rubrospinal tract	Flexors spinal motoneurons controlling associated movement
	Dentate	Superior cerebellar peduncle (SCP)	Cross Caudal midbrain	VL→4 (primary motor cortex)	Skilled & associated movement
2. Cerebello-vestibular	Fastigial	Juxtarestiform Body (JB)	Vestibular nuclear complex	MVST LVST Asc. MLF	Head reflex Axial anti-gravity extensors III, IV & VI cranial n. nuclei
	Vermis	Juxtarestiform Body (JB)	Vestibular nuclear complex	MVST LVST Asc. MLF	Head reflex Axial anti-gravity extensors III, IV & VI cranial n. nuclei
3. Cerebello-reticular	Fastigial, Globose Emboliform Dentate	Superior cerebellar peduncle (SCP)	Reticular formation (bilateral)		↑ muscle tone



# Cerebellar Afferents

X

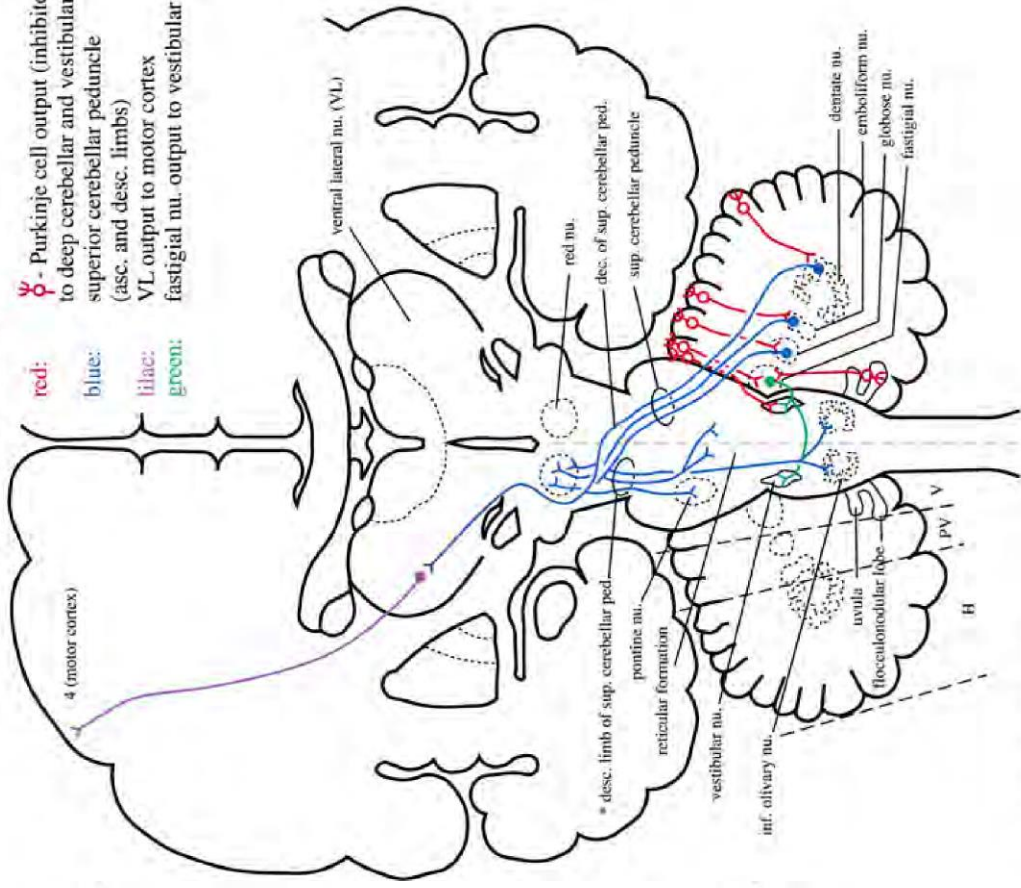
- solid red:** cortico-ponto-cerebellar tr.
- solid blue:** cortico-rubro-olivo-cerebellar tr.
- dashed lilac:** DSCT, dorsal spinocerebellar tr.
- solid green:** ASCT, anterior spinocerebellar tr.
- dashed red:** cuneocerebellar tr.
- dashed blue:** vestibulocerebellar fibers (via juxtarestiform body)
- solid lilac:** reticulocerebellar fibers (via inf. cerebellar peduncle)
- solid lilac:** 1st order sensory neuron (unconscious proprioception)



# Cerebellar Efferents

XI

- red:** Purkinje cell output (inhibitory) to deep cerebellar and vestibular nuclei (asc. and desc. limbs)
- blue:** VL output to motor cortex
- lilac:** fastigial nu. output to vestibular nu.
- green:** fastigial nu. output to vestibular nu.



Three Longitudinal Systems

V, Vermal : cerebellar coordination of extensor muscle activity (posture) through vestibular nu.  
 PV, Paravermal : cerebellar coordination of flexor muscle activity through red nu.  
 H, Hemispheric : cerebellar coordination of voluntary motor activity  
 \*, desc. limb of sup. cerebellar ped., terminates in the pontine nu., reticular formation and inf. olivary nu.

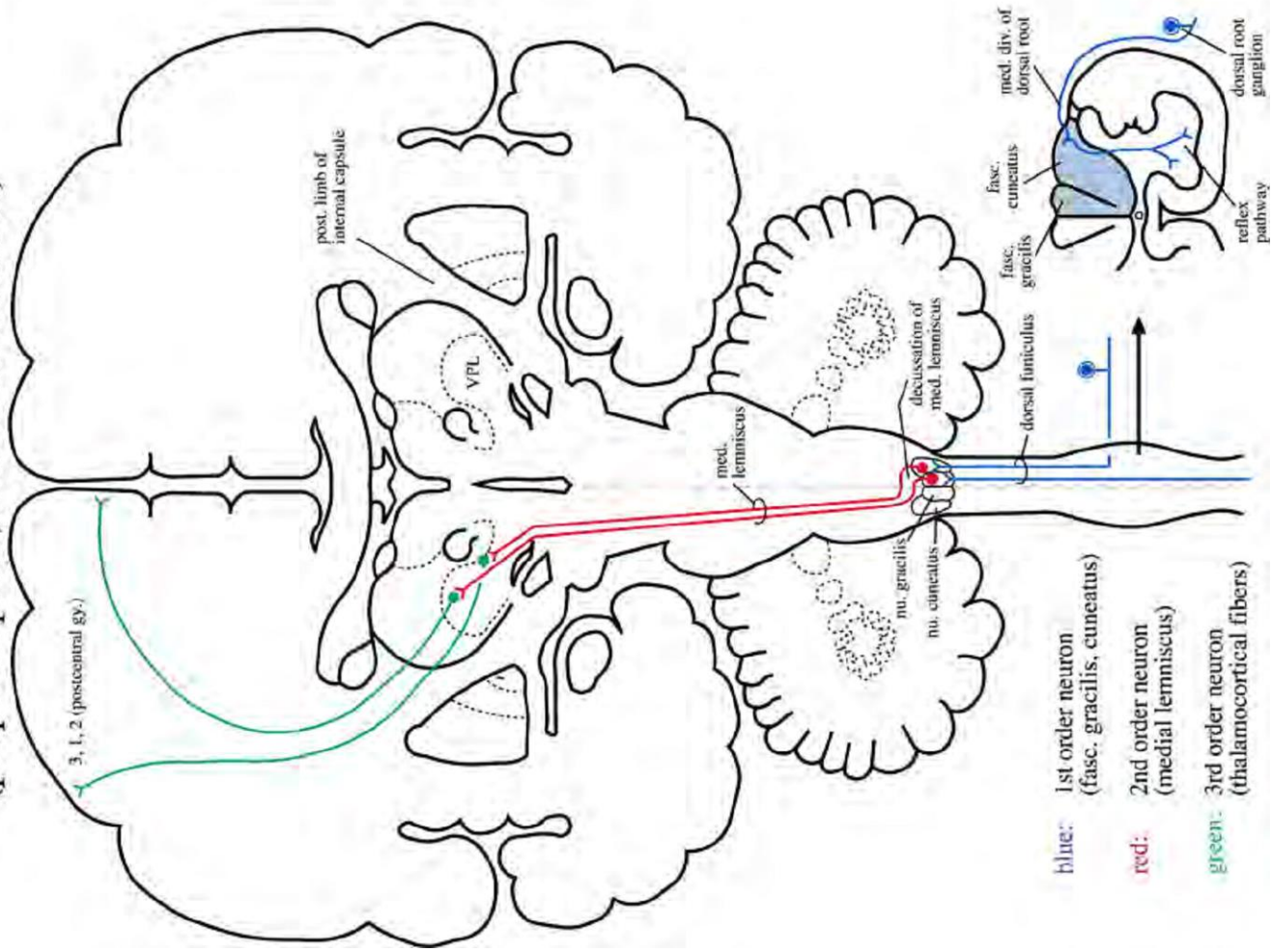
	Dorsal Column - Medial Lemniscus (ML)	ALS System (anterolateral system)	Trigeminal			
			Spinal nucleus	Chief nucleus	Mesencephalic nucleus	
<b>Modality</b>	<i>Body</i> Fine touch Vibration Deep Pressure (Pacinian) Cons. Proprioception (Diffuse endings joint capsule)	<i>Body</i> Pain Temperature Slow brush touch Itch (All free nerve endings)	<i>Face</i> Pain Temperature Light touch (All free nerve endings)	<i>Face</i> Fine touch (Meissner, Merkel Peritrichial) Vibration (Pacinian)	<i>Face</i> Proprioception  Conscious (Diffuse endings joint capsule)	<i>Face</i> Proprioception  Unconscious (Spindle & GTO)
<b>1<sup>st</sup> order neuron</b>	Dorsal root ganglion (DRG) medial division dorsal root	DRG lat. division dorsal root	Trigeminal ganglion	Trigeminal ganglion	Mesencephalic nucleus of V** **Inside CNS (rostral & mid pons, caudal midbrain)	
<b>Tract</b>	Fasciculi gracilis & cuneatus Spinal cord-foot fibers medial		Descend C2 spinal tract of V			
<b>2<sup>nd</sup> order neuron</b>	Nucleus gracilis & cuneatus	Spinal cord dorsal horn laminae I-V	Spinal nucleus of V	Chief sensory nucleus of V (mid pons)	Mesencephalic nucleus of V (rostral & mid pons, caudal midbrain)	
<b>Tract</b>	Crosses as internal arcuate fibers to form ML in caudal medulla. ML goes through medulla, pons & midbrain Medulla-foot ventral (ant.) Pons & midbrain -foot represented more laterally	↑ 1 level & cross ant. white comm. & form ALS (lat. spinothalamic tr.)  Collateral → Reticular Form.	Crosses  VTTT (rostral medulla & up)	Uncrossed  DTTT (mid pons & up)	Crossed  VTTT (rostral midbrain)	Uncrossed  Superior cerebellar peduncle
<b>3<sup>rd</sup> order neuron</b>	VPL	VPL	VPM	VPM	VPM	Cerebellum
<b>4<sup>th</sup> order neuron</b>	Primary sensory cortex: Brodmann's 3, 1, 2 Postcentral gyrus-medial surface & superior part lat. surface	Primary sensory ctx.: Brodmann's 3, 1, 2 Postcentral gyrus - medial surface & superior part of lat. surface Insular cortex	Primary sensory ctx.: Brodmann's 3, 1, 2 Postcentral gyrus- inferior half of lat. surface	Primary sensory ctx.: Brodmann's 3, 1, 2 Postcentral gyrus- inferior half of lat. surface	Primary sensory ctx.: Brodmann's 3, 1, 2 Postcentral gyrus- inferior half of lat. surface	

	Dorsal Column – Medial Lemniscus	ALS System (Antero-Lateral System)
Modality In Body	Fine touch, Vibration, Deep Pressure, Cons. Proprioception (Receptors, Diffuse endings)	Pain, Temperature, Slow brush touch, Itch (All free nerve endings)
1 <sup>st</sup> order	DRG medial division of dorsal root	DRG lat. division of dorsal root
Tract	Fasciculus gracilis & cuneatus Spinal cord-foot fibers medial	Posterolateral Fascicle (Lissauer's tract)
2nd	Nucleus gracilis & cuneatus	Spinal cord dorsal horn laminae I-V
Tract	Crosses as internal arcuate fibers to form medial lemniscus (ML) in caudal medulla, ML continues through medulla, pons & midbrain Medulla-foot represented ventrally (anteriorly) Pons-foot represented more laterally	↑ 1 level & cross ant. white comm. & form ALS (lat. spinothalamic tr.)  Collaterals→ Reticular formation.
3rd	VPL	VPL
4th order neurons	Primary sensory cortex: Brodmann's 3, 1, 2 Postcentral gyrus- medial surface & dorsal part of lat. surface	Primary sensory cortex (Areas 3,1,2), Insular cortex



## Dorsal Column - Medial Lemniscus (proprioception, fine discrimination)

II



## Pyramidal Tract (voluntary motor)

VIII

