



Gaza Ophthalmic Centre

21.2.2 The Pons Part 2 Neurosciences I

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Pons: Facial Nerve Nuclei

2 Sensory Nc

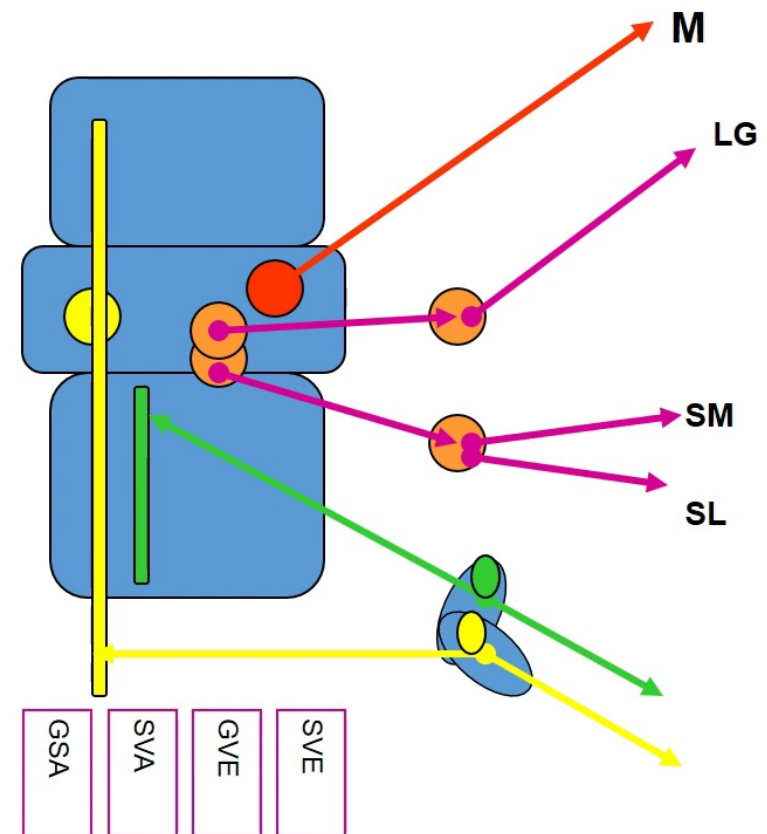
GSA

SVA

2 Motor Nc

GVE

SVE



Pons: Facial Nerve Nuclei

2 Sensory Nc →

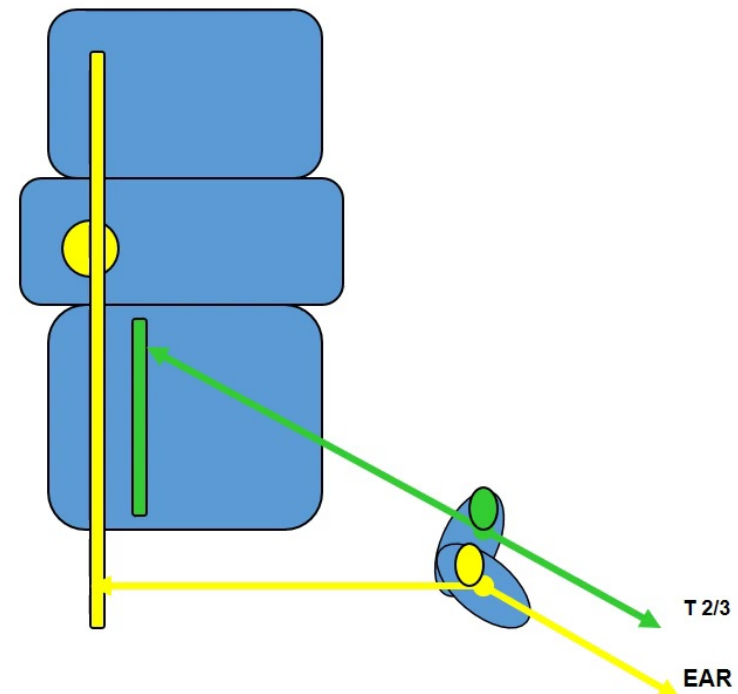
- 2 types of afferent sensation

- **Spinal Nc of the Trigeminal N**

- Somatic pain from
- External ear concha

- **Nucleus Solitarius**

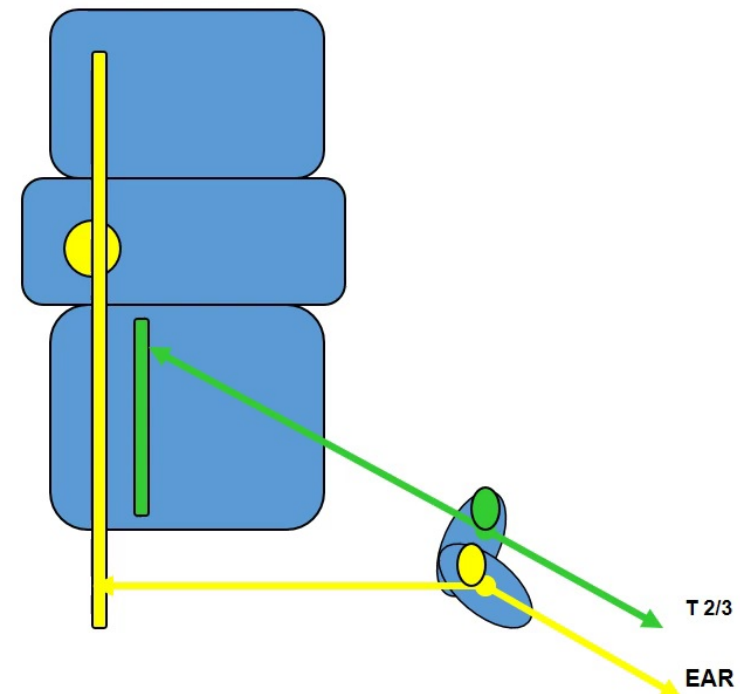
- Sensation from
- Anterior 2/3 of Tongue
 - Chorda tympani
- Soft Palate
 - Greater Petrosal N



Pons: Facial Nerve Nuclei

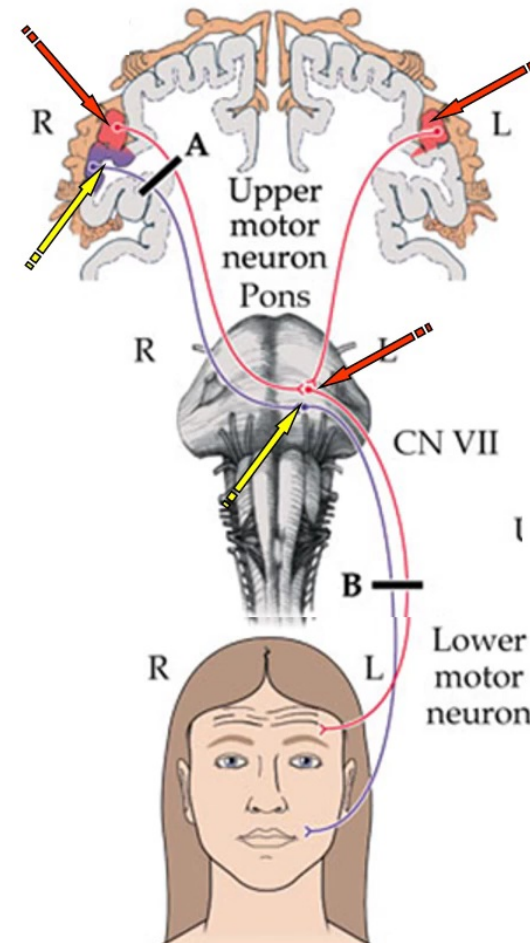
- **Geniculate Ganglion**

- Unipolar neurons
- Axons → sensory part of VII
- Located on VII Trunk
- within the Petrous bone



2 Groups of Motor Nc

- **1) Motor Nc of the Facial N**
 - Lower Pons
 - Upper part
 - ← Bil Cortico Nuclear Fibres
 - Lower part
 - ← CL Cortico Nuclear Fibres only



Pons: Facial Nerve Nuclei

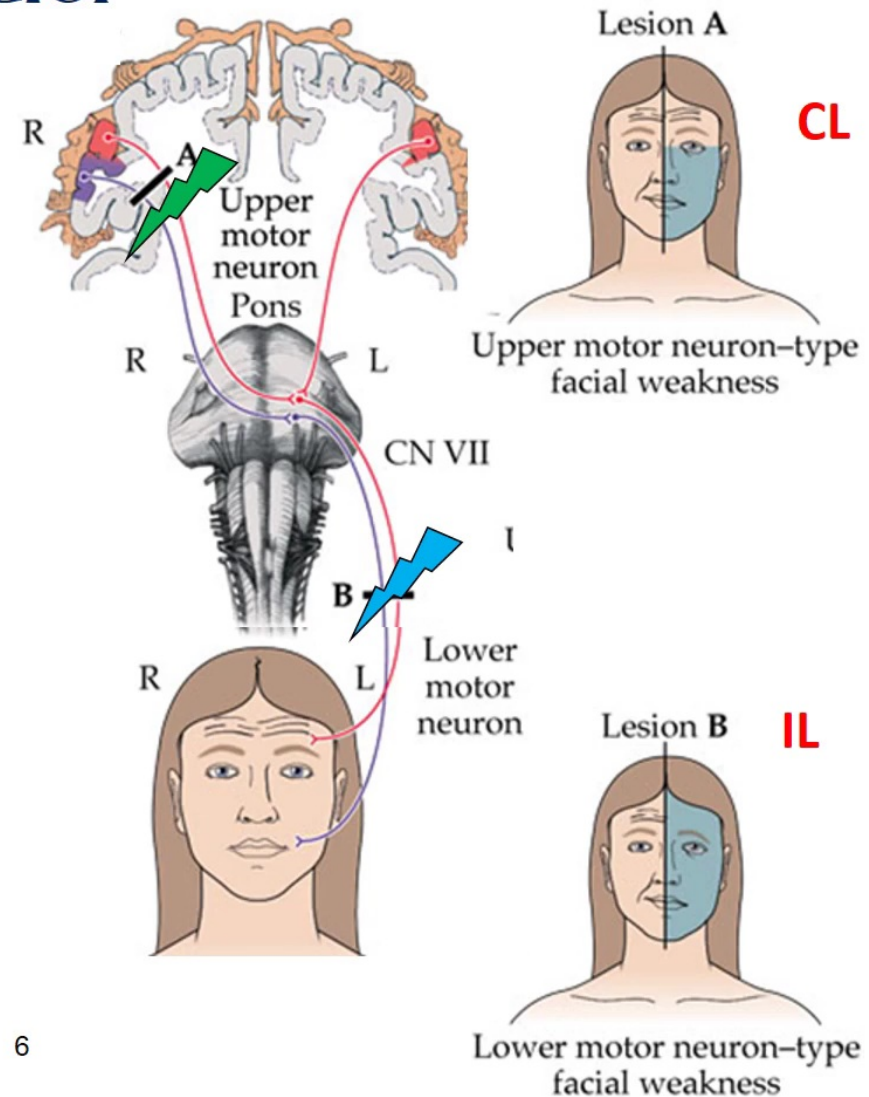
Damage

1) UMNL

- → Paralysis of CL Lower ½ of Face

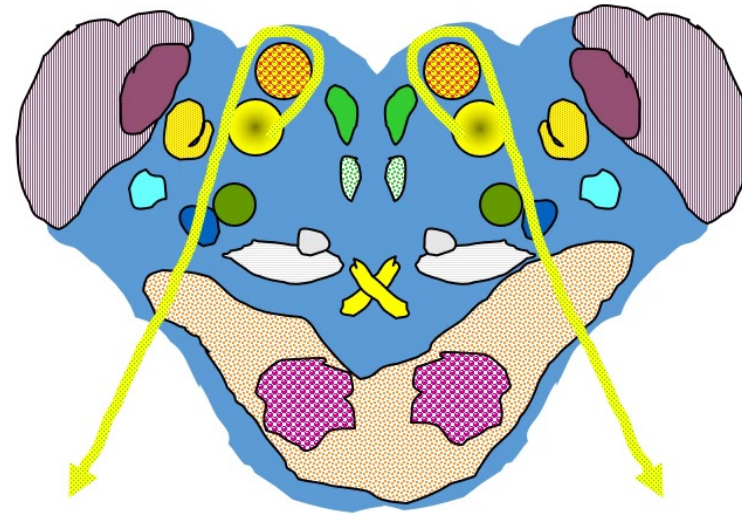
2) LMNL

- → Total Paralysis of CL Face



Pons: Facial Nerve Nuclei

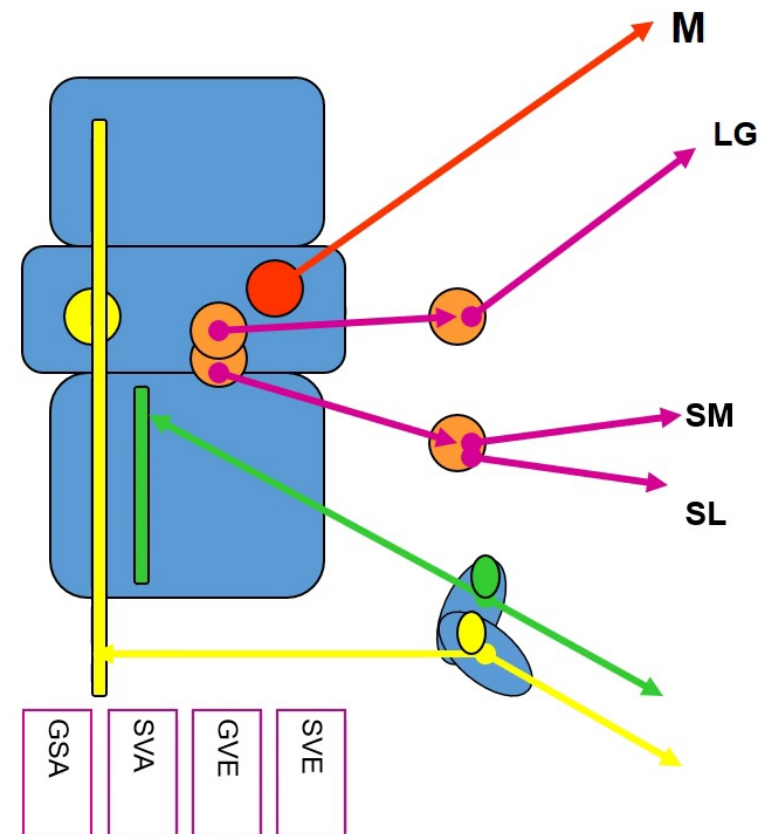
- **Motor Nc of the Facial N**
 - Axons loop around Abducent Nc
 - Emerge as Motor Root of facial Nerve
 - → Muscles of the 2nd Branchial Arch
 - Occipito frontalis,
 - **Face**,
 - buccinator,
 - platysma,
 - pos belly of digastric,
 - stylohyoid &
 - stapedius



Pons: Facial Nerve Nuclei

• 2) Parasympathetic Nc

- **Special Lachrymatory Nc**
 - → Greater Petrosal N
 - → Relay in Pterygopalatine Ganglion
 - → Lacrimal Gland
- **Uncertain Nc**
 - → Greater Petrosal N
 - → Relay in Pterygopalatine Ganglion
 - → Nasal, Palatine & Nasopharyngeal Glands
- **Superior Salivatory Nc**
 - → Chorda tympani
 - → Relay in Submandibular Ganglion
 - → Sublingual & Submandibular Salivary glands
- **All Nc lie in the Lower Pons**



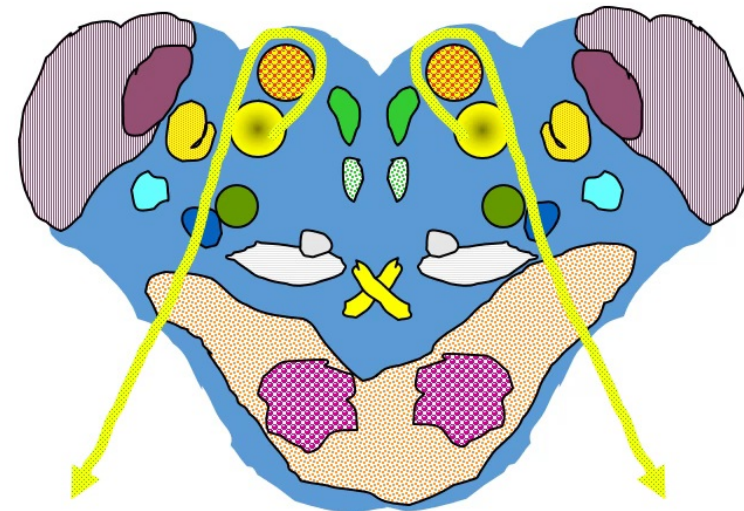
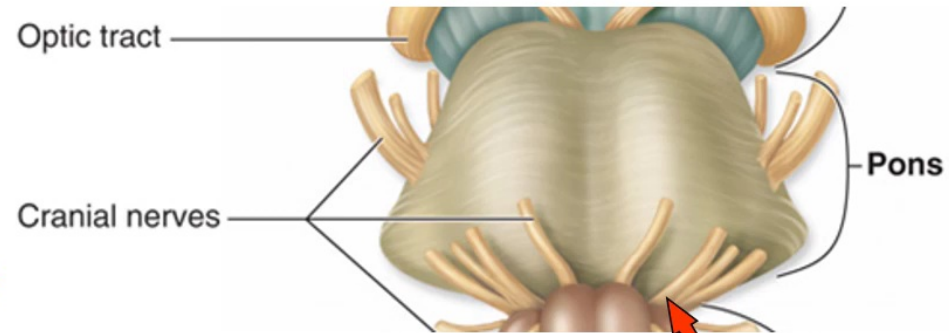
Pons: Facial Nerve

- Exit from Pons
 - Lower Pons at Cerebello Pontine Angle

1) Motor Root

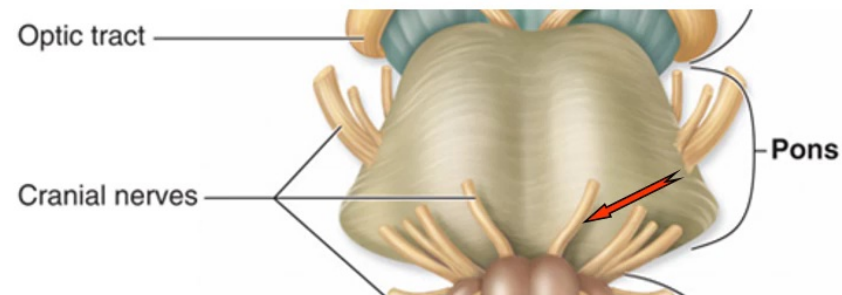
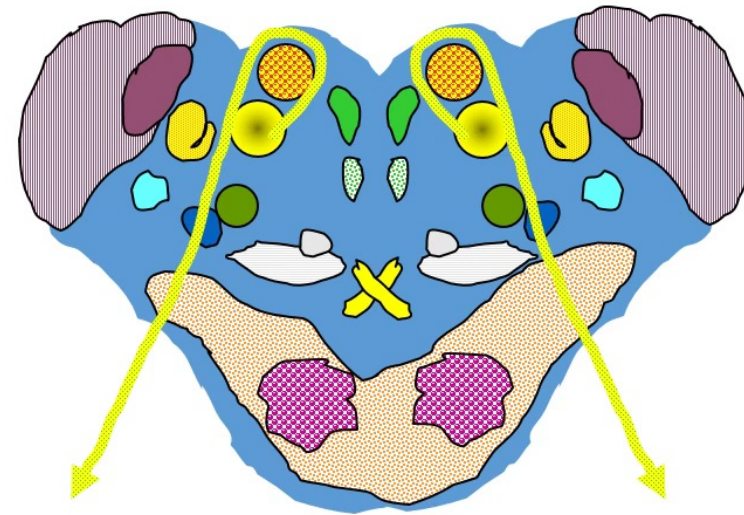
2) Nervous Intermedius Root

- Sensory & Preganglionic PS
- $\longleftrightarrow$
 - Motor root medially
 - VIII laterally



Pons: Abducent Nerve

- **Single Motor Nc**
 - Supplies 1 Muscle:
 - LR
- **Lower Pons**
 - Deep to
 - Facial Colliculus
- **Exit $\leftrightarrow$**
 - Lower border of Pons
 - Medullary Pyramid



Pons: Abducent Nerve

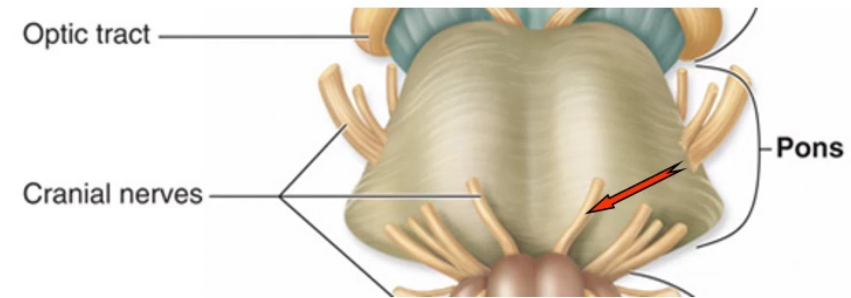
- **Input (VI, IV & III)**

- 1) **Bil Cortico Nuclear Fibres**

- From Frontal Eye Field
 - Area 8
 - → Voluntary
 - Conjugate Eye Movements

- 2) **Bil Occipito Nuclear Fibres**

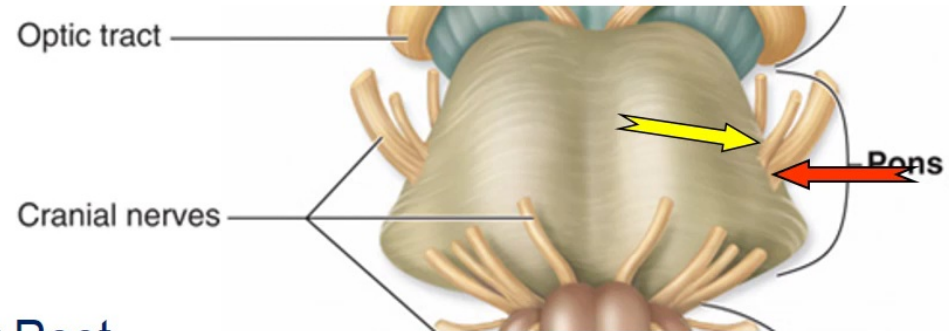
- From Occipital Visual Cortex
 - Area 19
 - → Involuntary (Reflex)
 - Conjugate Eye Movements



Pons: Trigeminal nerve

- Exits from Pons
 - Ventral surface

1. Large lateral sensory Root
2. Small medial motor Root

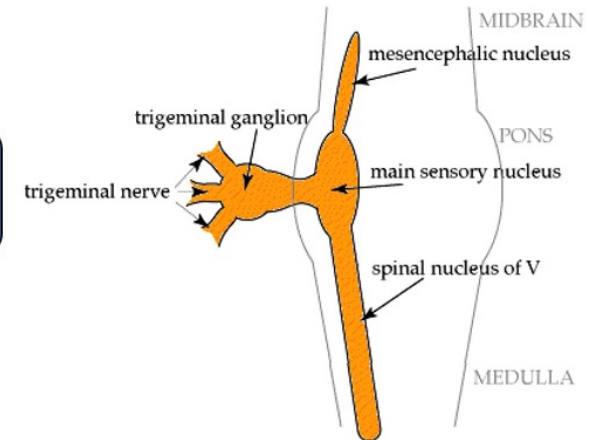
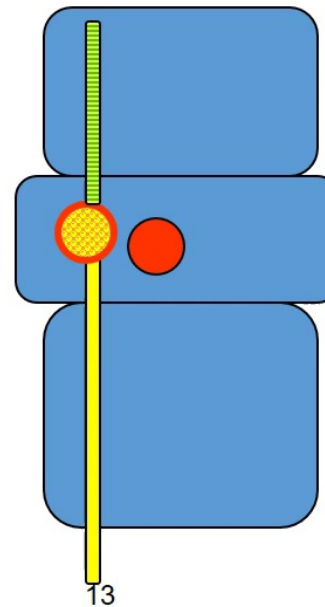
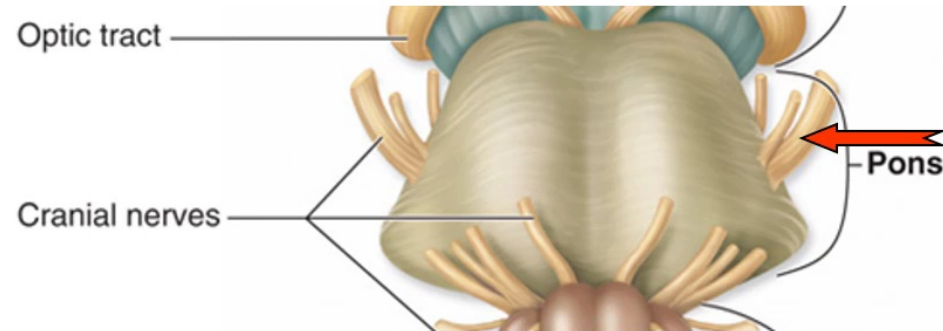


Pons: Trigeminal nerve

Nuclei

- 3 Sensory Nuclei +
- 1 Motor Nucleus

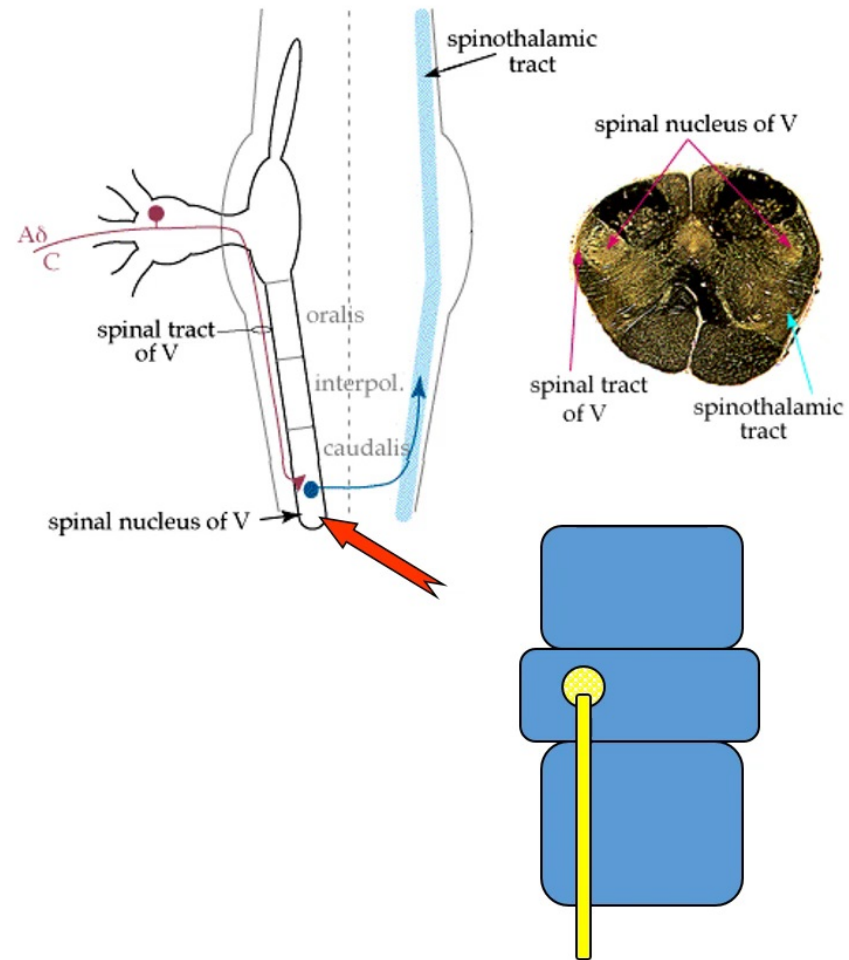
1. Main Sensory Nc
2. Spinal Nc
3. Mesencephalic Nc
4. Motor Nc



Pons: Trigeminal nerve

1- Spinal Nc of Trigeminal Nerve

- Extends
 - From lower Pons
 - continuous with the
 - Main Sensory Nc
- Through whole Medulla
- Down to C1-2
- continuous with
- Substantia Gelatinosa of Rolando

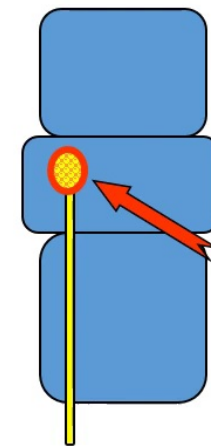
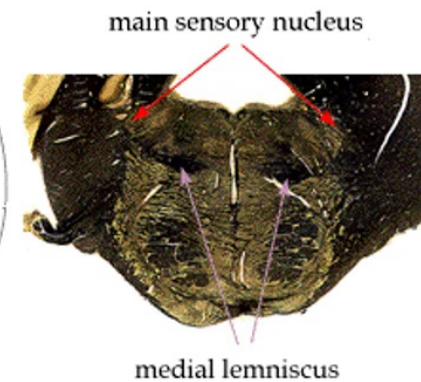
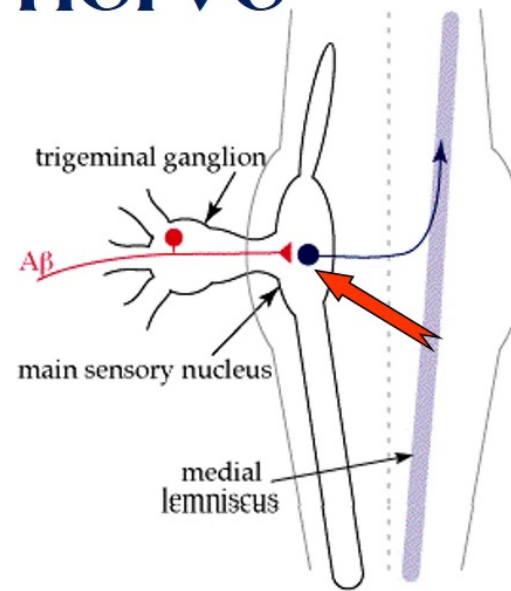


Pons: Trigeminal nerve

- 2- The Main Sensory Nc

- Upper Pons

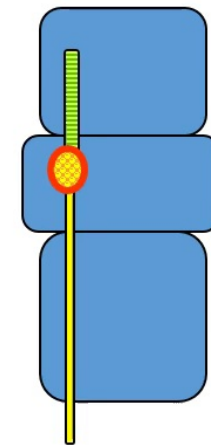
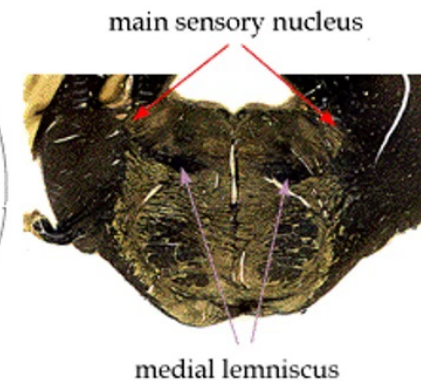
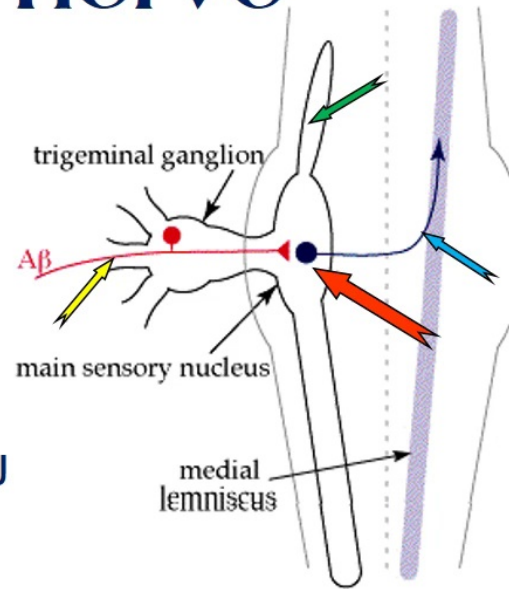
- Rostral to the Spinal Nc



Pons: Trigeminal nerve

The Main Sensory Nc

- **Afferents**
 - Touch from Face & Forehead
 - Fibres from Mesencephalic Nc
 - Conscious awareness of
 - Position & movement of TMJ
 - Pressure sense from teeth
- **Efferents**
 - Cross to opposite side
 - → share in Trigeminal Lemniscus
- **Function**
 1. Fine touch
 2. Proprioception sensation



Pons: Trigeminal nerve

• 3) Mesencephalic Nc

- **Extends**

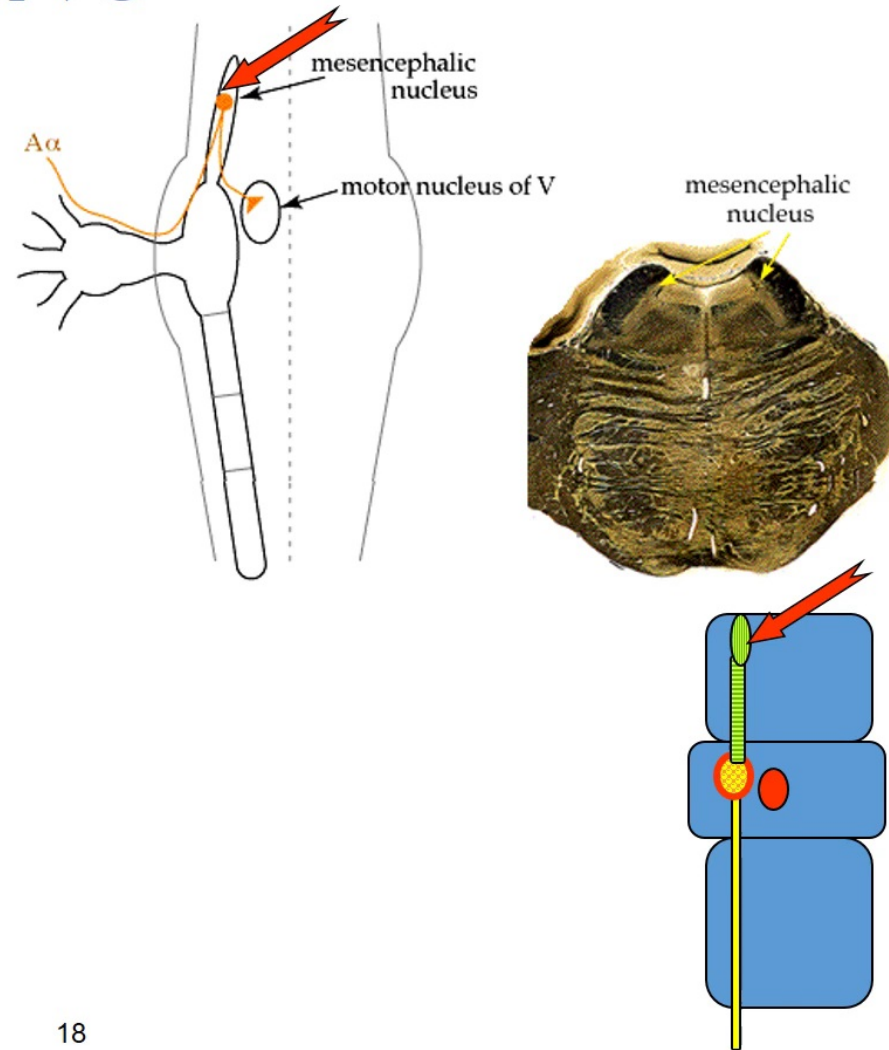
- From Upper Pons
- To level of Superior Colliculus of MB

- **Special features**

- The only Nc in CNS with
- Unipolar Neurons

Single axon divides into

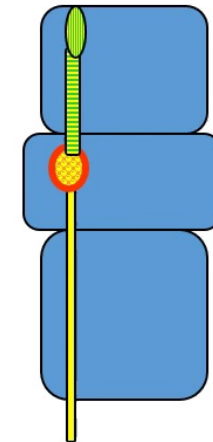
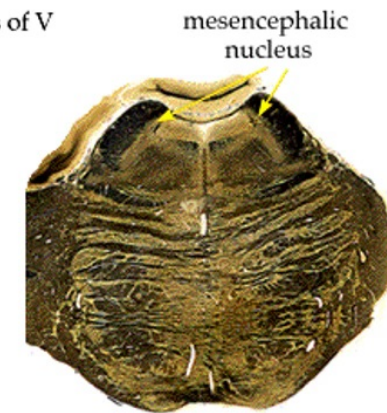
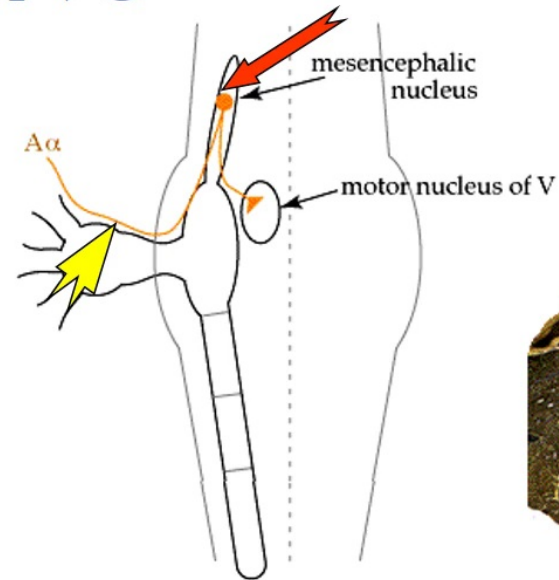
1. Central &
2. Peripheral processes



Pons: Trigeminal nerve

• Mesencephalic Nc

- Peripheral processes
 - → Trigeminal Nerve
- Proprioceptive sensation from
 1. Muscles of Mastication + TMJ + Teeth
 2. Muscles of Face
 3. Extra Ocular Muscles
 4. Muscles of the Tongue

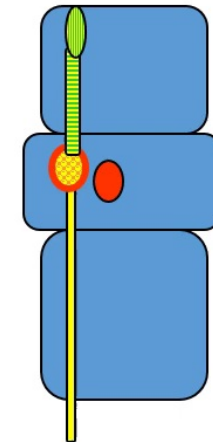
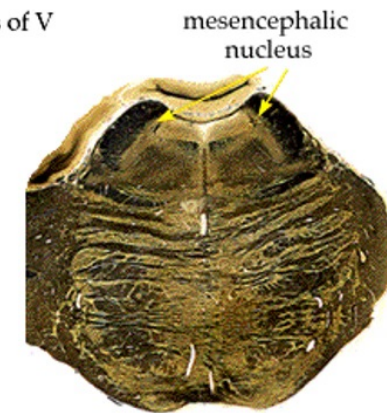
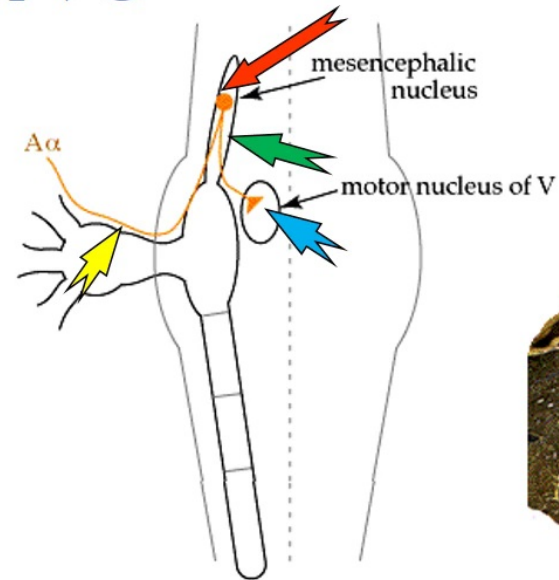


Pons: Trigeminal nerve

• Mesencephalic Nc

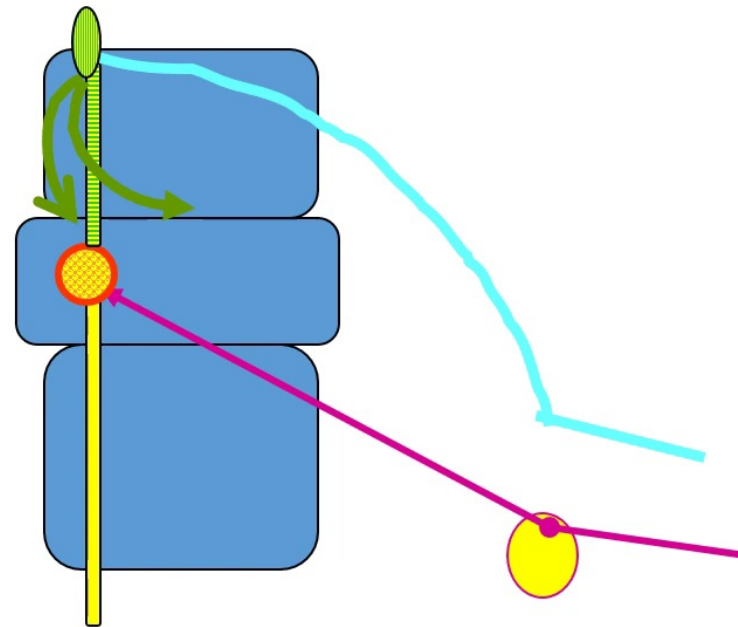
• Central processes

- → Mesencephalic tract
- Runs parallel to the Nc
- Most f project to the Motor Nc
- Jaw jerk stretch reflex → ^ force of bite
- Some fibres → SCP → cerebellum
 - Unconscious proprioception info
- Some fibres → Main Sensory Nc
 - Conscious awareness of TMJ & Teeth Pressure



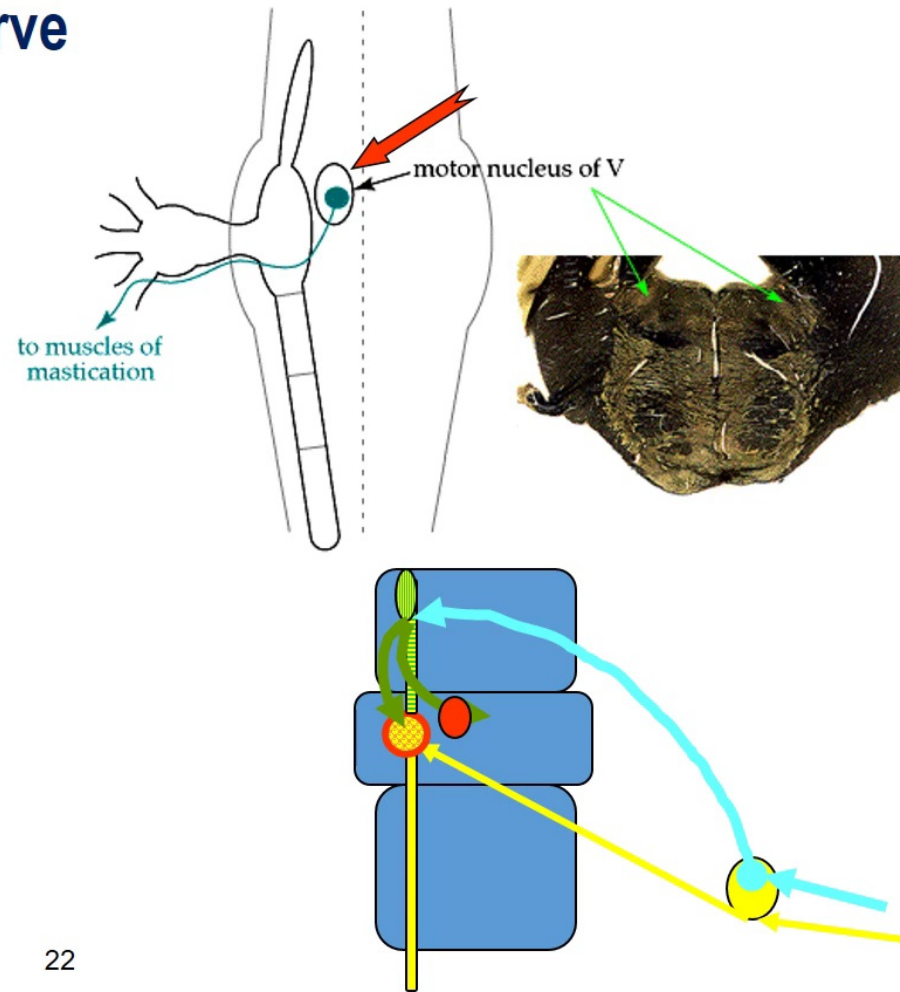
Pons: Trigeminal nerve

- **Somatic Sensory fibres**
 - the processes of
 - Unipolar Neurons
 - In the Sensory Trigeminal Ganglion
 - At the Apex of Petrous Bone
- **Proprioceptive Sensory fibres**
 - the processes of
 - Unipolar Neurons
 - In the Mesencephalic Nc
 - Within the MB



Pons: Trigeminal nerve

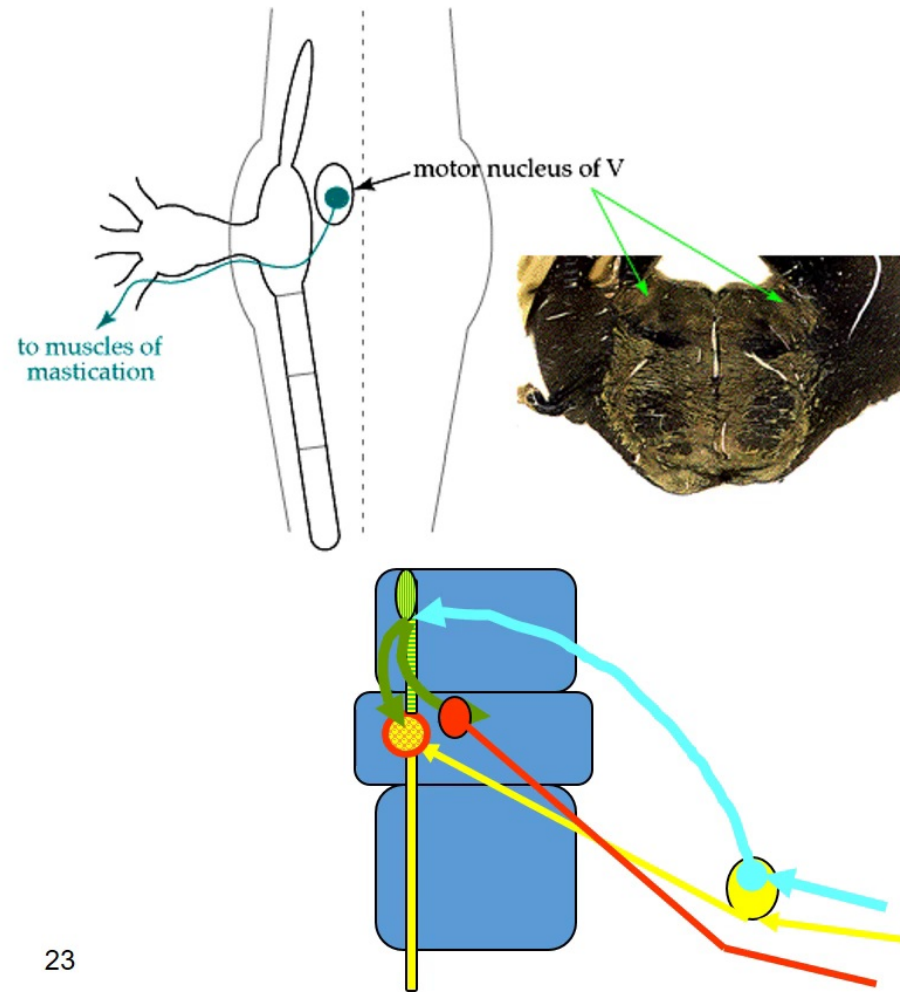
- 4) The Motor Nc of Trigeminal Nerve
 - Upper Pons
 - Medial to the Main Sensory Nc



Pons: Trigeminal nerve

The Motor Nc of Trigeminal Nerve

- **Input**
 - **Bilateral Cortico Nuclear F**
 - Voluntary movement of
 - Muscles of Mastication
 - **Fibres from Mesencephalic Nc**
 - Reflex increase of force of Teeth bite
- **Output**
 - **Motor Root of Trigeminal Nerve**
 - → Mandibular Nerve
 - → 8 muscles of the 1st Branchial Arch
 - 4 muscles of mastication
 - 2 tensors
 - Mylohyoid + ant ½ of Digastric

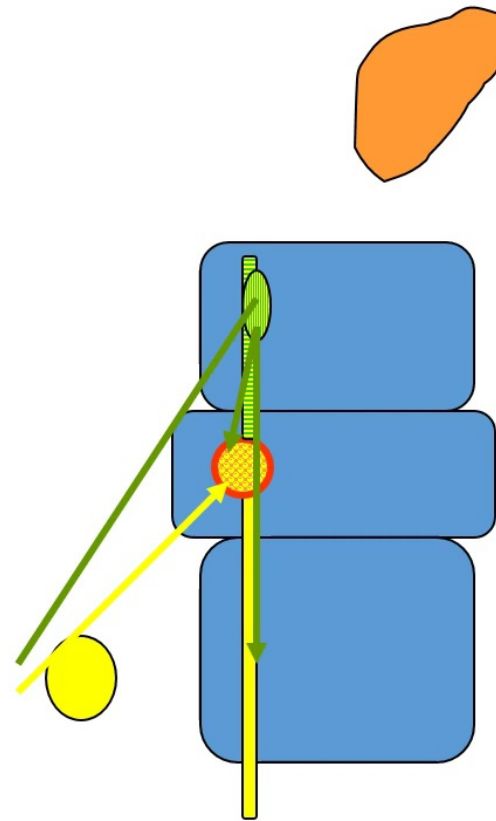


Pons: Central Trigeminal pathways

- Trigemino Thalamo Cortical Pathway
- 3 Neurons

- Neuron I

- Unipolar neurons of the Trigeminal Ganglion
 - All sensation
 - Except proprioception
 - → Main Sensory Nc
- Unipolar neurons of the Mesencephalic Nc
 - For Proprioception

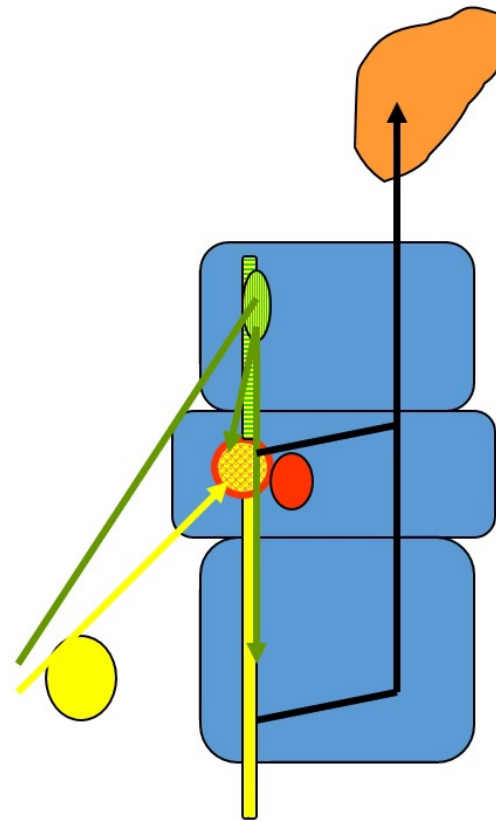


Pons: Central Trigeminal pathways

- Trigemino Thalamo Cortical Pathway

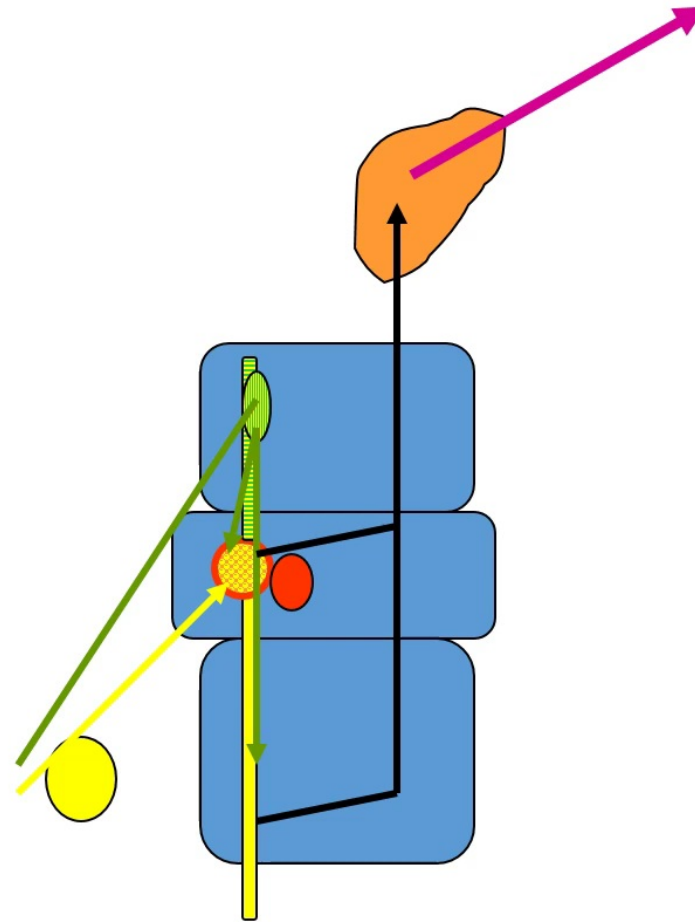
- Neuron II

- Neuron in the Spinal Nc
- Neurons in the Main Sensory Nc
- Axons cross to the opposite side
- Ascend as Trigeminal Lemniscus
- Terminate in the Thalamus



Pons: Central Trigeminal pathways

- Trigemino Thalamo Cortical Pathway
 - Neuron III
 - NVPM of Thalamus
 - Axon → posterior limb of Internal Capsule
 - → Face area in the sensory Cortex



Pons: Central Trigeminal pathways

- Trigemino Cerebellar Pathway

Via ICP

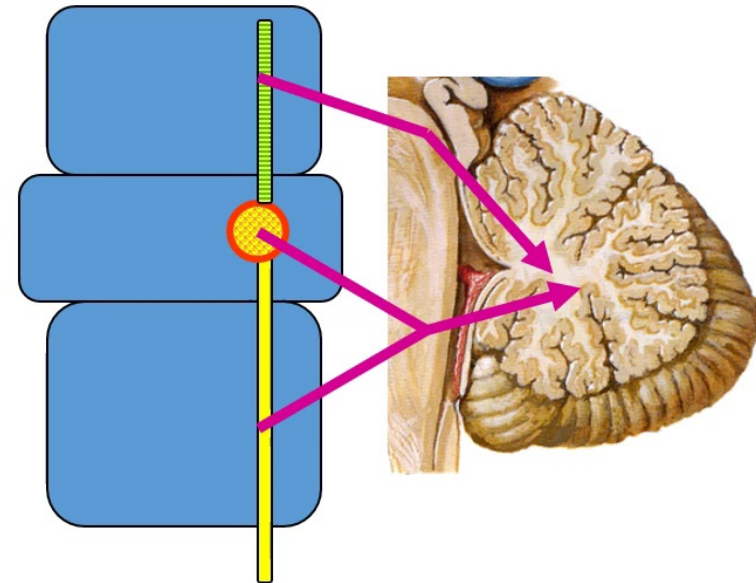
- Main Sensory Nc
- Spinal Nc

Via SCP

- Mesencephalic Nc

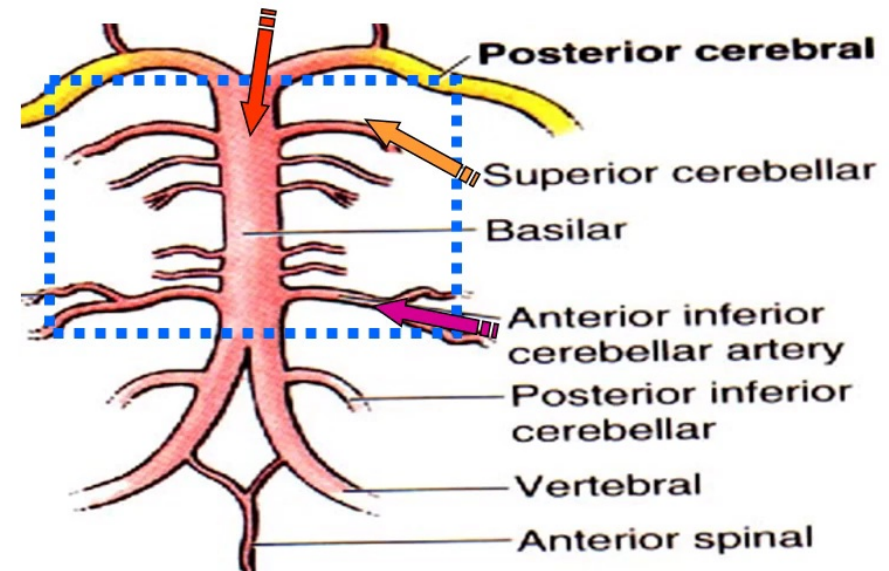
Transmit

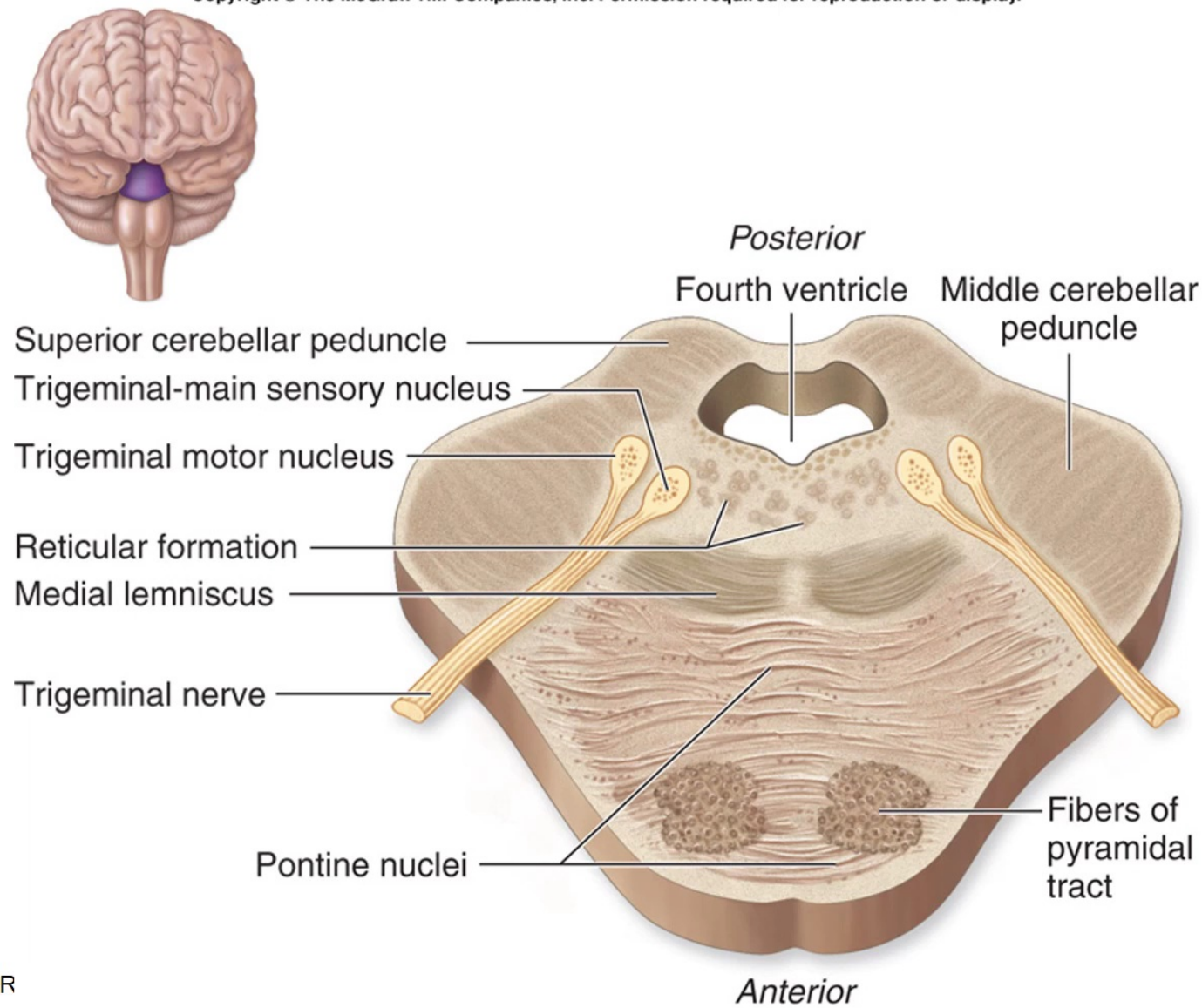
- Exteroceptive &
- Proprioceptive info
- → Cerebellum



Pons: Blood Supply

- Basis pontis
 1. Basilar Artery →
 1. Short circumferential branches
- Tegmentum
 1. Basilar Artery →
 1. Long circumferential branches
 2. Superior Cerebellar Artery
 3. Anterior Inferior Cerebellar Artery



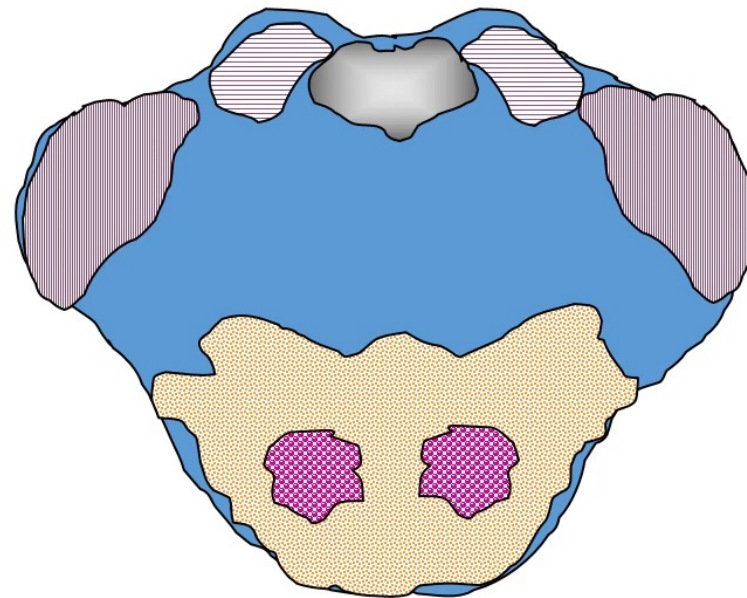


(h) Pons cross section



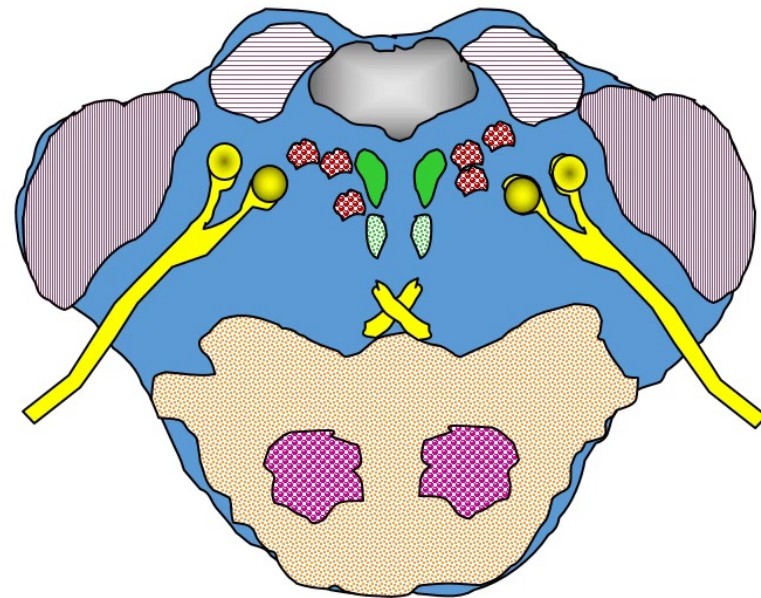
Pons: Midlevel of V

- Midpons
- V4
- Sup Medullary Velum
- SCP
- MCP
- Pontine Nuclei
- Pyramidal Tract



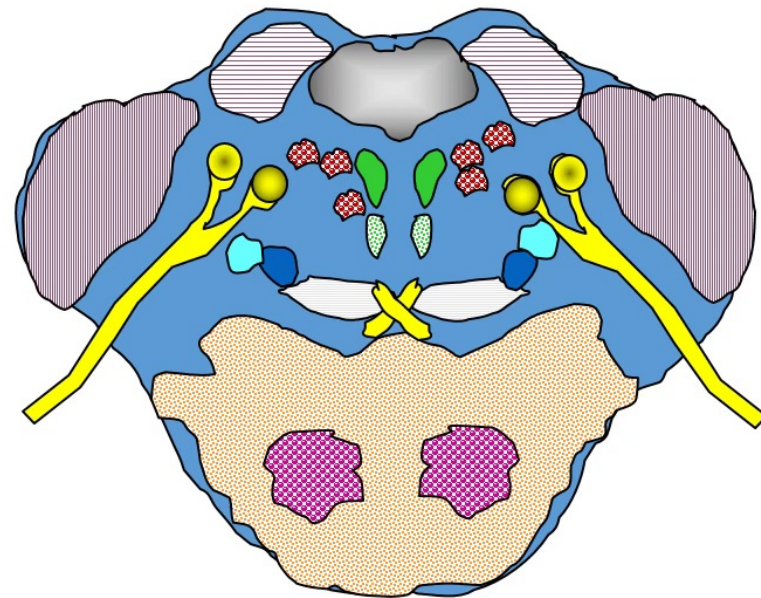
Pons: Midlevel of V

- V Main sensory Nc
- V Motor Nc
- Trigeminal Nerve
- Reticular Formation
- MLB
- Tectospinal Tract
- Trapezoid Body



Pons: Midlevel of V

- Lateral Lemniscus
- Spinal Lemniscus
- Medial Lemniscus



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