



Gaza Ophthalmic Centre

21.3.1 Medulla Part 1 Neurosciences I

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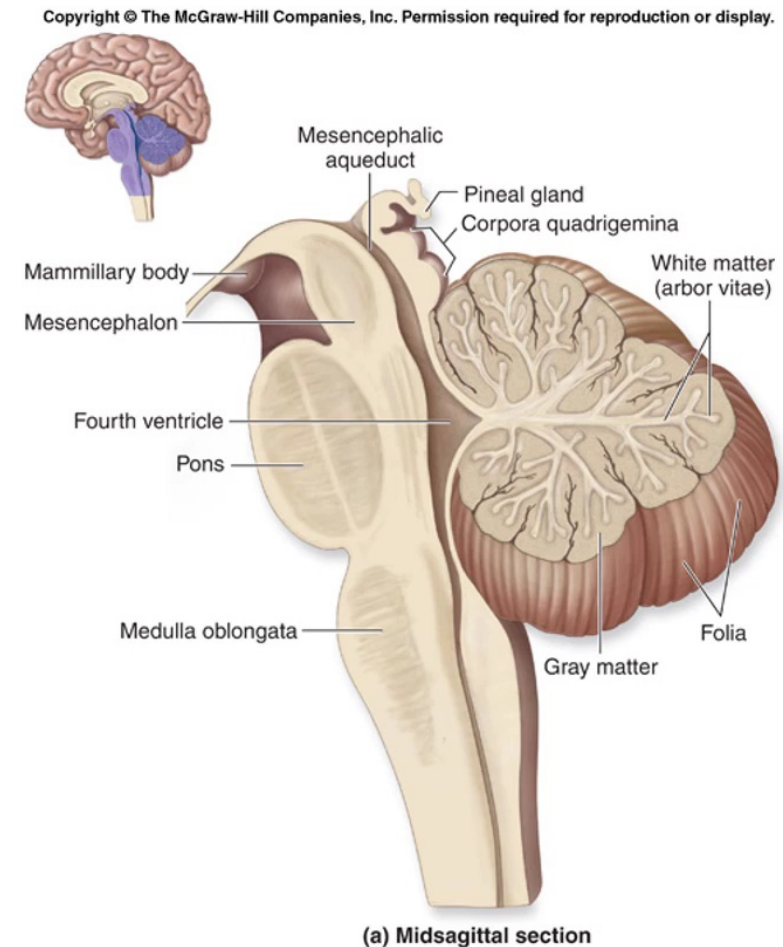
Gaza Ophthalmic Centre

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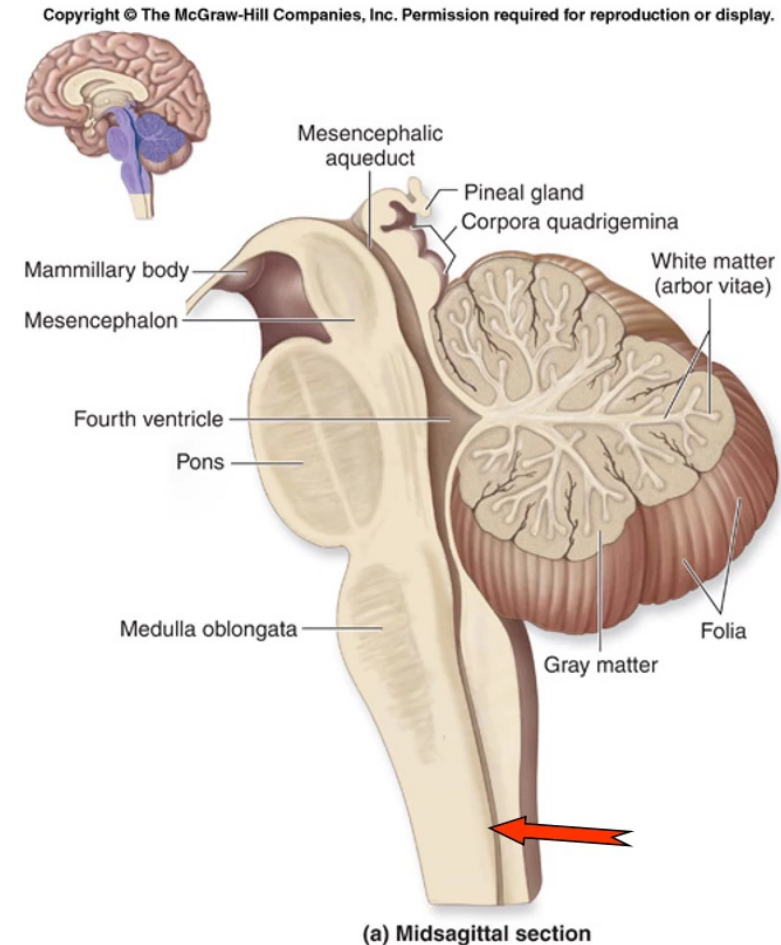
The Medulla Oblongata

- Most caudal level of the brain stem
 - 3cm long
 - Continuous above with the pons
 - Continuous below with
 - the spinal cord
 - at foramen magnum
 - (upper border of Atlas)
 - 2 parts
 - Upper Open Medulla → V4
 - Lower Closed Medulla → SC-CC



The Medulla Oblongata

- Spinal cord central canal
 - extends upward and
 - posteriorly into the
 - lower ½ of
 - the medulla
- Central canal
 - opens into
 - 4th ventricle
 - Upper medulla
 - has no central canal!
- Choroid plexus
 - lies in the
 - roof of the
 - fourth ventricle



The Medulla Oblongata

Pyramids of the medulla

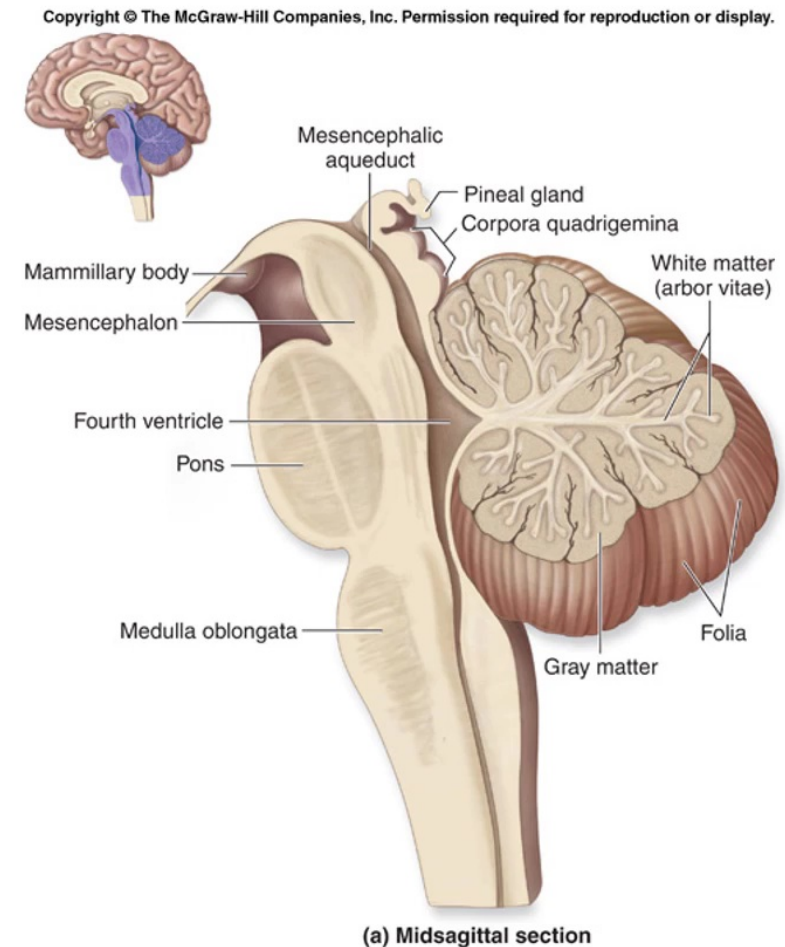
- lie on its ventral surface
- Decussation of the pyramids
 - Crossing over of
 - Motor tracts

Cranial nerves

- IX–XII
- attach to the medulla

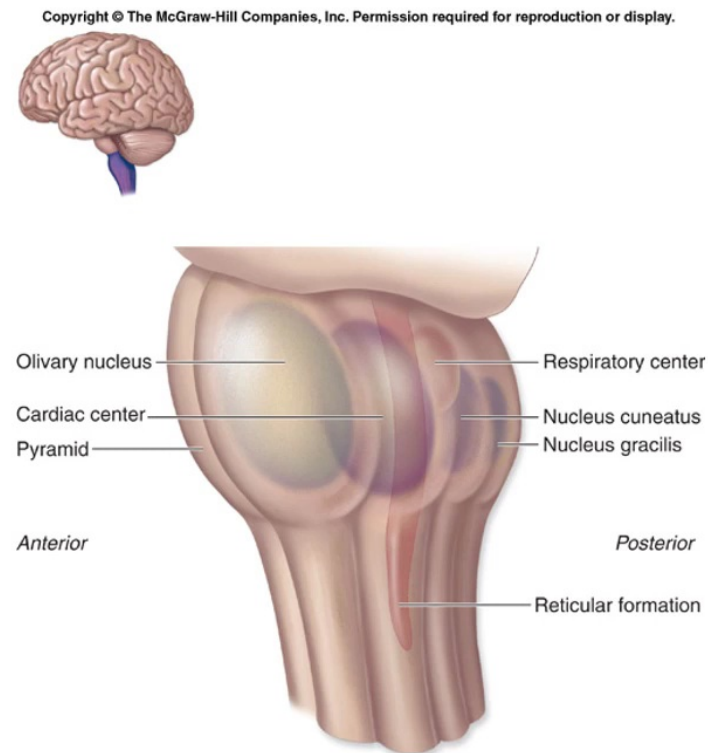
Inferior cerebellar peduncle

- → cerebellum



The Medulla Oblongata

- The core of the medulla contains:
 - Much of the
 - reticular formation
 - Nuclei influence
 - autonomic functions
- Visceral centers of the reticular formation include:
 - Cardiac center
 - Vasomotor center
 - The medullary respiratory center
 - Centers for hiccupping, sneezing, swallowing, and coughing



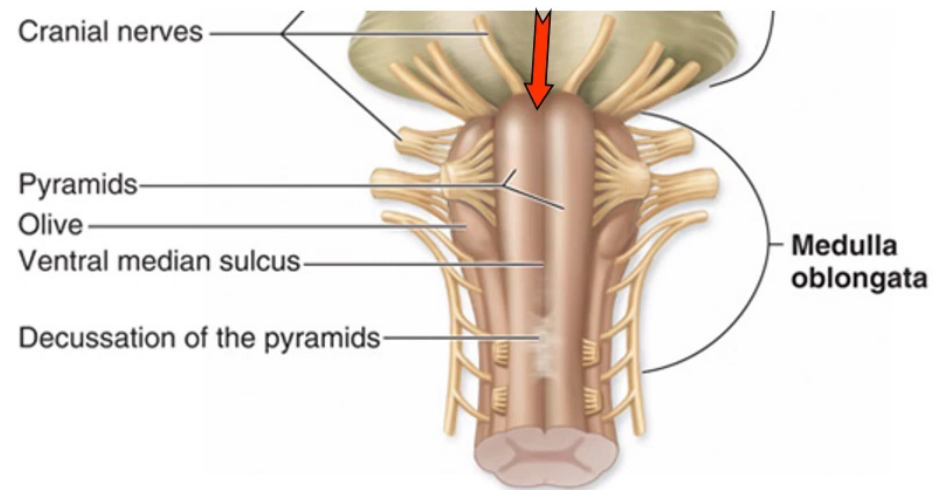
(b) Medulla oblongata, lateral view



Medulla: External Features

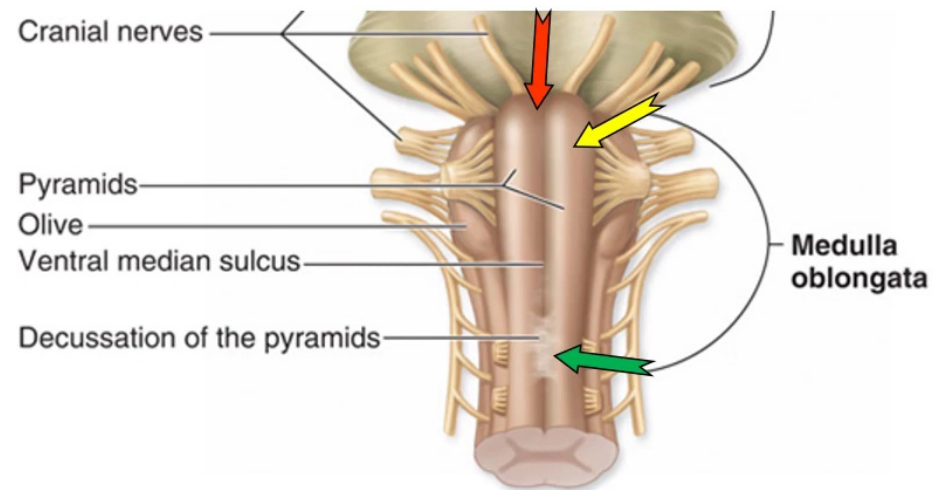
- Anterolateral surface

- 1 median fissure
- 2 sulci
- 3 structures
 - Pyramid
 - Olive
 - ICP



Medulla: External Features

- A) Anterior surface
 - Anterior median fissure
 - Midline groove
 - Continuous with SC AF
 - Pyramid
 - On either side of anterior median fissure
 - Contains Corticospinal F
 - Pyramidal decussation
 - Lower part of the medulla
 - Obliterates the anterior median fissure



Medulla: External Features

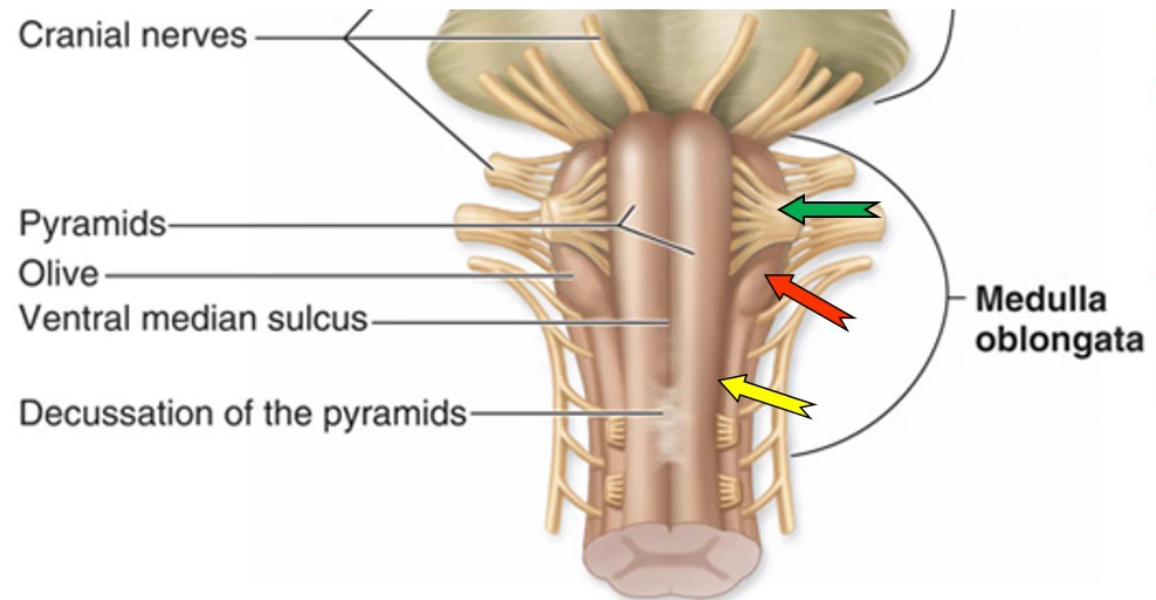
- B) Lateral surface

- Olive

- Overlies the
- Inferior Olivary Nc
- Lies $\leftrightarrow$ 2 longitudinal sulci

- 1) Anterolateral sulcus

- Separates the
 - Olive from the
 - Pyramid
-
- → Rootlets of the
 - hypoglossal nerve XII

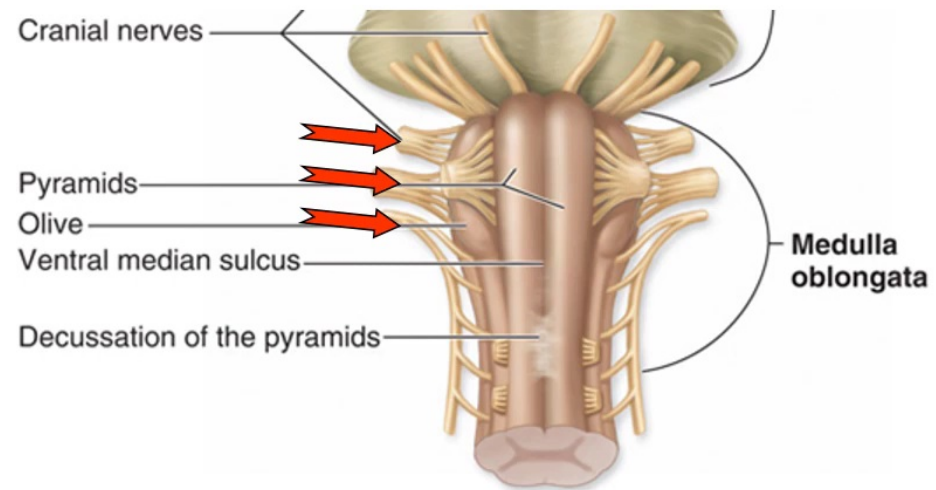


Medulla: External Features

- B) Lateral surface

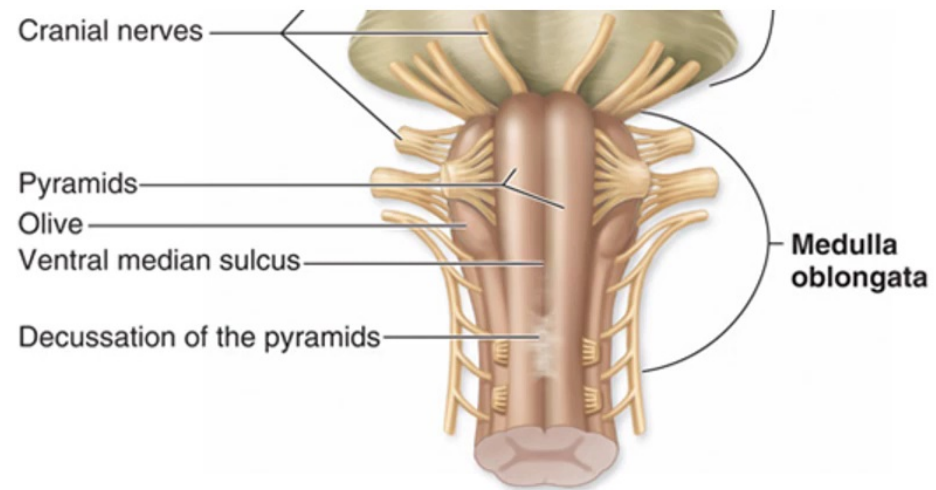
- 2) Posterolateral sulcus

- Separates
 - Olive from
 - Inferior cerebellar peduncle
 - Rootlets of
 - IX,
 - X
 - XI



Medulla: External Features

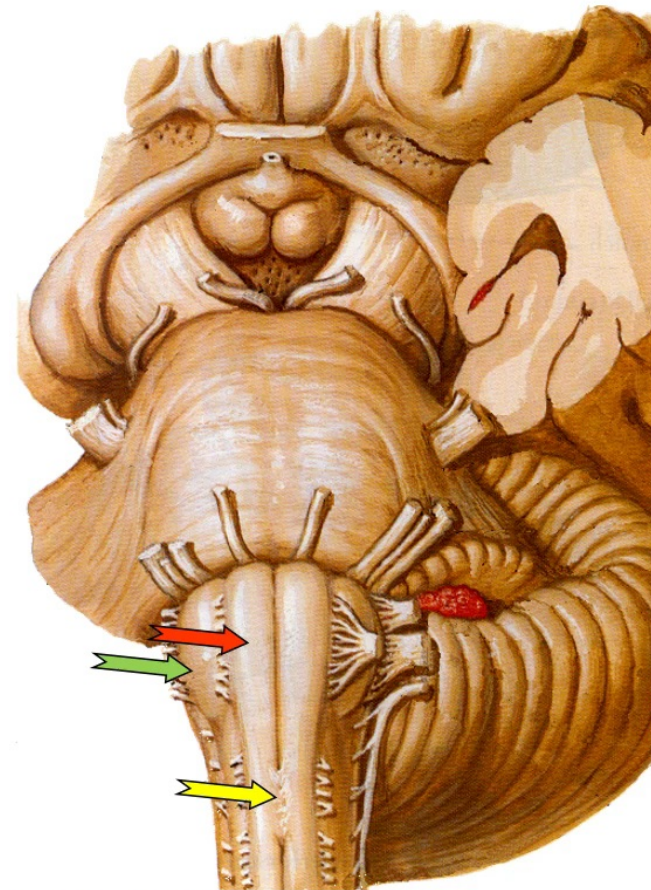
- B) Lateral surface
 - Anterior external arcuate fibres
 - Emerge from
 - anterior median fissure
 - Curve across
 - the olive
 - Reach the
 - ICP



Medulla oblongata

Ventral surface

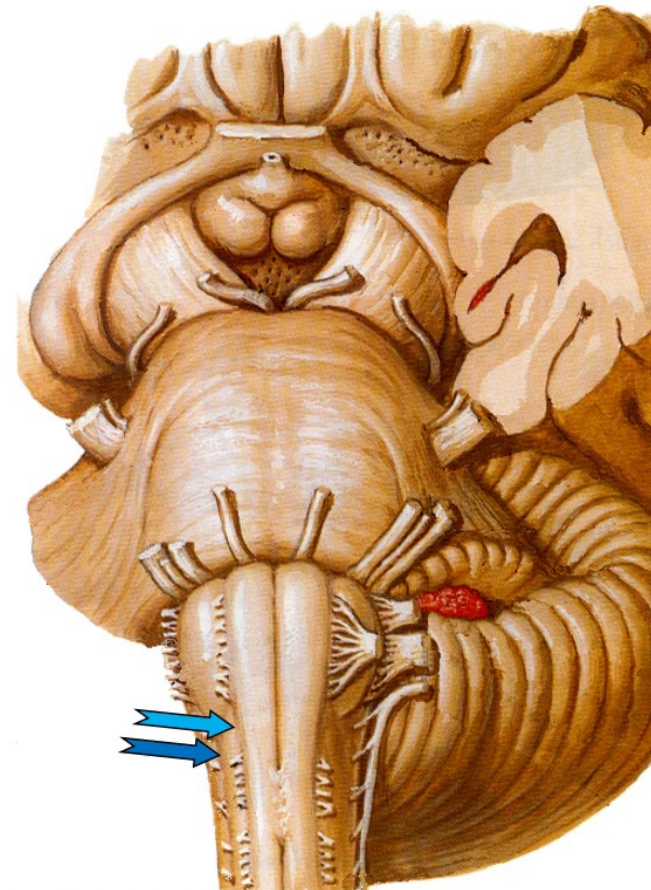
- **Pyramid**
 - contain **pyramidal tract** (corticospinal tract)
- **Decussation of pyramid**
 - formed by crossing fibers of **corticospinal tract**
- **Olive**
 - produced by underlying **inferior olivary nucleus**



Medulla oblongata

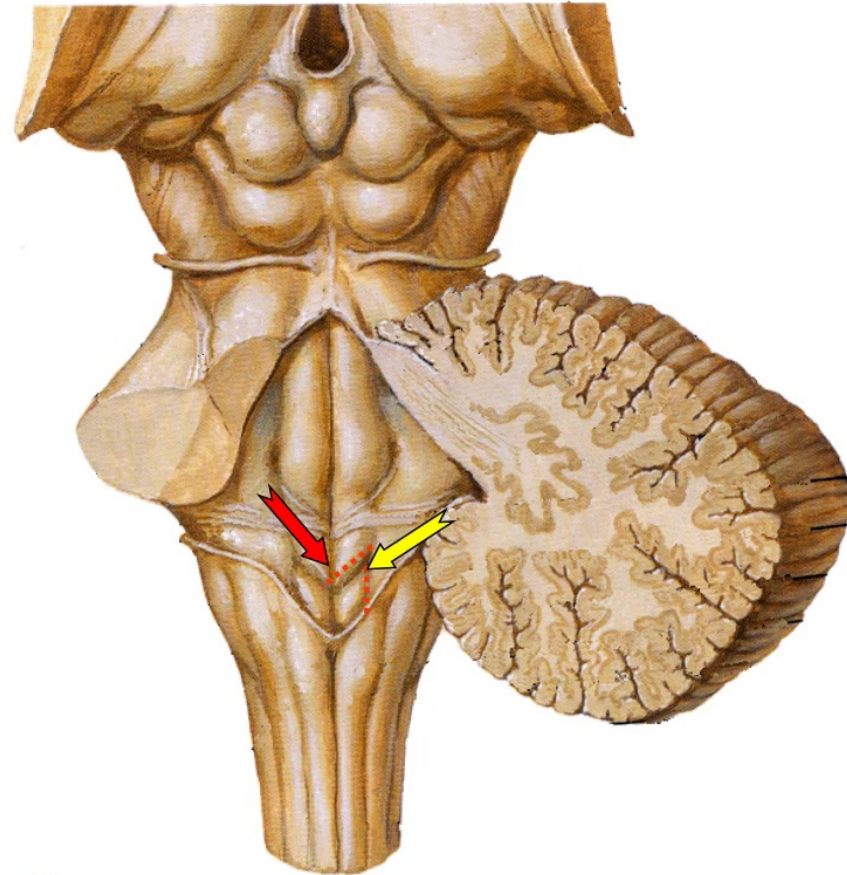
Ventral surface

- **Anterolateral sulcus**
 - rootlets of
 - **hypoglossal nerve**
 - emerge from it
- **Retro-olivary sulcus (Posterolateral)**
 - Rootlets of
 1. **Glossopharyngeal,**
 2. **Vagus and**
 - **Accessory nerves**
 - emerge from it



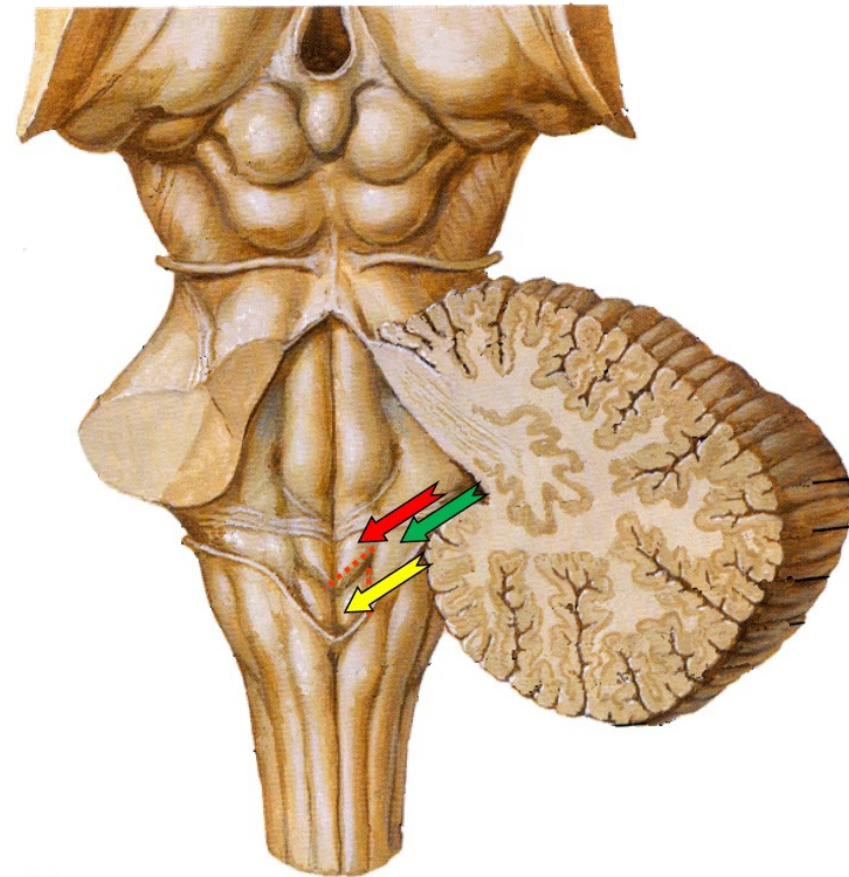
Medulla: External Features

- Posterior surface upper part
- (Open Medulla)
 - Lower part of the
 - floor of the 4th ventricle
- Vertical Median sulcus
- Inferior fovea
 - V shaped
 - depression
- Lower part →
- area postrema
 - Chemoreceptor trigger zone CTZ
 - Vomiting centre



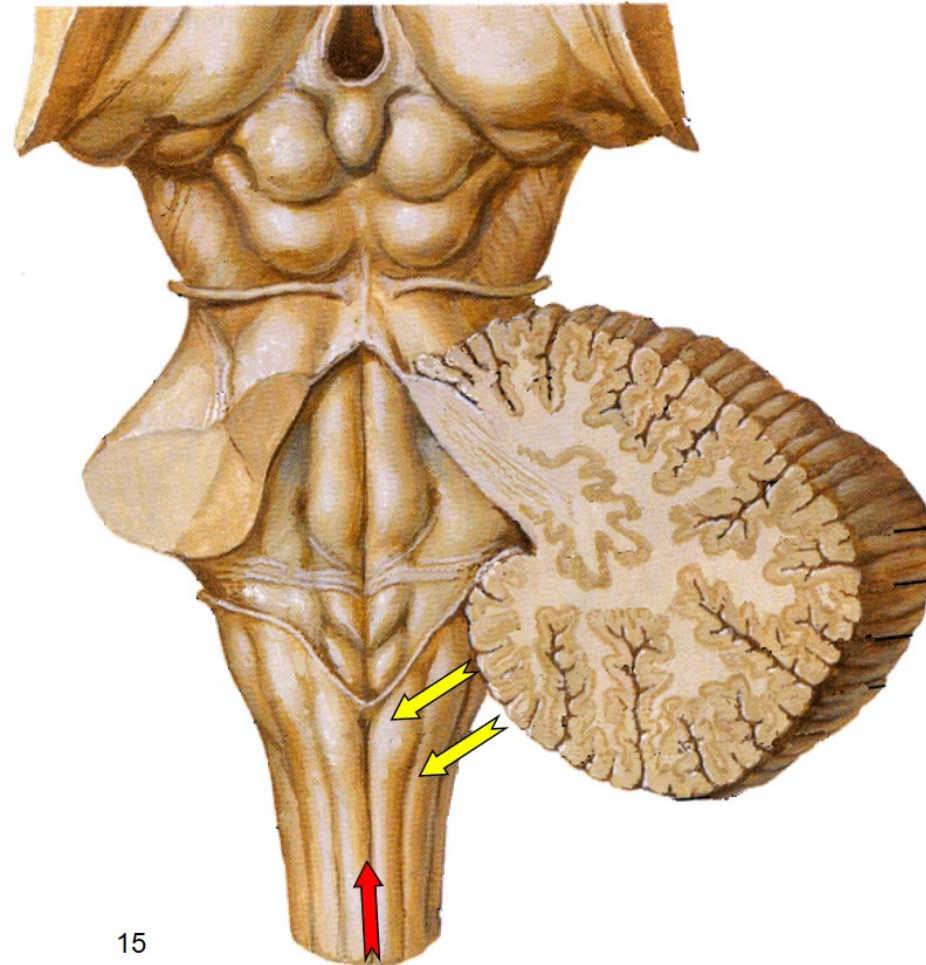
Medulla: External Features

- Hypoglossal triangle
 - Medial to
 - Inf fovea
- Vagal triangle
 - Between
 - limbs of the fovea
- Vestibular area
 - Lateral to
 - Fovea



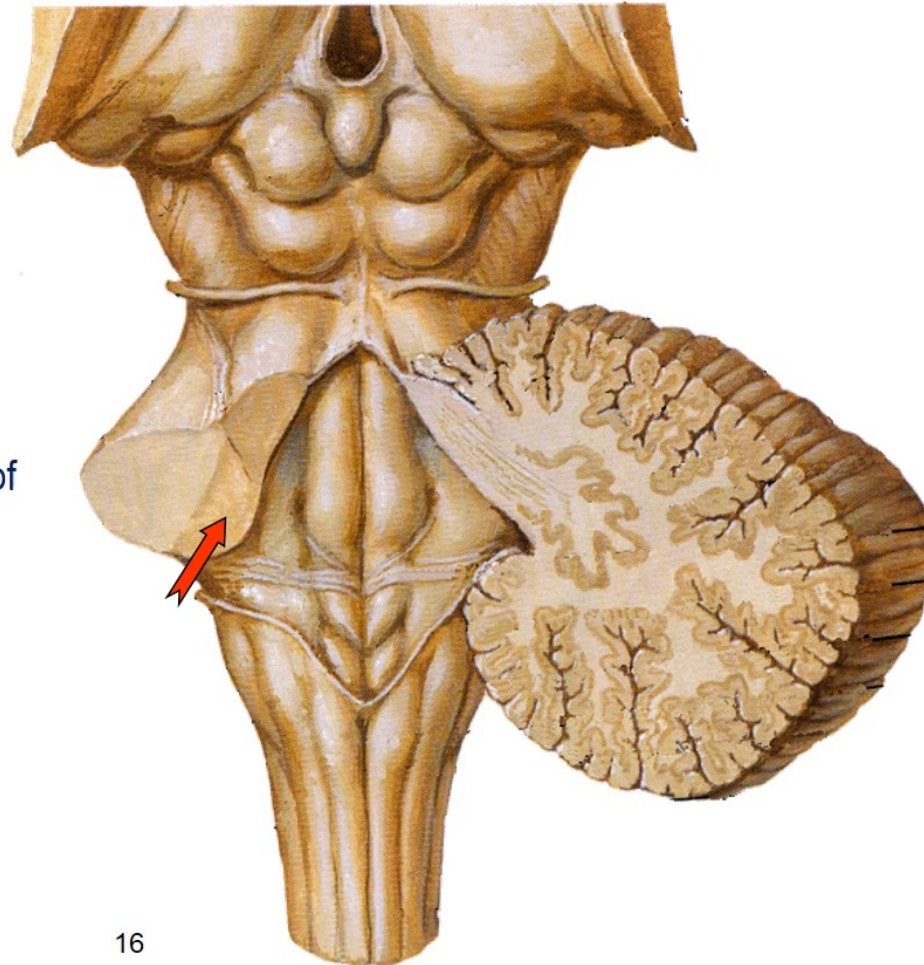
Medulla: External Features

- Posterior surface lower part
- (Closed Medulla)
 - Posterior median fissure
 - Of the spinal cord
 - Extends
 - ½ way up
 - the medulla
 - Gracile & cuneate tracts
 - Ascend on
 - either side of the
 - posterior median fissure
 - → 2 distinct ridges
 - Gracile & Cuneate tubercles
 - Tuberculum Cinerum
 - Overlies Trigeminal Spinal Nc



Medulla: External Features

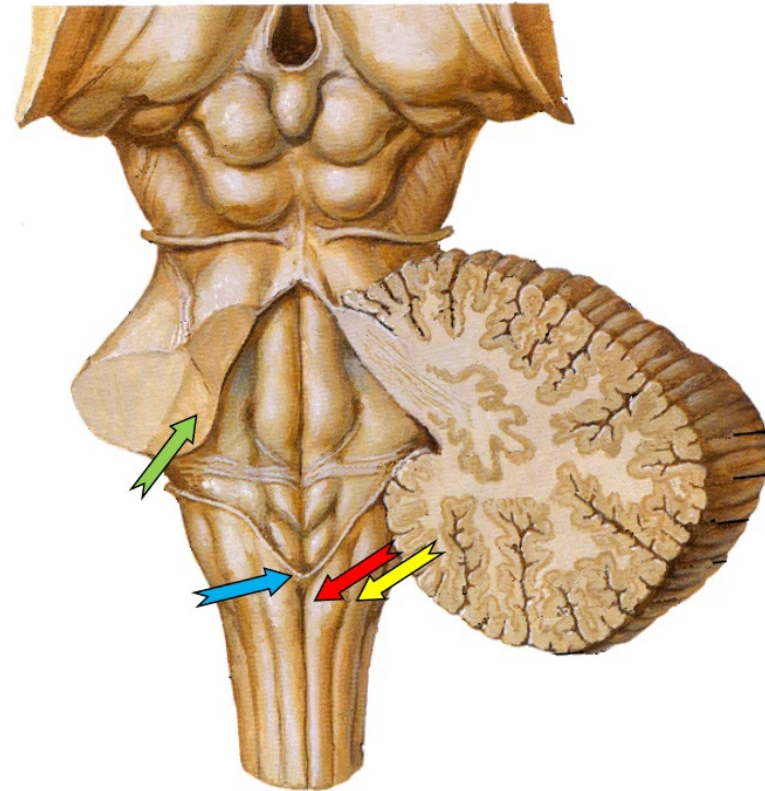
- Inferior cerebellar peduncles
 - 2 large rope like bundles
 - Along the sides of the 4th ventricle
 - Begin in the middle of the medulla
 - → Extend upward and laterally
 - → Reach the lower border of the back of the pons
 - → Bend sharply backward
 - → <> MCP & SCP
 - → Cerebellum



Medulla oblongata

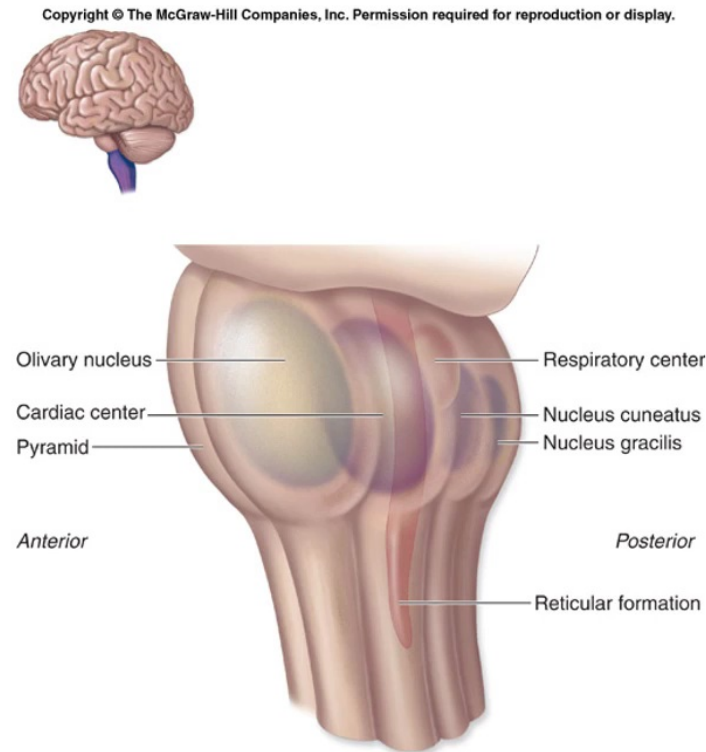
Dorsal surface

- Lower portion
 - **Gracile tubercle**
 - produced by underlying gracile nucleus
 - **Cuneate tubercle**
 - marks the site of cuneate nucleus
 - **Inferior cerebellar peduncle**
- **Obex**
- Upper portion:
 - forms the lower half of
 - rhomboid fossa



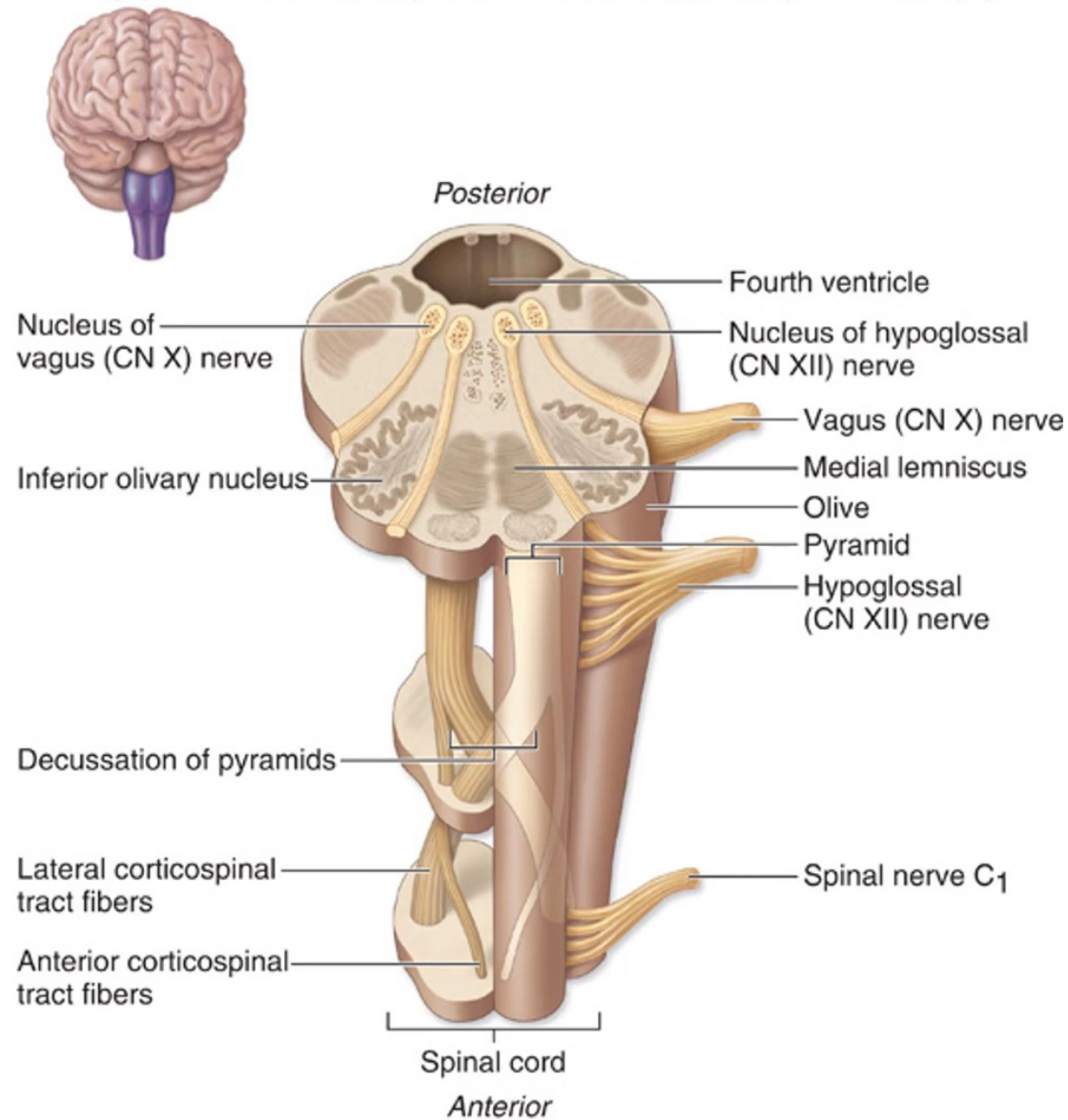
Medulla: Clinical

- Contains the vital centres
 - The respiratory centre
 - The cardiac centre
 - The vasomotor centre
- Respiratory centre
 - Sensitive to any pressure
 - May cause respiratory failure



(b) Medulla oblongata, lateral view





(a) Medulla oblongata, cross-sectional view



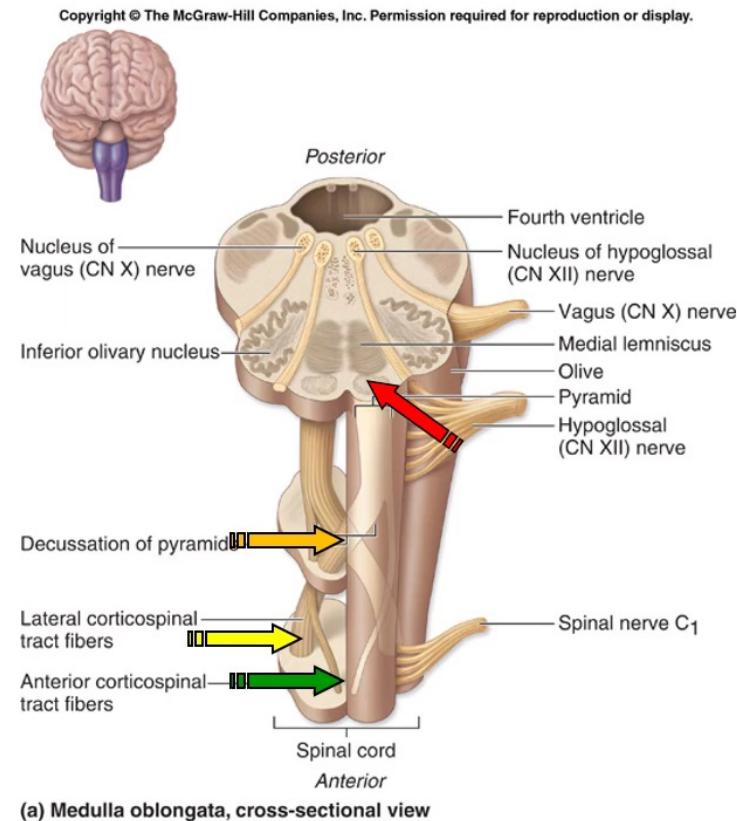
Medulla: Internal Structure

1. **Pyramids & motor decussation**
2. **Arcuate Nc**
3. **Gracile & cuneate Nc + sensory decussation**
4. **Accessory Cuneate Nc**
5. **Inferior Olivary Complex**
6. **Inferior Cerebellar Peduncle**
7. **Central Nc of lower 4 Cranial Nn**
8. **Some Nc of Trigeminal & Vestibular Nn**



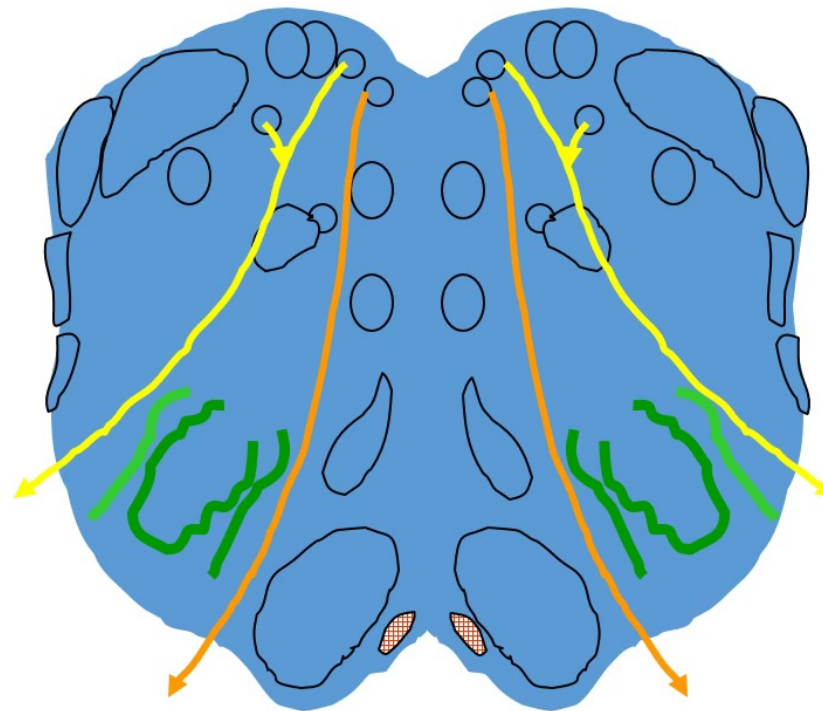
Medulla: Pyramids

- Cortico spinal & some Cortico nuclear F
- 80% cross at Motor Decussation
 - → lateral Corticospinal tract
- 18% descend uncrossed
 - → Anterior Cortico spinal tract
 - → cross later in Spinal cord
- 2% descend IL
 - Do not cross at all



Medulla: Arcuate Nucleus

- Caudally displaced Pontine Nc
- Afferent
 - Cortico pontine f
- Efferent
 - Anterior External Arcuate f
 - Cross → CL ICP
 - → Cerebellum
 - Medullary Stria
 - Pass posteriorly
 - Decussate in floor of V4
 - → ICP
 - → Cerebellum
- NB
 - Medullary Stria intervene between
 - Medullary part
 - Pontine part
 - Of V4



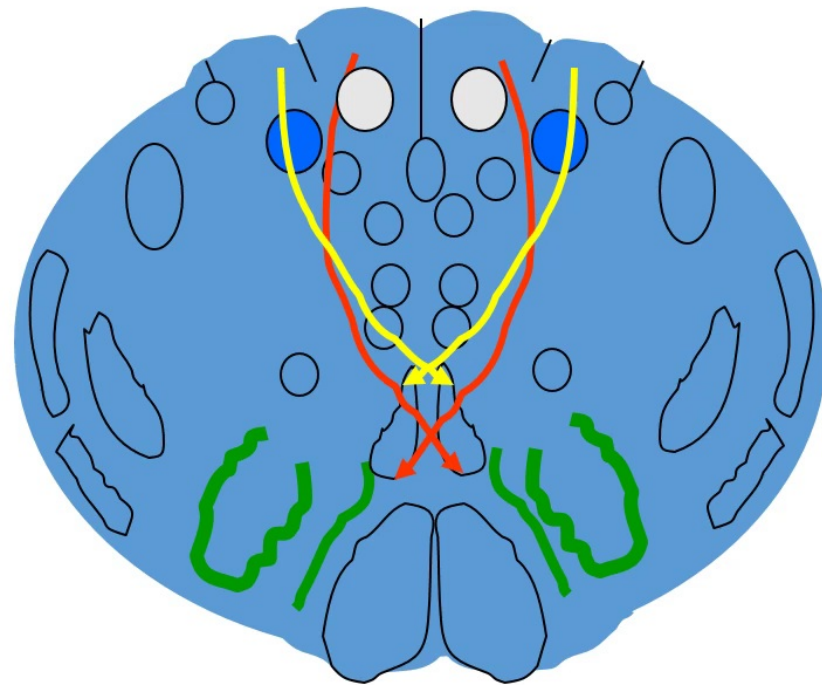
Medulla: Gracile & Cuneate Nc

Upper part of the

- Closed Medulla

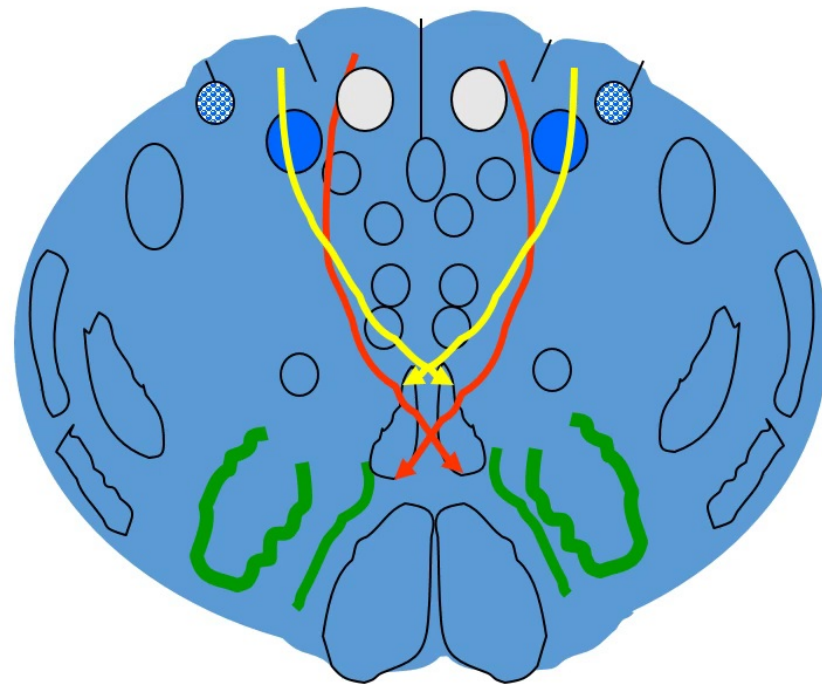
2nd order neuron of

- the Dorsal Column pathway



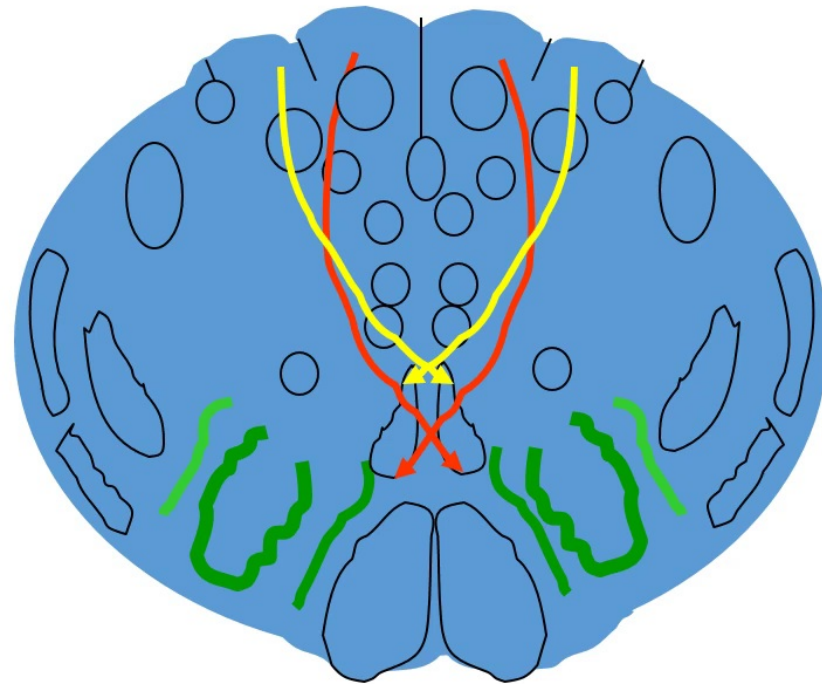
Medulla: Accessory Cuneate Nc

- Lateral to the Cuneate Nc
- Afferents
 - From the Cuneate Tract
 - Unconscious proprioceptive info
 - From UL & Neck
- Efferent
 - → Posterior External Arcuate f
 - → IL ICP
 - → Cerebellum



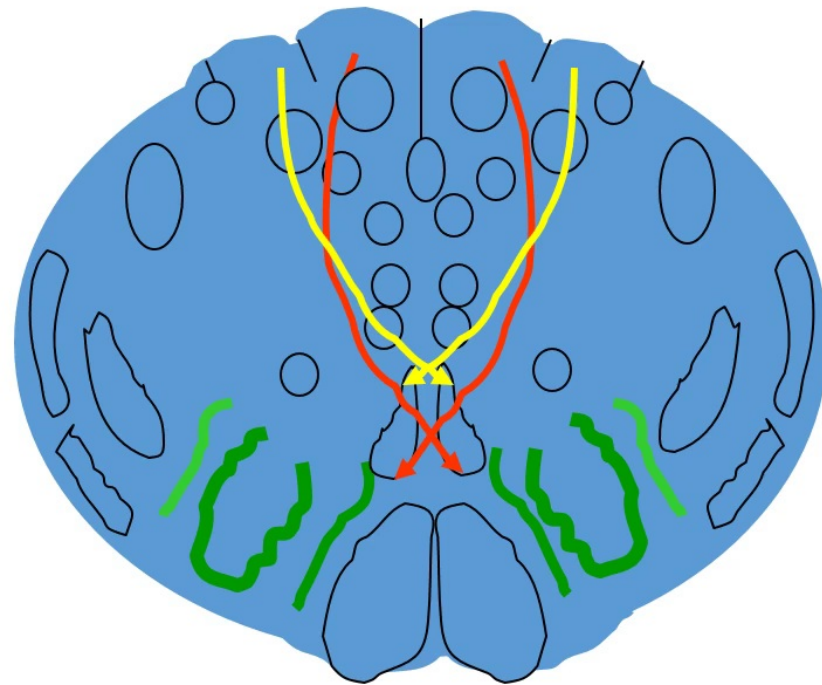
Medulla: the Inferior Olivary Complex

- Inferior Olivary Nc
 - Mass of grey matter
 - Underlies the Olive
- Afferents
 - Cortico Olivary
 - IL Motor Cortex
 - Rubro Olivary
 - IL Red Nc
 - Spino Olivary
 - CL ½ of Spinal Cord



Medulla: the Inferior Olivary Complex

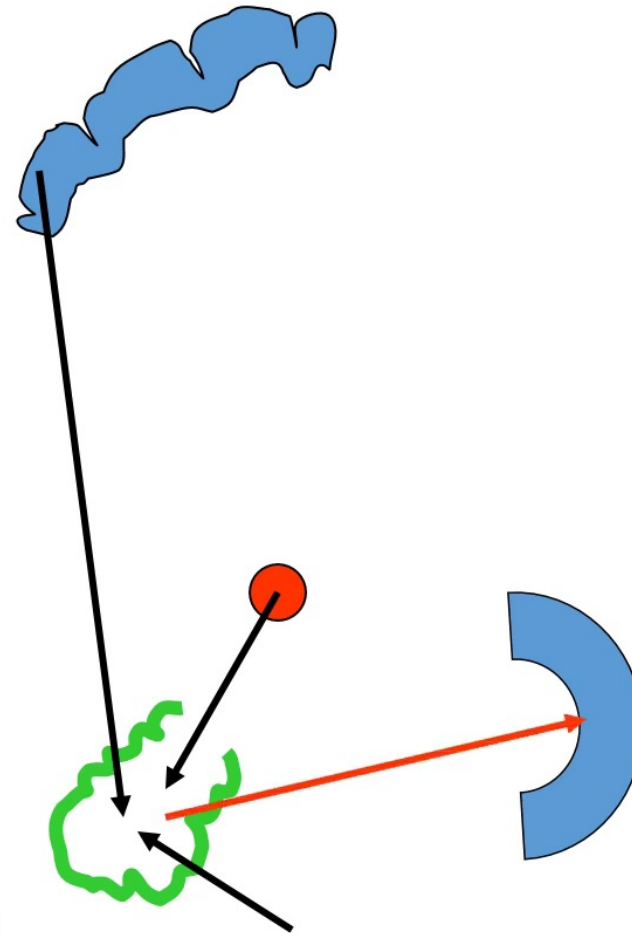
- Efferents
 - Olivo cerebellar F
 - Cross → CL ICP
 - → Climbing f
 - → Cerebellar Purkinji Neurons
- Function
 - Get knowledge of new complex movement
 - → Discharge to CL Cerebellum
 - Help in Motor Learning
- Medial & Dorsal Olivary Nc
 - Para Olivo Cerebellar F



Inferior Olive: Connections

Inferior Olivary Nc

- Cerebral Cortex
- Cortico Olivary F
- Red Nc
- Rubro Olivary F
- Spinal Cord
- Spino Olivary F
- Cerebellum
- Olivo Cerebellar F



Medulla: Inferior Cerebellar peduncle

- Afferents

1. Dorsal Spino Cerebellar tract
2. Posterior external Arcuate F
 1. Accessory Cuneate Nc
3. Anterior External Arcuate f + Medullary Stria
 1. Arcuate Nc
4. Olivo Cerebellar & Para Olivo Cerebellar F
 1. Inferior olivary Complex
5. Vestibulo Cerebellar
6. Reticulo Cerebellar
7. Trigemino Cerebellar
 - Main Sensory Nc & Spinal Nc of V



Medulla: Inferior Cerebellar peduncle

- Efferents
 1. Cerebello Vestibular
 2. Cerebello Reticular

