



Gaza Ophthalmic Centre

21.1.1 Midbrain (Part 1)

Neurosciences I

Maged A AbuRamadan
MD, FRCSEd, FICO, PPOS

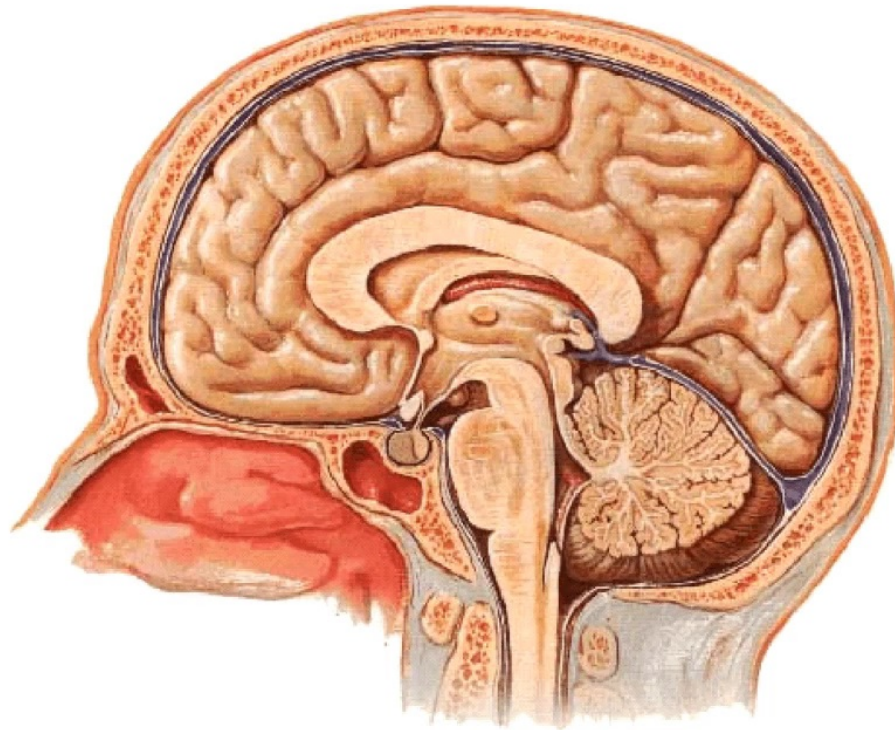
Gaza Ophthalmic Centre

Maged Awni Abu-Ramadan, MD, FRCSEd



The brain

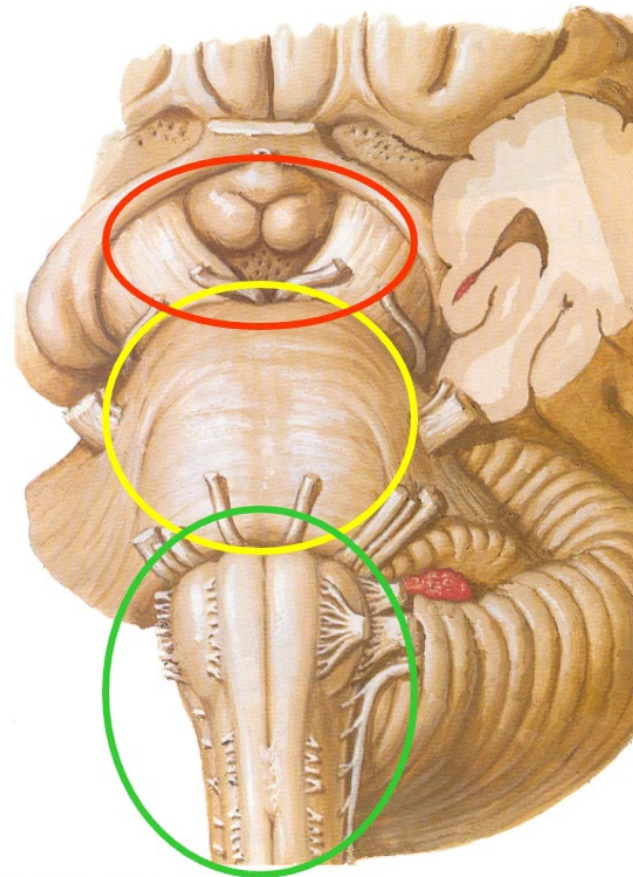
1. Telencephalon
2. Diencephalon
3. Cerebellum
4. Brain stem



The Brain Stem

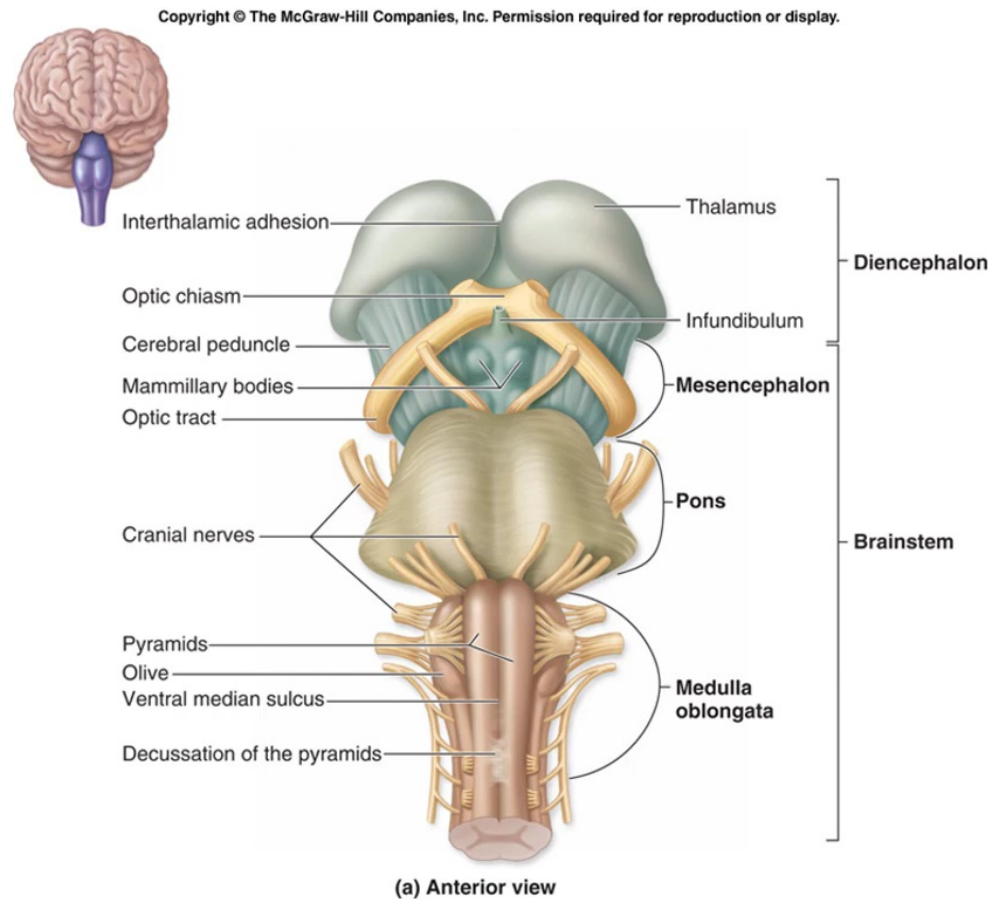
Consists of

1. Midbrain
2. Pons
3. Medulla oblongata



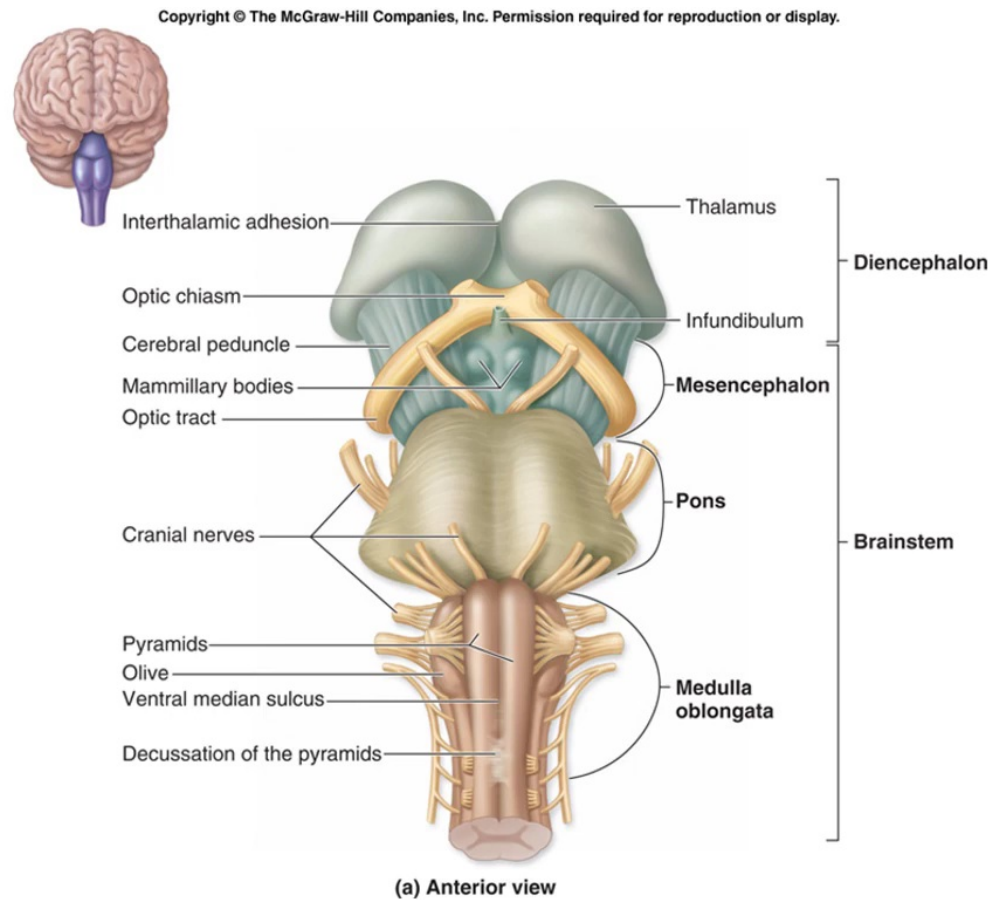
The Brain Stem

- Several general functions
 - 1) Produces
 - automatic behaviors
 - necessary for survival
 - 2) Passageway for
 - all fiber tracts running between
 - the cerebrum and
 - spinal cord



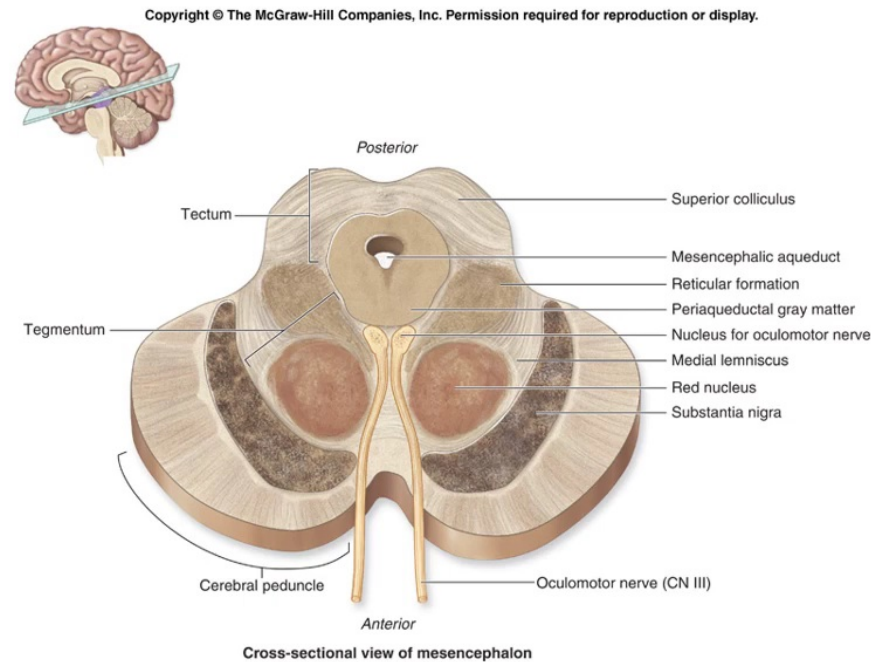
The Brain Stem

- Heavily involved with the innervation of
 - the face and head
 - 10 of the 12 pairs of cranial nerves attach to it



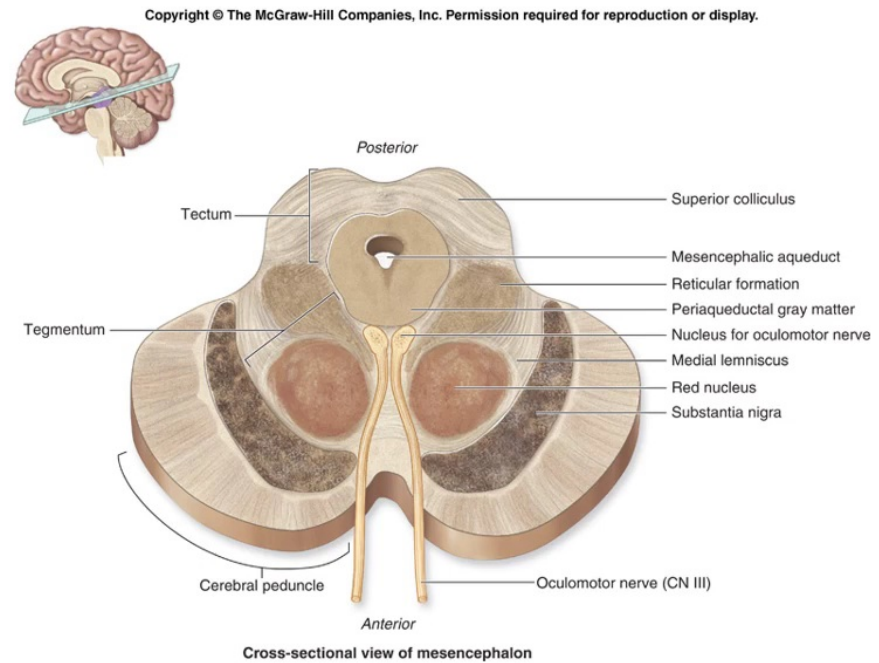
The Midbrain: General Features

- Shortest part of the
 - brain stem
- Lies between
 - Diencephalon,
 - level of Optic Tract
 - Pons
 - upper border
- Occupies the
 - notch in the
 - Tentorium cerebelli



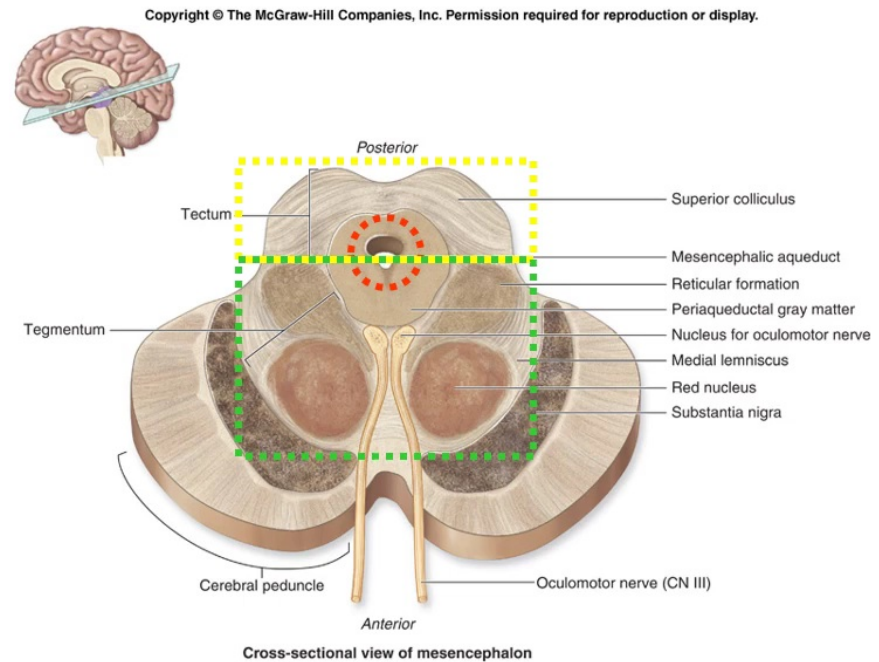
The Midbrain: General Features

- Largely hidden by the
 - surrounding structures
- Cube with
- 4 surfaces
 - Anterior
 - Posterior
 - 2 lateral



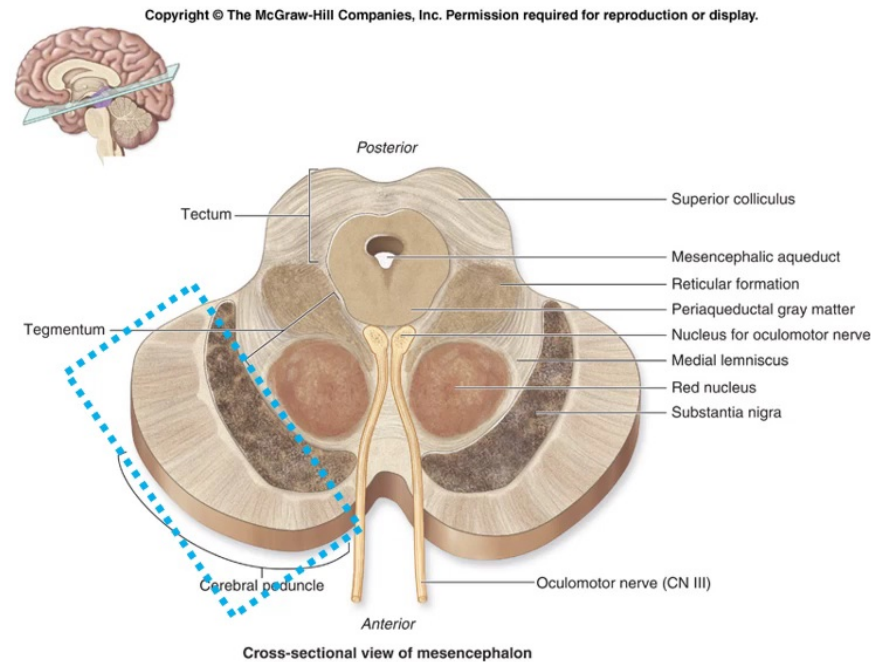
The Midbrain: General Features

- Central cavity
 - the cerebral aqueduct
 - Connects
 - V3 & V4
- Tectum
 - Posterior to
 - Aquiduct
- Tegmentum
 - Anterior to
 - Aquiduct



The Midbrain: General Features

- Cerebral peduncles
 - located on the
 - ventral surface of
 - the brain
- Superior cerebellar peduncles
 - Connect
 - midbrain to the
 - cerebellum



The Midbrain: Main Parts

- Tectum

- Posterior to Aquiduct

- 4 Colliculi

- 2 Superior Colliculi

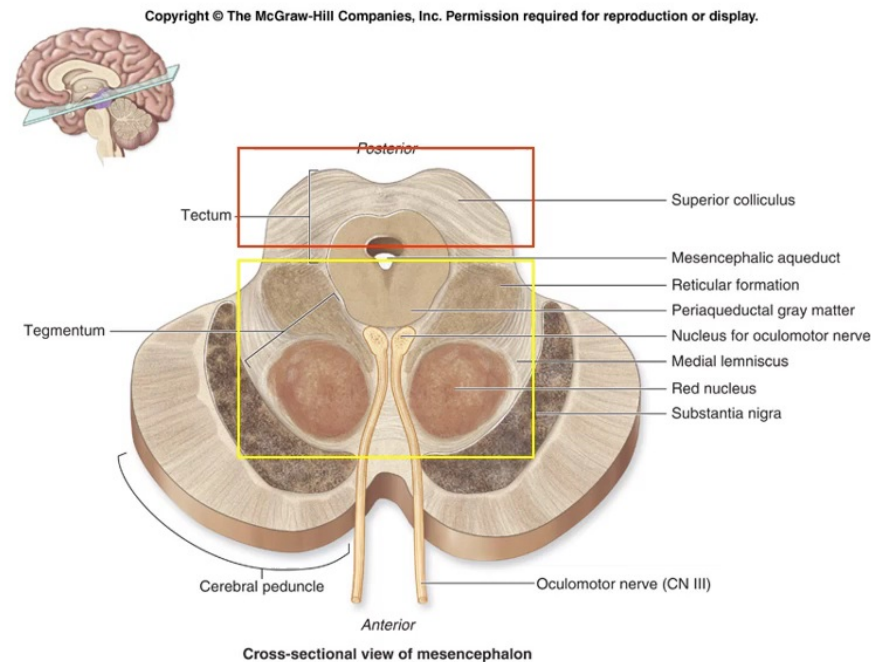
- Visual reflexes
- Connected to
- LGB by
- SC Brachium

- 2 Inferior Colliculi

- Auditory pathway
- Connected to
- MGB by
- IC Brachium

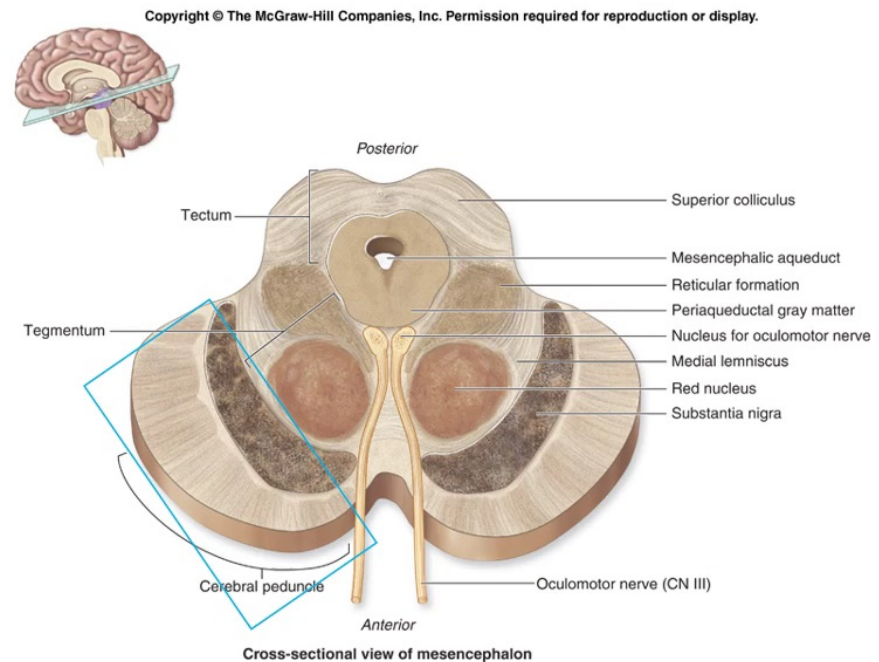
- Tegmentum

- Anterior to Aquiduct



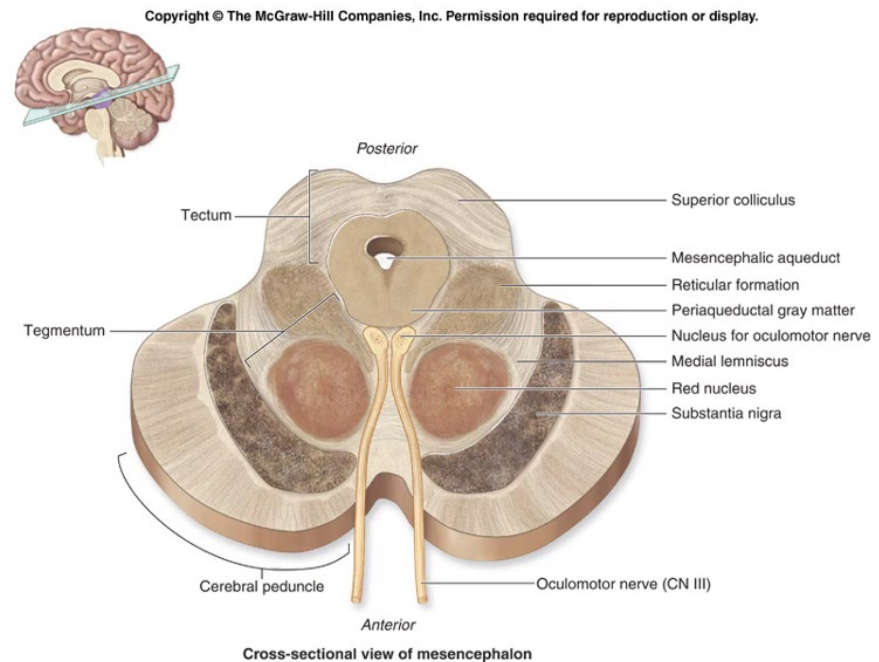
The Midbrain: Main Parts

- Cerebral peduncles
 - located on the
 - ventral surface of the brain
- Crus Cerebri
- Contain pyramidal
 - (corticospinal) tracts
- Crossed laterally by
 1. Posterior Cerebral A
 2. Trochlear N
 3. Optic Tract



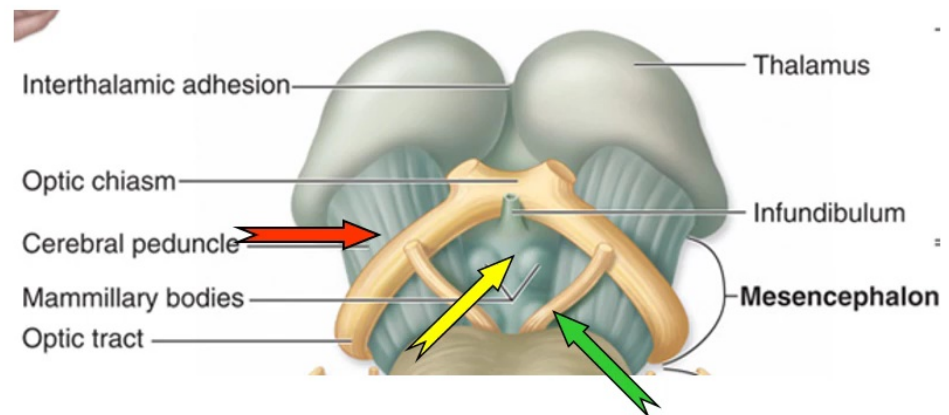
The Midbrain: Main Parts

- Superior cerebellar peduncles
 - Connect
 - midbrain to the
 - cerebellum
- Seen only in the
 - upper part of
 - **Roof of V4**
- Both peduncles
 - connected by
 - **Sup Medullary Velum**



Midbrain: External Features

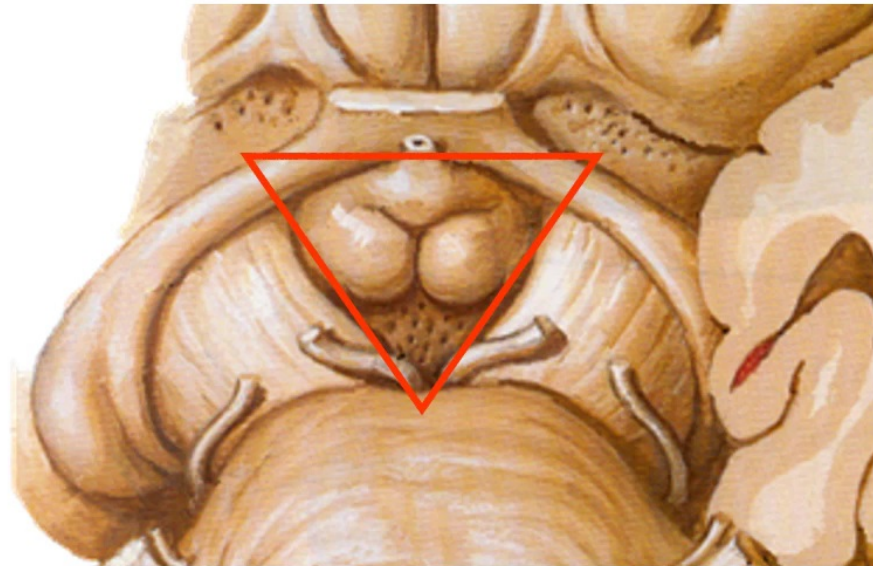
- The anterior surface
 - 2 Cerebral Peduncles
 - Interpeduncular fossa
 - Oculomotor nerve
 - Emerge just medial to the cerebral peduncles



Midbrain: External Features

Interpeduncular Fossa

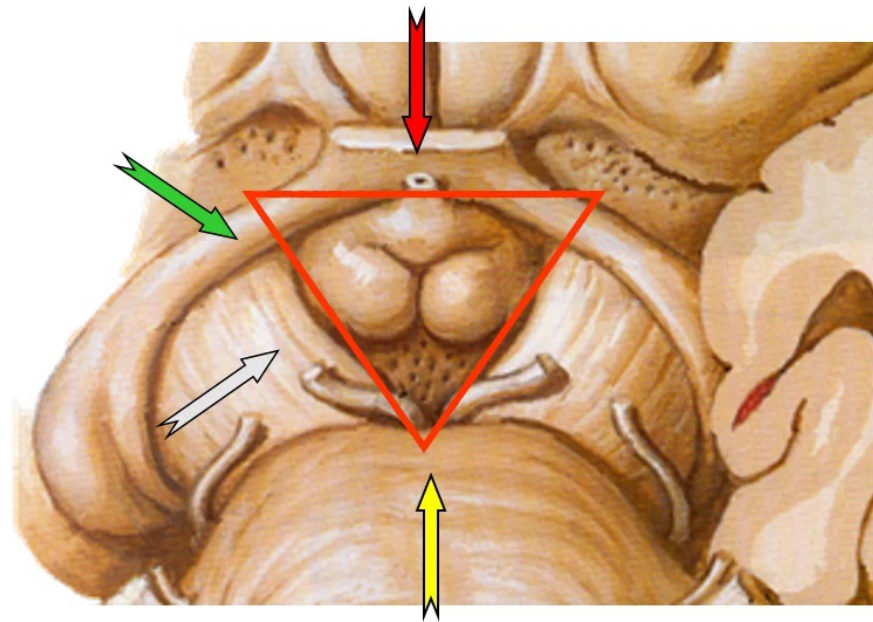
- Depressed area
- Rostral to the
- Pons
- Between the
- 2 Cerebral Peduncles



Midbrain: External Features

Interpeduncular Fossa

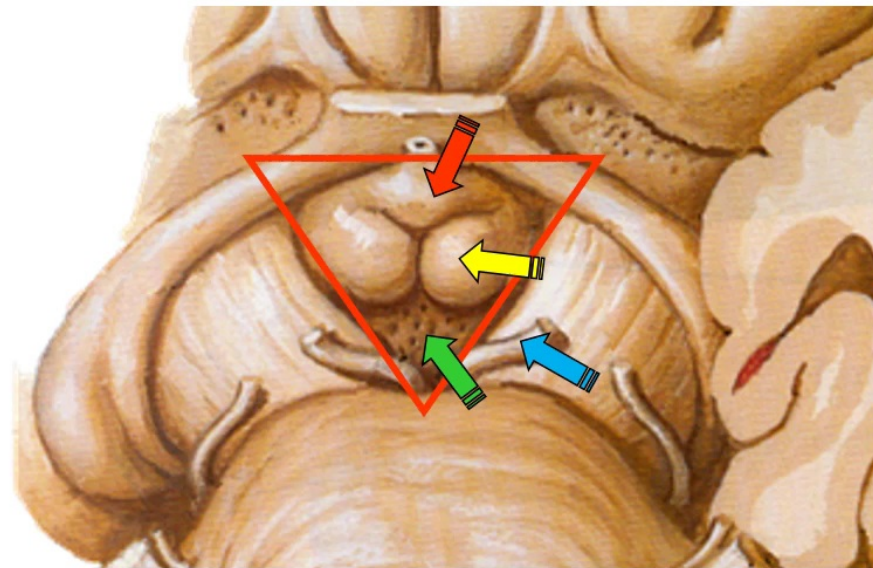
- Boundaries
 - Anterior →
 - Optic Chiasm
 - Posterior →
 - upper Pons
 - Anterolateral →
 - Optic Tract
 - Posterolateral →
 - Crus Cerebri



Midbrain: External Features

Interpeduncular Fossa

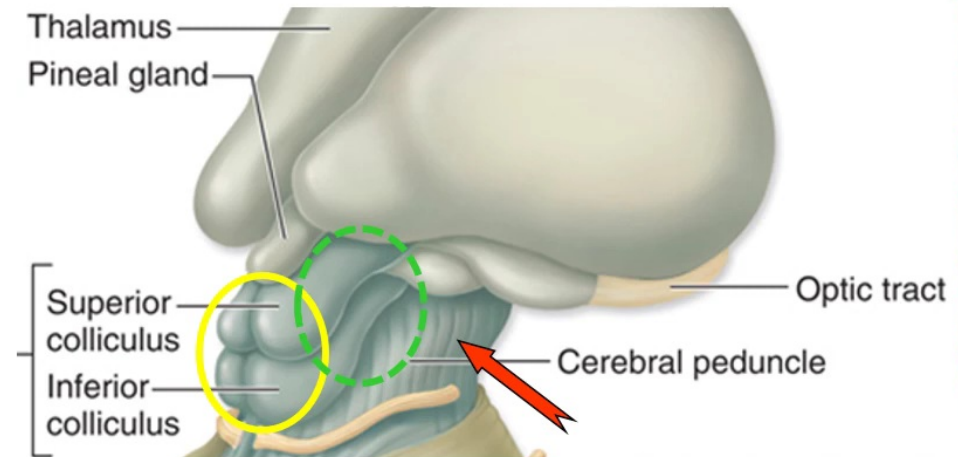
- Contents (before backward)
 - Infundibulum
 - $\leftrightarrow$
 - HTH &
 - Pituitary gland
 - 2 Mammillary Bodies
 - Posterior Perforated Substance
 - Pierced by
 - central branches of
 - PCA
 - Oculomotor N
 - Medial to
 - IL
 - Crus Cerebri



Midbrain: External Features

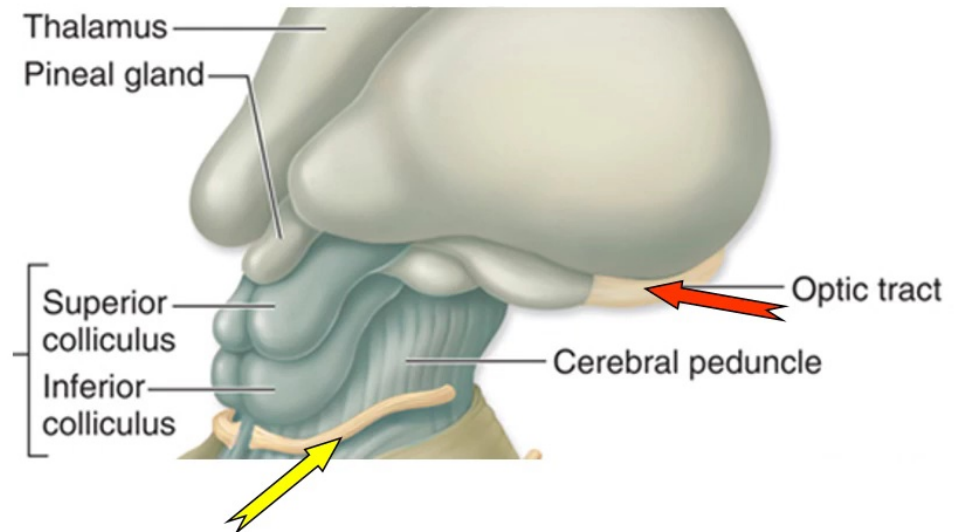
- The Lateral Surface

- Basis pedunculi
 - anteriorly
- Tectum
 - posteriorly
- Tegmentum
 - in the middle



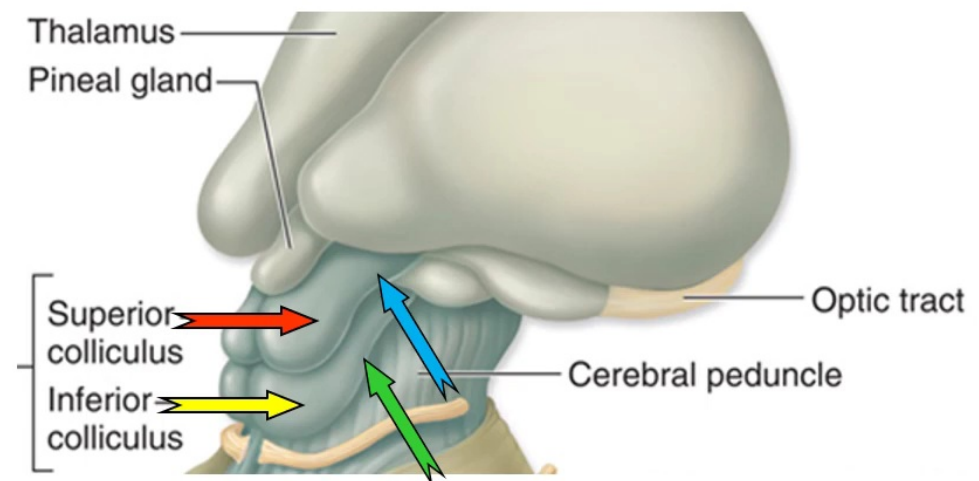
Midbrain: External Features

- The Lateral Surface
- 3 structures wind around
 1. The optic tract
 2. The trochlear nerve
 3. The posterior cerebral artery



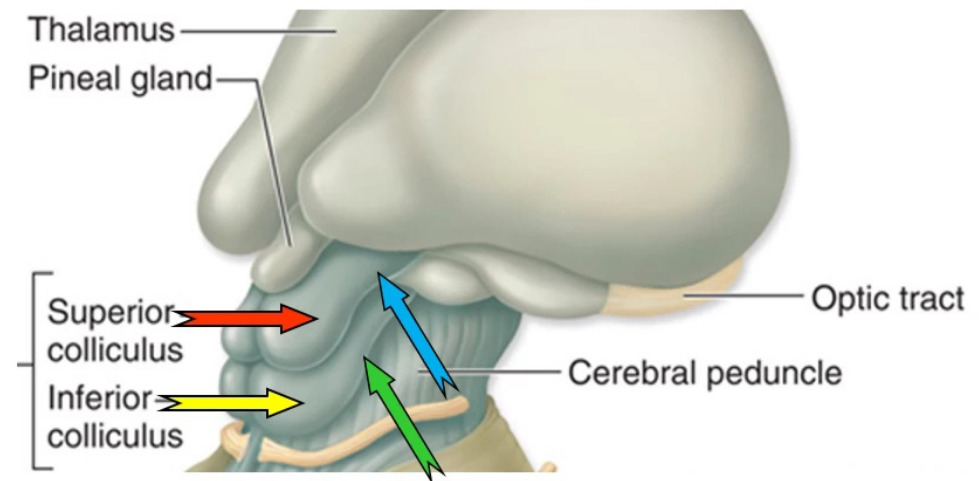
Midbrain: External Features

- The Posterior surface
 - Tectum
 - Corpora quadrigemina
 - Quadrigeminal brachia



Midbrain: External Features

- Corpora quadrigemina
 - 4 colliculi
 - 2 superior colliculi
 - 2 inferior colliculi



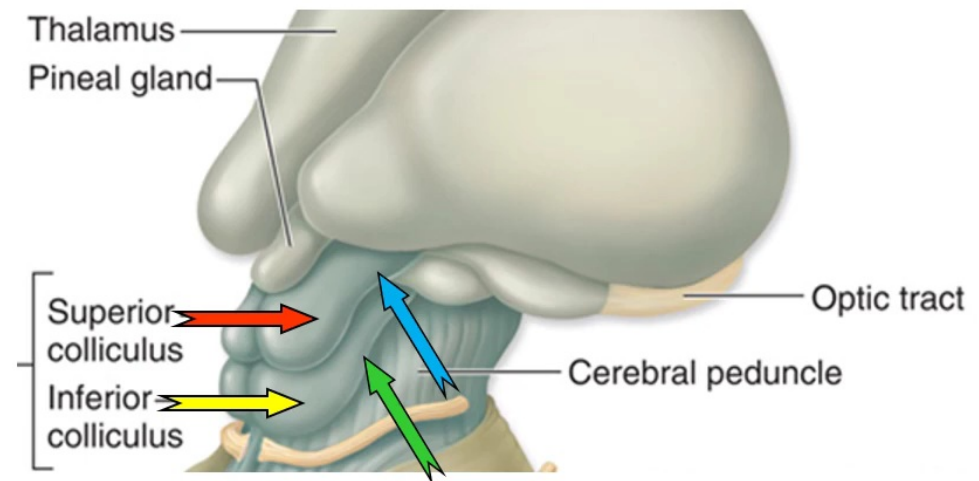
Midbrain: External Features

- Quadrigeminal brachia

- Arm runs
 - laterally from
 - each colliculus

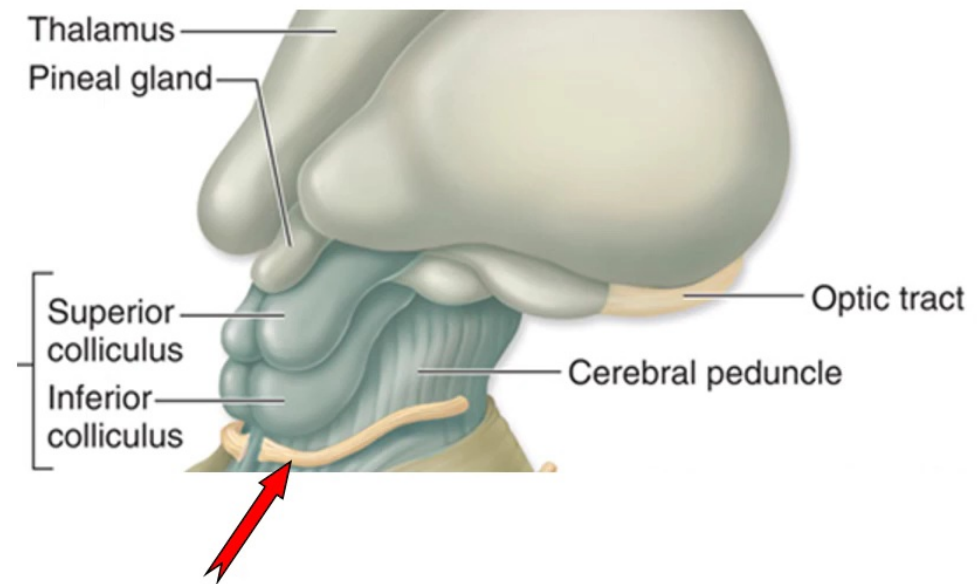
- Inferior QB
 - Larger →
 - MGB

- Superior QB
 - → LGB



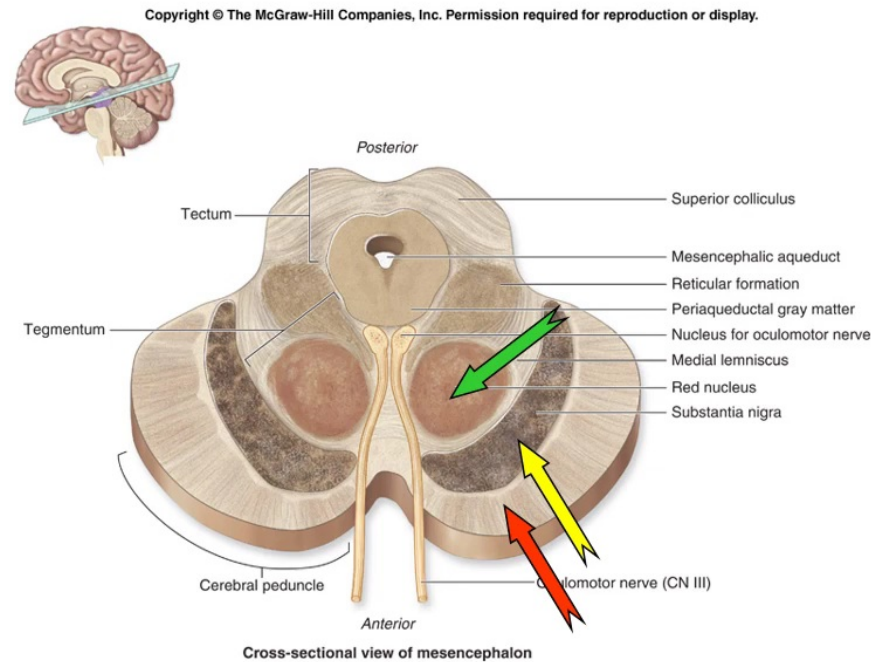
Midbrain: External Features

- The Posterior surface
 - The trochlear nerve
 - The smallest
 - cranial nerve
 - The only CN to
 - emerge from the
 - dorsal surface
 - Just behind the
 - inferior colliculi



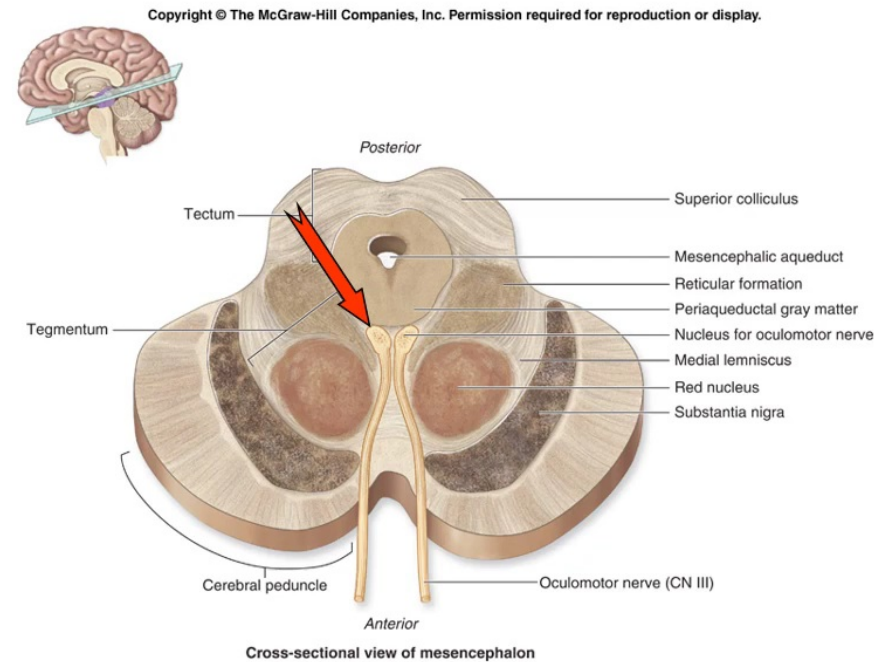
Midbrain Internal Structure

- Crura Cerebri
- 2 Extraparamidal Centres
 1. Substantia Nigra
 2. Red Nc



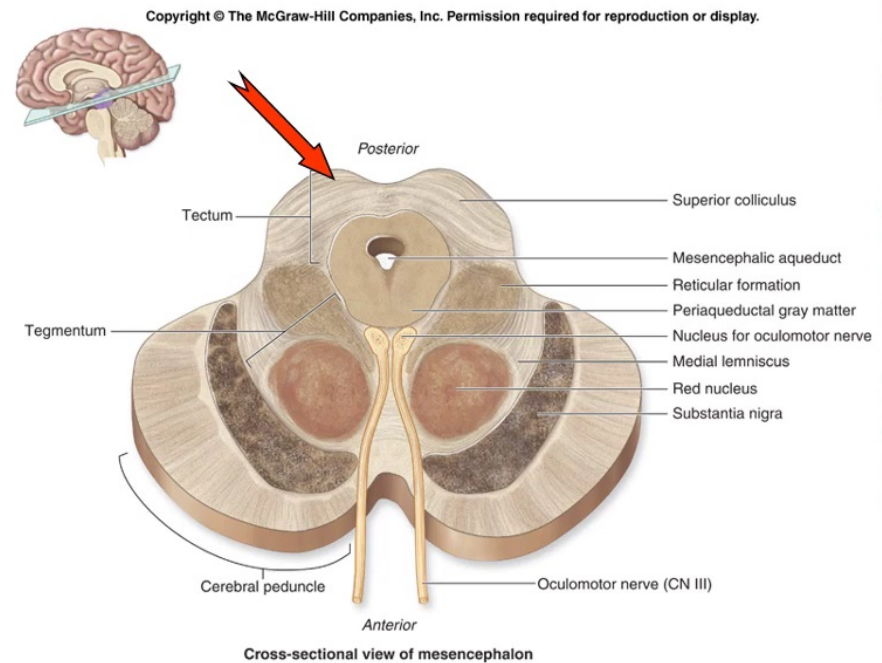
Midbrain Internal Structure

- 2 Cranial Nerve Nuclei
 - III
 - IV
- 2 other Nc
 - Pretectal Nc
 - Mesencephalic Nc



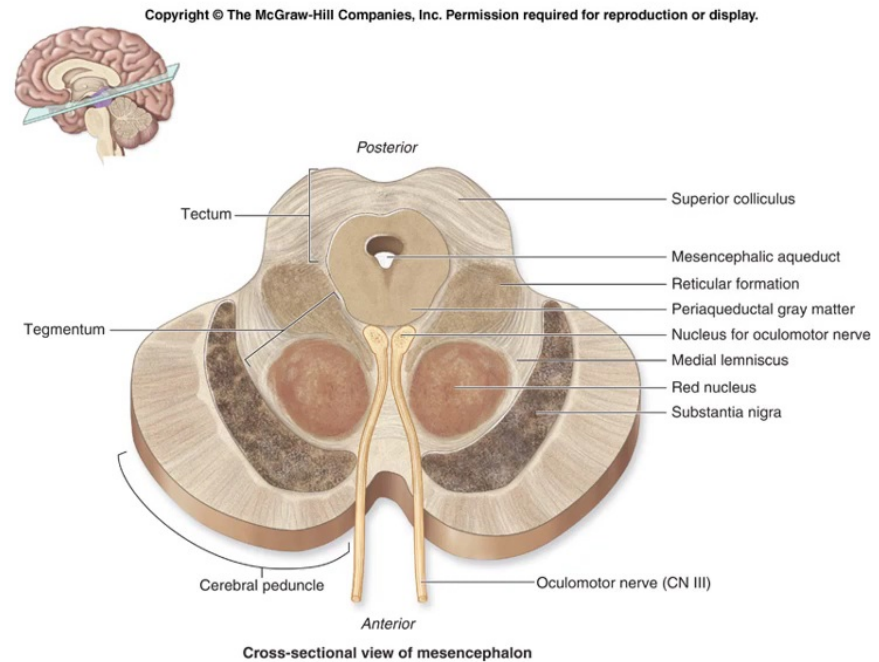
Midbrain Internal Structure

- 2 SCP
- 4 Colliculi (Tectum)
 - 2 SC
 - 2 IC



Midbrain Internal Structure

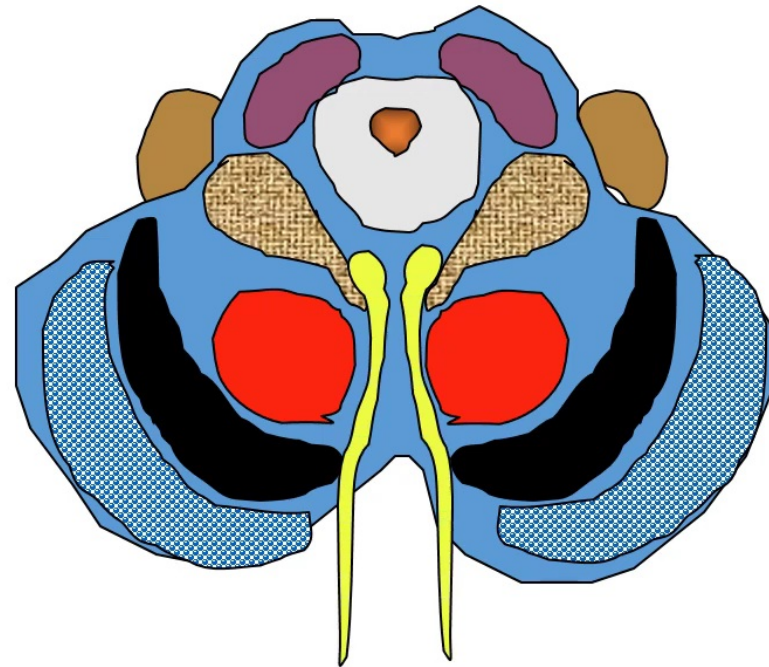
- 4 Decussations
 - 2 at level of SC
 - 2 at level of IC



Midbrain: Level of Superior Colliculus

- Major structure

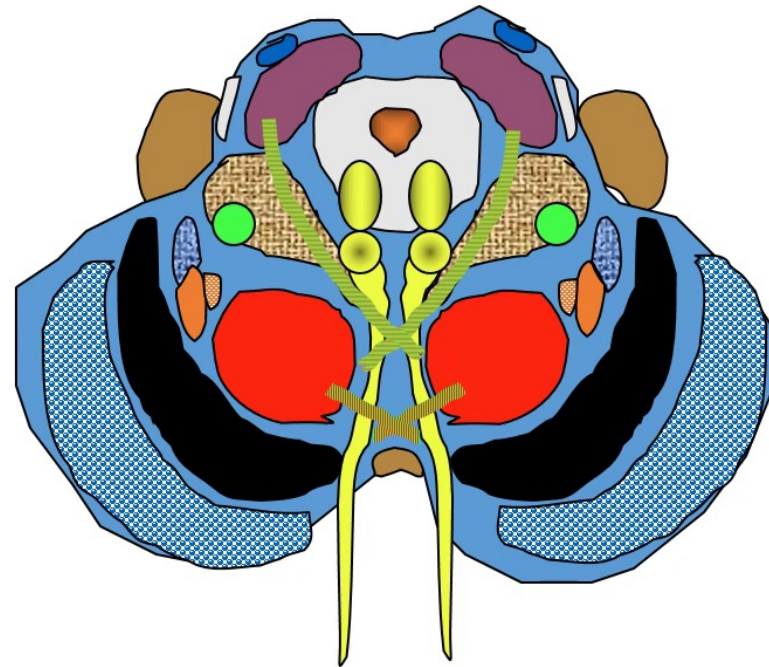
1. Midbrain SC level
2. MGB
3. Aquiduct
4. Periaquiduct Grey Matter
5. Superior Colliculus
6. Pyramidal Tract
7. Substantia Nigra
8. Red Nucleus
9. Reticular Formation
10. Oculomotor Nerve



Midbrain: Level of Superior Colliculus

- Special Details

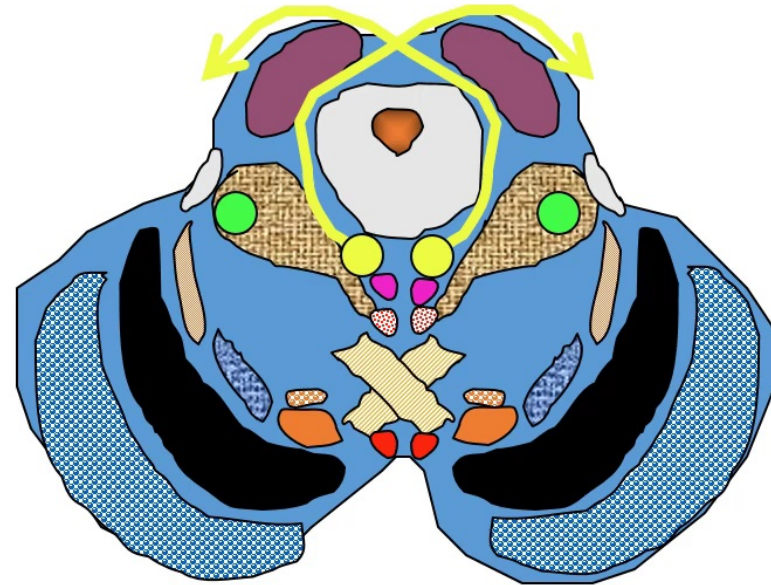
1. Pretectal Nc
2. Superior Brachium
3. Oculomotor Nc
4. EWN
5. Central Tegmental Tract
6. Dorsal Tegmental Decussation
7. Ventral Tegmental Decussation
8. Interpeduncular Nc
9. Spinal Lemniscus
10. Medial Lemniscus
11. Trigeminal Lemniscus



Midbrain: Level of Inferior Colliculus

- Special Details

1. Inferior Colliculus
2. Trochlear N Nc
3. Trochlear N
4. Central Tegmental Tract
5. Decussation of SCP
6. MLB
7. Tectospinal Tract
8. Rubrospinal Tract
9. Inferior Brachium
10. Lateral Lemniscus
11. Spinal Lemniscus
12. Medial lemniscus
13. Trigeminal Lemniscus



Midbrain: Crura Cerebri

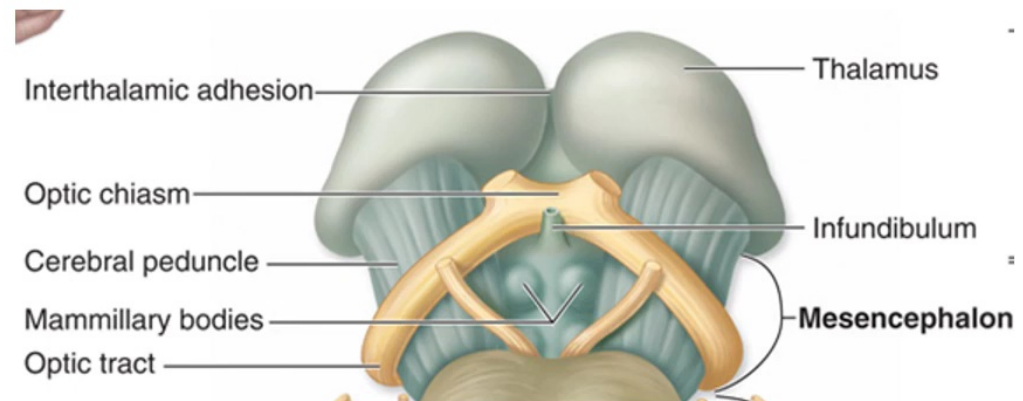
- Rope like bundles

Above →

- Disappear in the
 - substance of the
 - cerebral hemisphere
- Overlapped by
 - Uncus
 - Hippocampal gyrus

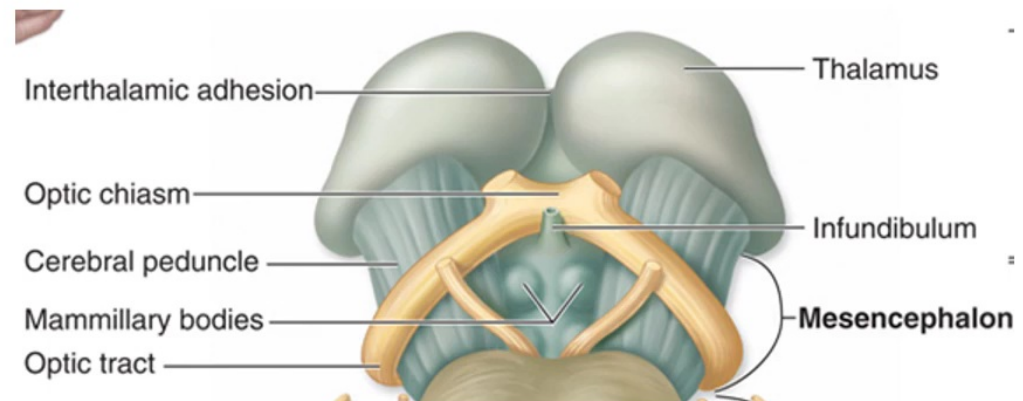
Below →

- Pass directly into the
- anterior part of
- the pons



Midbrain: Crura Cerebri

- Extend
 - From level of Optic Tract
 - Contiguous with
 - Internal Capsule
 - To Pons
 - upper border



Midbrain: Crura Cerebri

- Contains

- Fronto pontine F
- → med 1/5
- Temporo pontine +
- Occipito pontine +
- Parieto pontine F
- → lat 1/5
- Cortico nuclear +
- Cortico spinal F
- → middle 3/5

