



RADIOLOGY

TEAM 435

# BRAINSTEM & CEREBELLUM



## Objectives:

- Identify radiological anatomy of brain stem and cerebellum.
- Compares CT and MRI imaging of brain stem and cerebellum.
- Recognize the imaging findings in common diseases involving brain stem and cerebellum.

Please check out the this [link](#) for any future changes or additions.

Red = Important

Grey = Extra notes

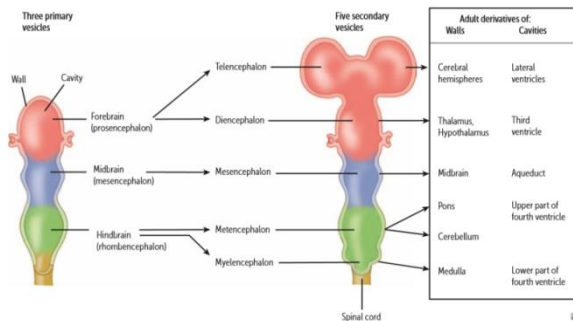
You can skip this page if you know them already.

## ❖ Introduction:

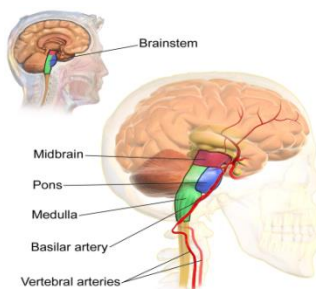
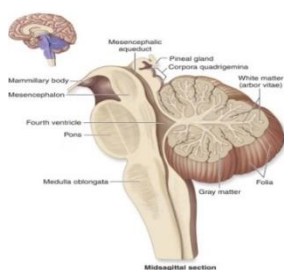
at the beginning we're going to review some anatomy, we recommend studying anatomy before this lecture .

### ❖ 3 primary vesicles :

- Forebrain.
- Midbrain.
- Hindbrain.



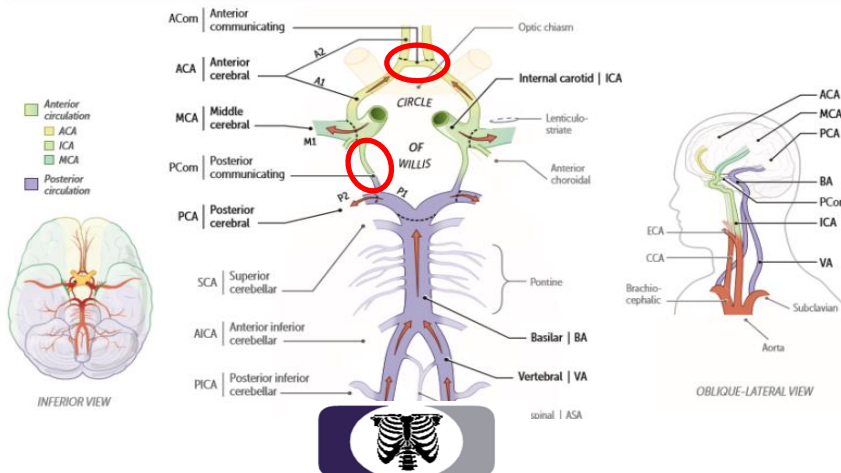
### ❖ Anatomy of the brainstem and cerebellum :



### ❖ Blood supply :

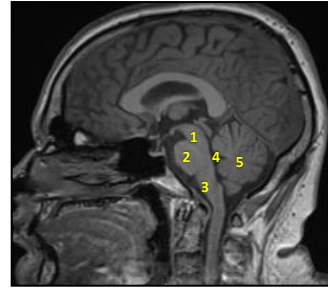
- The Vertebral Artery (Branch of Subclavian Artery) has 2 branches:
  - 1- Anterior spinal Artery (supplies the medial Medulla)
  - 2- Posterior Inferior Cerebellar Artery (supplies the lateral medulla)
- The two Vertebral Arteries fuse together at the level of Pons to form the Basilar Artery. The Basilar Artery supplies the medial Pons by Pontine Arteries and the lateral Pons by the Anterior Inferior Cerebellar Artery and the Superior Cerebellar Artery.
- The Basilar Artery Divides into 2 Posterior Cerebral Arteries at the level of the Midbrain.
  - Fusion of posterior cerebral and middle cerebral Artery (branch of the Internal Carotid Artery) forms the posterior communicating artery.
  - Fusion of two anterior cerebral arteries forms the anterior communicating artery.
  - **ACom** and **PCom** are the most common locations for **aneurysms**.

-The doctor said this in the lecture.



## ❖ Brain Stem :

- 1-mid brain.
- 2- pons.
- 3- medulla oblongata.
- 4- 4<sup>th</sup> ventricle .
- 5- cerebellum.

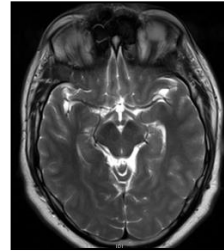


MRI T1 WI

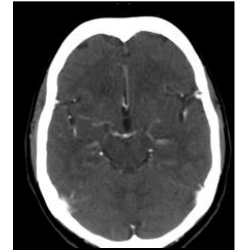
## ➤ Midbrain .

### Radiological Features:

- At the level of circle of Willis.
- Anteriorly two cerebral peduncles separated by interpeduncular fossa.
- Posteriorly four rounded prominences (superior and inferior colliculi).

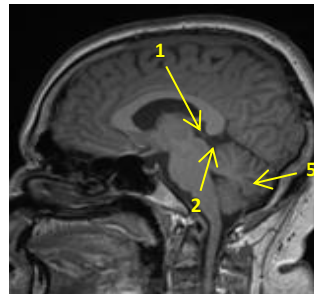


MRI axial T2WI

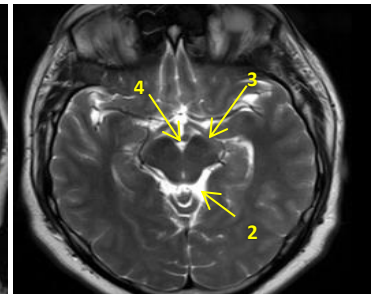


CT

1. superior colliculus
2. inferior colliculus
3. cerebral peduncle
4. interpeduncular cistern
5. Cerebellum.



MRI sagittal T1WI



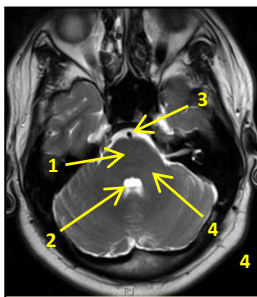
MRI axial T2WI

## ➤ Pons .

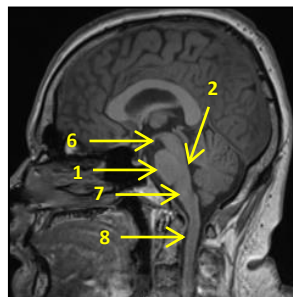
### Radiological Features:

- Basilar artery lies in groove anteriorly.
- Posterior surface of the pons forms the upper part of the floor of the 4<sup>th</sup> ventricle.
- Bony anterior relation:  
clivus centrally and petrous temporal bones laterally.

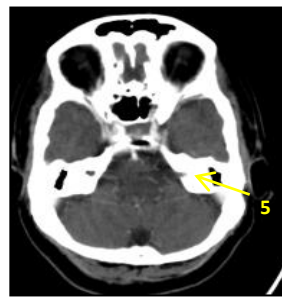
Pons is connected to the cerebellum by middle cerebellar peduncle Separated from the cerebellum by the 4th ventricle.



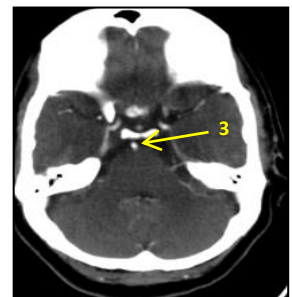
MRI axial T2WI



MRI sagittal T1WI



CT axial



CT axial

1. Pons.
2. 4<sup>th</sup> ventricle.
3. Basilar artery.
4. Middle cerebellar peduncle.

5. Petrous bone.
6. Midbrain.
7. Medulla
8. Spinal cord

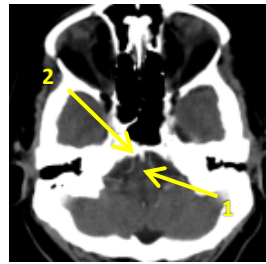


## ➤ Medulla oblongata .

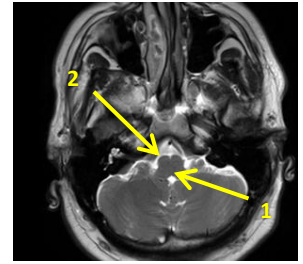
### Radiological Features:

- The ventral median fissure is seen anteriorly with the pyramid laterally
- The 4<sup>th</sup> ventricle is seen posteriorly

Medulla is differentiated by the two pyramids separated by the ventral median fissure.



CT



MRI axial T2WI

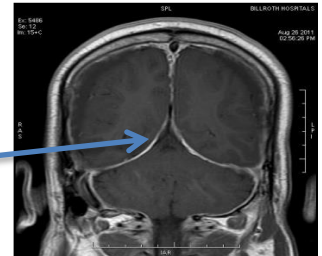
1. Medulla.
2. 2 Pyramids.

## ❖ Cerebellum :

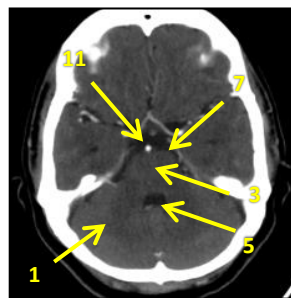
### Radiological Features:

- On axial Ct & MRI the cerebellum is separated from the pons by the 4th ventricle and connected to the pons on each side by middle cerebellar peduncle, it is bounded anteriorly by petrous temporal bone.
- Cerebellum is connected to the brainstem by three pairs of cerebellum peduncles:
  - Superior.....connected to the midbrain.
  - Middle.....connected to the pons.
  - inferior.....connected to medulla oblongata.
- Two cerebellar hemisphere with midline vermis.

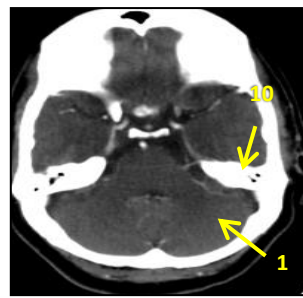
• This **fold** is an extension from the dura meninges separate the cerebellum from the occipital lobe it's called the tentorium.



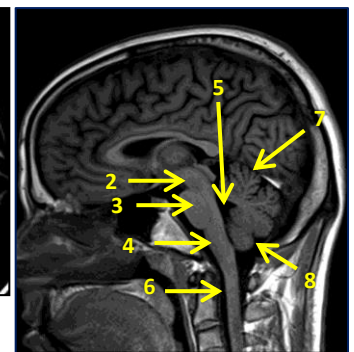
CT axial



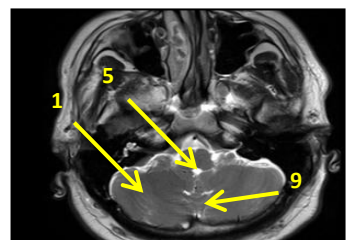
CT axial



CT axial



MRI sagittal T1WI



MRI axial T2WI

1. Cerebellum.
2. Mid brain.
3. Pons.
4. Medulla.
5. 4<sup>th</sup> vertical.
6. Spinal cord.
7. Tentorium. Separates the cerebellum from the occipital lobe.
8. Tonsil. The most inferior part of the cerebellum.
9. Vermis. The median part of the cerebellum.
10. Petrous bone.
11. Basilar artery.



## ❖ Common diseases :

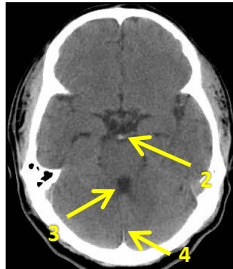
Brain diseases come in different forms. Infractions, trauma, infections, strokes, seizures and tumors, but in this lecture we will talk about only **Infractions** and **tumors** in the brainstem and cerebellum.

### ➤ Infraction .

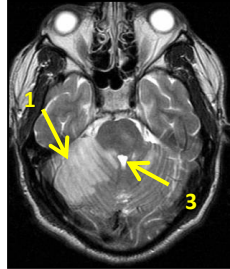
Caused by Thrombosis obstructing the basilar artery.



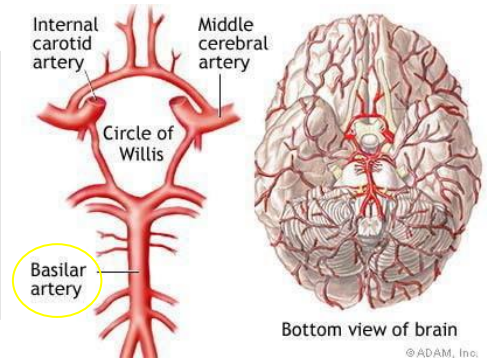
MRI axial FLAIR



CT axial



MRI axial T1WI



Bottom view of brain  
© ADAM, Inc.

1. **Infraction** (due to basilar artery thrombosis).
2. **Basilar artery** (hyperdense due to thrombosis).
3. **4<sup>th</sup> ventricle**.
4. **Vermis**.

### ➤ Tumors .

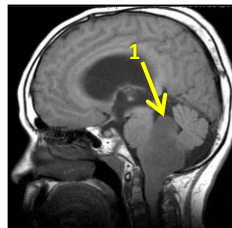
#### • Brainstem glioma.

Brainstem gliomas are tumors that occur in the region of the brain between the aqueduct of Sylvius and the fourth ventricle. Brainstem gliomas account for approximately 10-20% of all childhood brain tumors. The incidence in adults is lower than that in children younger than 16 years.

-Like astrocytoma of the spinal cord.

[-For more information.](#)

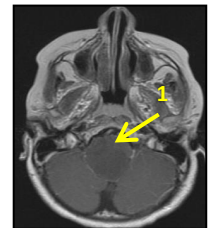
1. **Hypodense lesion.**
  2. **Hyperdense lesion.**
- Homogeneous lesions.



MRI sagittal T1WI



MRI axial T2WI



MRI axial T1WI contrast

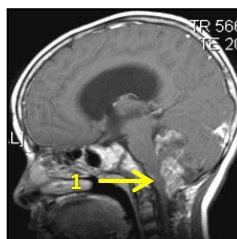
#### • Ependymoma .

Ependymomas are glial tumors that arise from ependymal cells within the CNS.

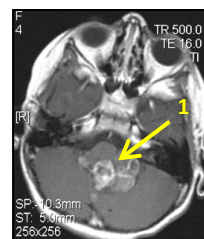
Commonly has hemorrhage and necrosis within the tumor.

[-For more information.](#)

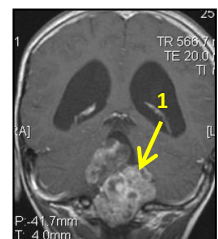
1. **Hyperdense lesion.**
- Heterogeneous lesion.



MRI sagittal T1WI contrast



MRI axial T1WI contrast



MRI coronal T1WI contrast

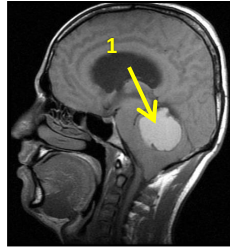
- **Hemangioma .**

Cushing and Bailey introduced the term hemangioblastoma. It refers to a benign vascular neoplasm that arises almost exclusively in the central nervous system.

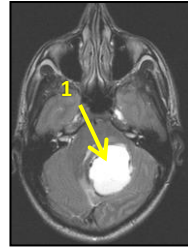
Mostly there all pediatric tumors and they appear in the posterior fossa.

[-For more information.](#)

1. **Well demarcated Hyperdense cystic lesion With thick walls.**



MRI sagittal T1WI



MRI axial T2WI

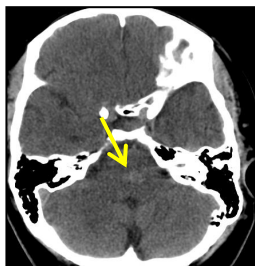
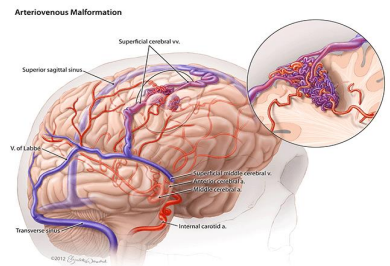


MRI coronal T1WI contrast

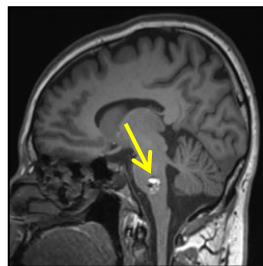
- **Cavernous angioma . popcorn like**

Cavernous angiomas belong to a group of intracranial vascular malformations that are developmental malformations of the vascular bed. These congenital, abnormal vascular connections frequently enlarge over time. The lesions can occur on a familial basis.

[-For more information.](#)



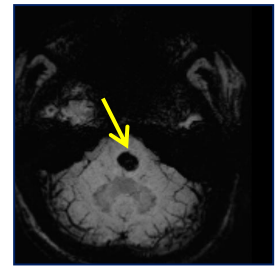
CT



MRI sagittal T1WI



MRI axial T2WI



MRI axial SWI



# Thanks for checking our team!

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## Suffer now and live the rest of your life as a great doctor !

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For any suggestions or questions please don't hesitate to contact us on:

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- Radiopaedia website.
- Medscape website.

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