

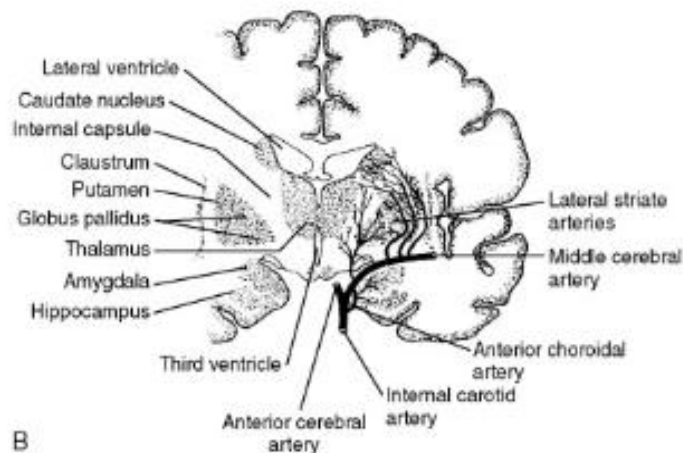
X-ray Sections in the brain : “ dr. hadeel part”

1. First section is a **coronal section at the level of the parietal lobe**

➤ how do we know it's at parietal ?!

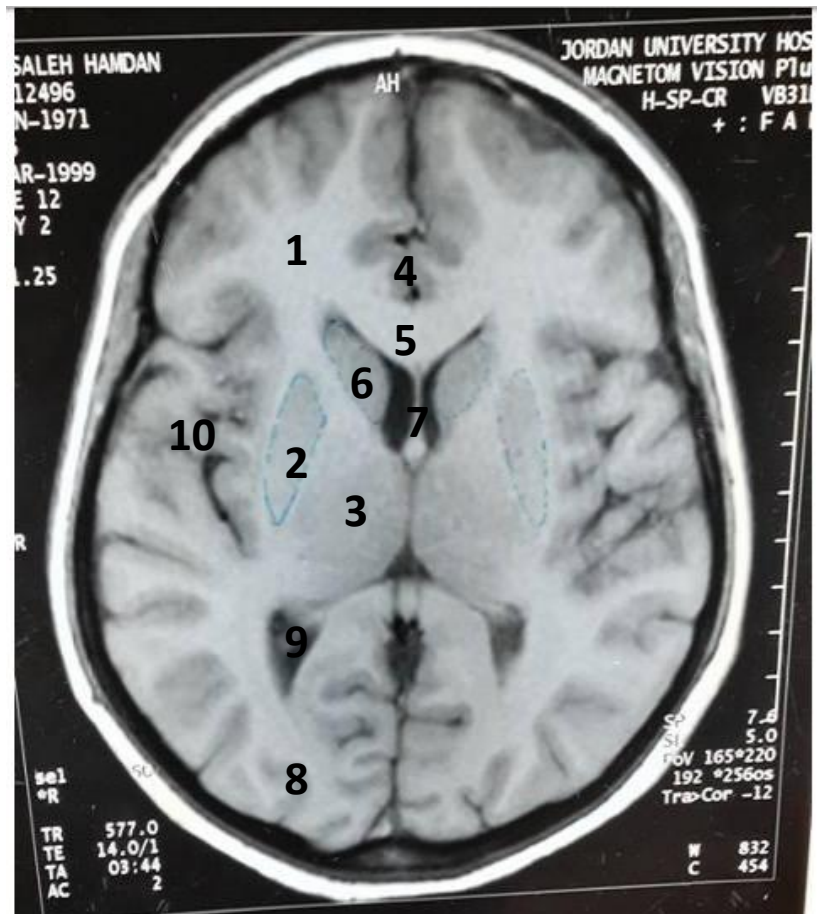
whenever you see **the brainstem** then it's at parietal lobe

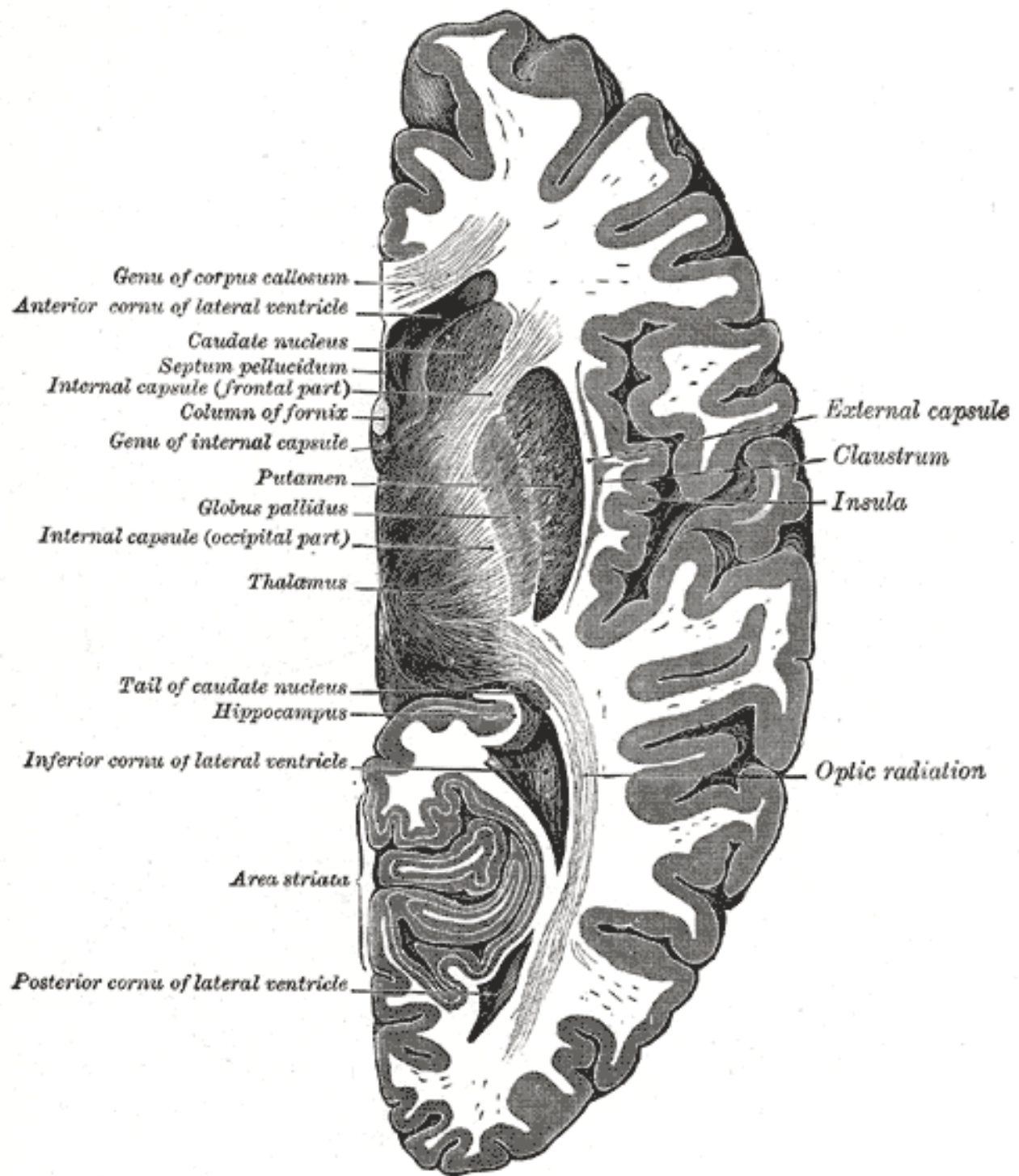
- 1) Thalamus .
- 2) Pons .
- 3) Midbrain (just below the thalamus).
- 4) the body of the 3rd ventricle.
{the ventricle of the diencephalon }
- 5) The body of the lateral ventricle . { remember its relation with the body of the corpus callosum , the body of the fornix and the body of the caudate }
- 6) The body of the corpus callosum .



2. Horizontal section :

- 1) the frontal lobe.
- 2) Lentiform nucleus { it's hard to identify if it's globus pallidus or putamen }
- 3) Thalamus
- 4) cingulate gyrus
- 5) corpus callosum
- 6) Septum leucidum covering the anterior horn of lateral ventricle .
- 7) The fornix .
- 8) Occipital lobe
- 9) the post horn of the lateral ventricle .
- 10) insula , it's separated from the lentiform nucleus by the external capsule, claustrum and the extreme capsule { lateralward from putamen }



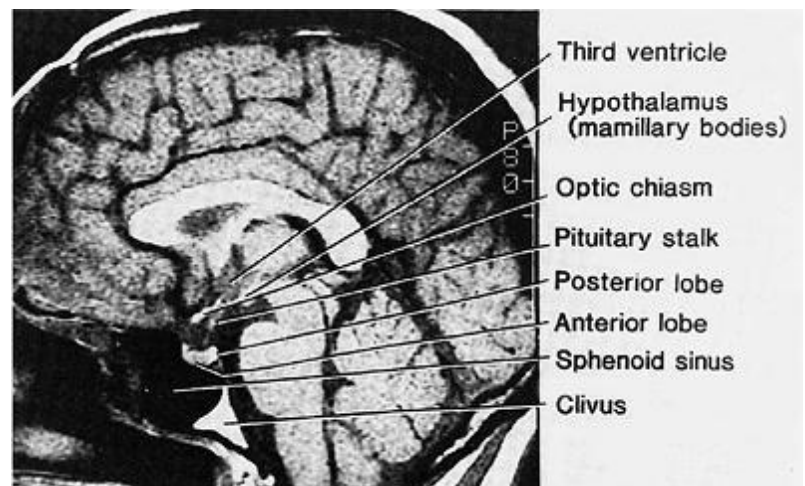


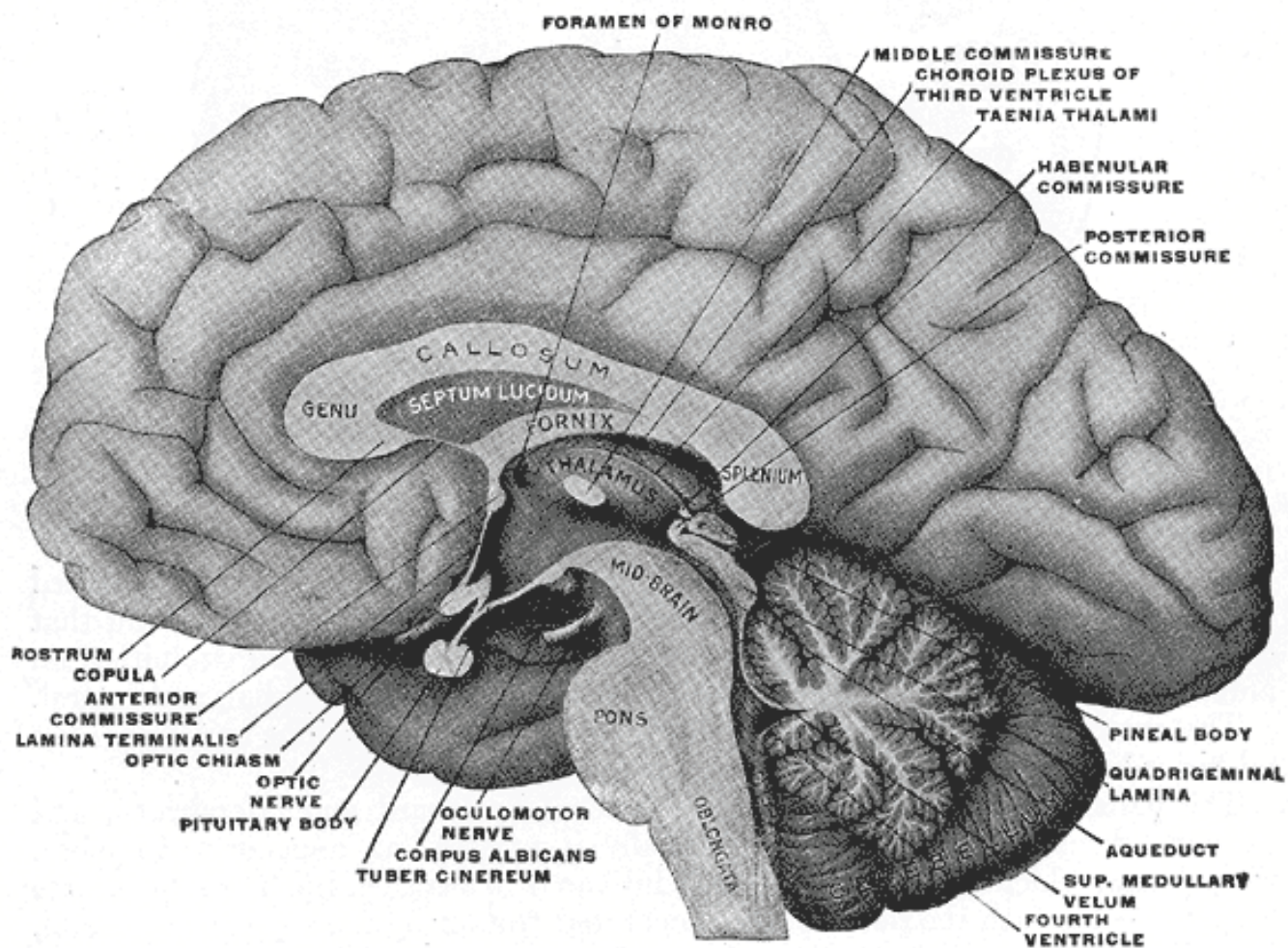
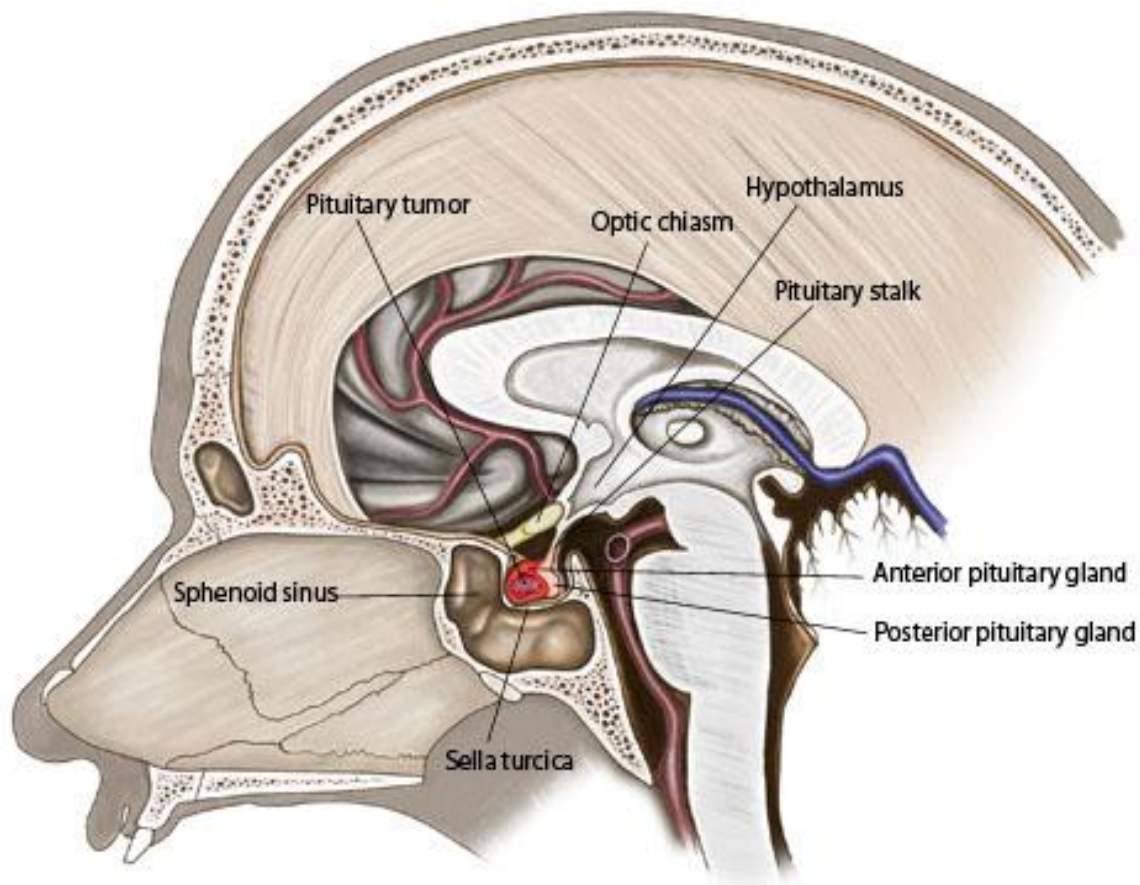
3.Sagittal section .

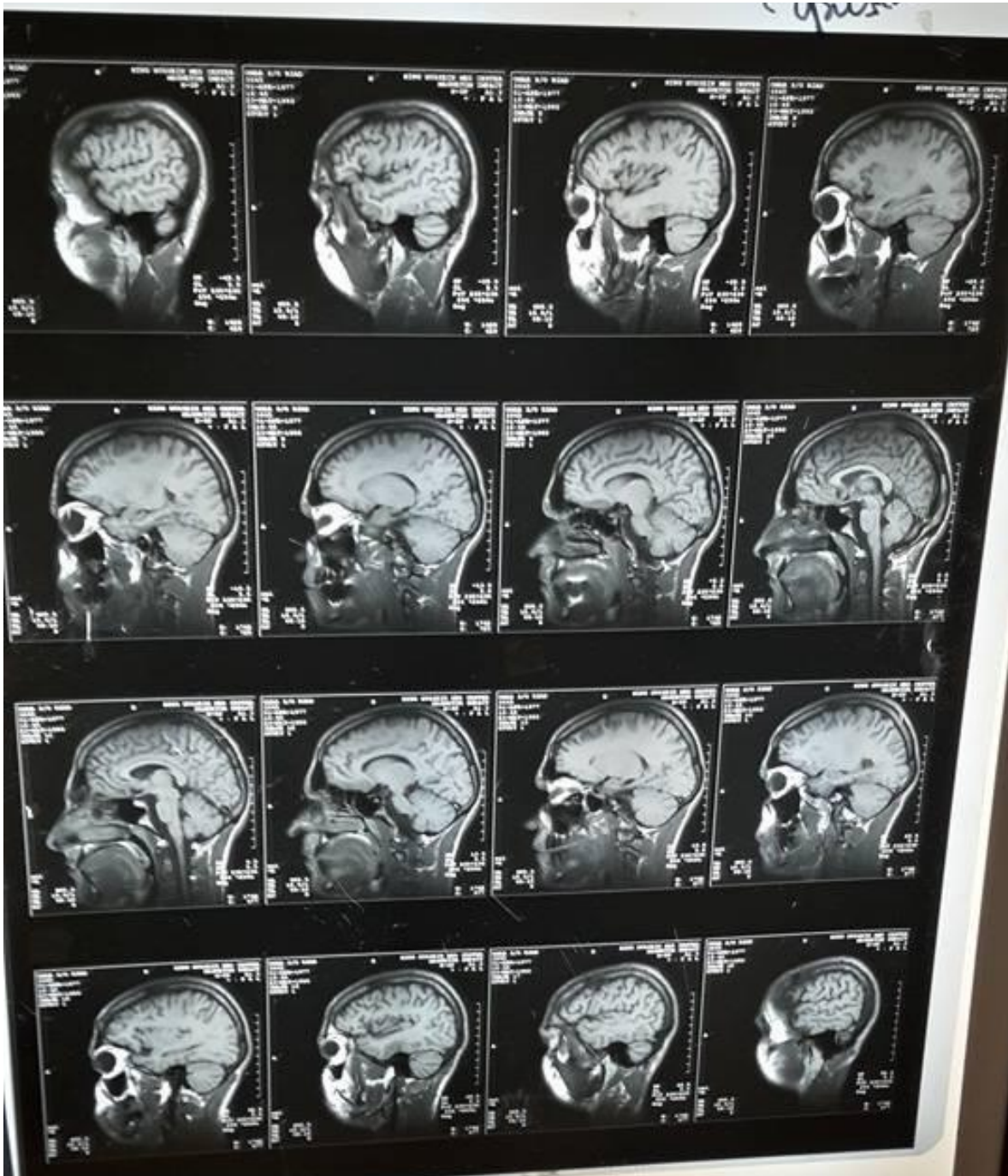
- 1) The corpus callosum with all its parts .
- 2) Frontal lobe .
- 3) Parietal lobe.
- 4) Occipital lobe
- 5) Cerebellum .
- 6) Thalamus
- 7) Midbrain
- 8) Pons
- 9) Medulla oblongata.
- 10)Spinal cord .
- 11)Sella turcica
- 12)Optic chiasm (tumor in pituitary gland may compress the optic chiasm lead to bitemporal hemianopia).



- 13)We can see also the Soft palate ,
Hard palate ,Tongue ,
Oropharynx and Nasopharynx



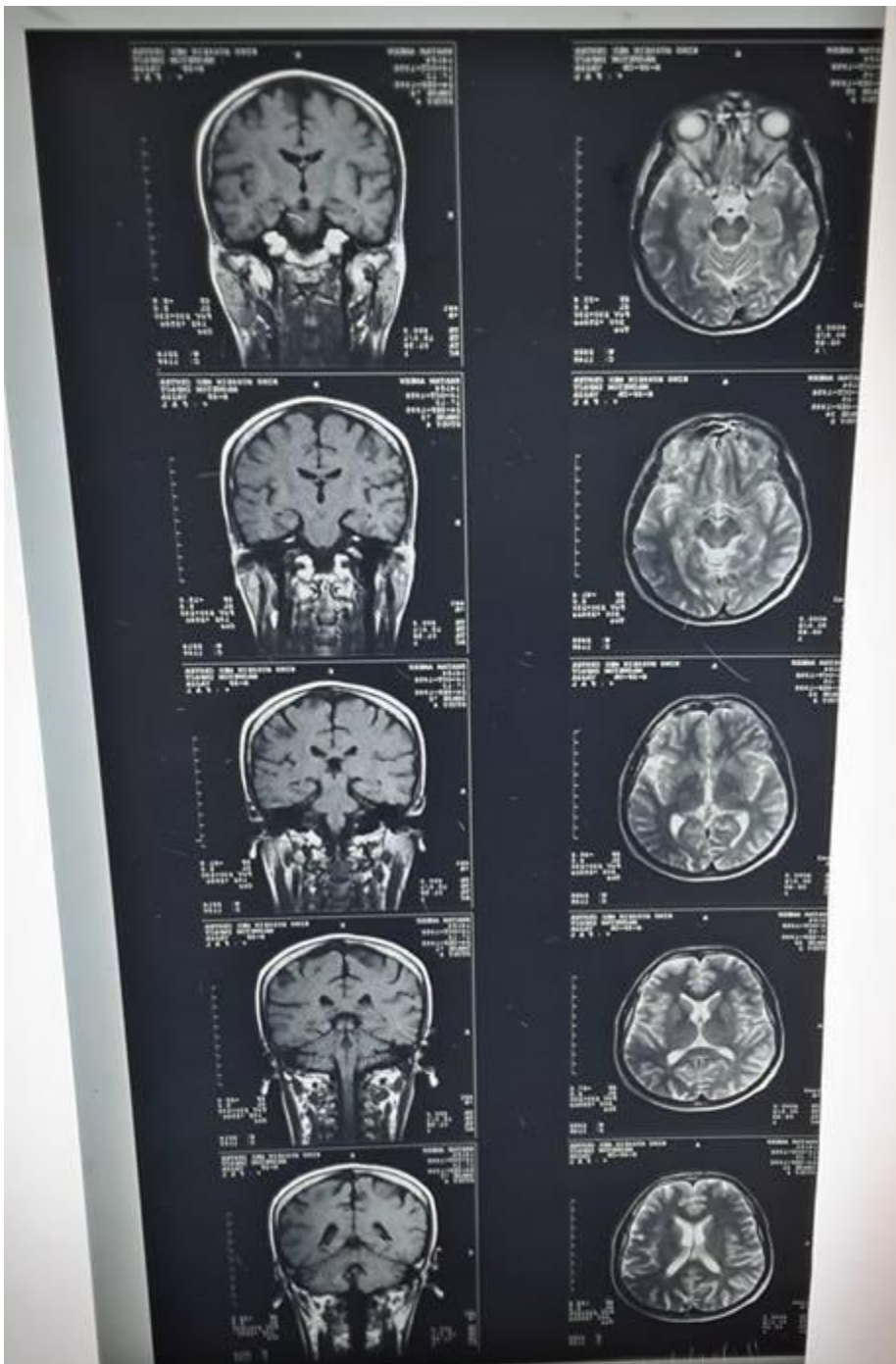




Sagittal sections at different levels , you have to identify each section .

Notice the change in the size of the cerebellum .

These are sagittal sections: we begin with parasagittal sections then sagittal then again parasagittal. The upper first picture on the left shows the lateral surface of the brain which have an important fissure called the lateral fissure .



Coronal sections from ant. To post. .

You have to identify each section at which level it's taken and the structures that present in each one

The upper three sections>> This is a coronal section passing in the body of lateral ventricle, why?
Because the brain stem is visible and above the brain stem is the thalamus.

Boundaries of the body of lateral ventricle : above it is body of corpus callosum below it is the body of caudat.

We can see the third ventricle (the black area between the two thalamus), then mid brain and pons (notice the middle cerebellar peduncle appear as projections on both sides of pons).

The lower two sections>> As we go backward, the brainstem starts to disappear being replaced by the cerebellum. as we go backward further ,the parietal lobe become occipital, below it is the cerebellum. So whenever you see cerebellum you should know that the occipital lobe is located above it.

The black area in the occipital lobe >>> posterior horn of lateral ventricle.

What is located between the cerebellum and cerebrum? Tentorium

<https://www.imaio.com/en/e-Anatomy/Head-and-Neck/Brain-MRI-3D> >>> useful to understand the sections

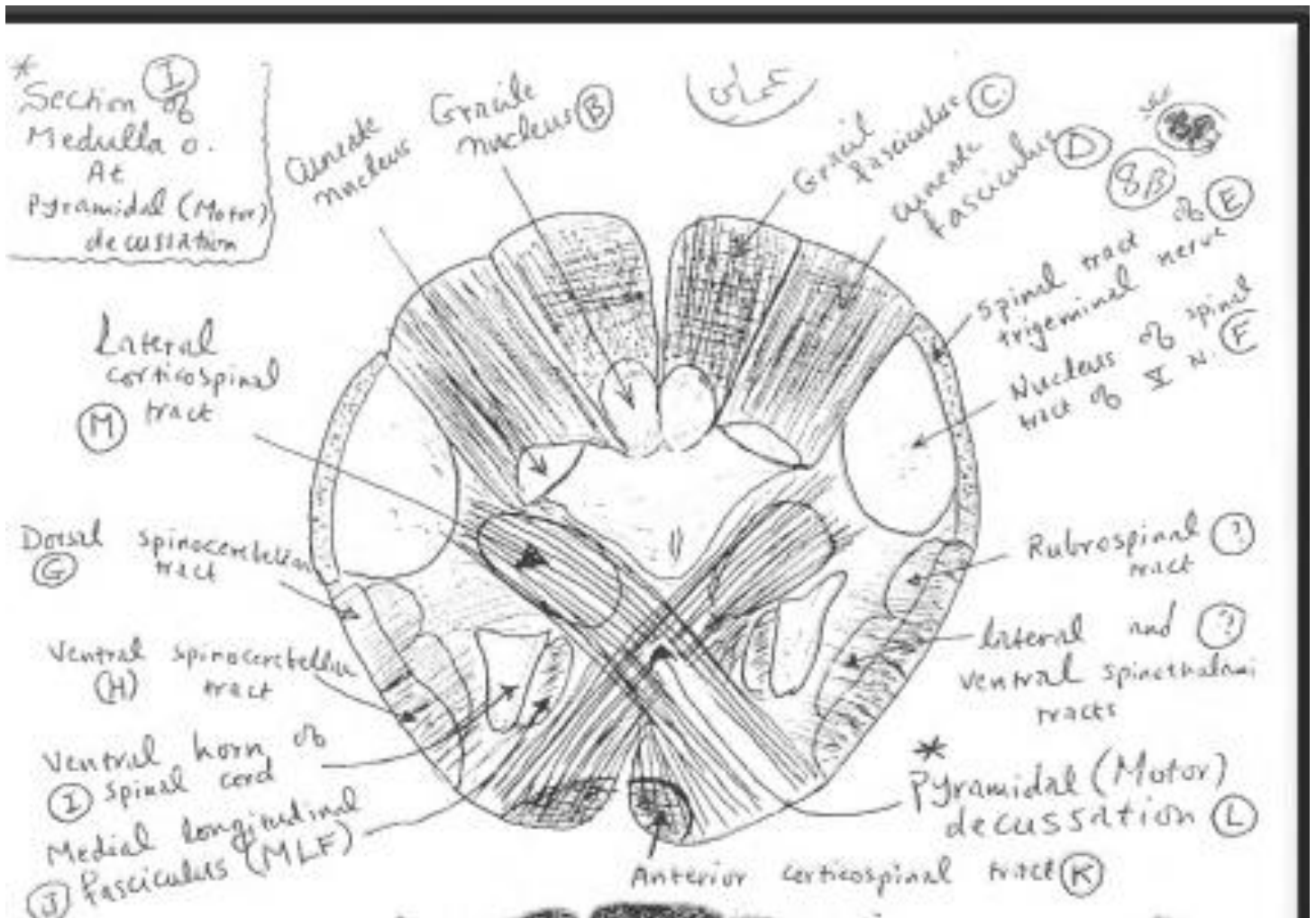
Sections in the medulla and pons “ dr. Faraj part “

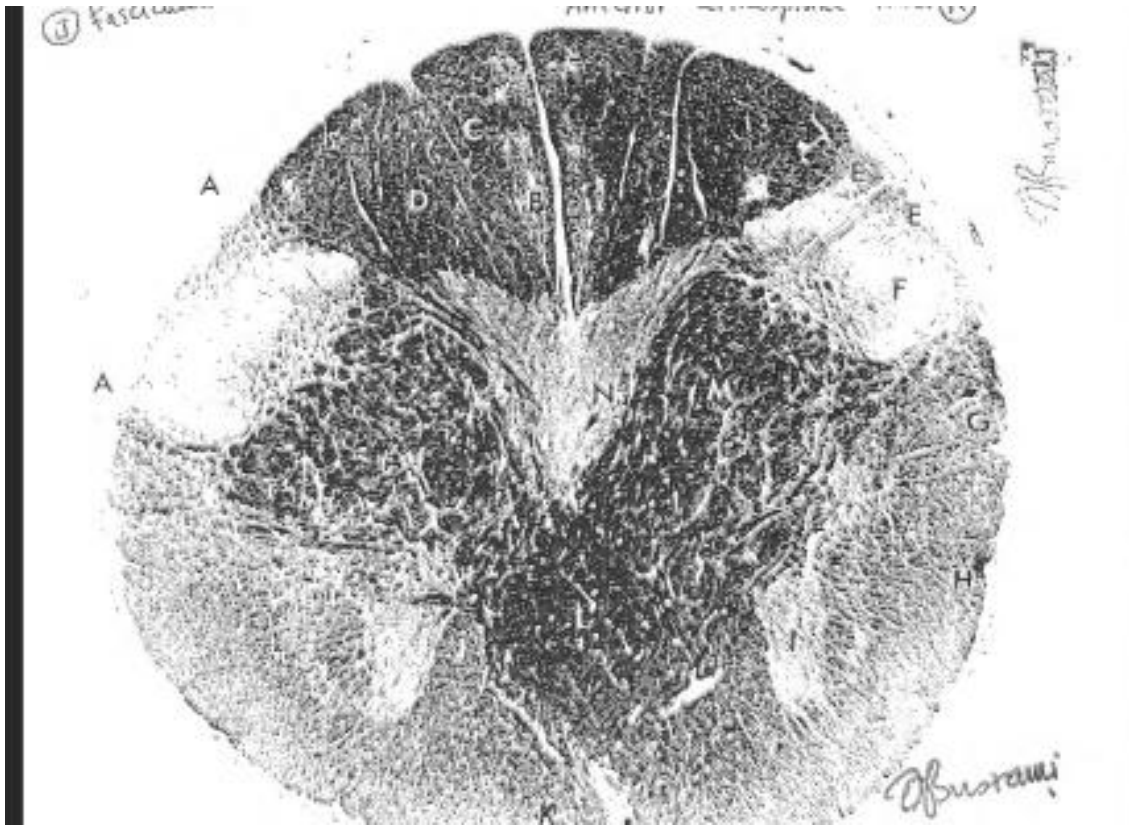
➤ **First section at the lower third of the medulla oblongata :**

- This section is called closed medulla _bcz of cuneate and gracile fasciculus { parts of the dorsal column system }_ at the level of motor decussation .
- The most important feature her is the motor decussation; as we know 90% of the corticospinal tract decussate >> lateral corticospinal tract , the 10% which don't decussate >> ventral corticospinal tract { most of its fibers decussate at the level of the spinal cord } .
- Both the lower and the middle thirds contain central canal just like the spinal cord ,behind the central canal the gracile and cuneate fascicule . As we go upside the central canal opens into the forth ventricle but the upper third there are no gracile and cuneate fascicule !
- **Remember :**
 - gracile is medial and cuneate is lateral .
 - gracile nucleus and cuneate nucleus are 2nd order neurons in the dorsal column sensory pathway .

➤ as we go up in the medulla the tract become smaller and the nuclei become larger.

- The spinal trigeminal tract and nucleus >>> part of the trigeminal pathway .
- Make sure that you identify the pyramidal , extra pyramidal tracts , the ventral horn of the spinal cord and the MLF .
- The spaces between all these tracts are filled with Reticular Formation .



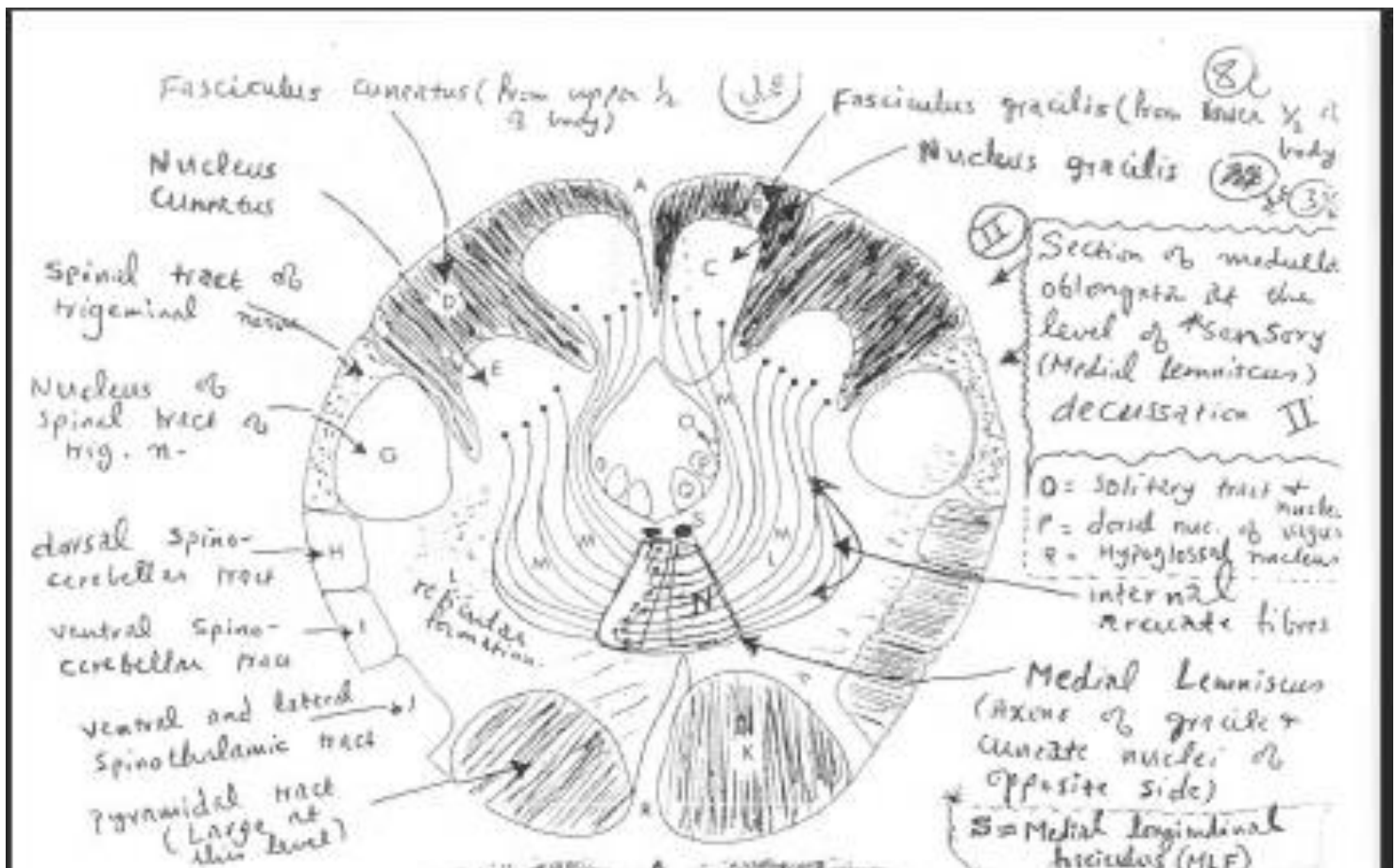


This large black area >>> the motor decussation >> the most characteristic part of this section .

➤ **2nd section : at the level of the middle third of the medulla**

- It's called section of closed medulla { due to the presence of the gracile and cuneate } at the level of the sensory decussation .
- Here the decussation of the dorsal column system occurs, remember that spin thalamic tract decussation at the level of spinal cord.
- The size of the gracile and cuneate nuclei become larger and the tracts become smaller .
- Medial lemniscus >>> the decussation of the fibers of gracile , cuneate and Z nuclei .
- Lesion in the Medial lemniscus >> CONTRALATERAL loss of the stereognosis , two point discrimination , vibration and sense of position.

- Make sure that you are able to place :
spinal trigeminal nuclei and tracts , pyramidal and extra pyramidal tracts ,MLF .
- The pyramidal tract become larger than in the lower third bcz its fibers don't cross yet.
- The medial lemniscus is extended until reach the thalamus (3rd order neuron of the sensory system) ; we can find it in all sections above the middle third of the medulla until reach the thalamus.





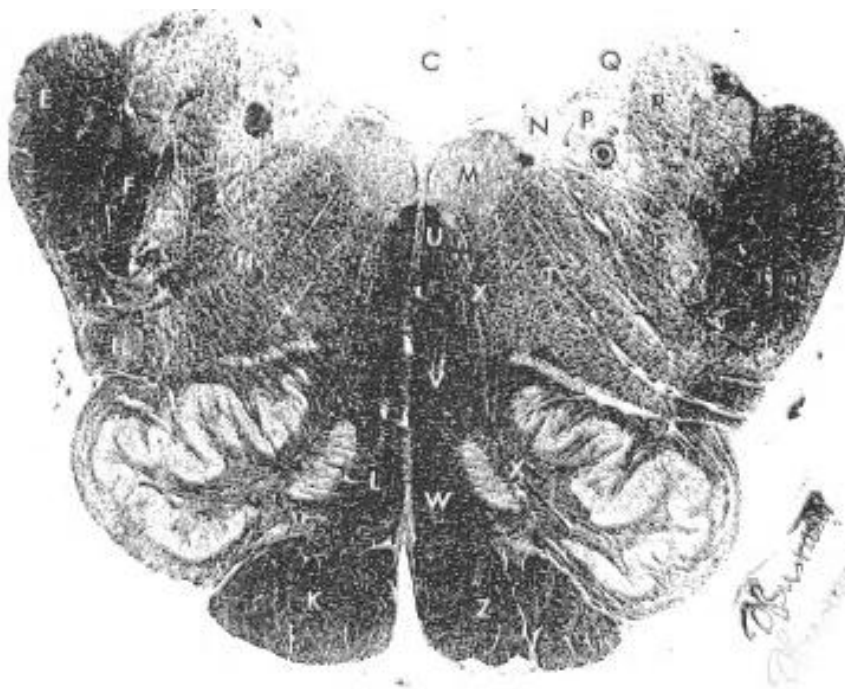
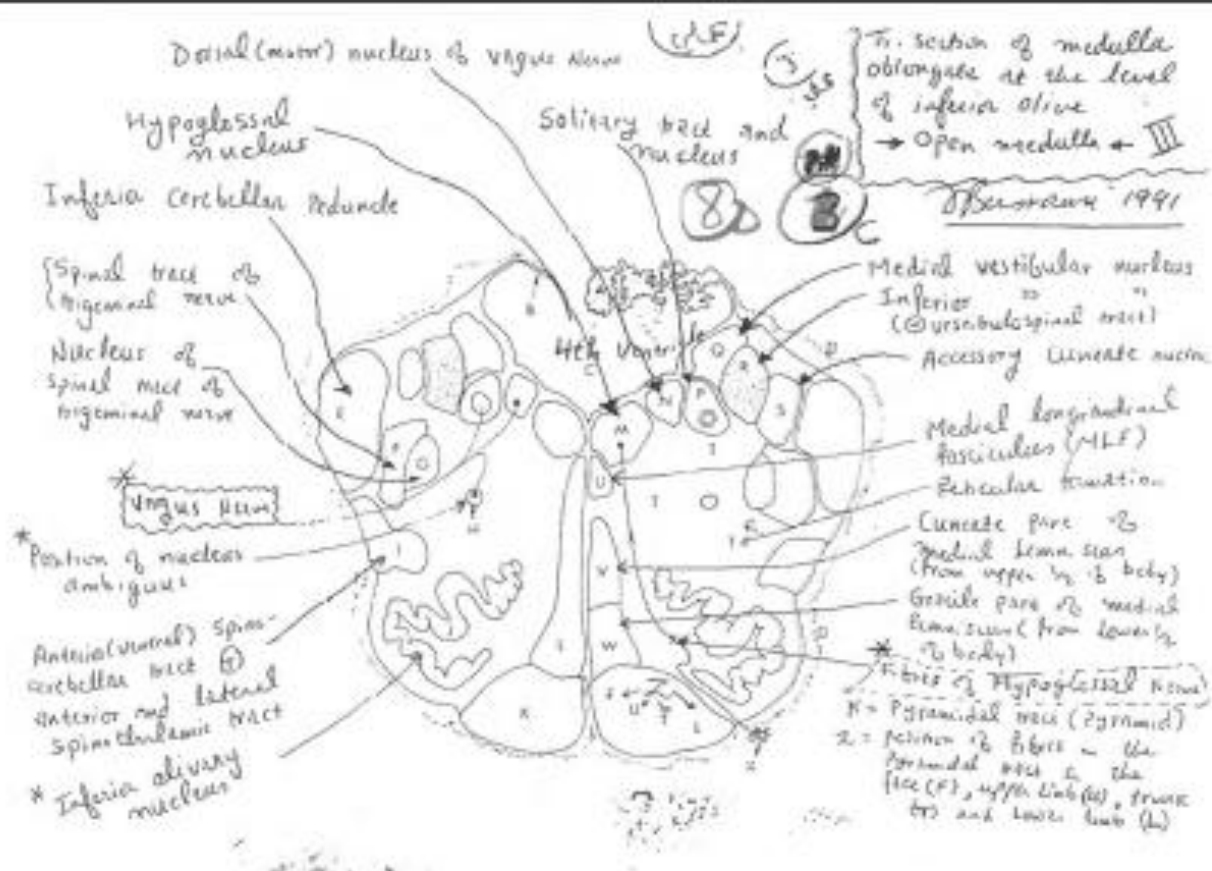
➤ 3rd section : section at the upper third of the medulla

- This section is called : section of open medulla { directly related to 4th ventricle there no gracile and cuneate tracts and nuclei ; their fibers crossed forming the medial lemniscuses } at the level inferior olive.
- The inferior olive is lateral to the pyramid.

- The most characteristic feature here is the inferior olive which is the station to collect information about the intended movement from the cortex /basal ganglia /red nucleus and send them to the cerebellum.
- Just posterior to the inferior olive there is the inferior cerebellar peduncle .
- The floor of the 4th ventricle , there is gray matter which contains a lot of nuclei from medial to lateral >>

hypoglossal nucleus , dorsal nucleus of vagus { parasympathetic part of the vagus } , solitary nucleus {for taste} , medial vestibular nucleus , inferior vestibular nucleus , accessory cuneate nucleus { cuneocerebellar tract from the muscle spindles in the upper limbs to the cerebellum }.
- Hypoglossal nerve emerge between the pyramid and inferior olive .
- Nerves for taste : 7th /9th /10th cranial nerves.
- Make sure you are able to place the spinal trigeminal tracts and nuclei just medial to the inferior peduncle .also, the cuneate and gracile parts of the medial lemniscuses.
- Remember : the vestibular nerve >> 4 nuclei >> 2 in pons { lateral and superior } and 2 in medulla { medial and inferior } .
- 9th /10th / 11th cranial nerves between the inferior peduncle and the inferior olive.
- MLF >> medial to the hypoglossal nucleus .
- The rest of the section filled with reticular formation .
- Nucleus ambiguus : this nucleus migrate from the floor of the 4th ventricle inside >>> this nucleus for some parts of 9th/10th/ cranial 11th cranial nerves to supply special muscles { pharynx , larynx and palate muscles } >> its lesion results in nervous dysphasia { the pts cannot swallow fluids }
- The accessory nerve >> two parts : cranial and spinal . the spinal accessory nerve supply trapezius and sternocleidomastoid.
- The cranial accessory is complementary to the vagus; the pharyngeal and laryngeal branches of vagus are cranial accessory in origin .

- Vagus nerve is related to Nucleus ambiguus, dorsal nucleus of vagus, solitary nucleus and the spinal trigeminal nucleus.
- If we stimulate the branch of vagus that goes to the external ear >> inhibitory effect on the heart {bradycardia ,,,etc}

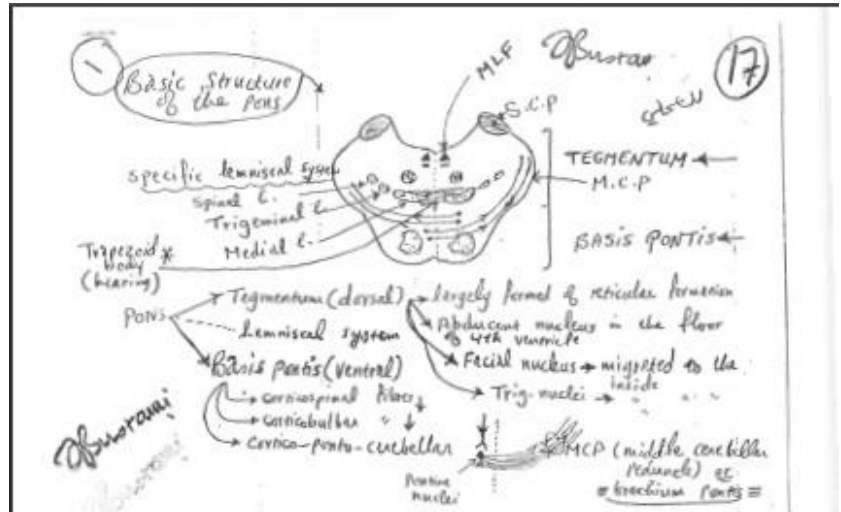


➤ 1st section in the Pons : at the lower 1/3 of the Pons

- Before that we have study the basic structure of the Pons : Tegmentum { dorsal and contains RF } and basis pontis { ventral parts contains crossed fibers as shown in the figure } in between lemniscal system.

- Lemniscal systems : just like continuation of the sensory pathways :

- 1) Medial : the decussation of the sensory fibers from the cuneate , gracile and Z nuclei .
- 2) Lateral : auditory system .
- 3) Spinal .
- 4) Trigeminal .



- The middle cerebellar peduncle >>> axons of pontine nuclei in the opposite side.
- The basis pontis >> ventral { pyramidal fibers } and horizontal { cortico-ponto-cerebellar } fibers .
- **The first section to be discussed is the section at the level of abducent and facial nuclei.**
- Through the SCP > dentate-thalamic- cortical fibers pass .
- At this section : the three peduncles appear .

- The site of the nuclei as mentioned before should be at the floor of the 4th

ventricle but some nuclei migrate .at this section we can notice that the abducent nucleus remain in its place but the facial nuclei migrate { remember the nucleus ambiguus }.

- Facial colliculus : fibers from the facial nerve looping around the abducent nucleus .

- Make sure that you're able to identify all structures in the section .

- Central tegmental tract : collect information from the red nucleus and basal ganglia then them to the inferior olive

- In medulla , we see the medial and inferior vestibular nuclei her we see the superioior and lareral nuclei.in medulla we see dorsal and ventral spinocerebellar trascts here only the ventral spinocerebellar tract bcz the dorsal spinocerebellar trasct enter through ICP into cerebellum.

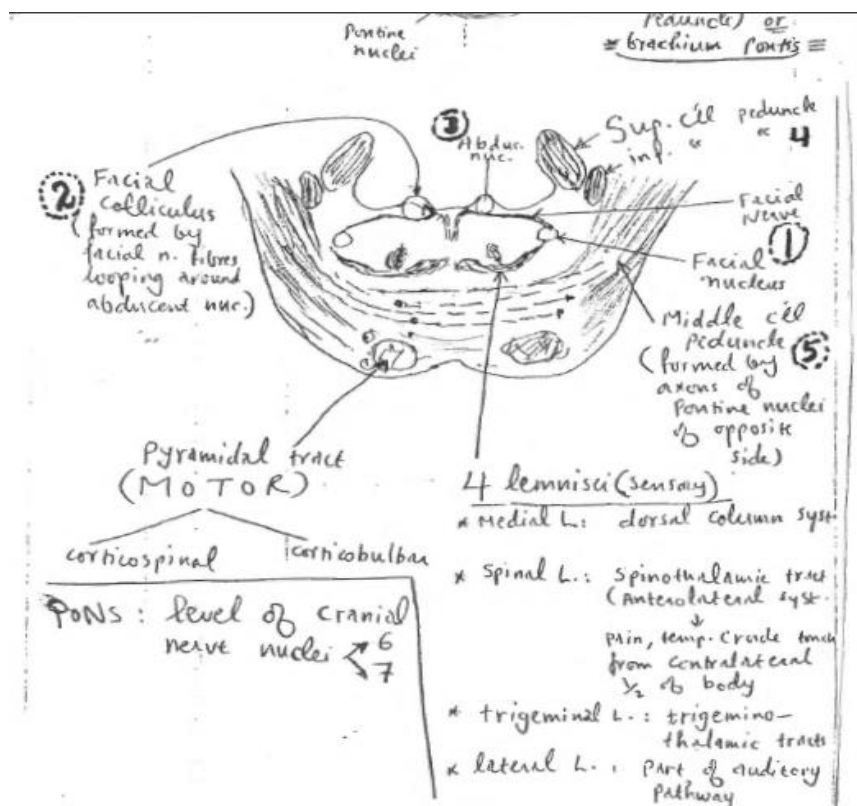
- Remember the pontine reticular spinal tract.

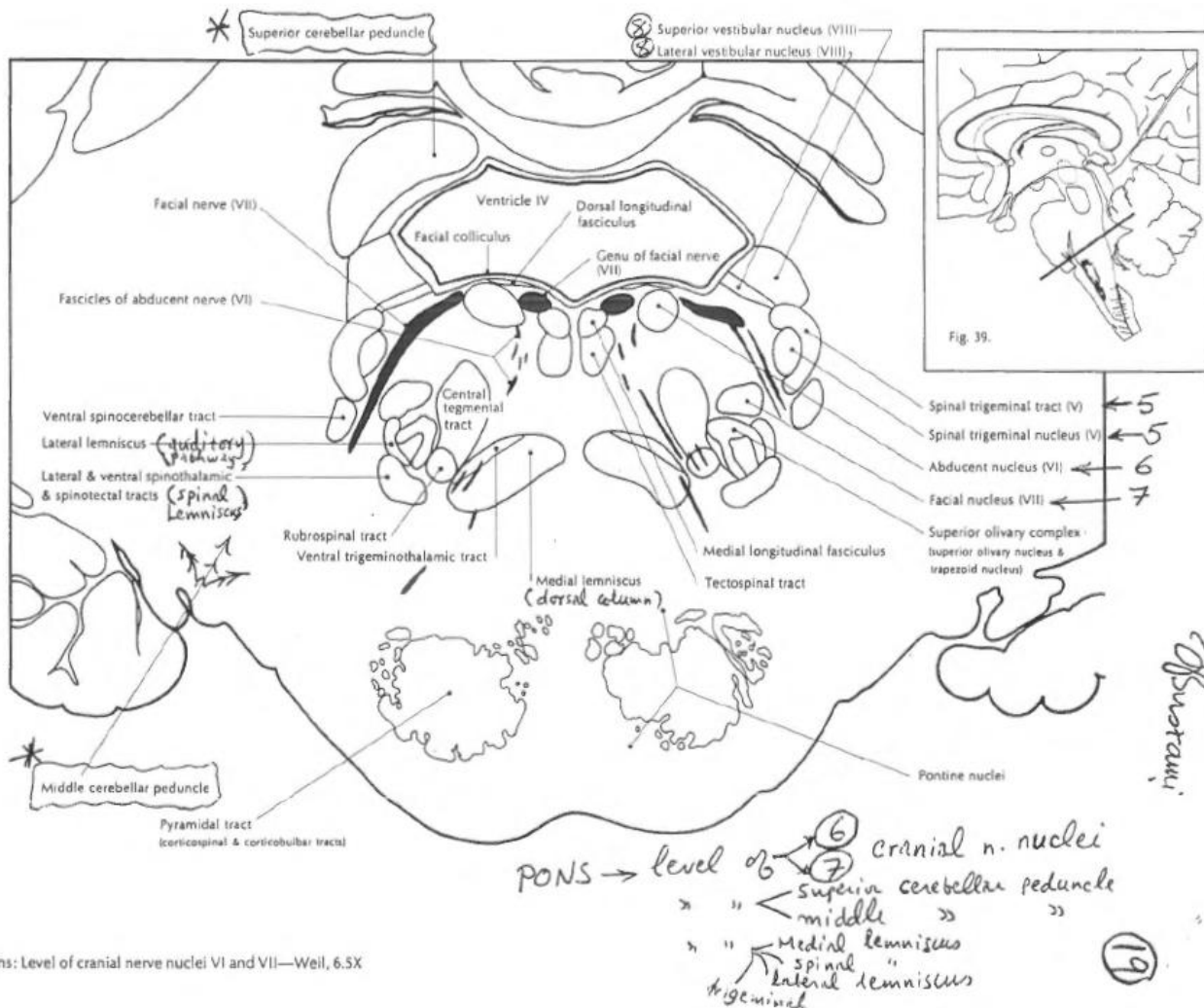
- In this section , major characteristics :

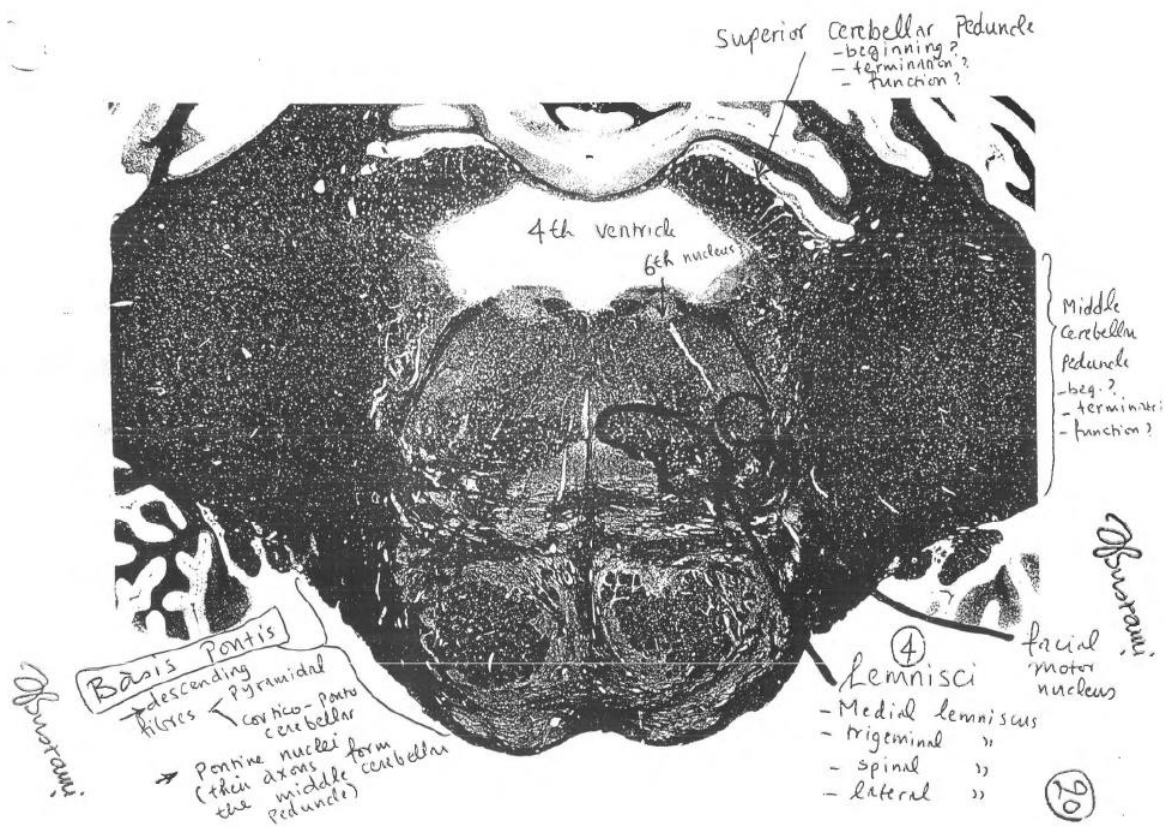
- 1) The 3 cerebellar peduncles can be found .
- 2) The 4 lemniscal systems can be found .
- 3) Vertical and horizontal crossed fibers can be found .
- 4) The facial colliculus

- The worst ataxia , when the SCP is injured.

- Lesion in the lateral lemniscus >>> impairment in hearing in both ears mainly the contra lateral side .

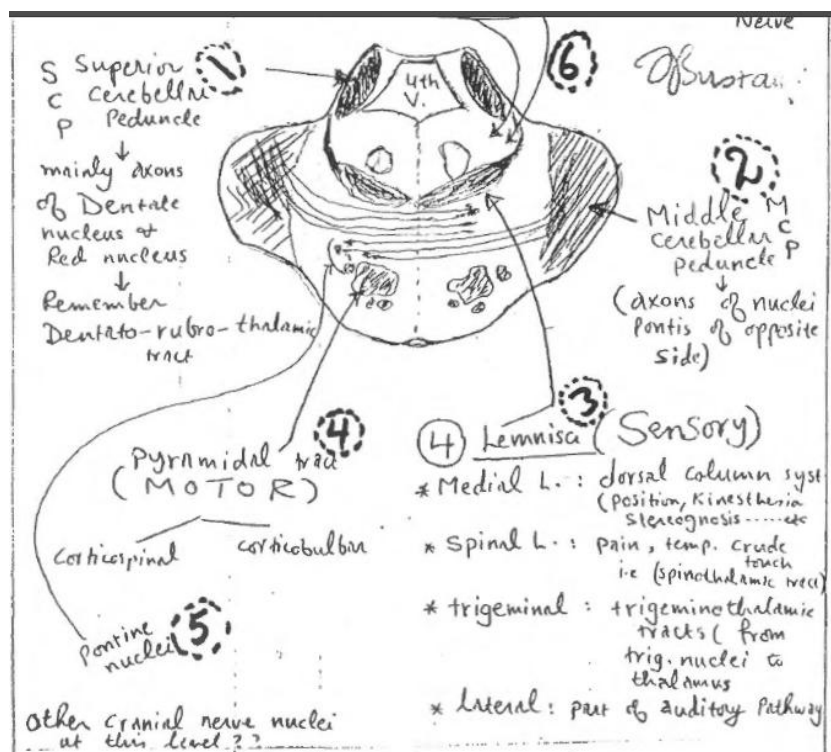






➤ Section of Pons at the level of the motor and main sensory nuclei of trigeminal nerve.

- Most of trigeminal nerve is sensory ; ophthalmic branch is pure sensory ,maxillary is pure sensory but the mandibular branch is mixed.
- the 4th ventricle become smaller , in the midbrain it becomes the cerebral aqueduct.
- The doctor pointed most of the structures in the diagrammatic section so Make sure that you're



able to identify all structures in the section .

- Again the basis pontins >>> fibers pass ventral { are not apparent } and horizontal fibers.
- lesion in the motor nucleus of the trigeminal >> affect the muscles that control the opening and the closure of the mouth { masseter and lateral pterygoid muscles which are supplied by the motor part of mandibular }
- MLF >>> near the midline .

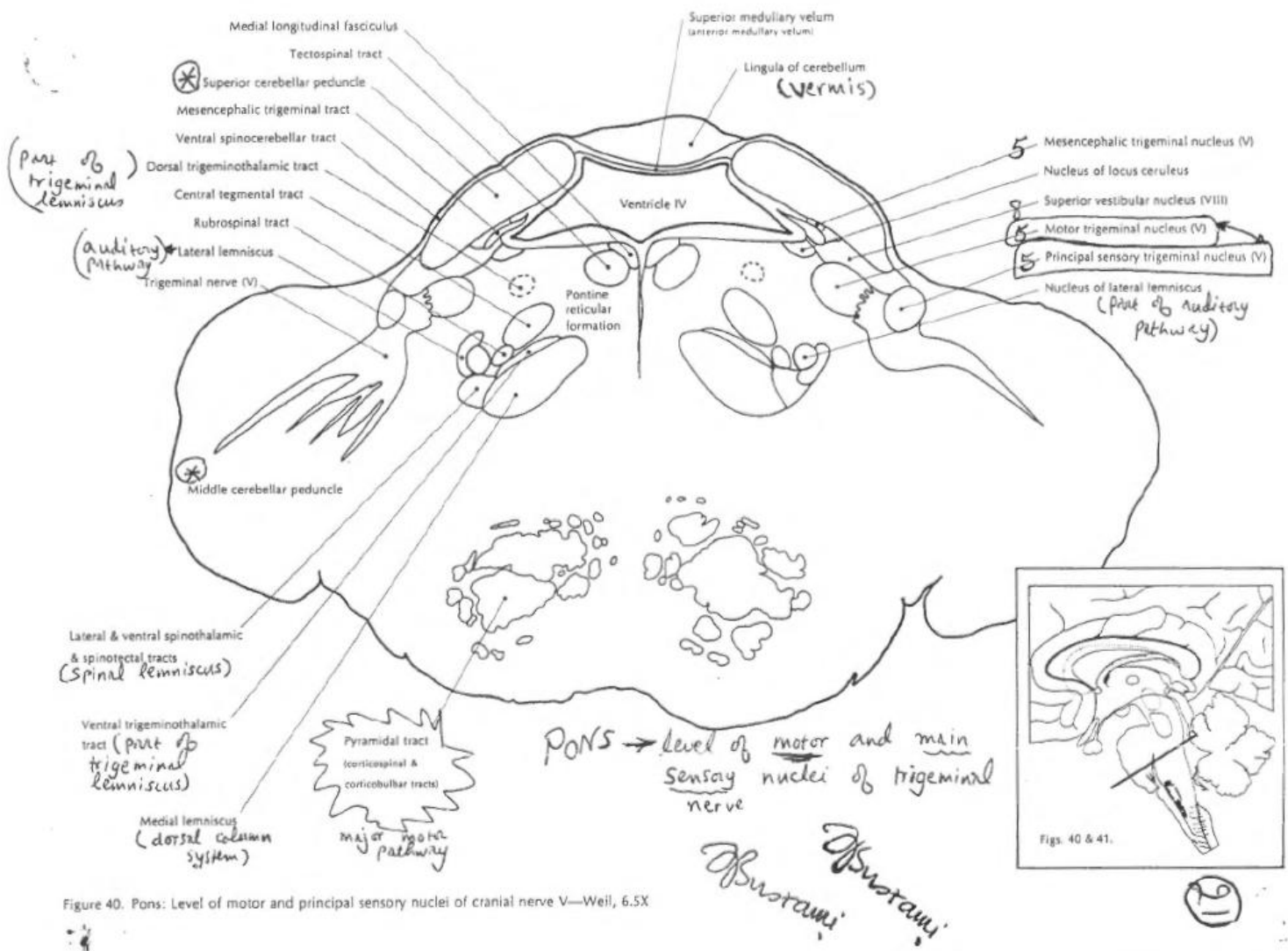
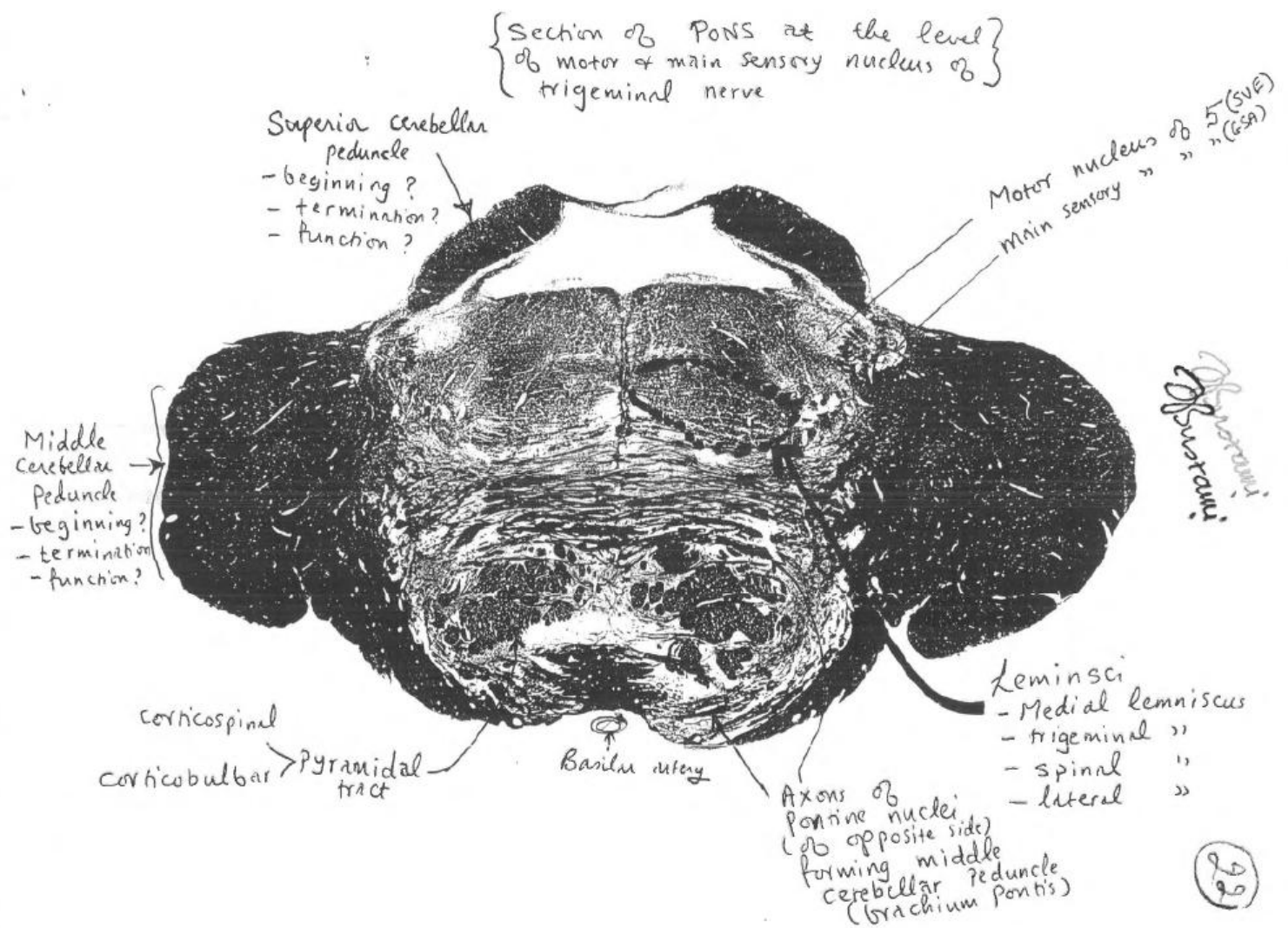


Figure 40. Pons: Level of motor and principal sensory nuclei of cranial nerve V—Weil, 6.5X



this is a real section try to point all structures !

- The doctor said the he may point any structure in any of these section and ask about the lesion in this area , its blood supply, how the lemniscal systems are formed,,, etc .