

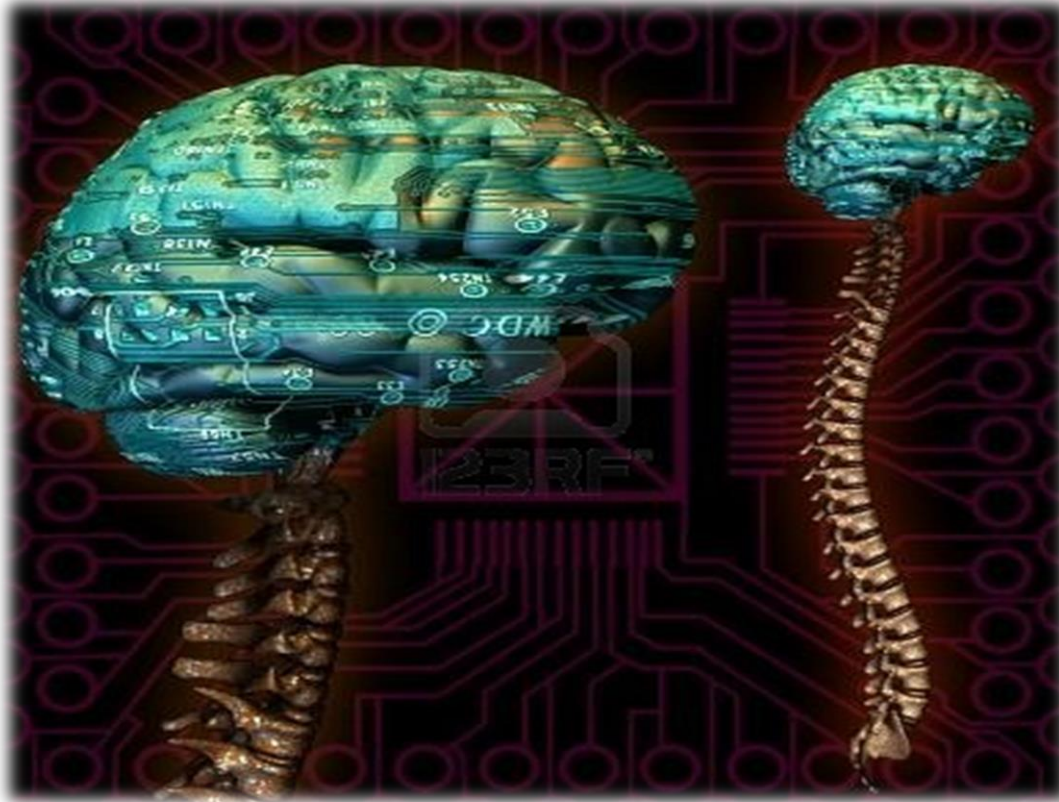


CNS Block

OSPE

Anatomy Team
432 

Best of Luck 😊



Done by : Eman alBediea _ Noor alZahrani_ Fahad Alshayhan_ Majed AlAsheikh

بما أنه المراجعة هالبلوك ما كان فيها أي بيانات أو معلومات تساعد ، حاولنا قدر الإمكان نغطي جميع النقاط اللي ركز عليها البروف في المراجعة و اعتمدناها منه .
لكن من باب الاحتياط إذا جابوا أي أسئلة غيرها أضفنا أسئلة من ملف العام و أضفنا بعض الأشياء من مجهودنا الشخصي بحيث نكون شملنا كل شي بإذن الله .

ف لا تخافوا من عدد السلايدات و لا تنسوا انه CNS ☺



السلايدات المعتمدة من الدكتور عليها هـ العلامة

- بالنسبة للرادولوجي في كم صورة بالأخير و ان شاء الله ما يطلعوا منها بس حاولوا تاخذوا فكرة أكثر .

بالتوفيق لكم جميعاً..

In general, doctor focuses on the identification of the section given and which level is involved. For example; a section of the spinal cord, the identification is (Spinal Cord) and the level will be either (Cervical, thoracic or lumbar). Or a section of the brainstem the identification is (Brain stem – Medulla) and the level will be either (Open, mid or caudal medulla).

So the most important things to know in a given section are:

- The identification
- The most important features
- The level

e.g. (Cervical, thoracic or lumbar spinal cord). (Rostral, mid or caudal medulla).

- The disorders or diseases related to the components of the section e.g. (Spinothalamic tract lesion leads to loss of pain and temperature).

● **Sensory pathways :**

مهم و أكد البروف على أهميته



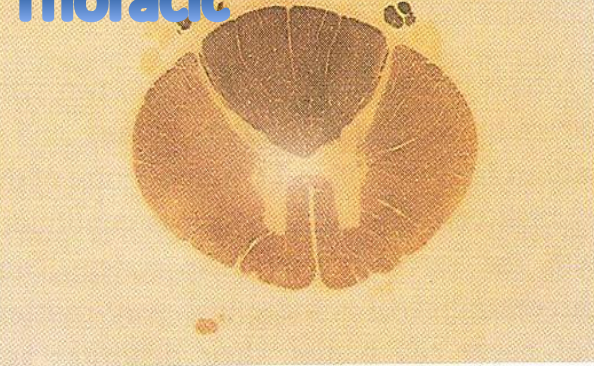
Sensory fibers	First order neuron	Second order neuron	Third order neuron	Function
<i>Fasciculus Gracilis</i>	<i>dorsal root ganglia</i>	<i>nucleus gracilis</i>	<i>ventral posterior nucleus of the thalamus</i>	<i>proprioception and , discriminative touch (lower limbs)</i>
<i>Fasciculus Cuneatus</i>	<i>dorsal root ganglia</i>	<i>nucleus cuneatus</i>	<i>ventral posterior nucleus of the thalamus</i>	<i>proprioception and , discriminative touch (upper limbs)</i>
Anterior Spinothalamic	<i>dorsal root ganglia</i>	<i>nucleus proprius</i>	<i>ventral posterior nucleus of the thalamus</i>	<i>non- discriminative “crude” touch and pressure</i>
Lateral Spinothalamic	<i>dorsal root ganglia</i>	<i>substantia gelatinosa</i>	<i>ventral posterior nucleus of the thalamus</i>	<i>pain and thermal sensations</i>
Anterior Spinocerebellar	<i>dorsal root ganglia</i>	<i>nucleus dorsalis</i>	_____	<i>unconscious proprioception</i>
Posterior Spinocerebellar	<i>dorsal root ganglia</i>	<i>nucleus dorsalis</i>	_____	<i>unconscious proprioception</i>
Olfactory (I)	<i>Bipolar cells</i>	<i>Mitral cells</i>	_____	<i>Smelling</i>
Optic (II)	<i>Bipolar cells</i>	<i>Ganglion cells</i>	<i>Lateral geniculate body</i>	<i>Vision</i>
Trigeminal (V)	<i>1-Mesencephalic nucleus 2-main sensory nucleus 3-spinal nucleus</i>	<i>Thalamus</i>	_____	<i>1-prprioception 2-touch 3-pain & temperature</i>
Facial (VII)	<i>nucleus solitarius</i>	<i>Thalamus</i>	_____	<i>Taste sesation from anterior 2/3</i>
Vestibular (VIII)	<i>Cells of Vestibular ganglion</i>	<i>vestibular nucleus</i>	<i>1-Anterior horn of SC 2-flocculonodular 3-VP nucleus in thalamus</i>	<i>Balance</i>
Cochlear (VIII)	<i>spiral ganglion in the cochlea</i>	<i>dorsal & ventral cochlear nuclei</i>	<i>inferior colliculus</i>	<i>Hearing **4th order is medial geniculate body</i>
Glossopharyngeal (IX)	<i>Superior and inferior ganglion</i>	<i>Thalamus</i>	_____	<i>Taste sensation over posterior 1\3</i>
Vagus (X)	<i>Superior and inferior ganglion</i>	<i>Thalamus</i>	_____	<i>Sensation from auricle, external acoustic meatus and cerebral dura mater, viscera of neck, thoracic and abdominal</i>



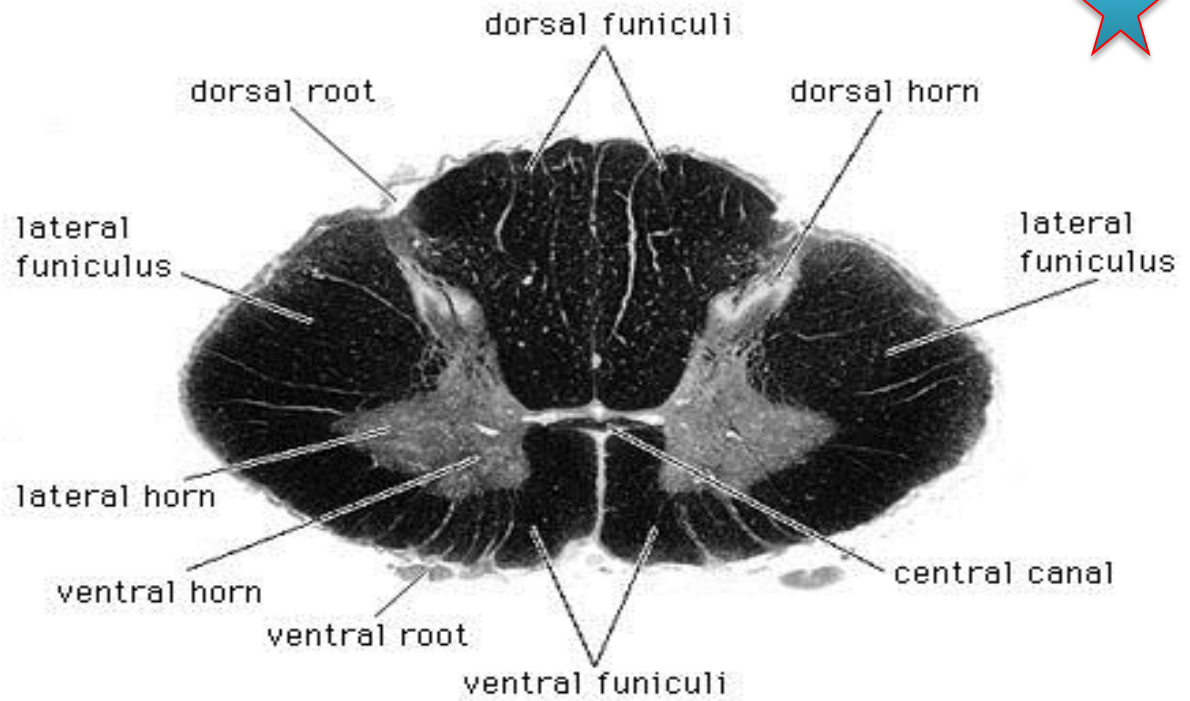
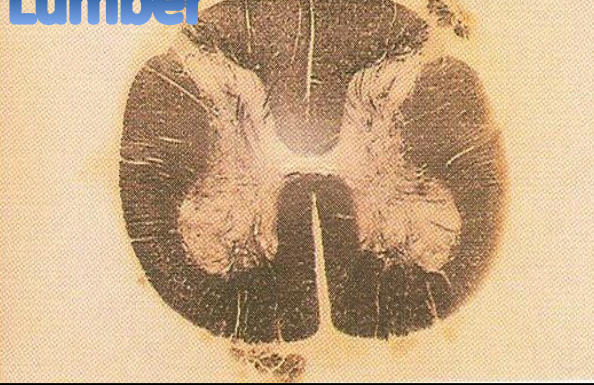
cervical



Thoracic



Lumbar

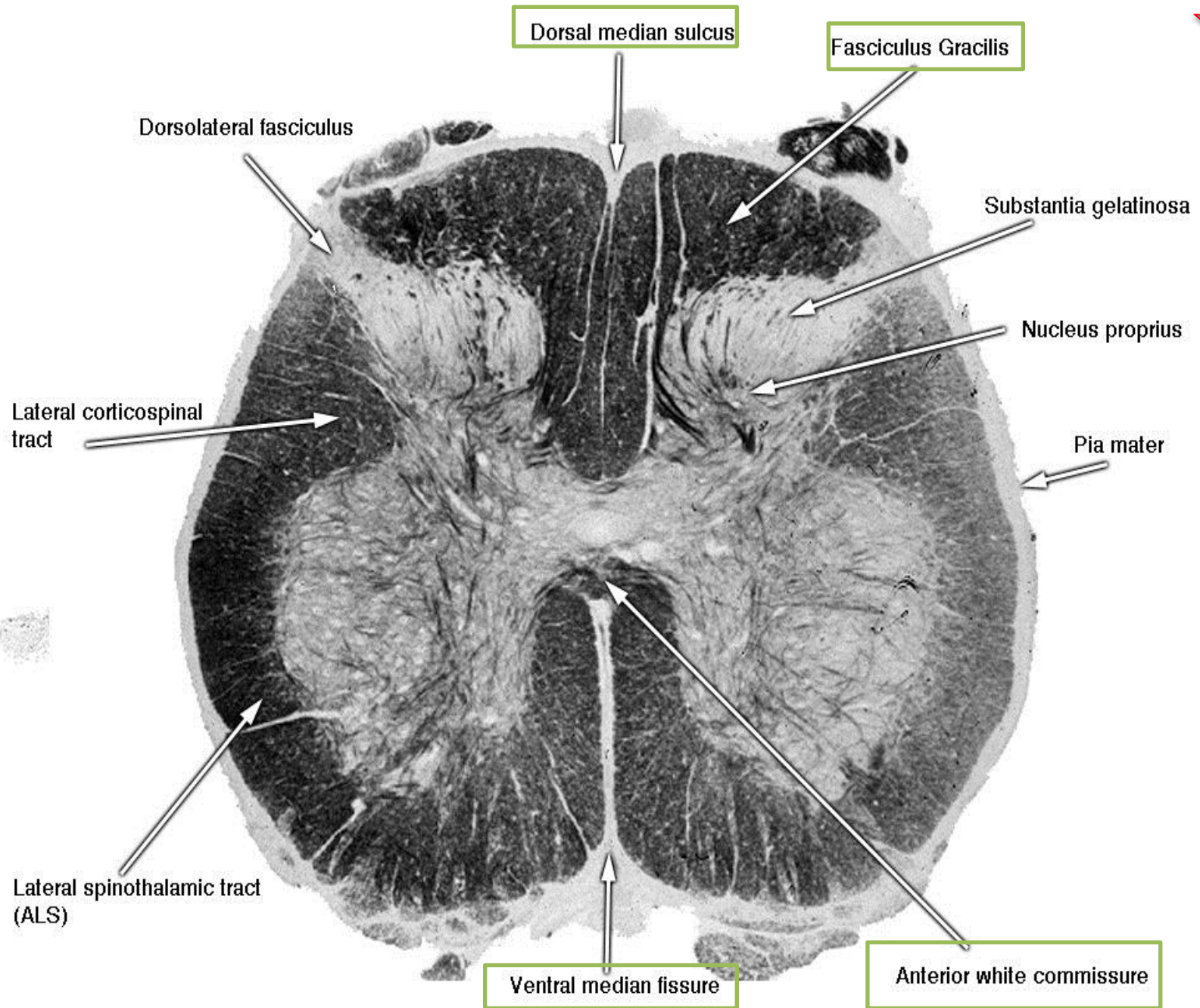


Proprioception sensation, fine touch

**Cuneat (upper limb)
Gracile (lower limb)**

**crude touch and pressure,
pain , temperature**

**Spinothalamic tracts:
1-ventral spinothalamic tract
2-lateral spinothalamic tract**



What is the level?

Identification for each section?

Internal structure?

Questions may come as a scenario for example:

Q 1:A boy has lost **proprioception sensation** in **lower limb**. which tract is affected ? **gracile fasciculus**

Region? **DORSAL COLUMN**

Q2- A patient is presented with loss of sensation in the **upper limb**, what is the affected structure? **Cuneat fasciculus**

Q3- Loss of **pain and temperature** is because of a lesion in which of the labeled areas ? (The section will be divided into areas – A,B,C and D)

Answer is: **Lateral spinothalammic tract.**



ROSTRAL MEDULLA

Open medulla :

-ICP: Inferior cerebellar peduncle.

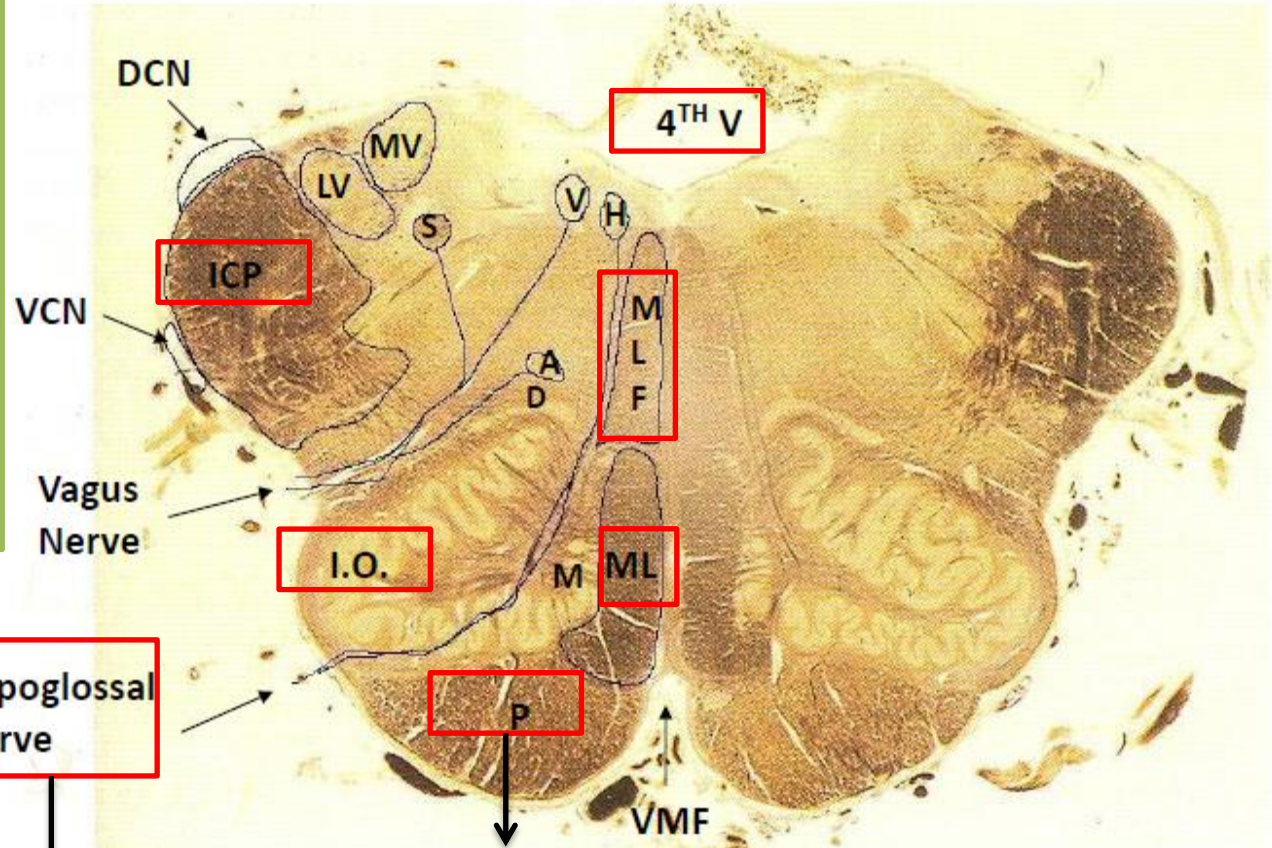
I.O: Inferior olive.

“ most important connection with Cerebellum ”

- P: pyramid (corticospinal)

-ML: Medial lemniscus

- MLF: Medial longitudinal fasciculus



Hypoglossal Nerve

Type: General somatic efferent

Supplied by : vertebral artery

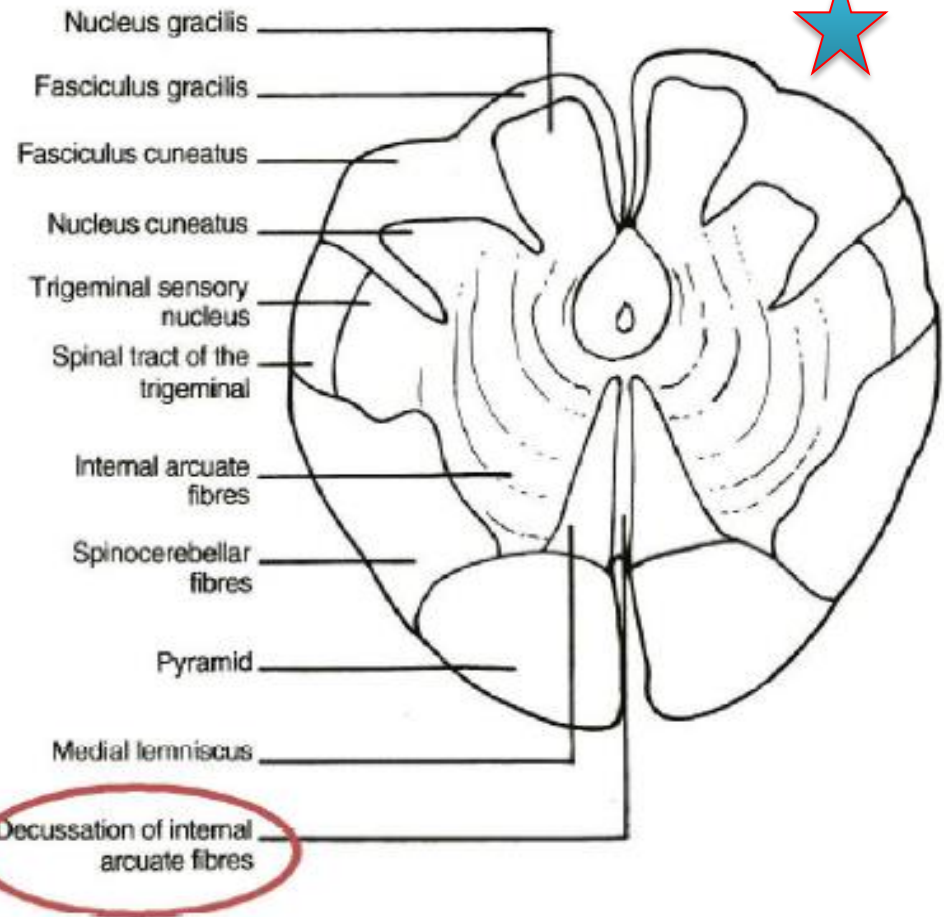
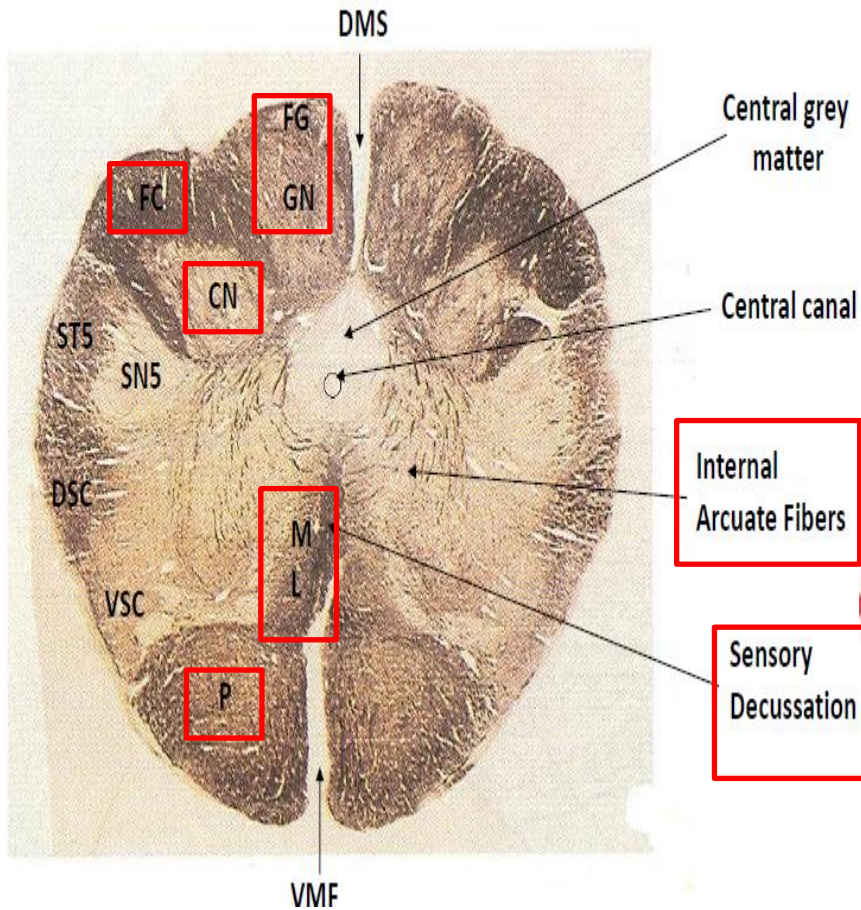
He may label the I.O and ask for one of the efferent or afferent:

-As an afferent : spino-olivary

-Efferent : olivo-cerebellum, olivo-spinal

MID MEDULLA

(LEVEL OF SENSORY DECUSSATION)



Transverse section of the mid medulla (Sensory Decussation)

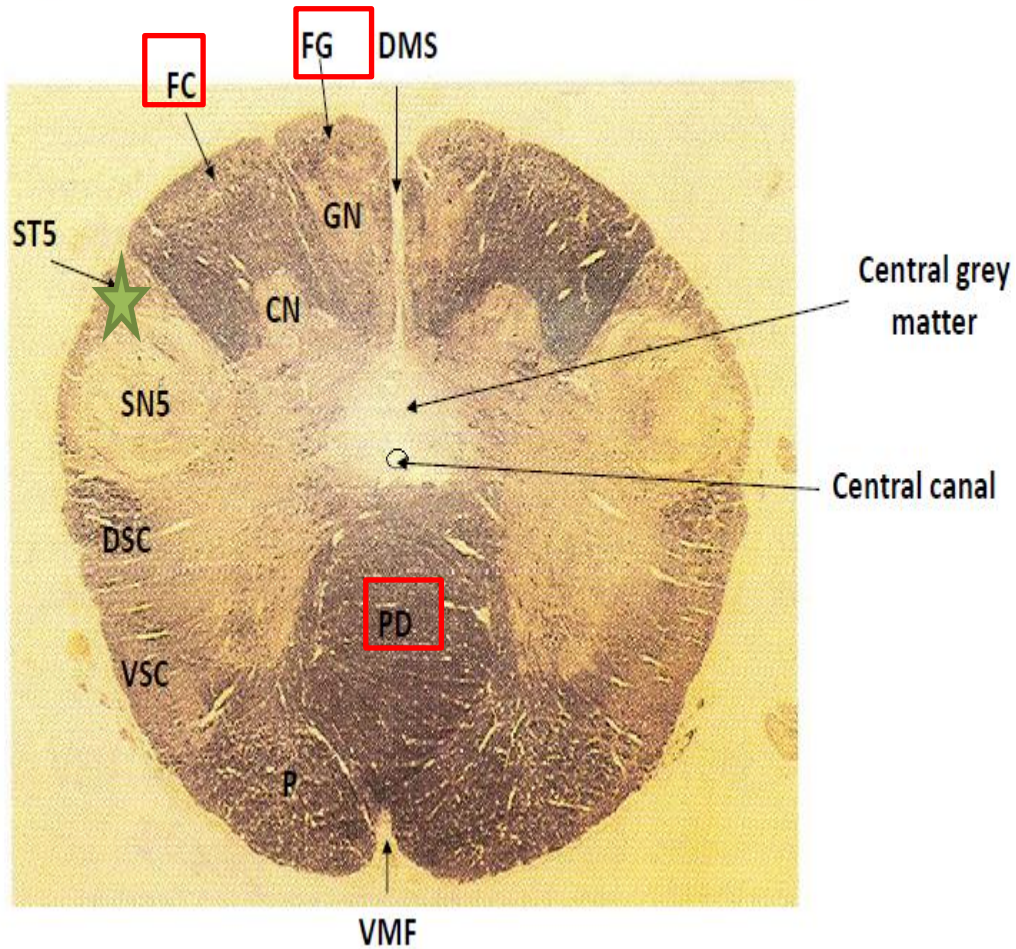
Important structures:

- 1- Nucleus gracil
- 2- Nucleus cuneat
- 3- Nucleus of spinal tract of trigeminal
- 4- Internal arcuate fibers (Axons of Gracil & Cuneat)
- 5- Decussation of internal arcuate fibers
- 6- Medial lemniscus
- 7- Pyramid

CAUDAL MEDULLA



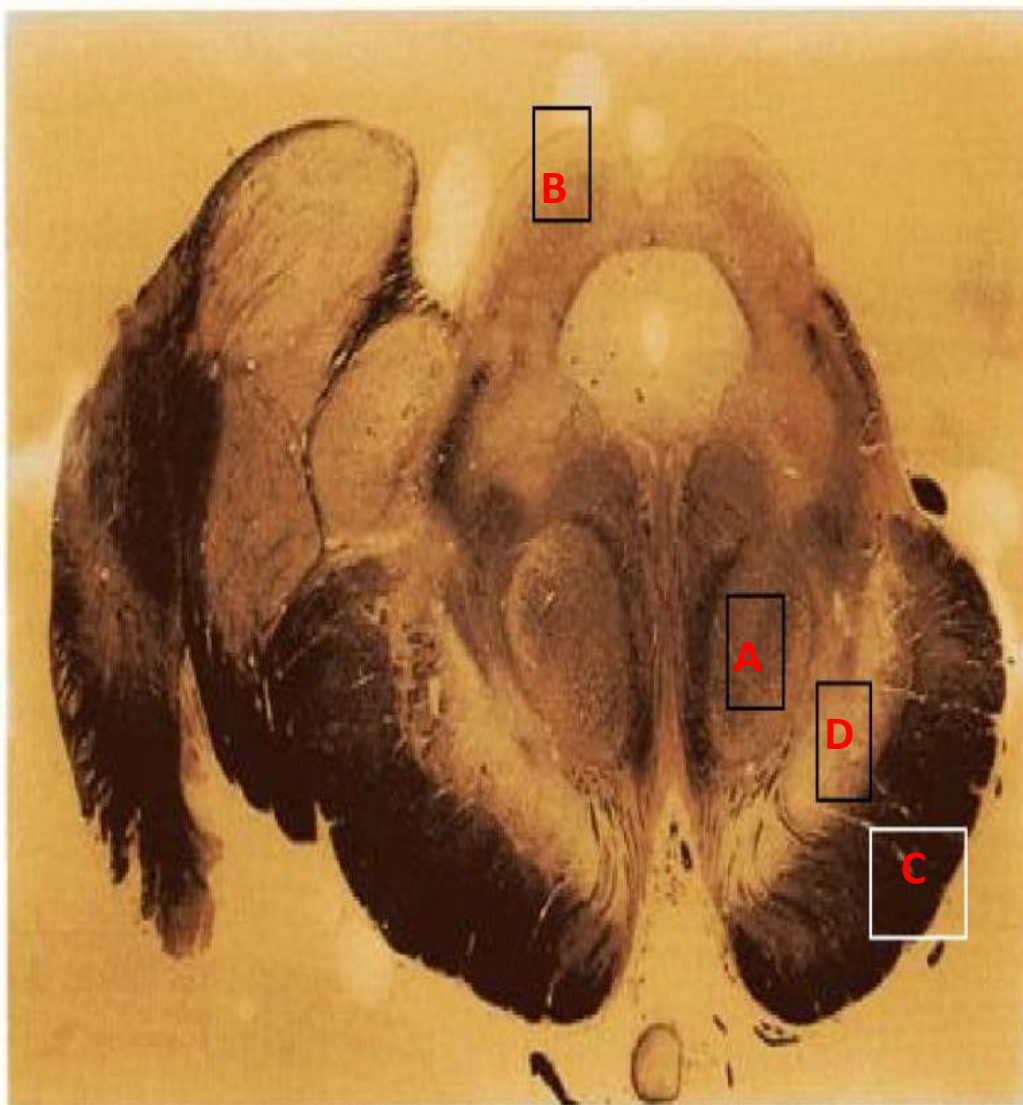
(LEVEL OF PYRAMIDAL DECUSSATION)



- gracilis fasciculus
- cuneatus fasciculus
- Trigeminal sensory nucleus
- pyramidal decussation (lateral cortico-spinal tract)
- pyramid.



MID BRAIN (SUPERIOR COLLICULUS)



Identify :

A: red nucleus

(connection with : spinal cord & Thalamus)

B :superior colliculus.

C :crus cerebri and list it is structures :
fibers of : temporopontine fiber , corticobulbar , corticospinal , frontopontine fiber .

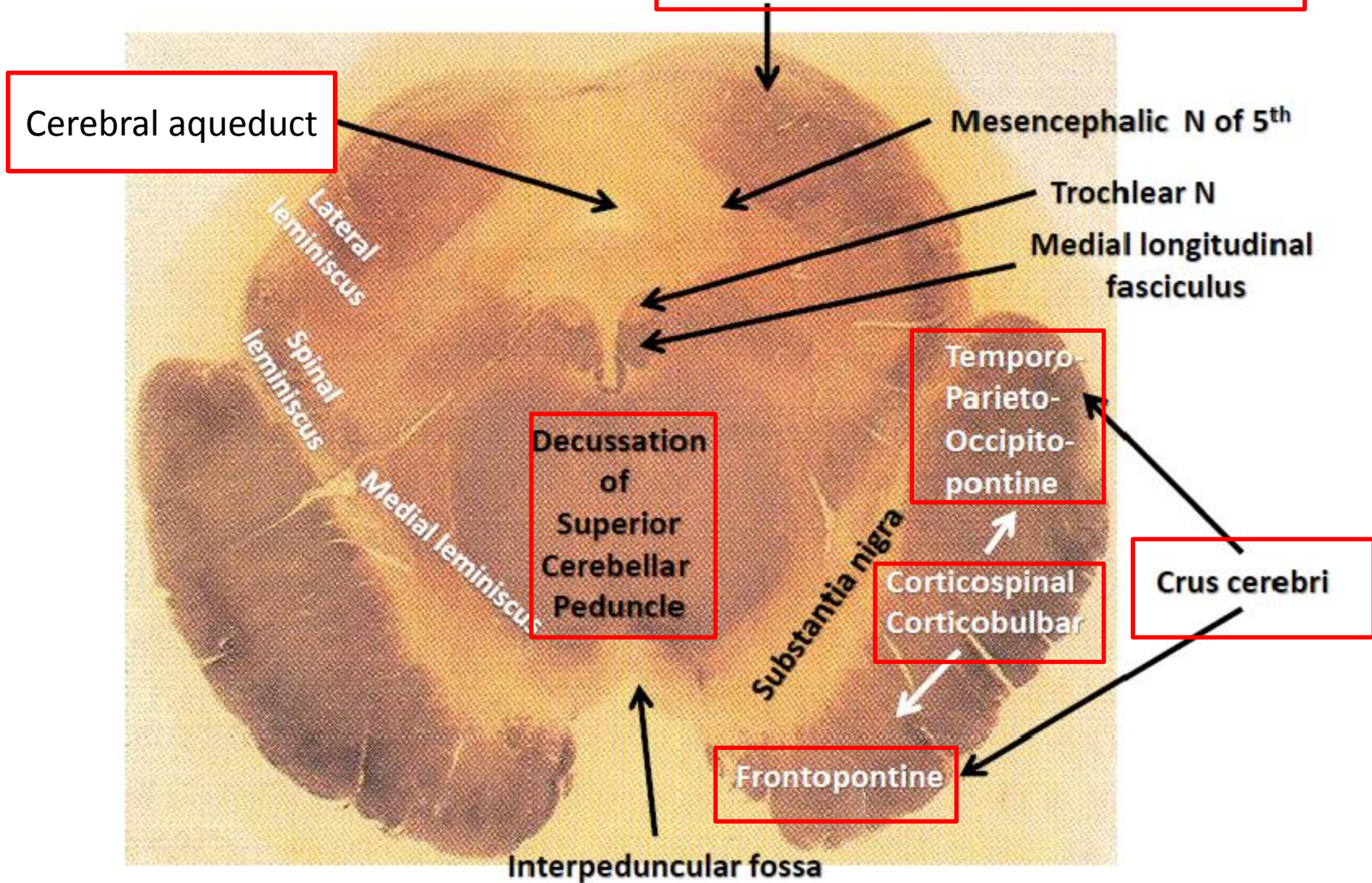
(all the descending tracts pass through the Crus Cerbri)

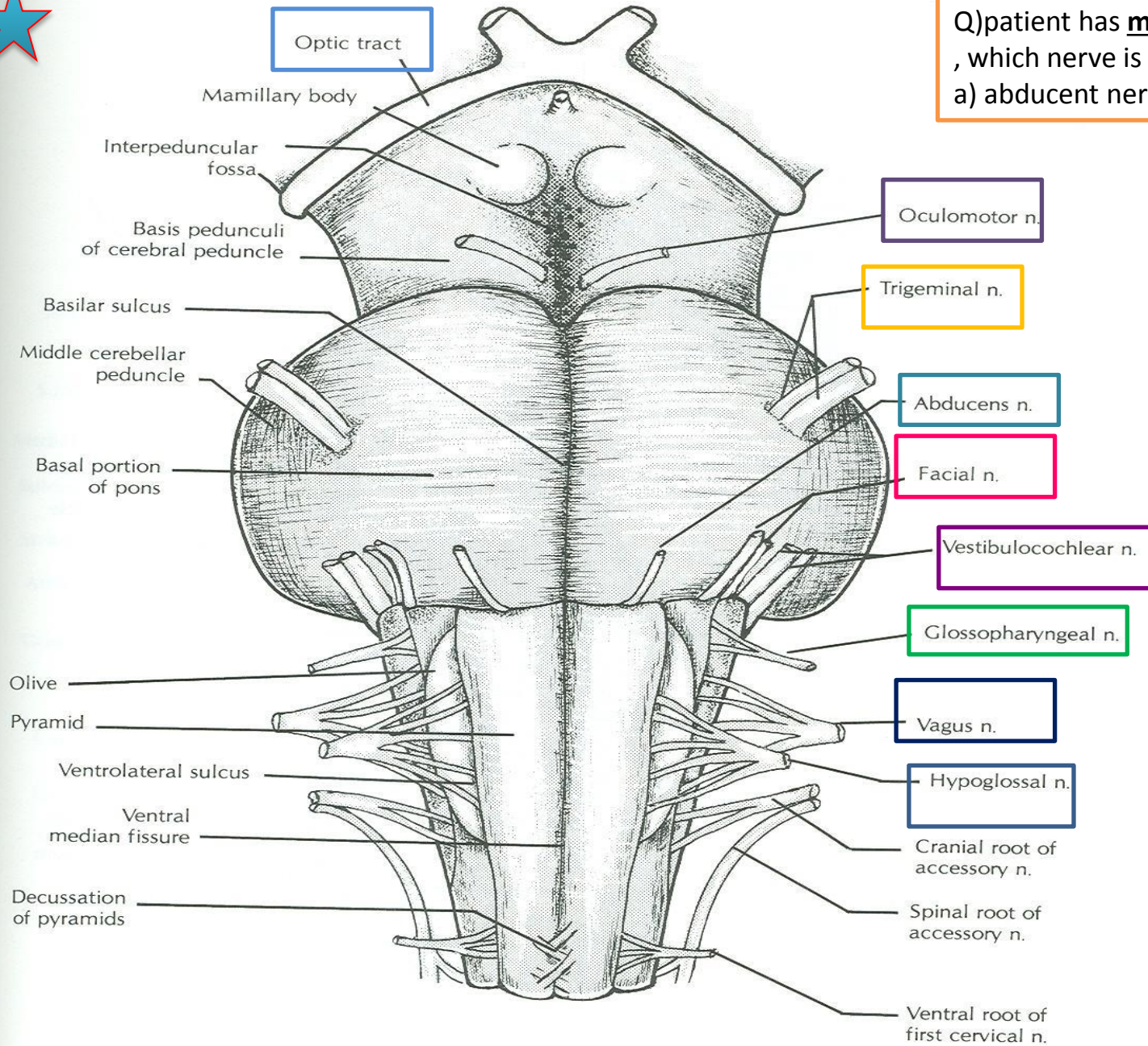
D :substantia nigra

Q: Man came to the hospital with tremor, stiffness, cog wheel rigidity . It was Parkinson disease .

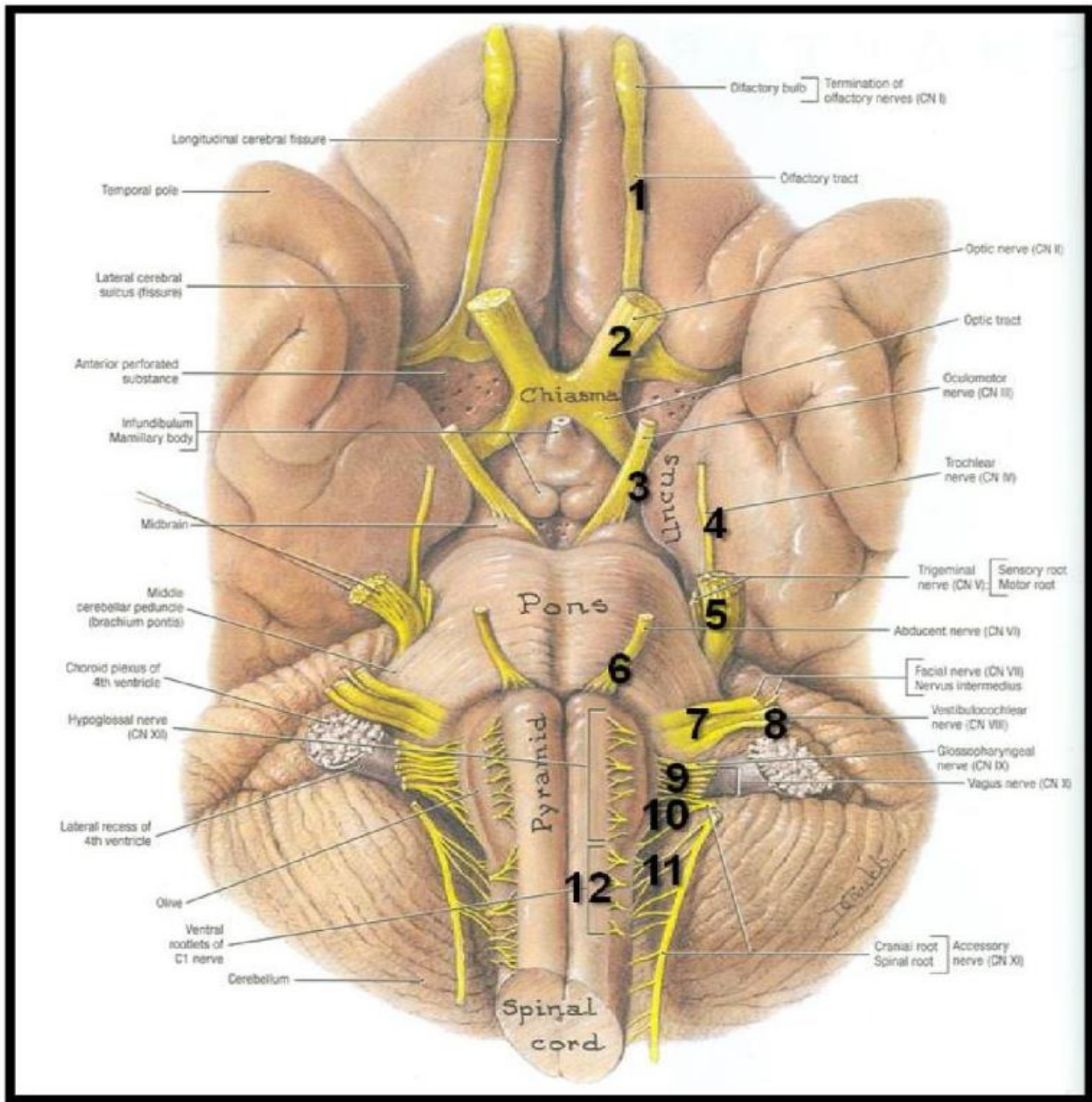
Which of these letters shows the affected part? D

MIDBRAIN – LEVEL OF INFERIOR COLLICULUS





Case:
Q)patient has **medial squint**
, which nerve is responsible?
a) abducent nerve



Emergence

occulomotorx	Trochlear	Trigeminal	Abducent	Fascial
Anterior surface of midbrain (interpeduncular fossa)	Caudal to the inferior colliculus	Pons through petrous bone in middle cranial fossa	Junction between pons and medulla	cerebellopontine angle
Vestibulococlear	Glossopharyngeal	Vagus	Accessory	Hypoglossal
Ventral surface "pontomedullary sulcus"	Ventral aspect of medulla "groove btw olive & inf. Cerebellar peduncle"	Ventral aspect of medulla " btw olive & inf. Cerebellar peduncle"	*Cranial part: lateral aspect of medulla, caudal to the vagus *Spinal part: laterally midway btw the dorsal and ventral roots of spinal nerves	Ant. surface of M.O "sulcus btw Pyramid & olive"

SUMMARY OF SENSORY NERVES :

Nerves	Type	1 st order	2 nd order	3 rd order	Termination	Function	Notes
Olfactory	Special visceral afferent	Olfactory bulb	In cortex	—	Hippocampal gyrus & Uncus	Smell	
Optic	special somatic afferent	Bipolar cells	Ganglion cells	Lateral geniculate body	Primary visual cortex (area 17 of abarodmann's)	vision	
Trigeminal	General visceral afferent	1- Mesencephalic nucleus 2-main sensory nucleus 3-spinal nucleus	In cortex	—	—	Sensation of ophthalmic maxillary mandibular regions	Sensory branches: 1-ophthalmic 2-maxillary 3-mandibular
Facial	Special visceral afferent	nucleus solitarius	In cortex	—	—	Receive taste sensation from anterior 2/3 of the tongue	
Vestibular	special somatic afferent	Cells of Vestibular ganglion	Superior, inferior, medial and lateral vestibular nucleus	1- Anterior horn of spinal cord. 2flocculonodular lobe of cerebellum. 3- VP nucleus in thalamus	Vestibular area	Balance	
Cochlear	special somatic afferen	spiral ganglion in the cochlea	dorsal & ventral cochlear nuclei	inferior colliculus	Primary Auditory cortex	Hearing	Has 4 th order neuron: medial geniculate nucleus
Glossopharyngeal	Special visceral afferent	Has 2 ganglion : superior and inferior			Solitary nucleus	Taste sensation over post. 1\3	
Vagus	Special visceral afferent	Has 2 ganglion : superior and inferior			Trigeminal sensory nucleus While the fibers from thoracic and viscera terminate in Nucleus Solitarius	Affrent fibers convey inf. From	

SUMMARY OF MOTOR NERVES :

Nerves	Type	Nucleus	Note
Oculomotor	Motor	-Main oculomotor nucleus(main motor). -Edinger-Westphal nucleus (parasympathetic)	-Supply most of the Extra-ocular muscles. ▪Elevation of upper eyelid. ▪Turning the eye upward, downwards and medially , ▪Constricting the pupil. ▪Accommodating reflex of the eyes.
Trochlear	Motor	One motor nucleus	Supply one muscle (superior oblique)
Trigeminal	Special visceral efferent	Motor nucleus	Muscles supplied by mandibular branch called 1 st pharyngeal arch
Abducent	Motor	One motor nucleus	Supply one muscle (lateral rectus >> abduction)
Facial	Special visceral and General visceral efferent	motor nucleus (SVE) superior salivatory nucleus (GVE)	Muscles supplied by motor nucleus called 2 nd pharyngeal arch
Glossopharyngeal	Sensory Parasympathetic Motor	No real nucleus "share with VII & X"	Responsible for Gag reflex
Vagus	Sensory Parasympathetic Motor	Nucleus Ambiguous (SVE) Dorsal nucleus of Vagus (GVE)	*longest and most widely distributed
Accessory	Motor	*Cranial part: caudal part of Nucleus Ambiguous *Spinal part: Motor neurons "spinal nucleus C1-\C5"	Accessory nerve leave the Cranial fossa through Jugular Foramen *Movements of the soft palate, larynx, pharynx. *Controls the movements of neck
Hypoglossal	Motor	Hypoglossal nucleus	*Control shape & movement of Tongue

Nerves	Branches	SUPPLY
Olfactory	Supply the olfactory mucosa for smelling	
Oculomotor	<p>➤ Motor for most of extraocular muscles. ➤ preganglionic parasympathetic fibers</p> <p>Superior & inferior divisions (enter the orbit through superior orbital fissure)</p>	<p>A-Motor to: Levator palpebrae superioris Superior rectus muscle Medial rectus muscle Inferior rectus muscle Inferior oblique muscle.</p> <p>B-Parasympathetic fibers to : 1- Constrictor pupillae 2- Ciliary muscles.</p>
Trochlear	MOTOR to the Superior oblique muscle “Rotates the eye ball downwards and laterally”	
Trigeminal	<p><u>1-Ophthalmic >></u> A-“Frontal”: supplies skin of face & scalp. B-“Lacrimal”: supplies skin of face & lacrimal gland. C-Nasociliary: supplies skin of face, nasal cavity & eyeball.</p> <p><u>2-Maxillary.>></u> A-Upper teeth, gums & maxillary air sinus (posterior, middle & anterior superior alveolar nerves). B-Face: (zygomaticofacial & infraorbital nerves).</p> <p><u>3-Mandibular>></u> <u>SENSORY BRANCHES:</u> A-Lingual: General sensations from anterior 2/3 the of tongue. B-Inferior alveolar: Lower teeth, gums & face. C-Buccal: Face, (cheek on upper jaw) D-Auriculotemporal: auricle, temple, parotid gland & TMJ. <u>MOTOR BRANCHES:</u> to 8 muscles (4 muscles of mastication & other 4 muscles).</p>	
Abducent	MOTOR to the lateral rectus muscle which rotates the eye ball laterally ; (abduction).	
Facial	<p>IN FASCIAL CANAL :- 1-Greater petrosal nerve: carries preganglionic <u>parasympathetic</u> fibers to lacrimal, nasal & palatine glands.</p> <p>2-Chorda tympani: carries a) preganglionic <u>parasympathetic</u> fibers to submandibular & sublingual glands. b) taste fibers from anterior 2/3 of tongue.</p> <p>3- Nerve to stapedius.</p>	<p>*Emerge from stylomastoid foramen:- 1-Posterior auricular: to occipitofrontalis muscle. 2-Muscular branches to posterior belly of digastric & stylohyoid.</p> <p>*Inside parotid gland: gives 5 terminal motor branches: <i>Temporal, Zygomatic, Buccal, Mandibular & Cervical.... To the muscles of the face.</i></p>

Nerves	Branches	Supply
Vestibulocochlear	1-Vestibular branch 2-Cochlear branch	1-The vestibular nerve fibers make dendritic contact with hair cells of the membranous labyrinth 2-The cochlear nerve fibers make dendritic contact with hair cells of the organ of Corti within the cochlear duct of the inner ear.
Glossopharyngeal	<ul style="list-style-type: none"> ▪ Tympanic: relays in the otic ganglion and gives secretomotor to the parotid gland ▪ Nerve to Stylopharyngeus muscle. ▪ Pharyngeal: to the mucosa of pharynx . ▪ Tonsillar. ▪ Lingual : carries sensory branches, general and special (taste) from the posterior third of the tongue. 	<ul style="list-style-type: none"> ▪ Sensory branches from the carotid sinus and body (pressoreceptors and chemoreceptors).
Vagus	<ul style="list-style-type: none"> ▪ Meningeal : to the dura ▪ Auricular nerve: to the external acoustic meatus and tympanic membrane. ▪ Pharyngeal : it enters the wall of the pharynx. It supplies the mucous membrane of the pharynx, superior and middle constrictor muscles, and all the muscles of the palate except the tensor palati. ▪ To carotid body ▪ Superior Laryngeal: It divides into: (1) Internal Laryngeal : It provides sensation to the hypopharynx, the epiglottis, and the part of the larynx that lies above the vocal folds. (2) External Laryngeal : supplies the cricothyroid muscle. ▪ Recurrent Laryngeal : ▪ the recurrent laryngeal nerve goes round the subclavian artery on the right, and round the arch of the aorta on the left 	
Accessory		<ul style="list-style-type: none"> *Cranial part: motor to the muscles of soft palate, esophagus, pharynx and larynx *Spinal part: 1) to Sternomastoid // 2) to Trapezius
Hypoglossal		<ul style="list-style-type: none"> *Motor to supply all muscles of Tongue EXCEPT palatoglossal “Vagus” *proprioceptive afferent from tongue’s ms.

Nerve	Lesion
Olfactory	Loss of smell
Optic	1: A lesion of the right optic nerve causes a total loss of vision (blindness) in the right eye 2: A lesion of the optic chiasm causes a loss of vision in the temporal half of both visual fields: bitemporal hemianopsia 3: A lesion of the right optic tract or right optic radiation just after the LGN causes a loss of vision in the left hemifield: contralateral homonymous hemianopsia.
Oculomotor	<u>Lateral squint , ptosis , loss of accommodation , pupillary dilatation , { first sign of compression: ipsilateral slowness of pupillary light reflex }</u>
Trochlear	<u>Diplopia , eye deviates upward and slightly inward.</u>
Trigeminal	<u>Trigeminal neuralgia or tic douloureux</u>
Abducent	<u>Medial squint & may involve the facial N (facial colliculus) and cause paralysis of all ipsilateral facial muscles</u>
Facial	Bell's Palsy
Vestibular	Loss of equilibrium , Vestibular Schwannoma
Cochlear	Hearing loss, tinnitus
Glossopharyngeal	Difficulty in swallowing, impaired taste over post. 1\3 and absent gag reflex
Vagus	Abnormalities in esophageal motility, gastric acid secretion, gallbladder emptying and heart rate
Accessory	Difficulty in swallowing & speech, unable to turn the head or rise the shoulders and winged scapula
Hypoglossal	Loss of tongue mov., paralysis and atrophy of affected side and deviates to the effected side, Difficulty in chewing & speech

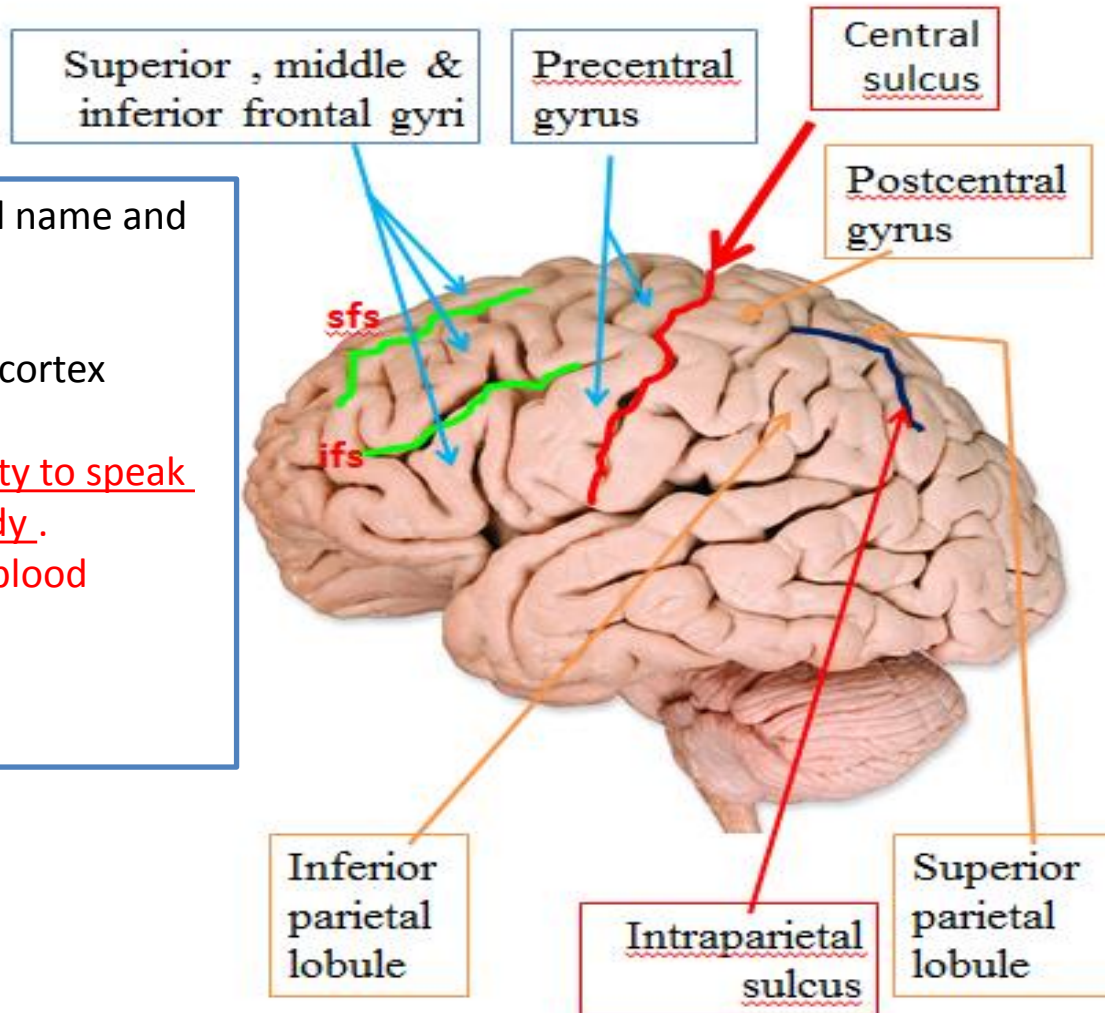
BRAIN:

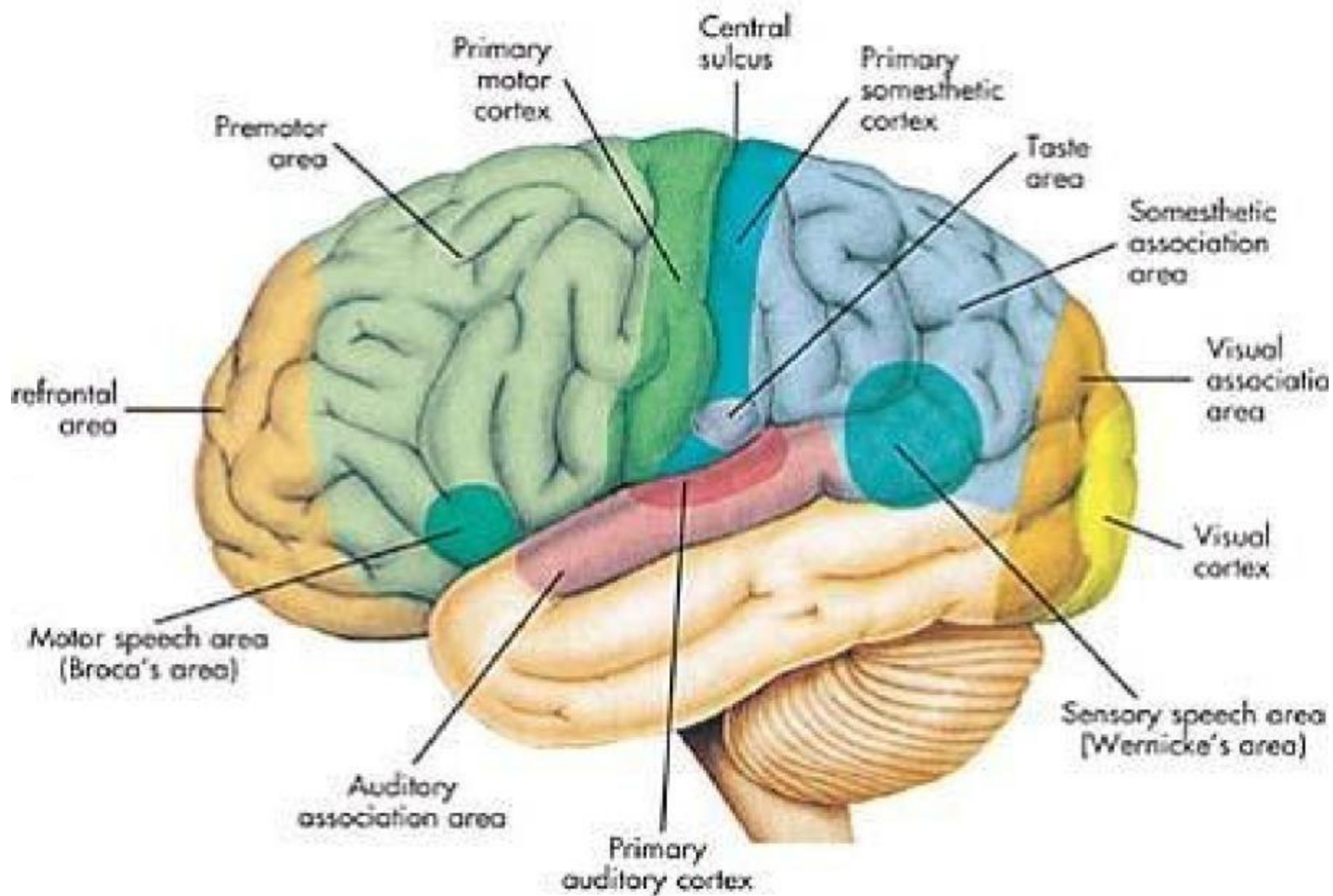
-Lateral Surface:

-All name of sulci and gyri (the functional name and anatomical) +blood supply
-In the exam write the 2 names
e.g: precentral gyrus and primary motor cortex

Q : man came to the hospital with inability to speak and weakness in the right side of the body .
what are the area that affected? and its blood supply?

1-areas : Broca's area , precentral gyrus .
2- Blood supply : middle cerebral artery .





Identify :

Gyrus:

- Precentral gyrus.
- Postcentral gyrus.
- Superior frontal gyri.
- Middle frontal gyri.
- Inferior frontal gyri.
- Superior parietal lobule.
- Inferior parietal lobule.
- Superior temporal gyri.
- Middle temporal gyri.
- Inferior temporal gyri.

Sulcus:

- Central Sulcus.
- Intraparietal Sulcus.
- Superior frontal sulci.
- Inferior frontal sulci.
- Superior temporal sulci.
- Inferior temporal sulci.
- Lateral Sulcus
- Parieto-occipital Sulcus

1- What its Function: "According to Brodmann Classification"



1&2&3 – Primary Somatosensory area. ((sensory area))

4- Primary motor area.((motor area))

6- Premotor Cortex.

8- Frontal eye field.

22- Wernicke's area.(Posterior of area)((Sensory speech area))

41&42- Primary Auditory Cortex. ((hearing area))

44&45- Broca's area.((motor speech area))

Cortical vascular territories

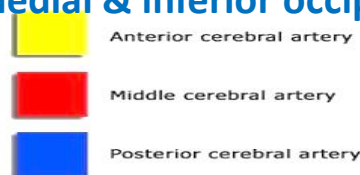
What areas affected in case of obstruction of :

Ex: primary auditory area is defected in case of obstruction in middle cerebral area.

1-Anterior cerebral artery: Supply medial side of frontal and parietal lobes

2-Middle Cerebral Artery: Supply most of superior lateral side.

3-Posterior Cerebral Artery: Supply inferior temporal and medial & inferior occipital lobes.



-Medial Surface:

Identify:

Gyrus:

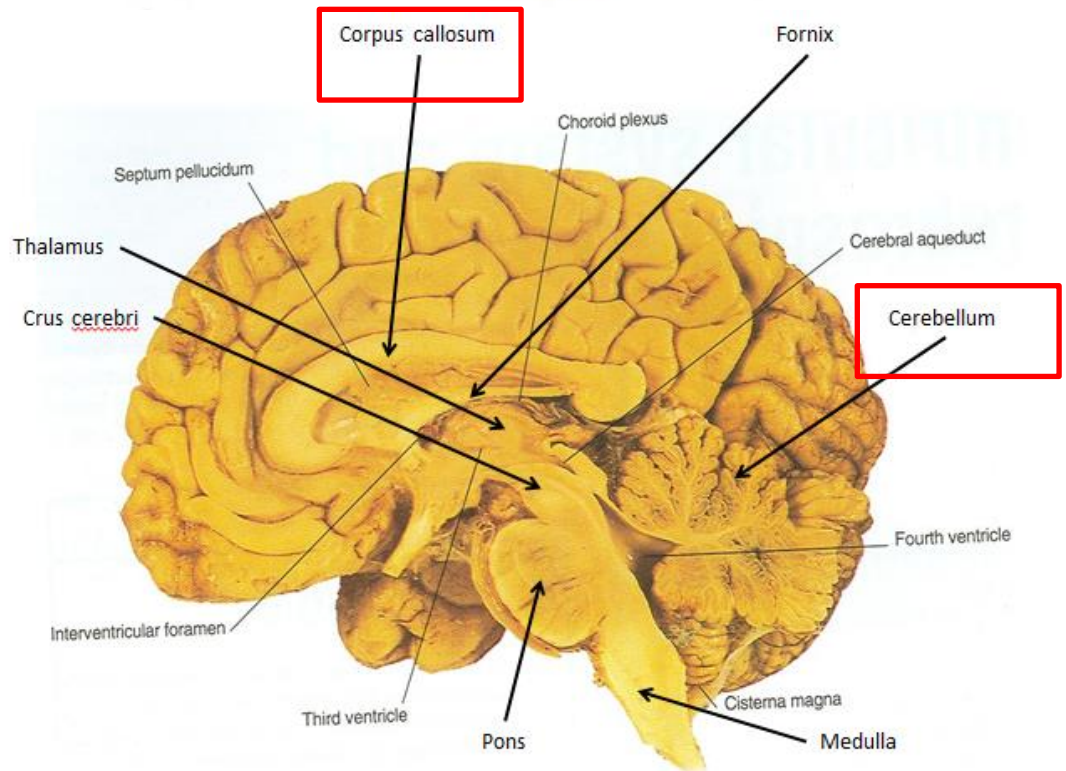
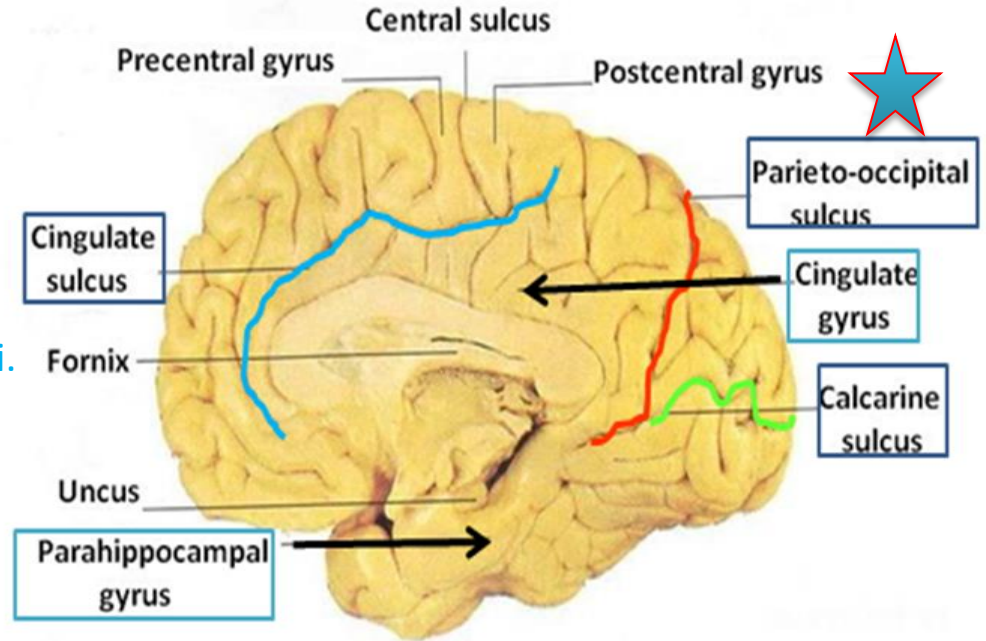
- Cingulate gyrus
- Parahippocampal gyrus

• Other:

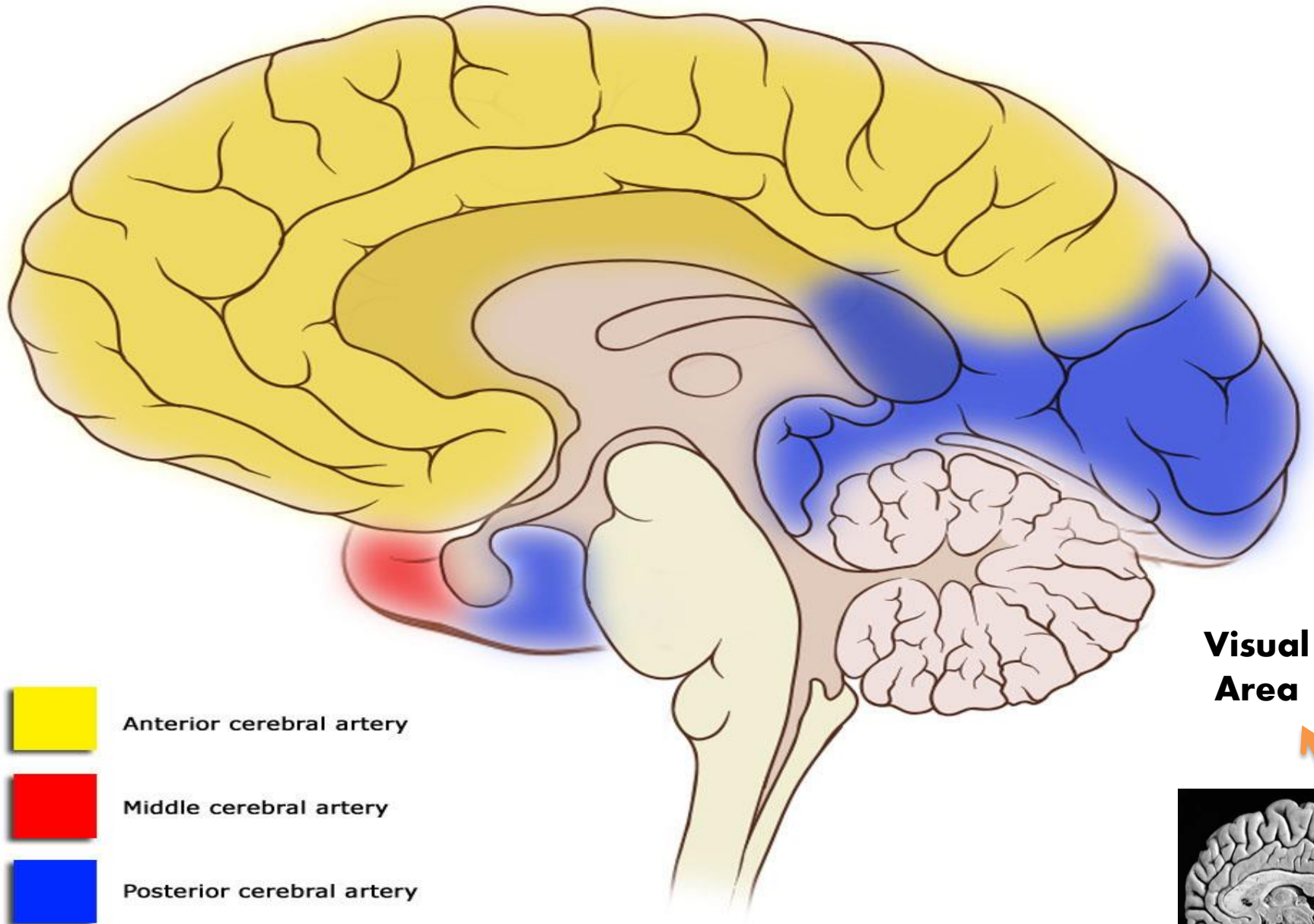
- Corpus callosum
- Fornix
- Uncus
- Thalamus
- Cerebral Aqueduct
- Midbrain
- Pons
- Medulla
- Third ventricle
- Fourth ventricle
- Cerebellum
- Cisterna magna
- Choroid plexus
- Interventricular foramen
- Crus cerebri
- Septum pellucidum

Sulcus:

- Cingulate sulci.
- Parieto-occipital sulci.
- Calcrine sulci.



Cortical vascular territories



Anterior cerebral artery



Middle cerebral artery



Posterior cerebral artery

Visual Area





1- What its function:

- Primary Visual area “area 17 “((Vision area))
- Cerebellum: Balance
- Choroid plexus: production of CSF

● Fornix connect between hippocampus and mammillary body

● Corpus Callosum connections :

1- Association fibers:

a- Short fibers

b- Long fibers:

- Superior longitudinal fasciculus
- Inferior longitudinal fasciculus

2- Commissural fibers:

- Corpus callosum
- Hippocampal callosum

3- Projection fibers:

- Afferent fibers.
- Efferent fibers.

Q:Patient with unsteady gate ,nystagmus , tremor, ataxia which part will be affected ?

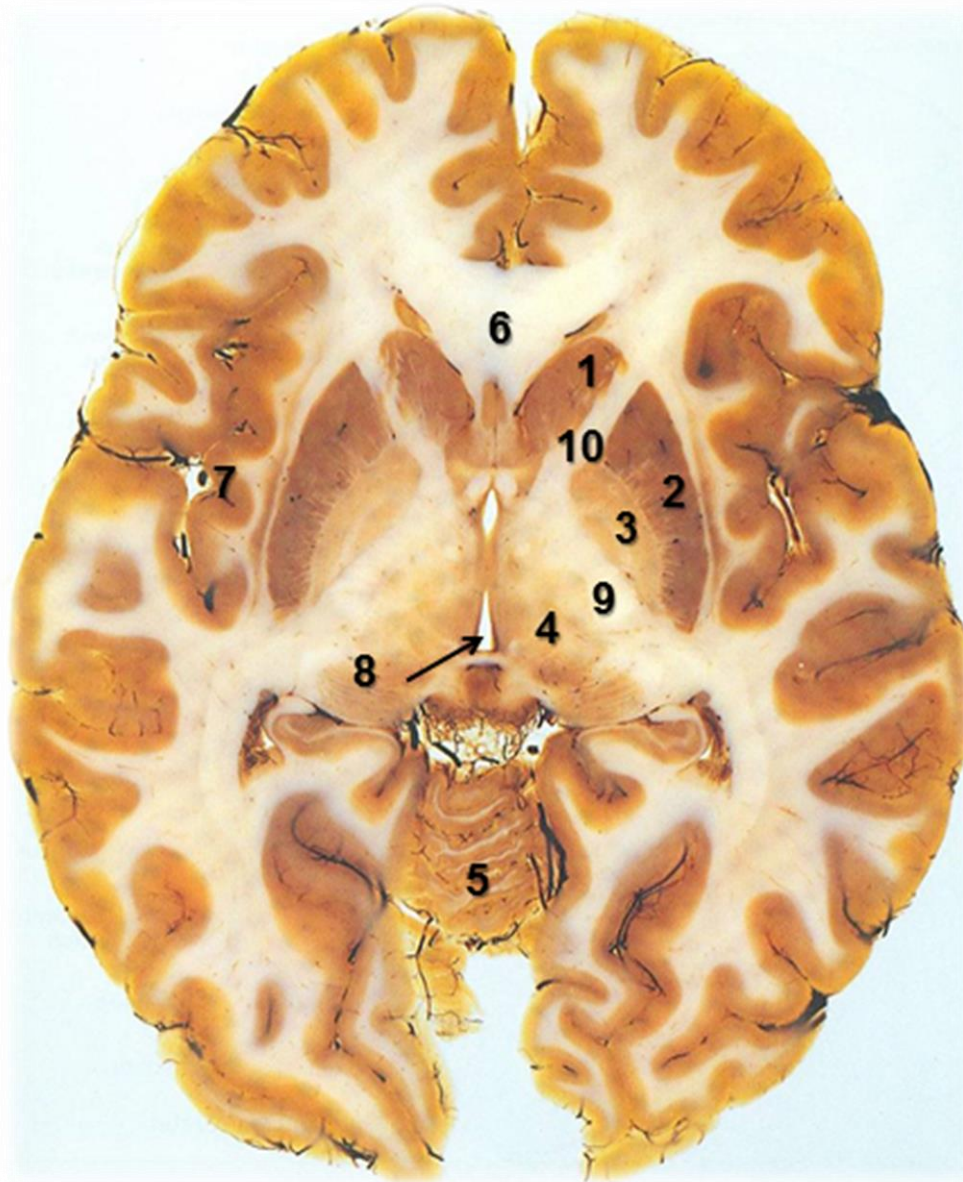
cerebellum



Horizontal section:



- 1- Anterior horn of lateral ventricle
- 2- Posterior horn of lateral ventricle
- 3- Caudate
- 4- Lentiform nucleus
- 5- Thalamus
- 6- Anterior limb of internal capsule
- 7- Genu
- 8- Posterior limb of internal capsule
- 9- Insula
- 10- Lateral sulcus
- 11- Forceps minor
- 12- Forceps major



- 1-Head of Caudate**
- 2-Putamen**
- 3-Globus pallidus**
- 4-Thalamus**
- 5-Cerebellum**
- 6-Corpus callosum**
- 7-Insula**
- 8-Third ventricle**
- 9-Posterior limb of IC**
- 10-Anterior limb of IC**



Internal Capsule:

- Anterior limb:

Thalamocortical

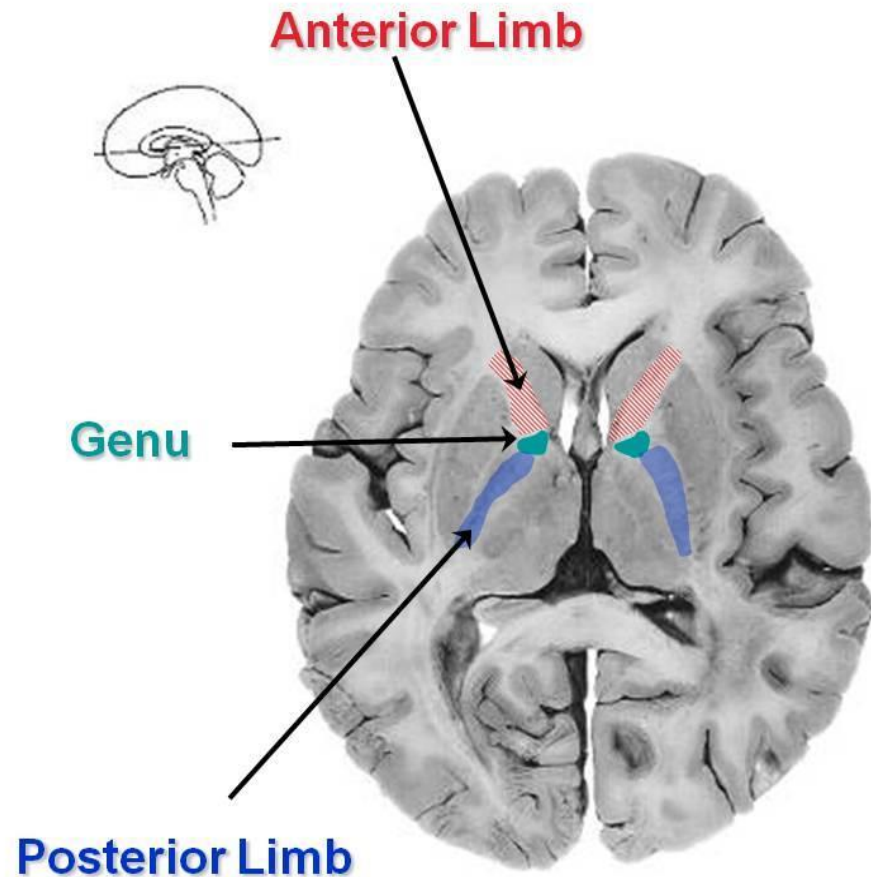
- Genu:

Corticobulbar

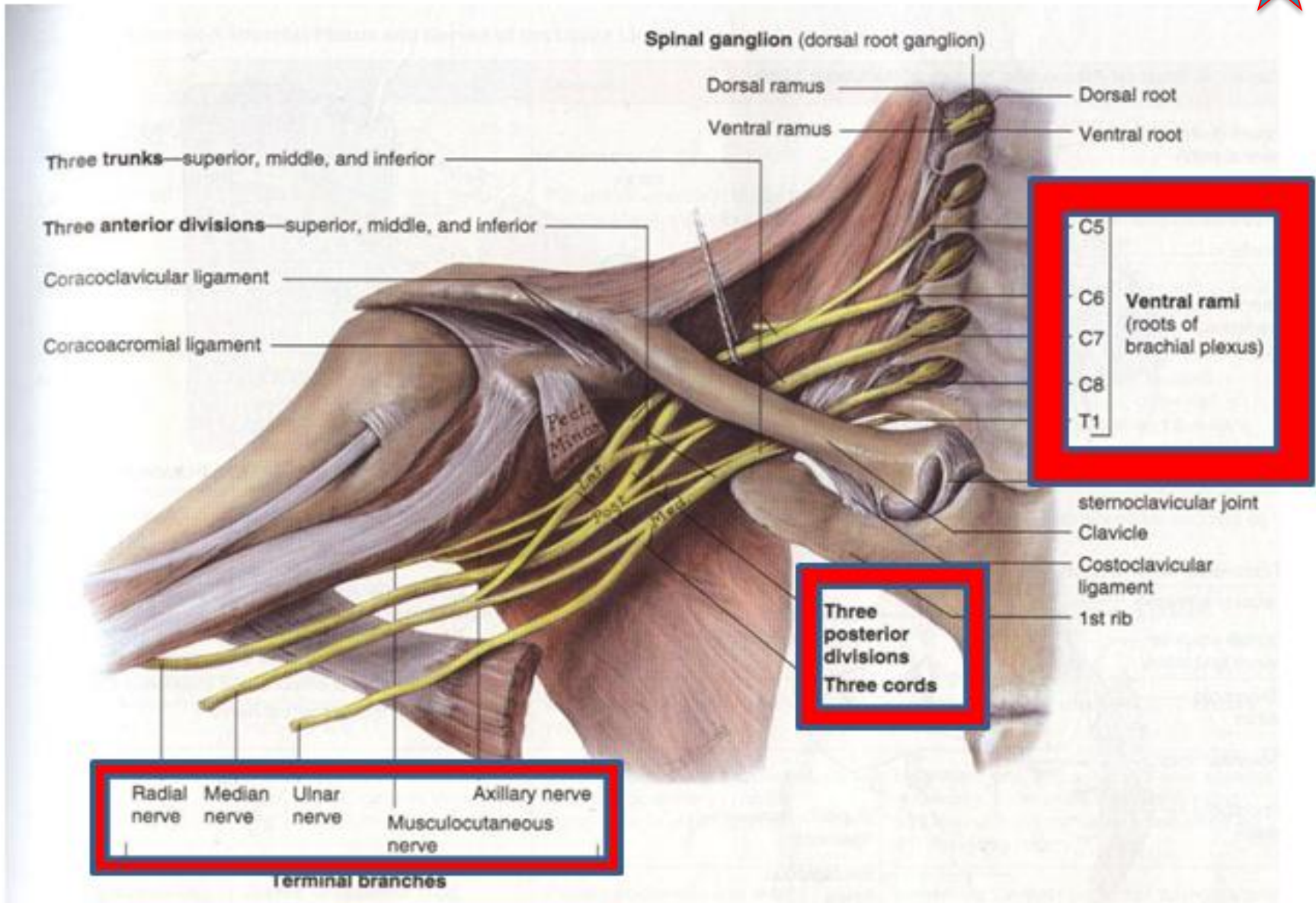
- Posterior limb:

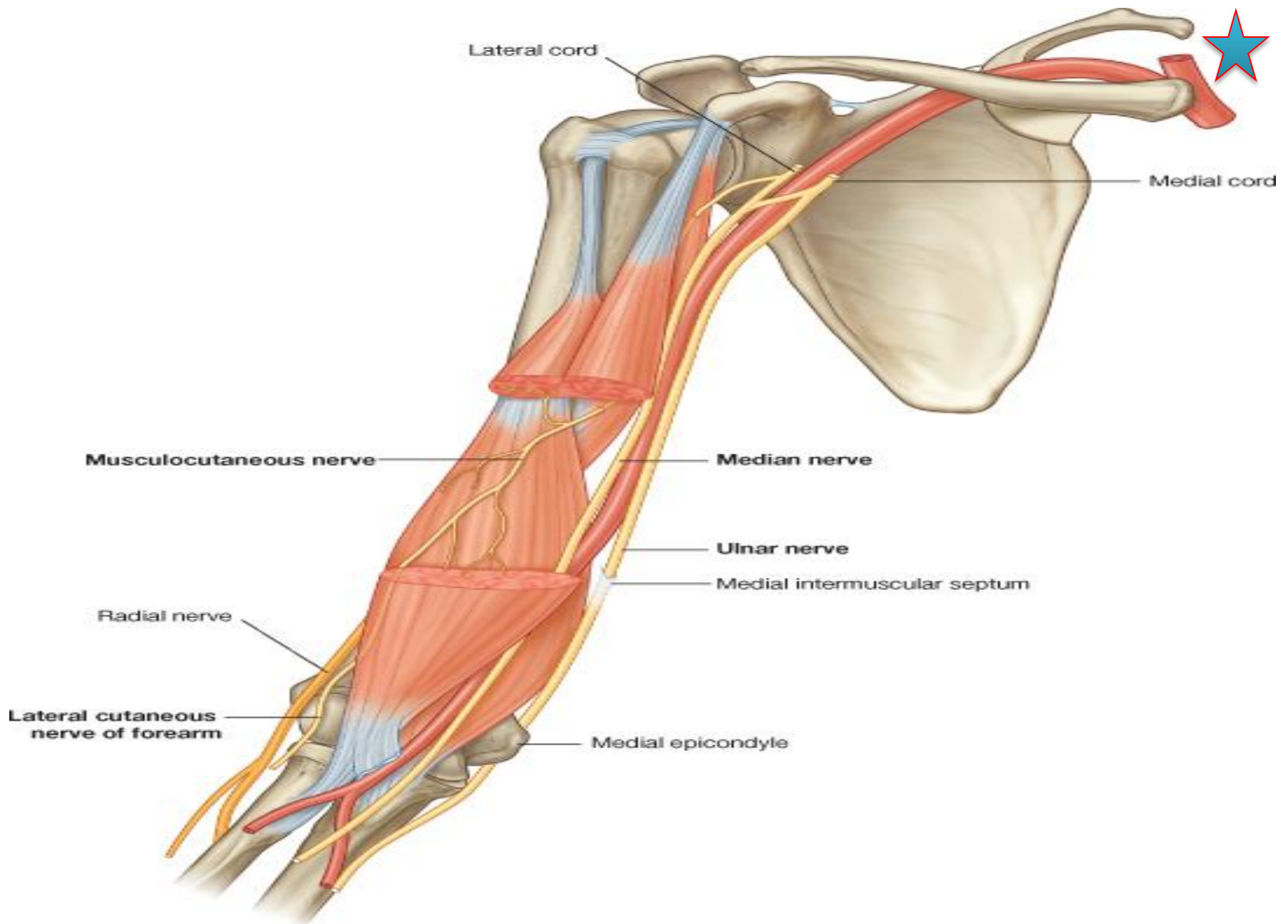
Corticospinal


Corticobulbar



PERIPHERAL NERVES:





Name	Radial	Ulnar	Median	Femoral	Sciatic 
Plexus	Brachial	Brachial	Brachial	Lumber	Sacral
Roots	C5,6,7,8,T1	C7,8,T1	C5,6,7,8,T1	L2,3 and 4	L4,5, S1, 2,3
Cord	Posterior	Medial	Medial, lateral	-----	-----
Muscles supply “Remember two”	1-Triceps 2- anconeus 3- brachialis	1- Flexor carpi ulnaris 2- Three hypothenar muscles 3- Adductor pollicis	1-Pronator teres, 2-Flexor carpi radialis 3-Palmaris longus,	1-Sartorius 2-Pectineus 3-Quadriceps femoris.	1-gastrocnemius 2-soleus 3-Hamstring
Area of skin	1- posterior and lateral parts of arm 2- Posterior of forearm 3- dorsum of the hand (skin of lateral 2/3 of back of hand. Skin over the back of proximal phalanges of lateral 3 ½ fingers)	1- front & dorsum of medial 1/3 of hand + medial 1 & ½ fingers 2- Medial part of forearm ((medial cutaneous branch))	1- palmar surfaces of lateral 3 ½ fingers.	To antero-medial aspect of the thigh. To medial side of: 1-Knee 2-Leg 3-Foot (saphenous nerve).	To all leg & foot EXCEPT: areas supplied by the Saphenous nerve (branch of Femoral nerve).
Lesions	Wrist drop	Claw hand	Ape hand	Loss of extension of knee	<i>Foot Drop</i>



- **Notes:**

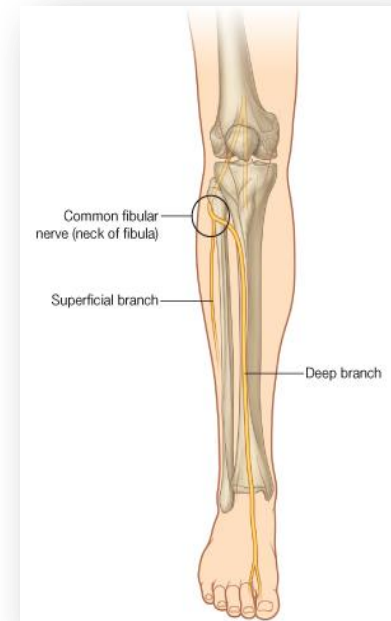
- Posterior cord **From the three posterior divisions**
- Lateral Cord from **the anterior divisions of the upper and middle cords**
- Medial cord **It is the continuation of the anterior division of the lower trunk**



- **SCIATIC NERVE Divided into :**

- 1- **Common peroneal (fibular):**

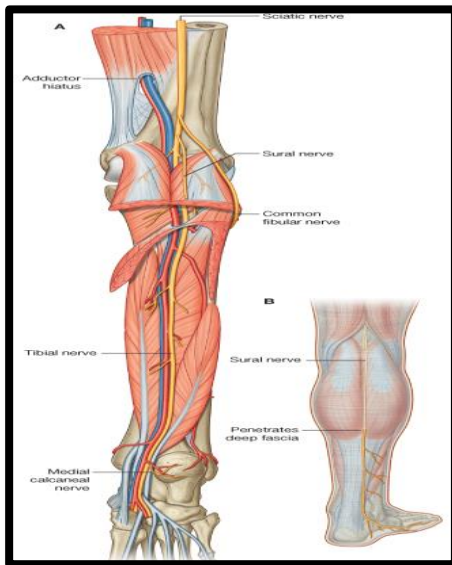
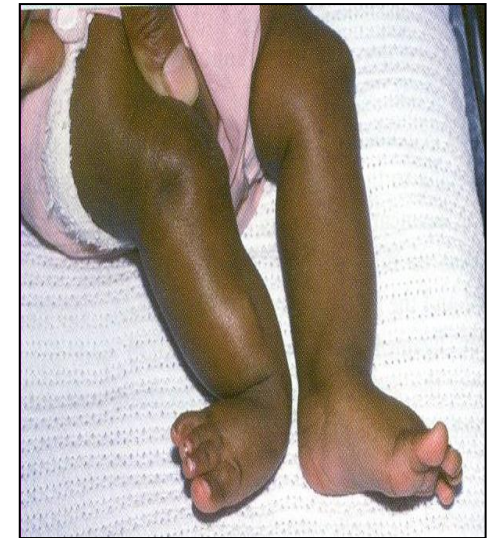
Muscles of anterior & lateral compartments of leg,
lesion of it **“Equinovarus”** (**plantar flexors of the ankle joint, inversion and Flexors of toes**)





2. Tibial:

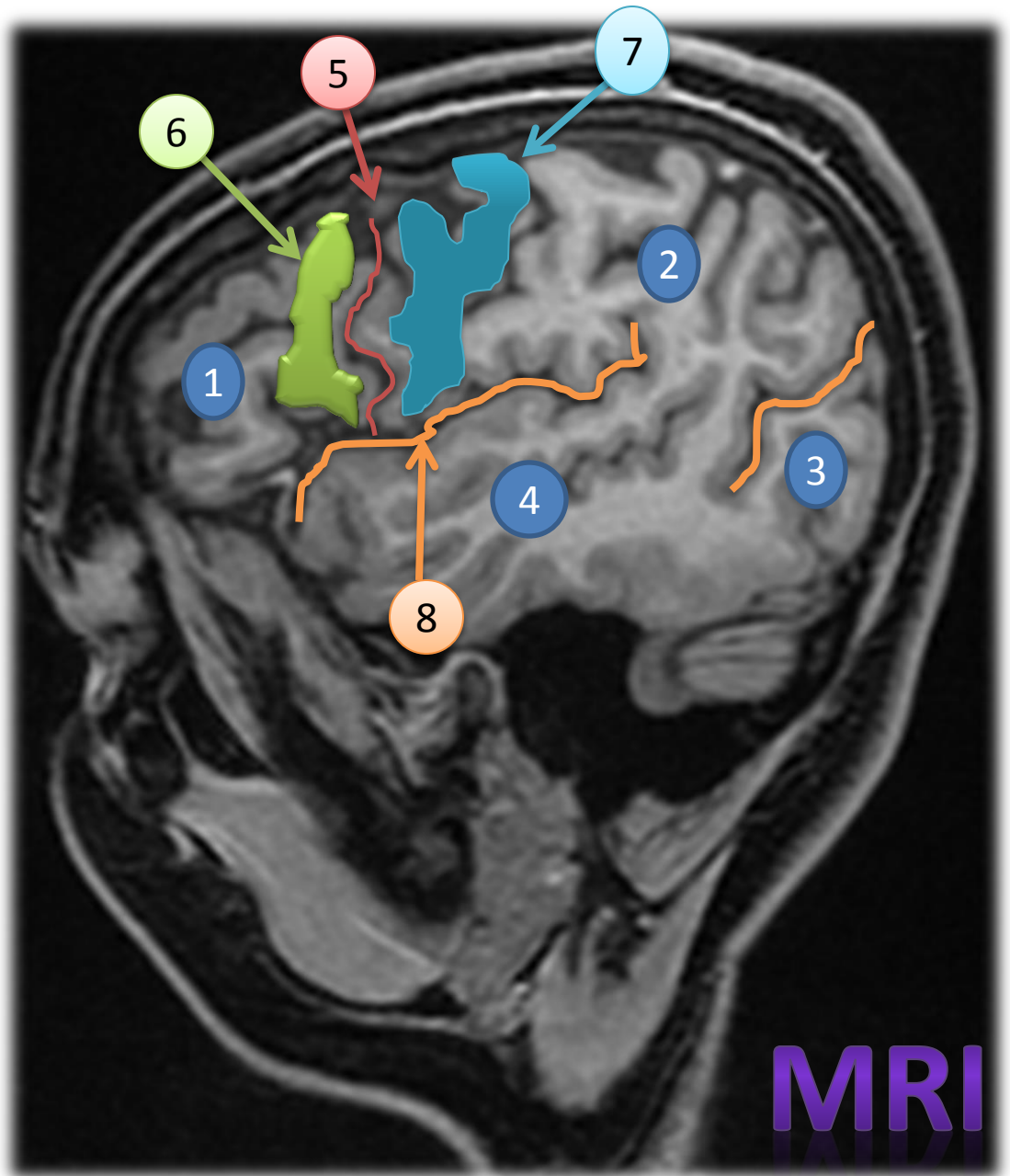
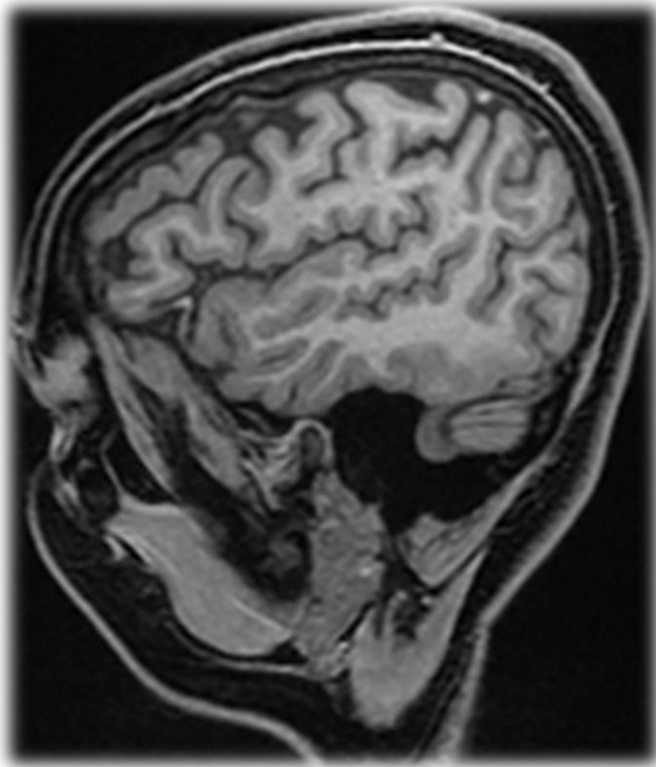
Muscles of posterior compartment of leg & intrinsic muscles of sole, Lesion of it **Calcaneovalgus** (**Dorsi flexors of ankle, Extensors of toes, Evertors of foot**)



RADIOLOGY:

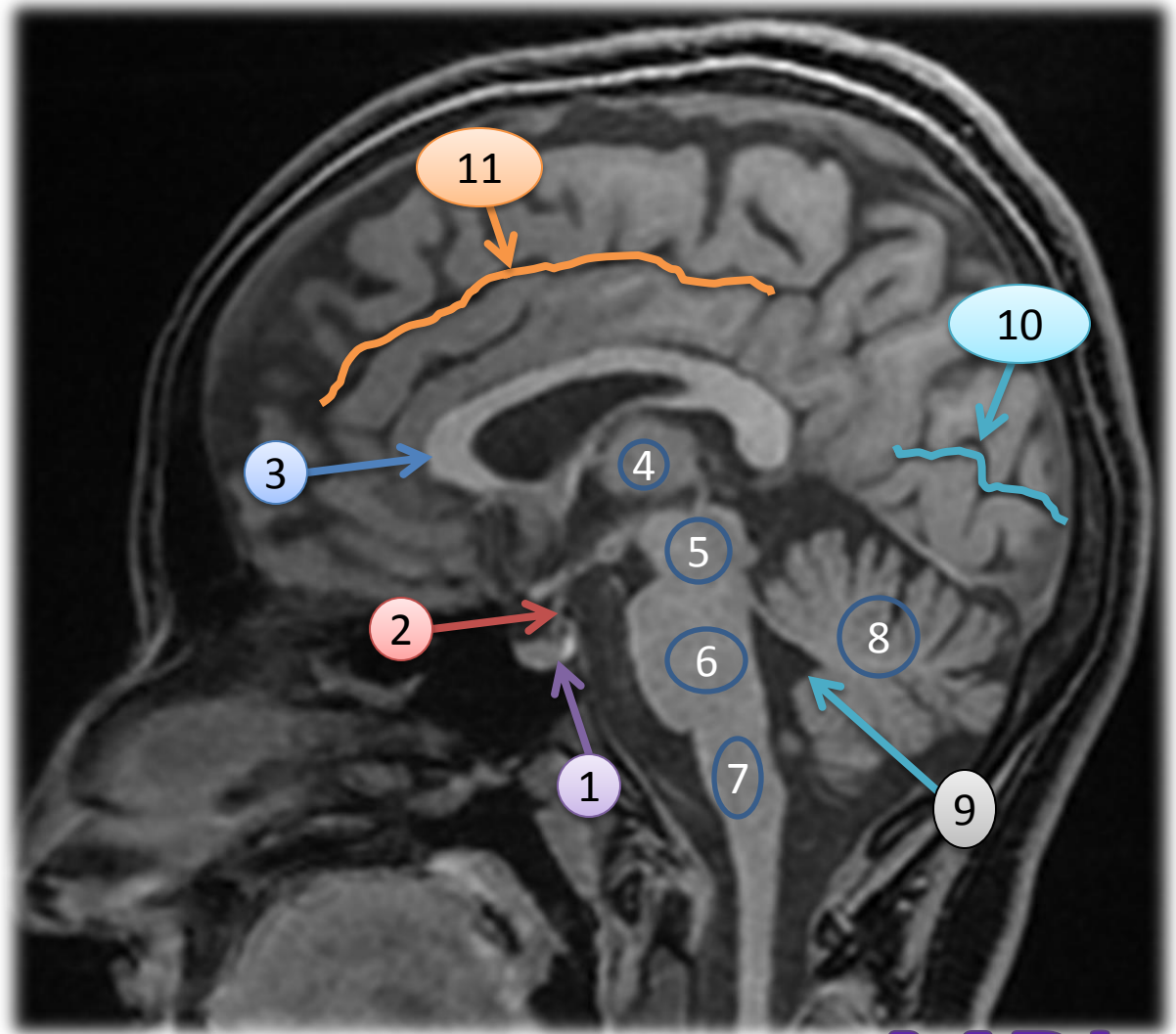
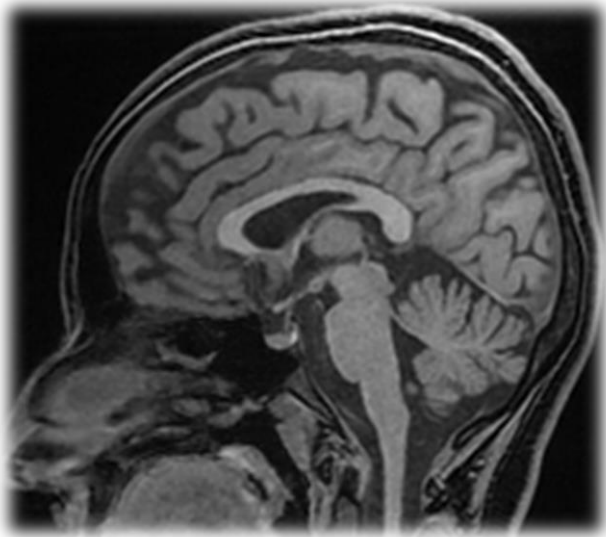
Note :

Take a general look in many sections
of radiology



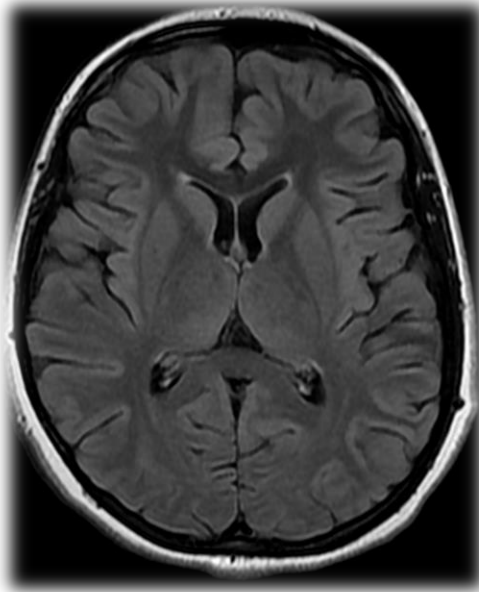
1. Frontal lobe
2. Parietal lobe
3. Occipital lobe
4. Temporal lobe
5. Central sulcus
6. Pre central Gyri (motor)
7. Post central Gyri (sensory)
8. Sylvain Fissure

MRI

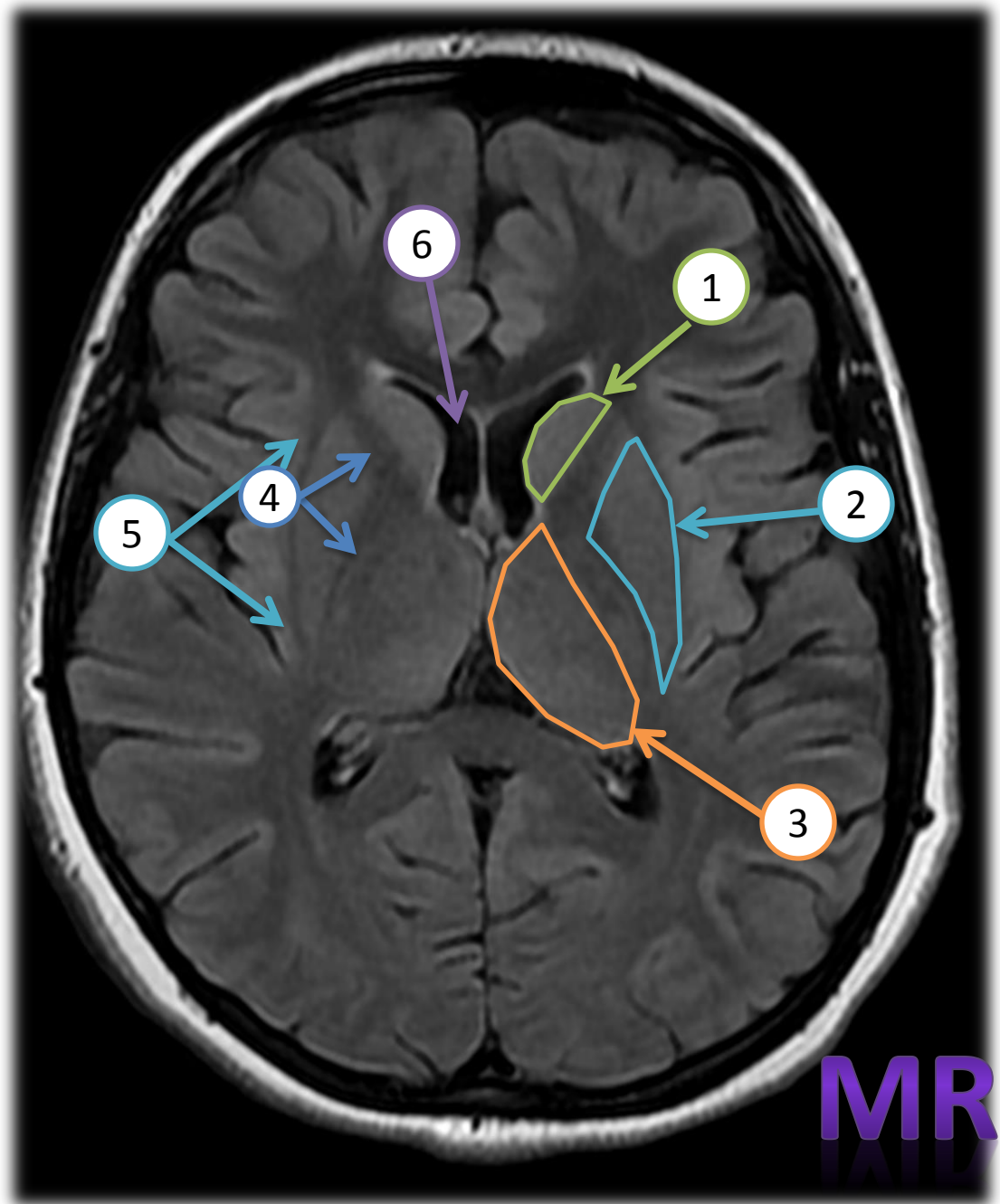


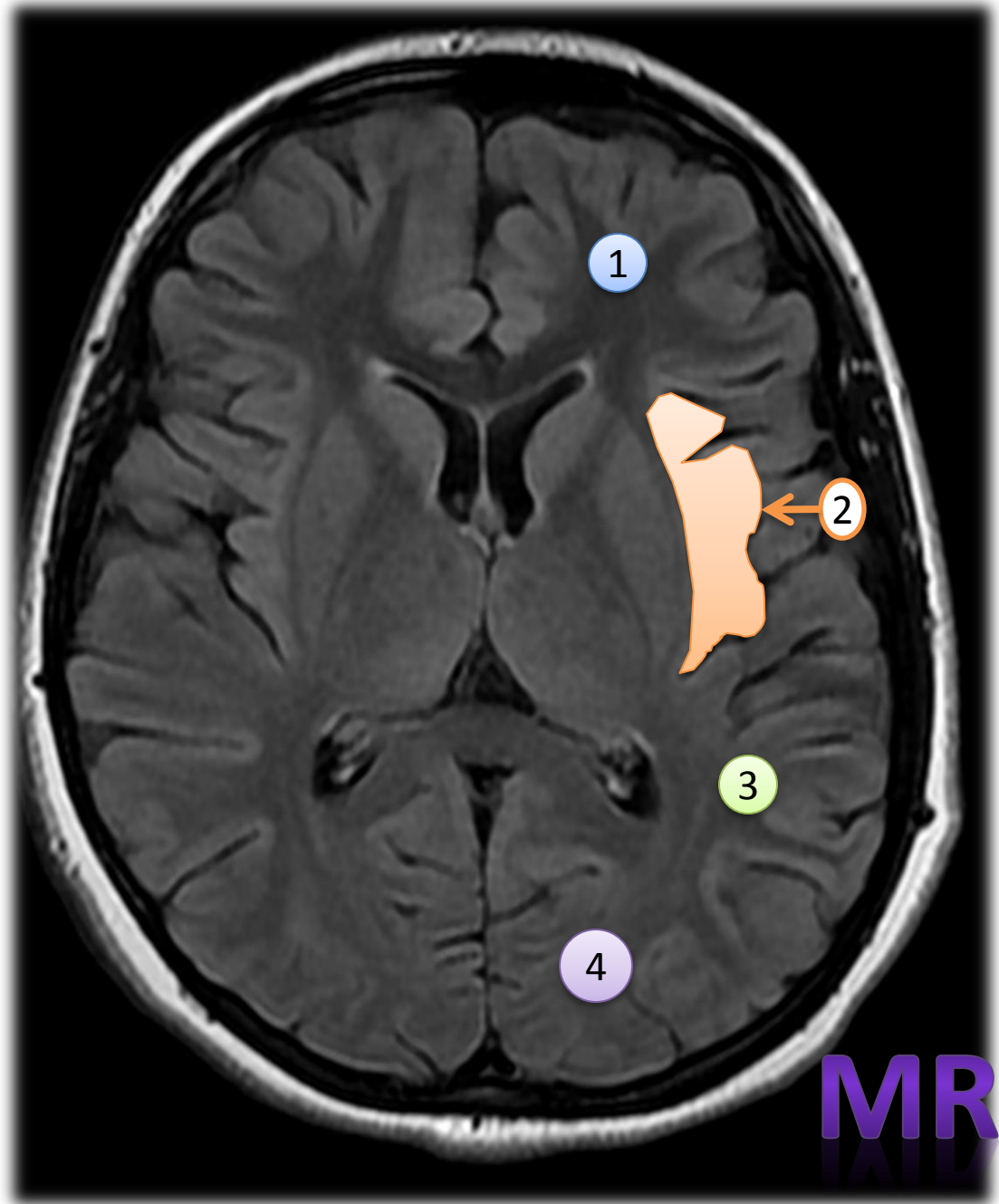
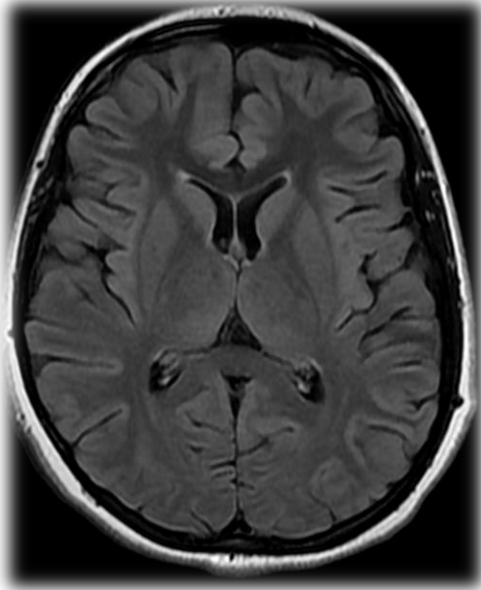
1. Pituitary gland
2. Pituitary stalk
3. Corpus callosum
4. Thalamus
5. Mid brain
6. Pons
7. Medulla oblongata
8. Cerebellum
9. 4th ventricle
10. Calcarine fissure
11. Cingulate fissure

MRI



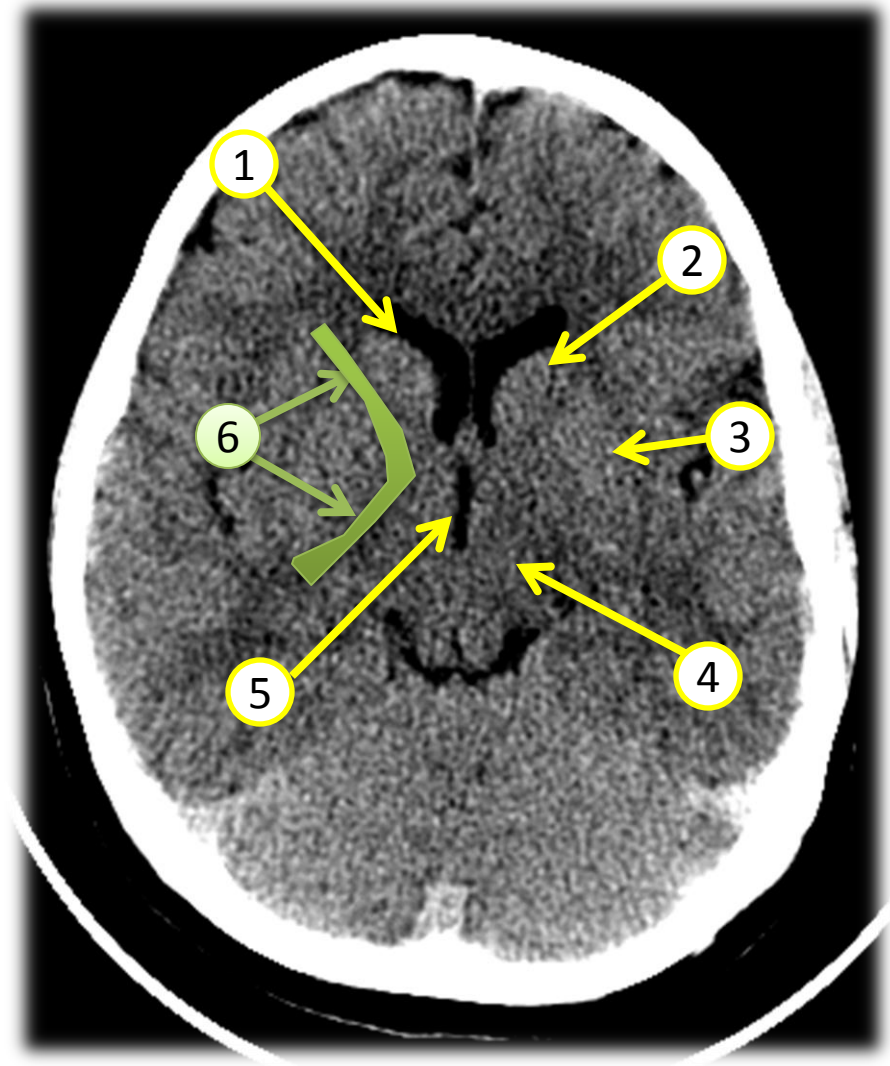
1. Caudate nucleus (head)
2. Lentiform nucleus
3. Thalamus
4. Internal capsule
5. External capsule
6. Lateral ventricle (anterior horn)





1. Frontal lobe
2. Insular cortex
3. Parietal lobe
4. Occipital lobe

CT



1. Frontal horn (lateral ventricle)
2. Caudate nucleus (head)
3. Lentiform nucleus
4. Thalamus
5. 3rd ventricle
6. Internal capsule