UNIVERSITÀ DEGLI STUDI DI TRIESTE

DEPARTMENT OF MEDICINE, SURGERY AND HEALTH SCIENCES

NEUROLOGY UNIT

Course of
Human Neuroanatomy

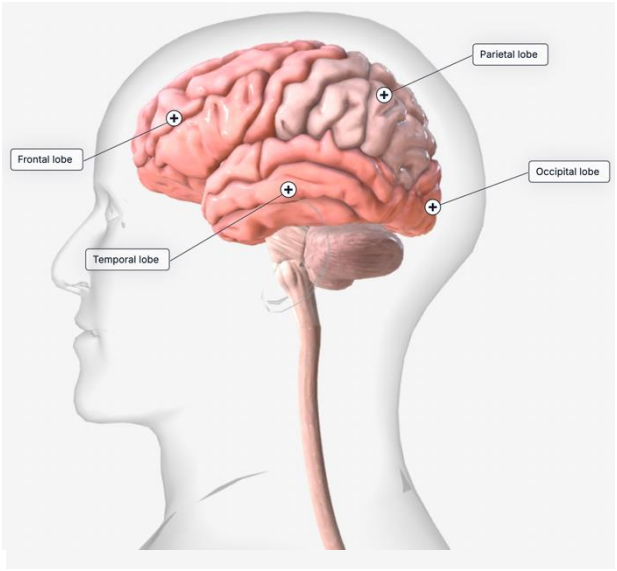
Master of Neuroscience, University of Trieste
2026-27

Dr. Federica Palacino

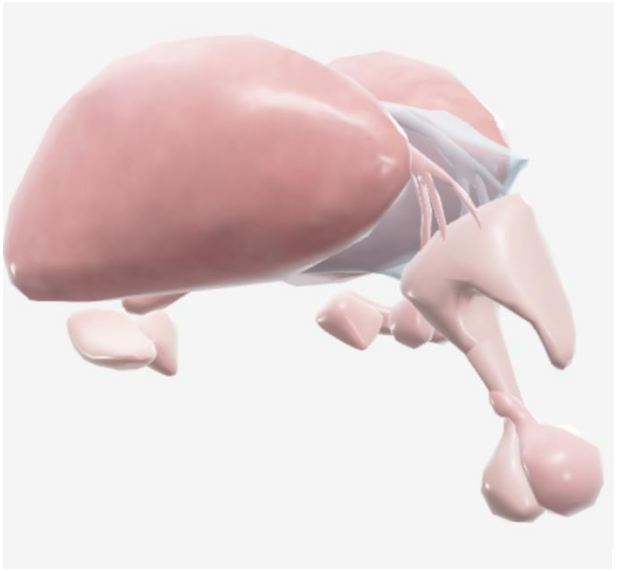
The macroscopic organization of CNS

Macroscopic organization of CNS

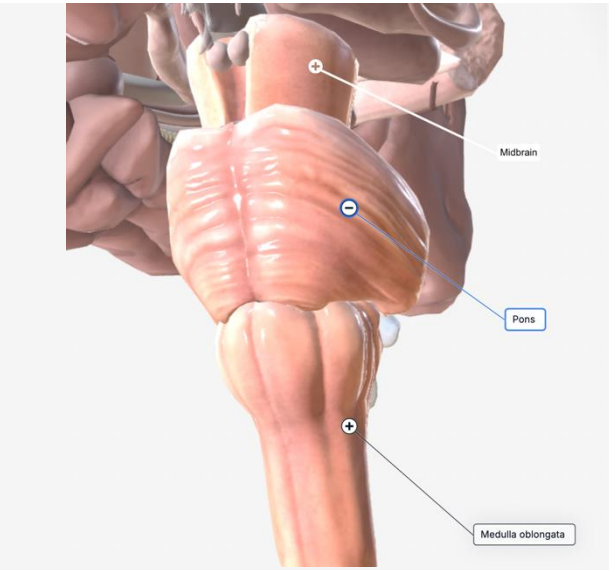
Cerebral hemispheres



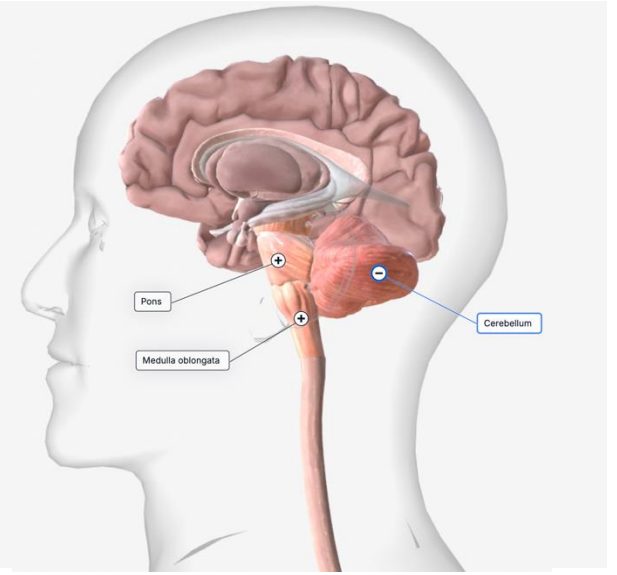
Diencephalon



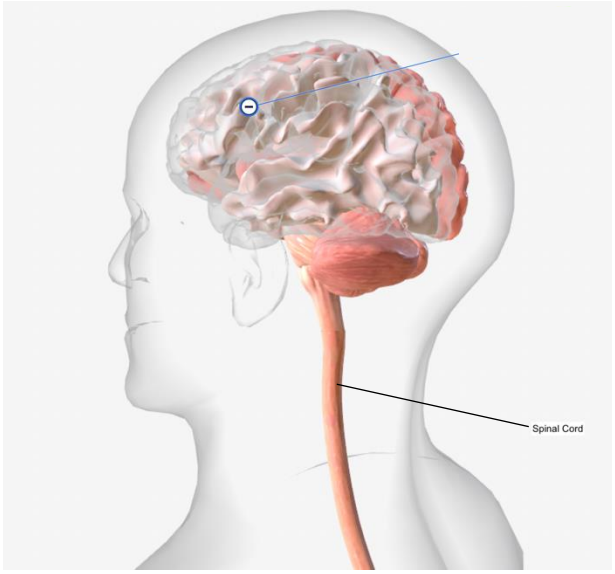
Brainstem



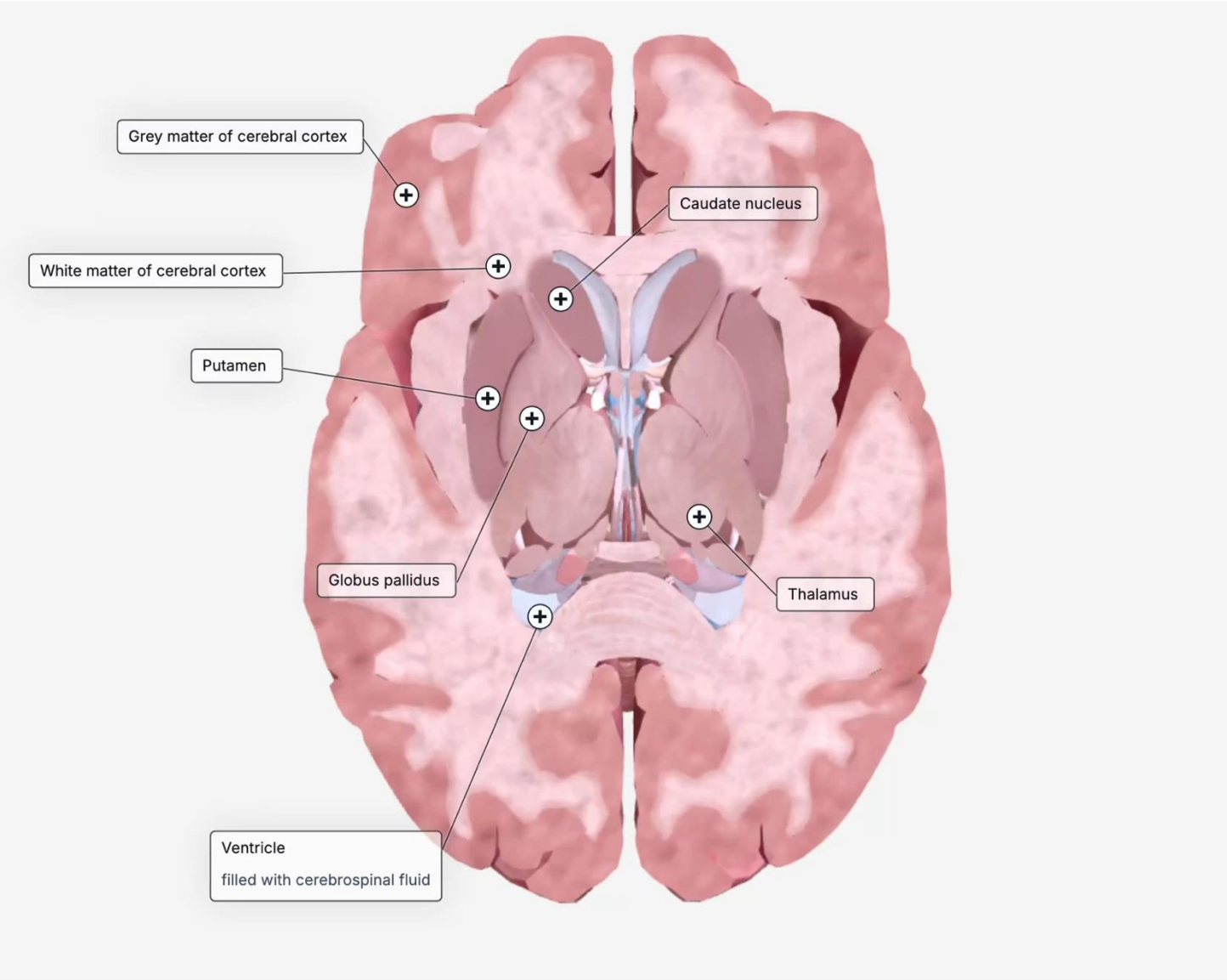
Cerebellum



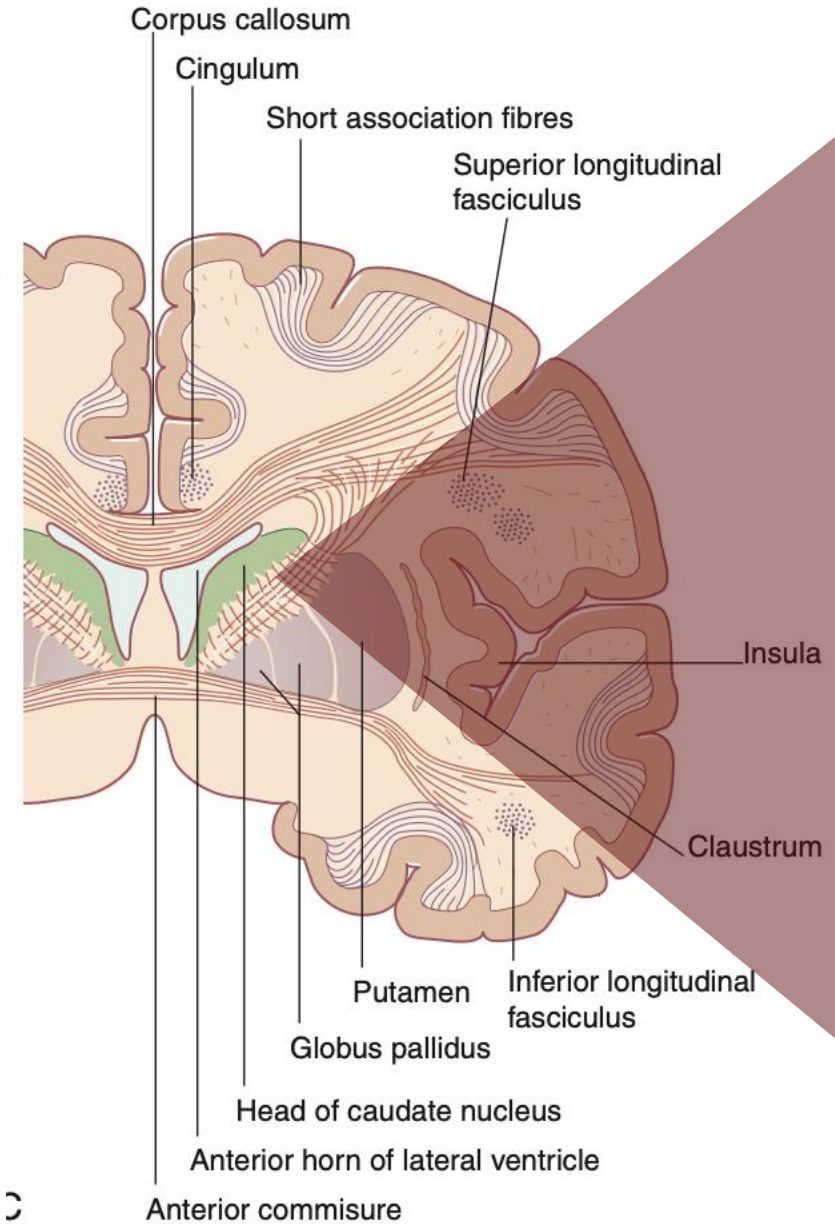
Spinal cord



Brain axial view



White matter tracts



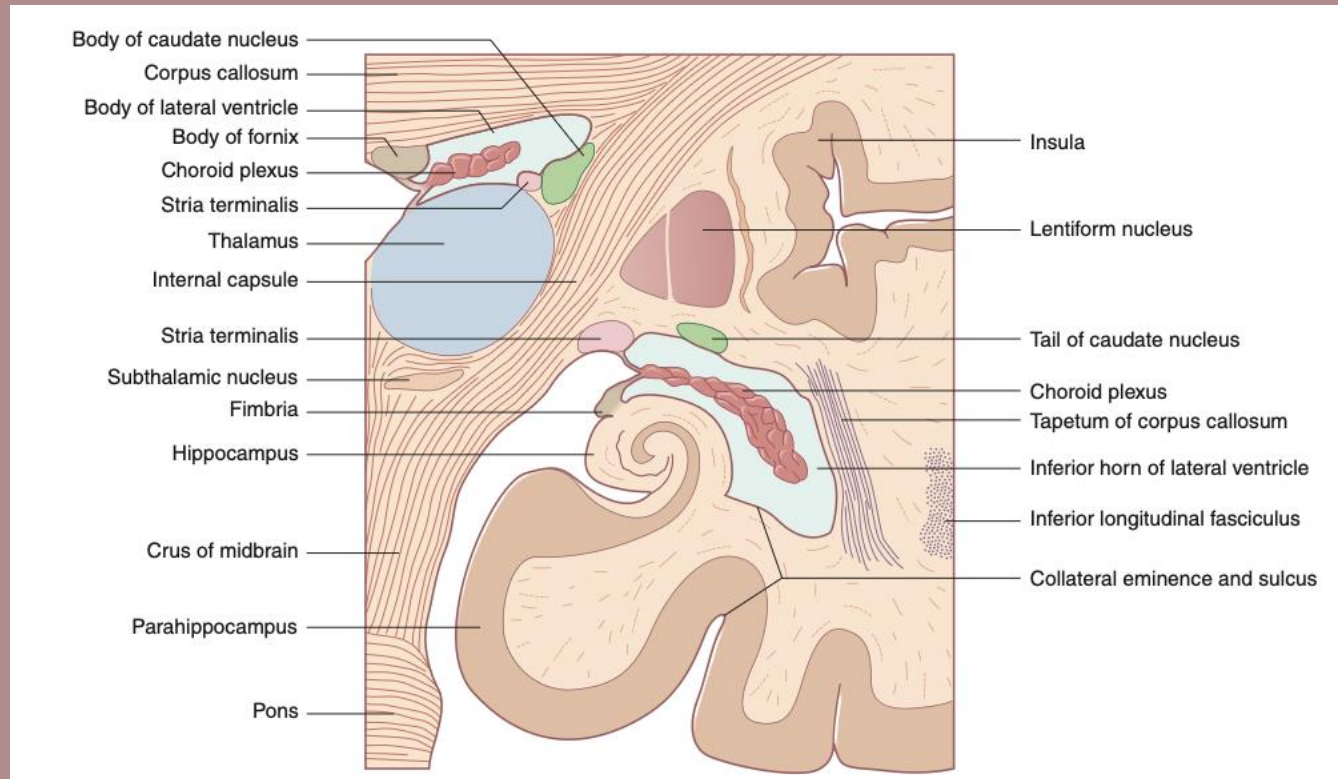


FIGURE 2.19 Coronal section through the body and inferior horn of the lateral ventricle.

The internal capsule

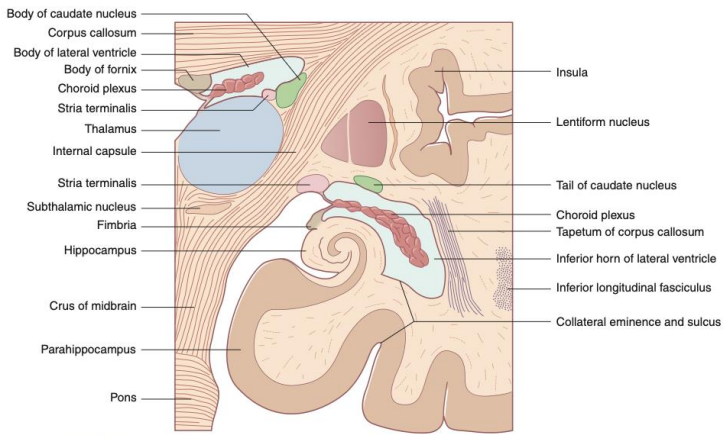
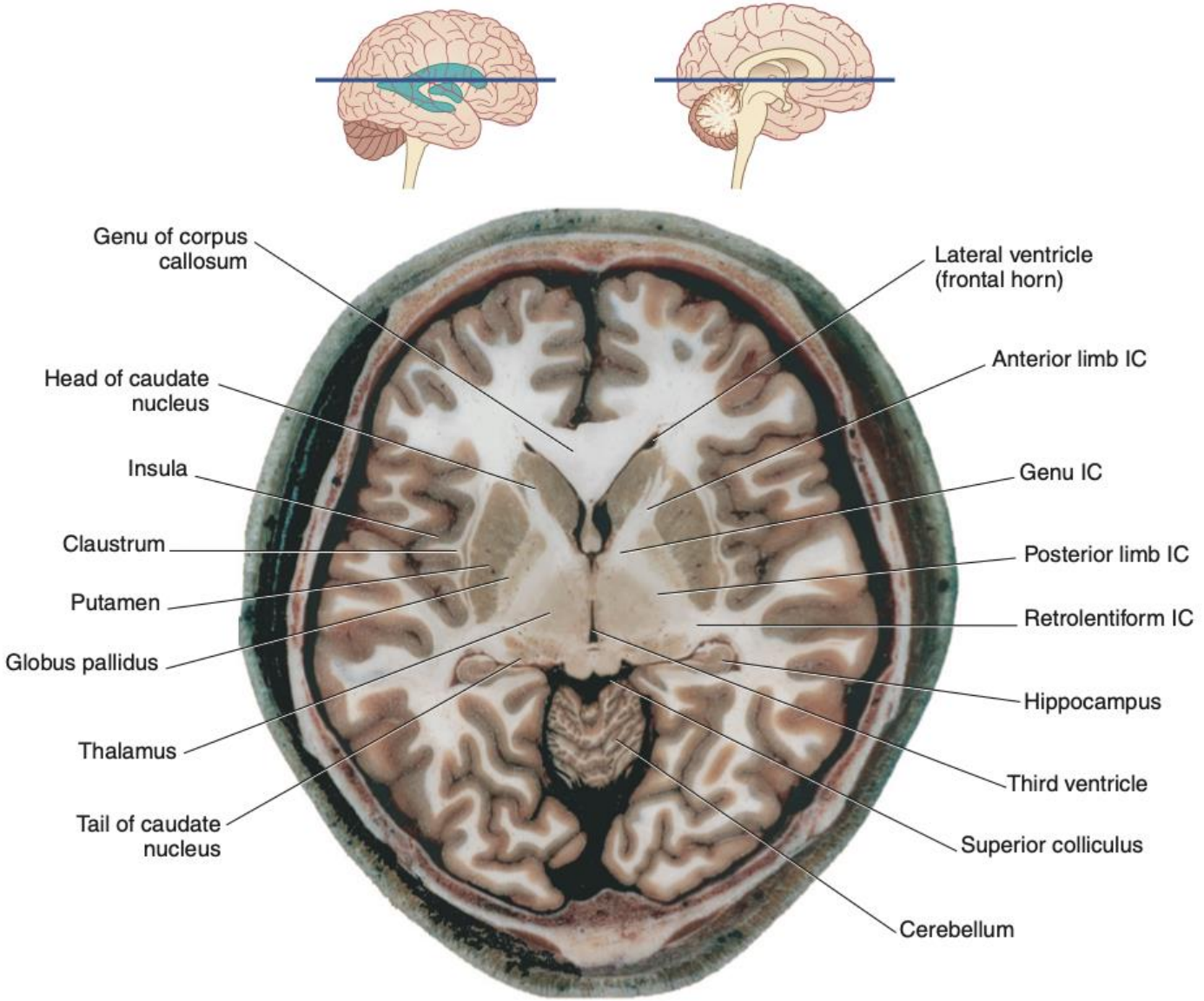
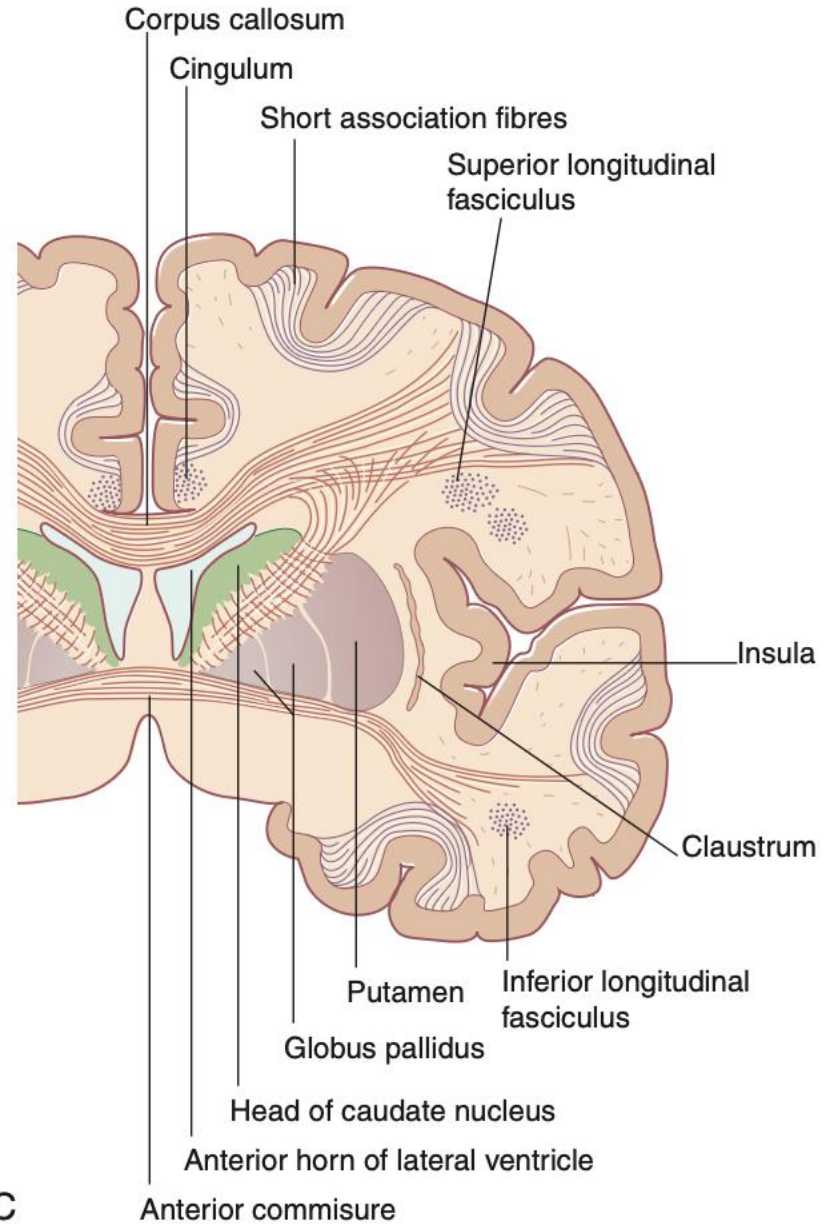
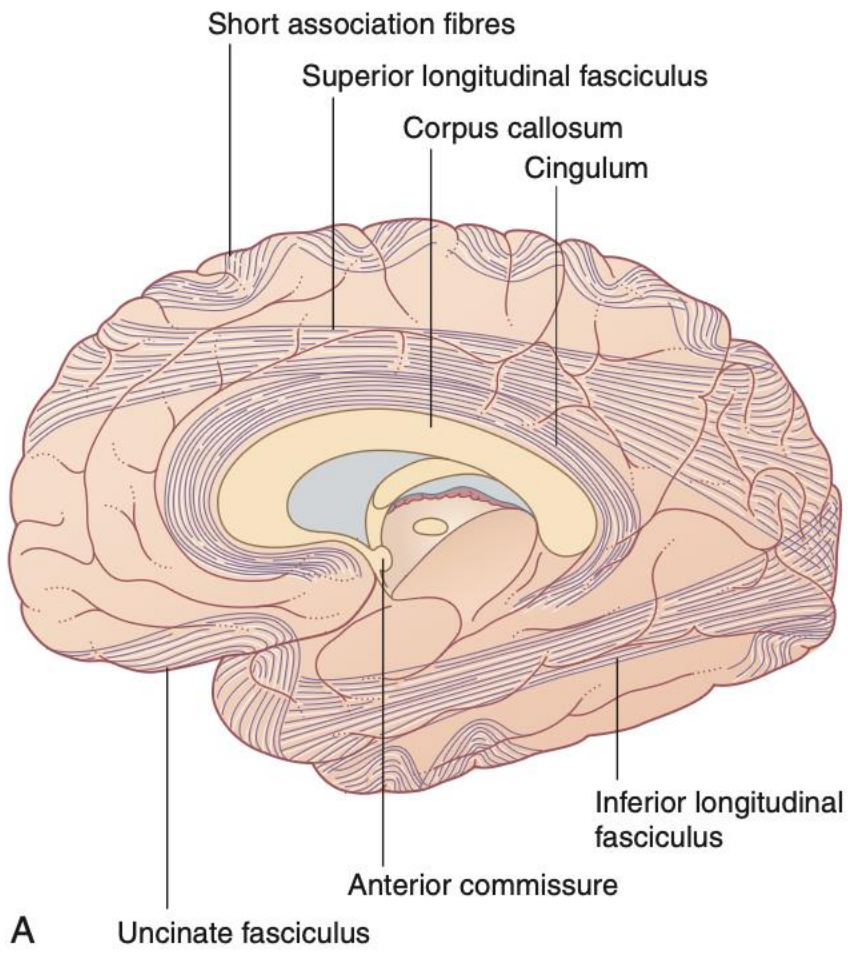


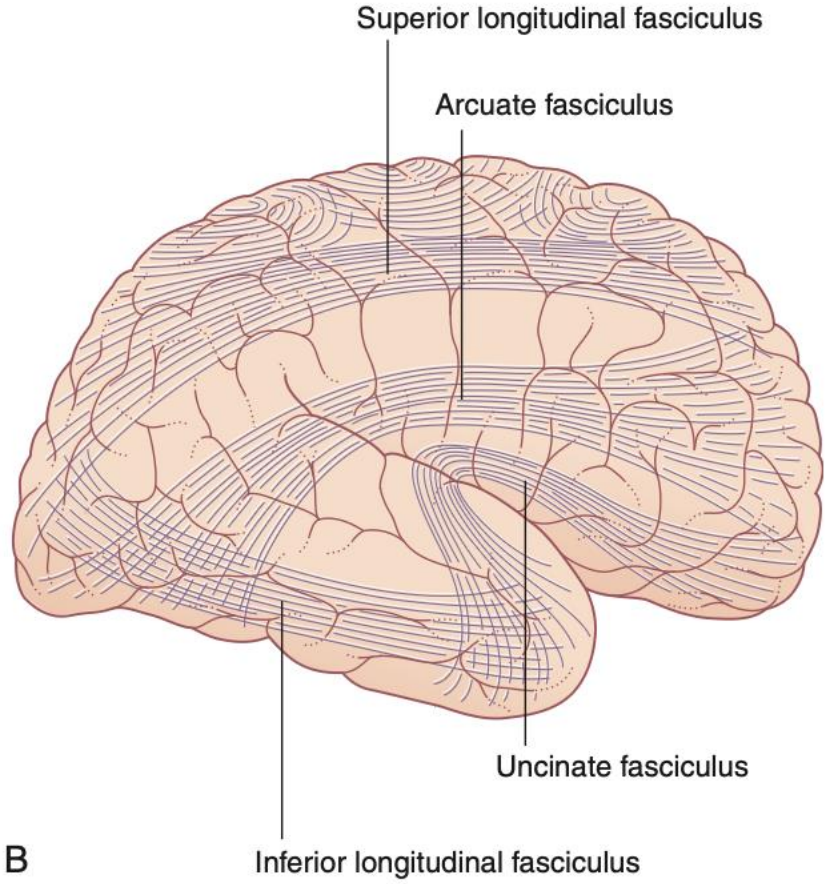
FIGURE 2.19 Coronal section through the body and inferior horn of the lateral ventricle.



White matter tracts

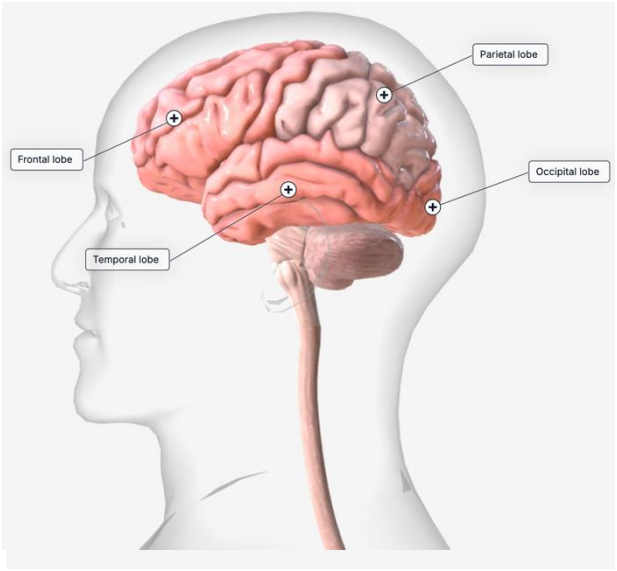




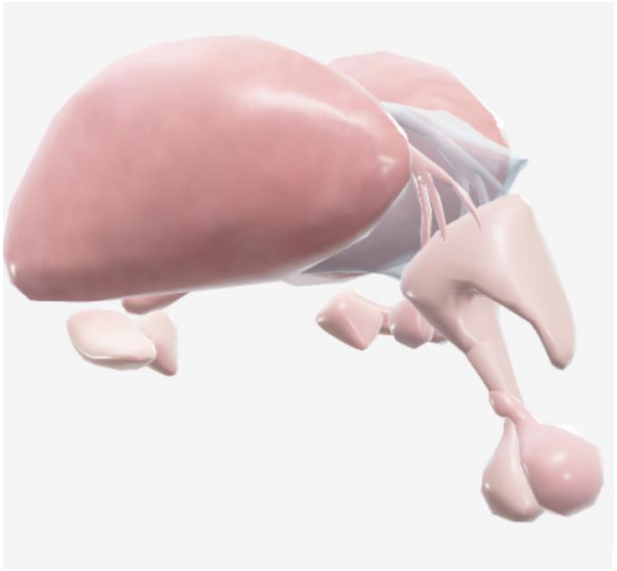


Macroscopic organization of CNS

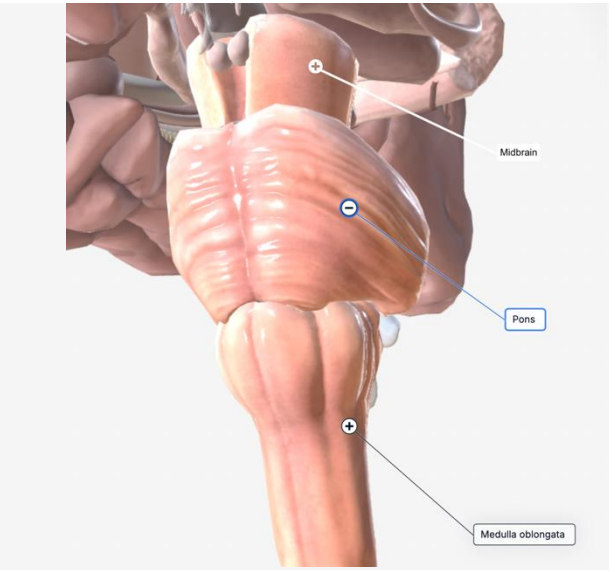
Cerebral hemispheres



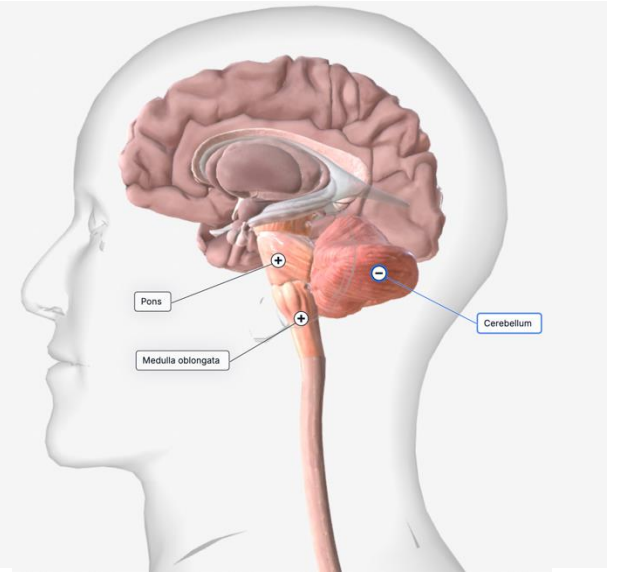
Diencephalon



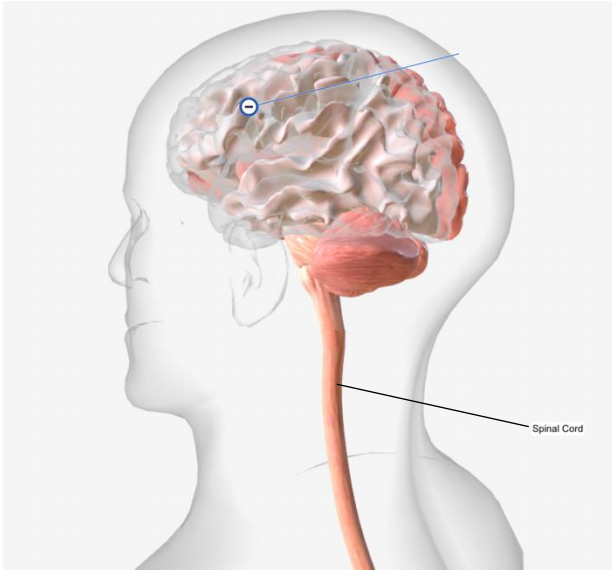
Brainstem



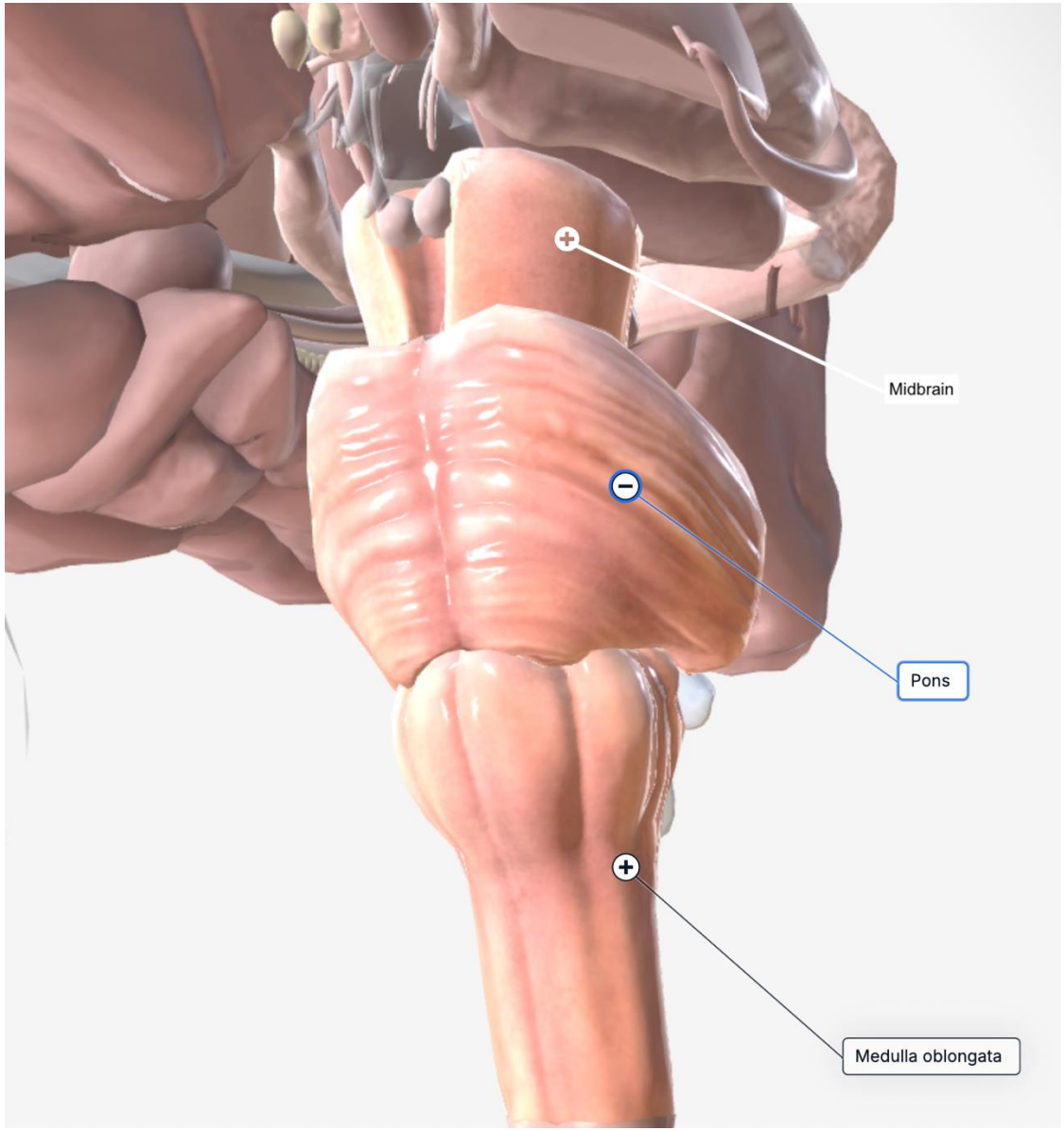
Cerebellum



Spinal cord



Brainstem



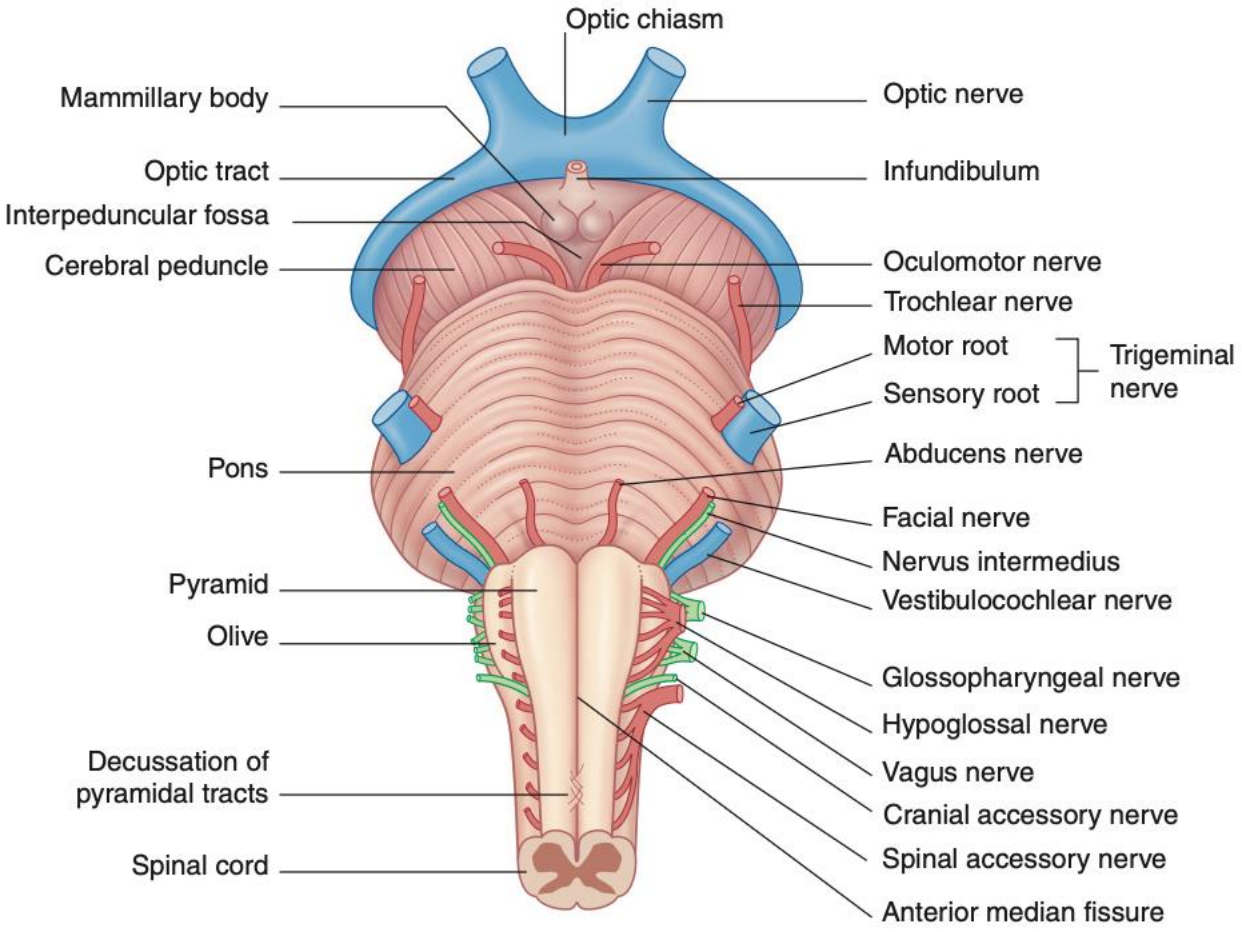
The brainstem consists of:
- Midbrain
- Pons
- Medulla

It has three principal functions:
1. Conduit for ascending and descending tracts
2. Cranial nerve nuclei
3. Vital autonomic centers

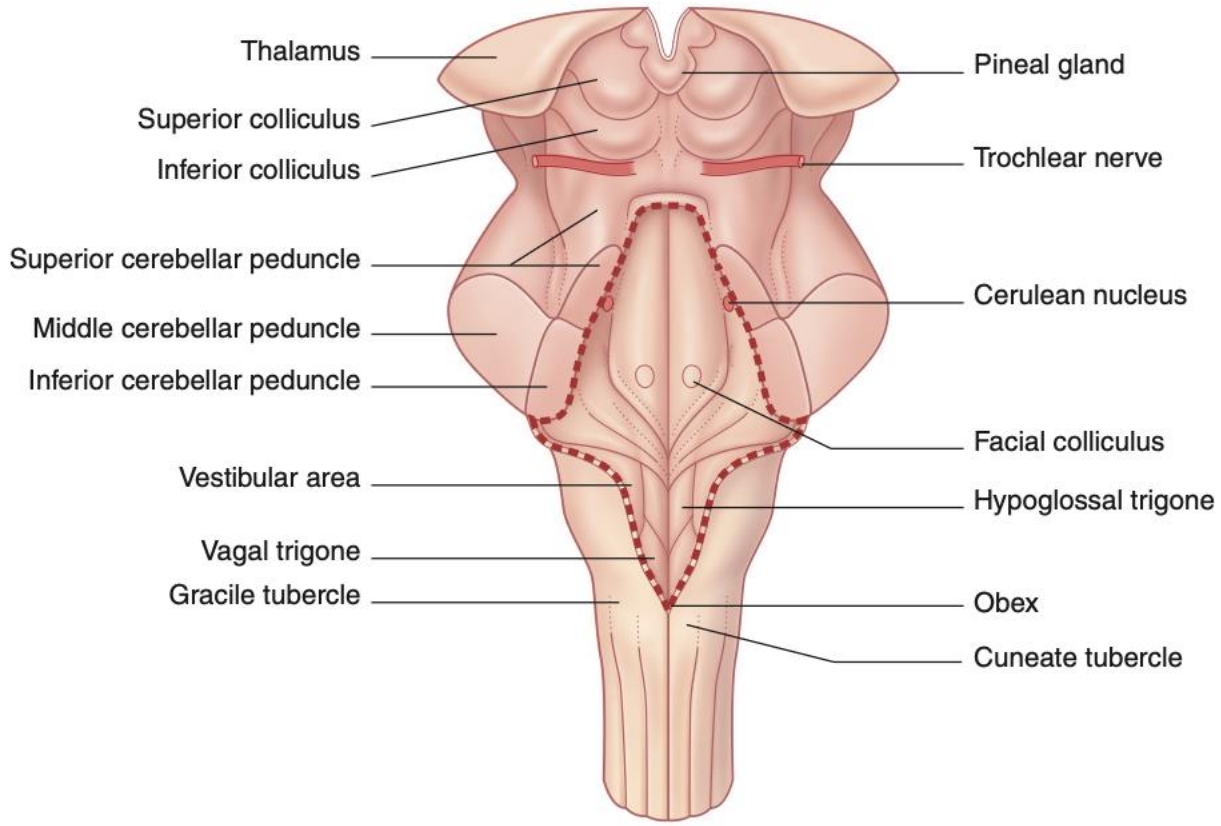
It is structurally compact and functionally dense.

Brainstem

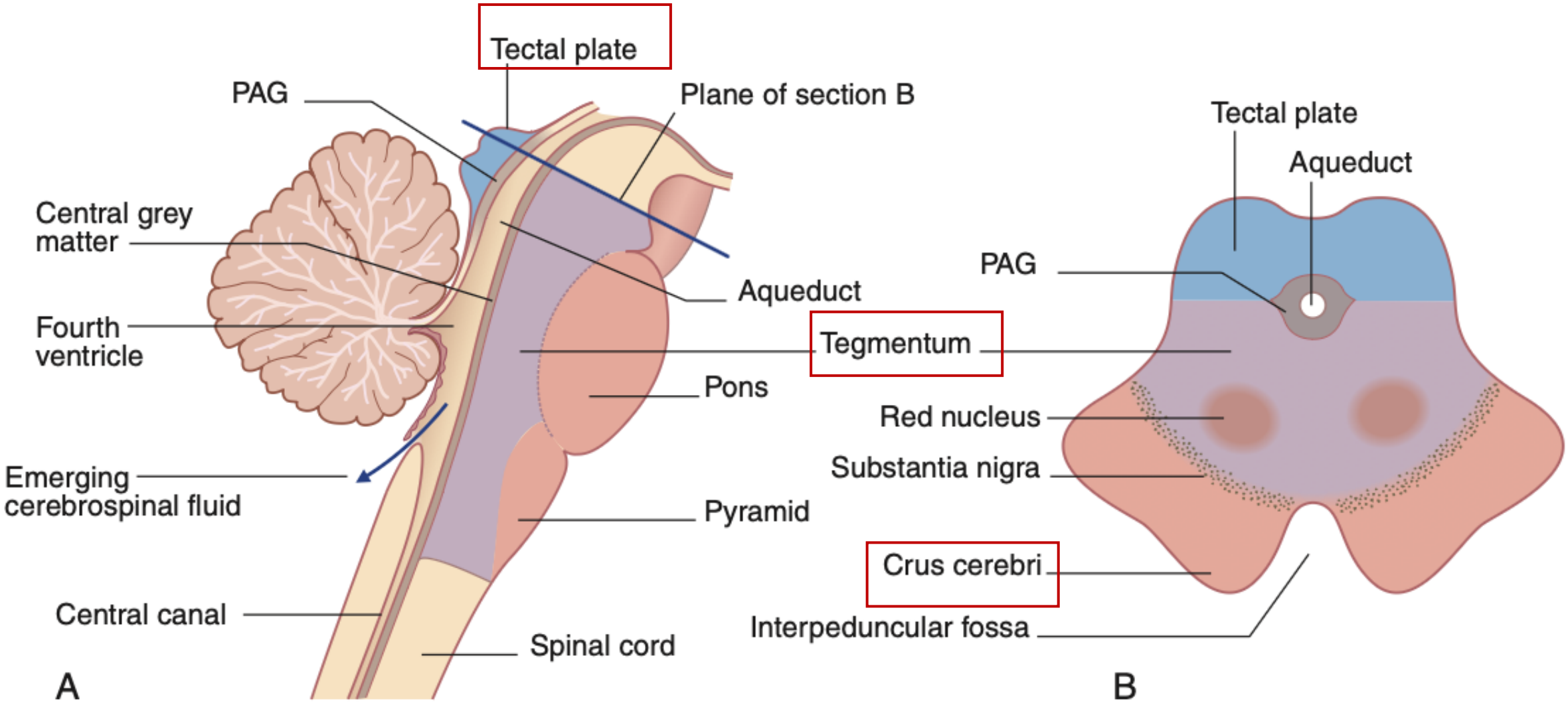
Ventral view



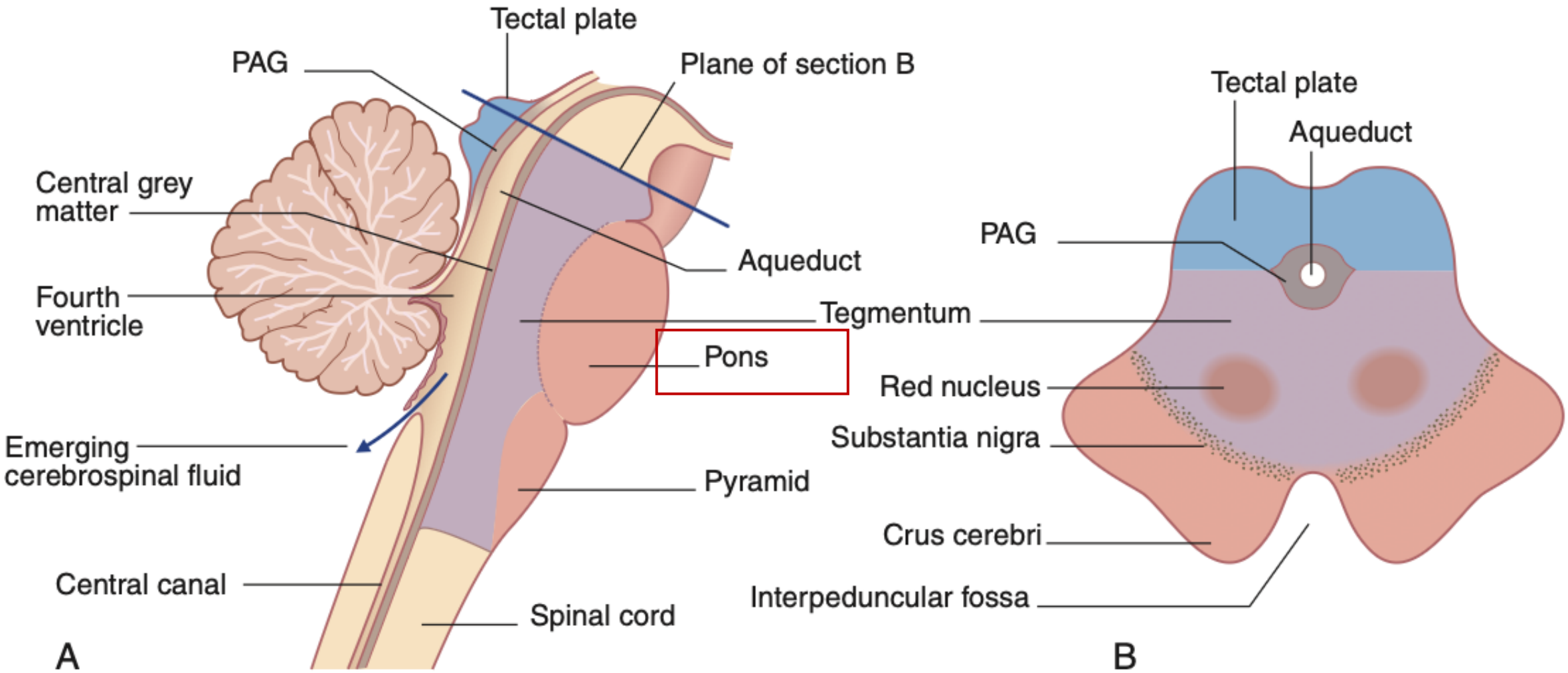
Dorsal view



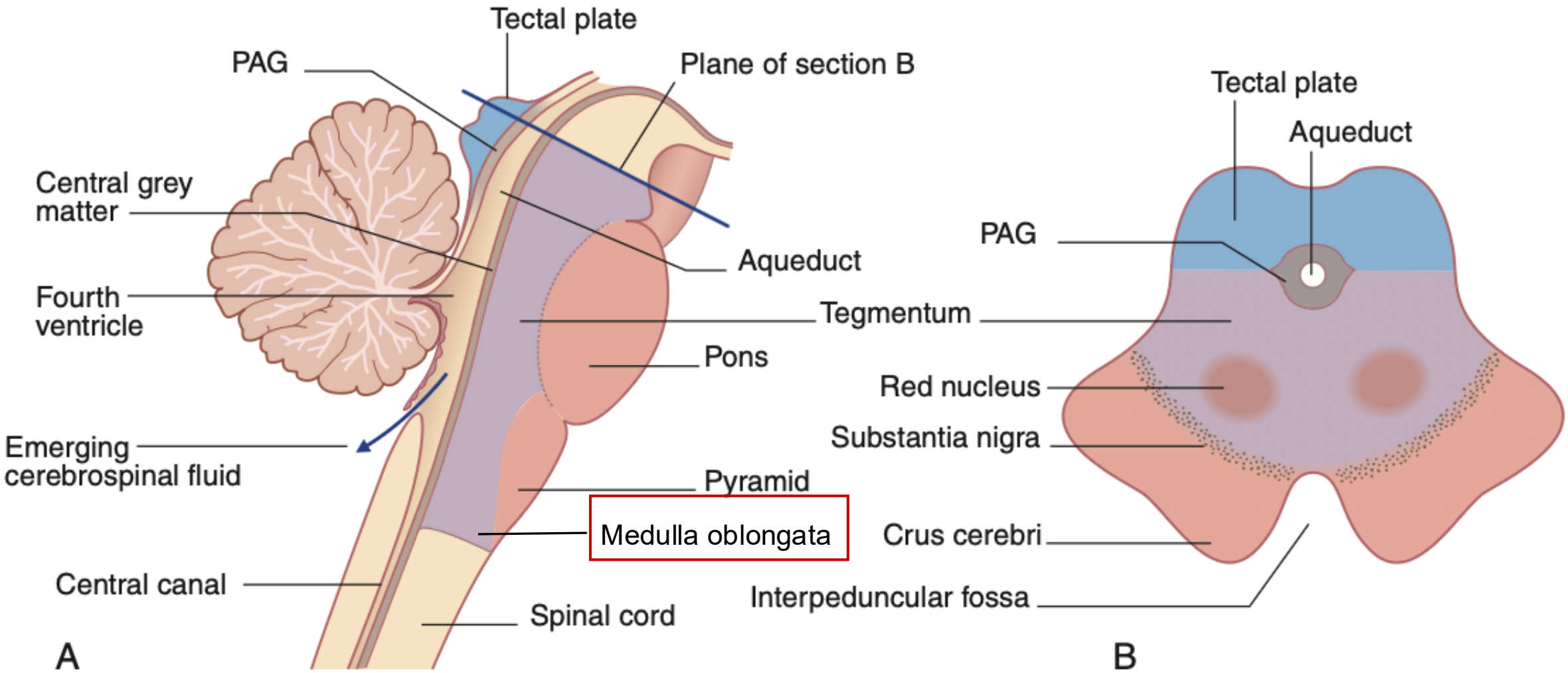
Brainstem: midbrain



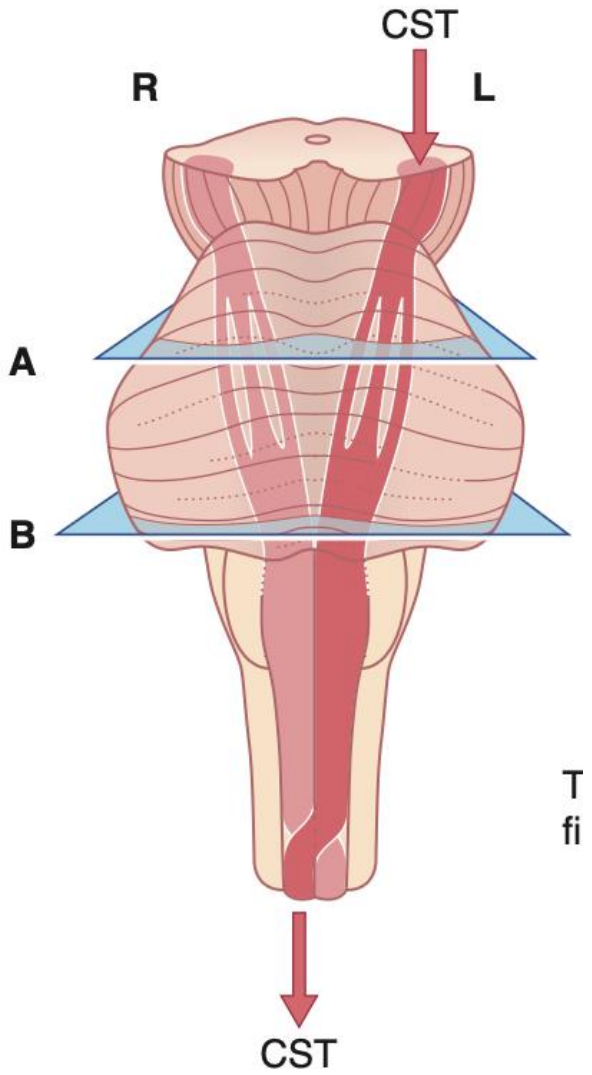
Brainstem: pons



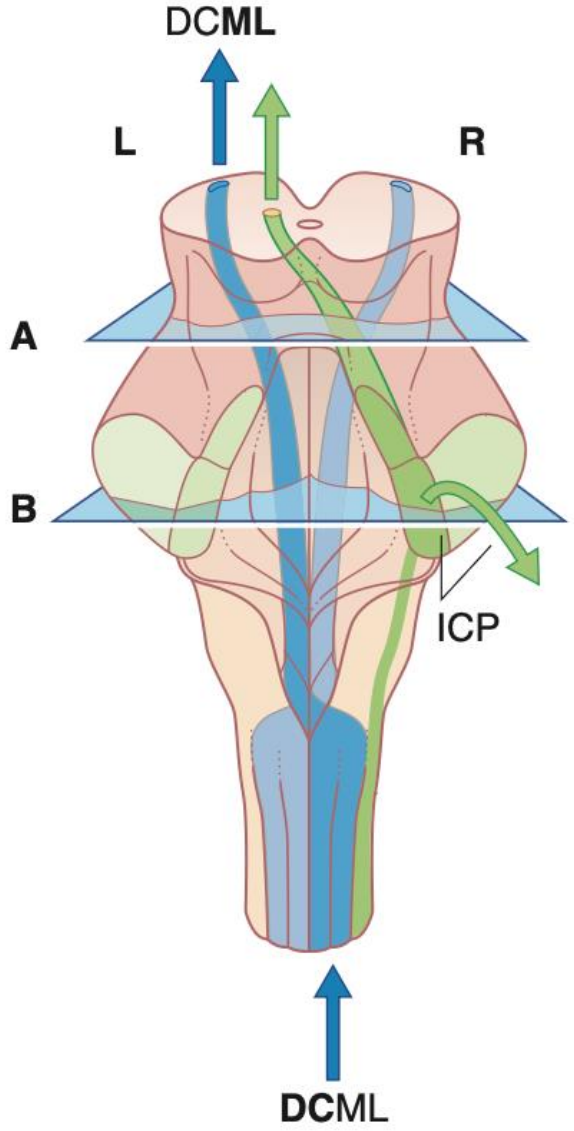
Brainstem: medulla oblongata



Brainstem: midbrain

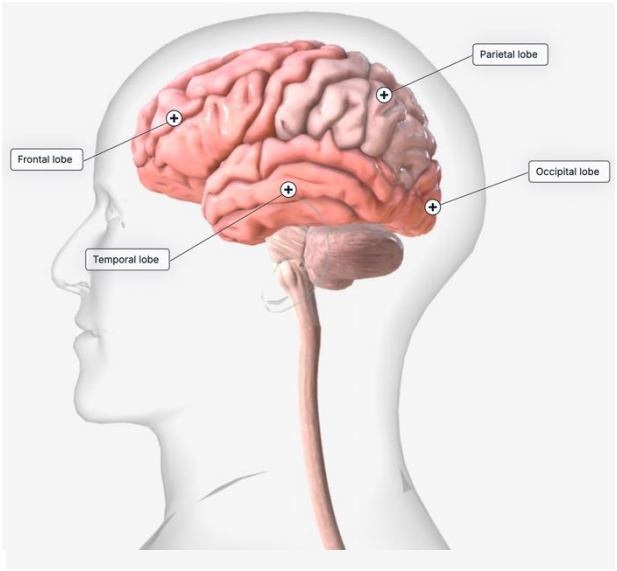


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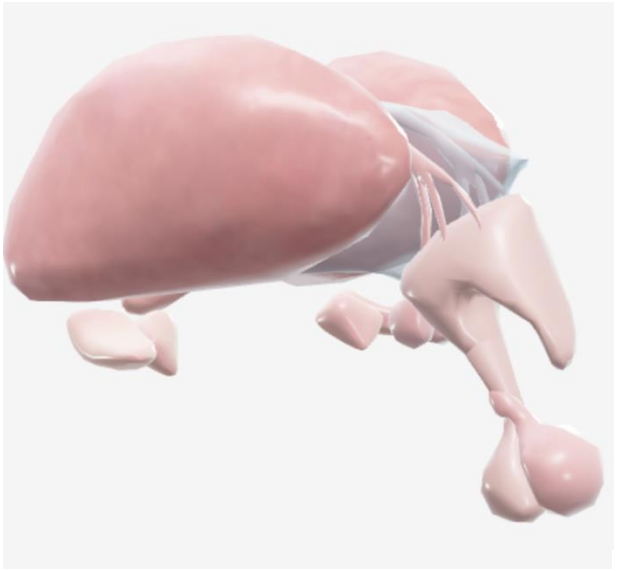


Macroscopic organization of CNS

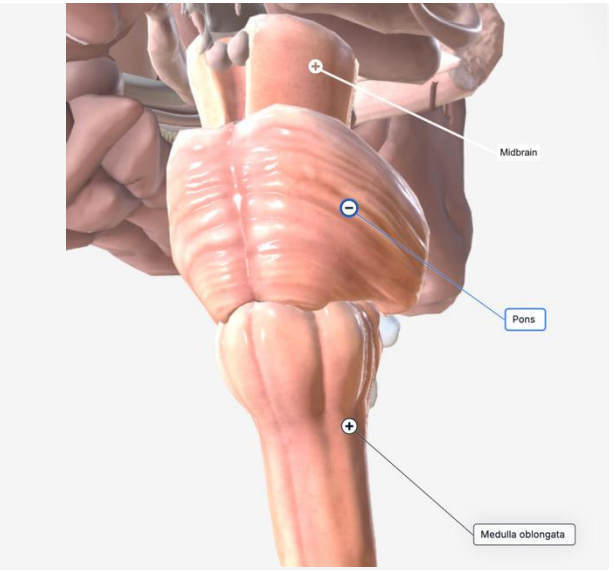
Cerebral hemispheres



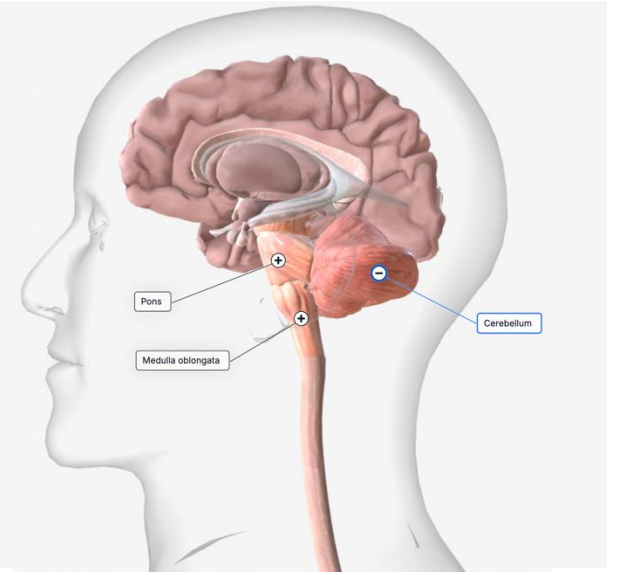
Diencephalon



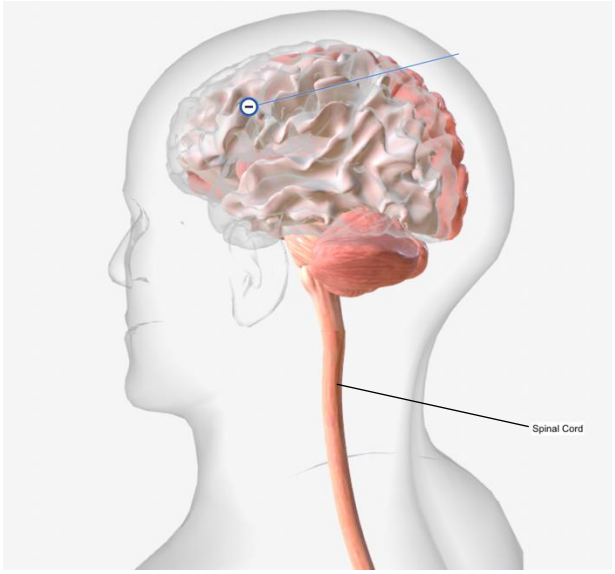
Brainstem



Cerebellum



Spinal cord



Cerebellum

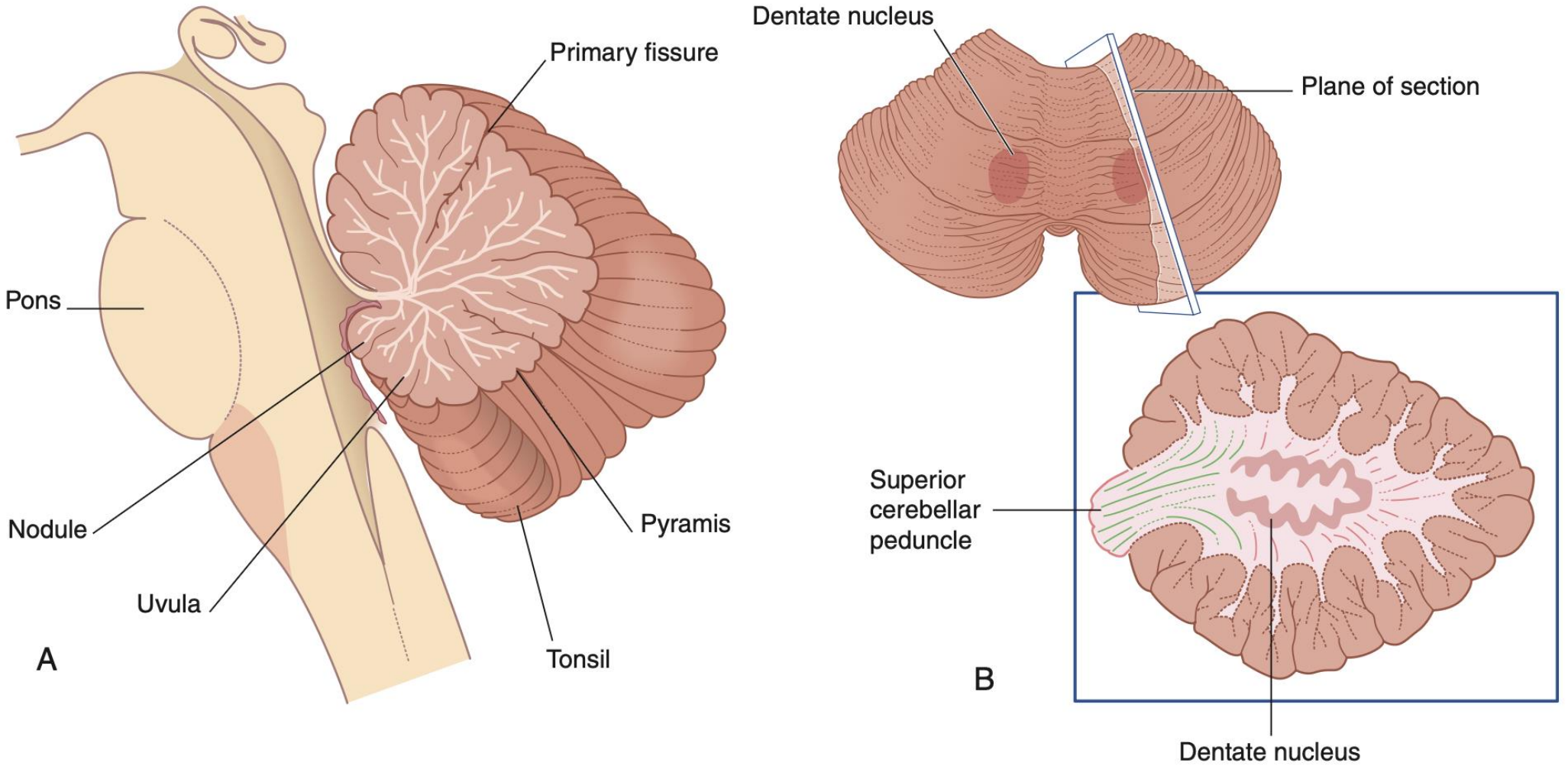
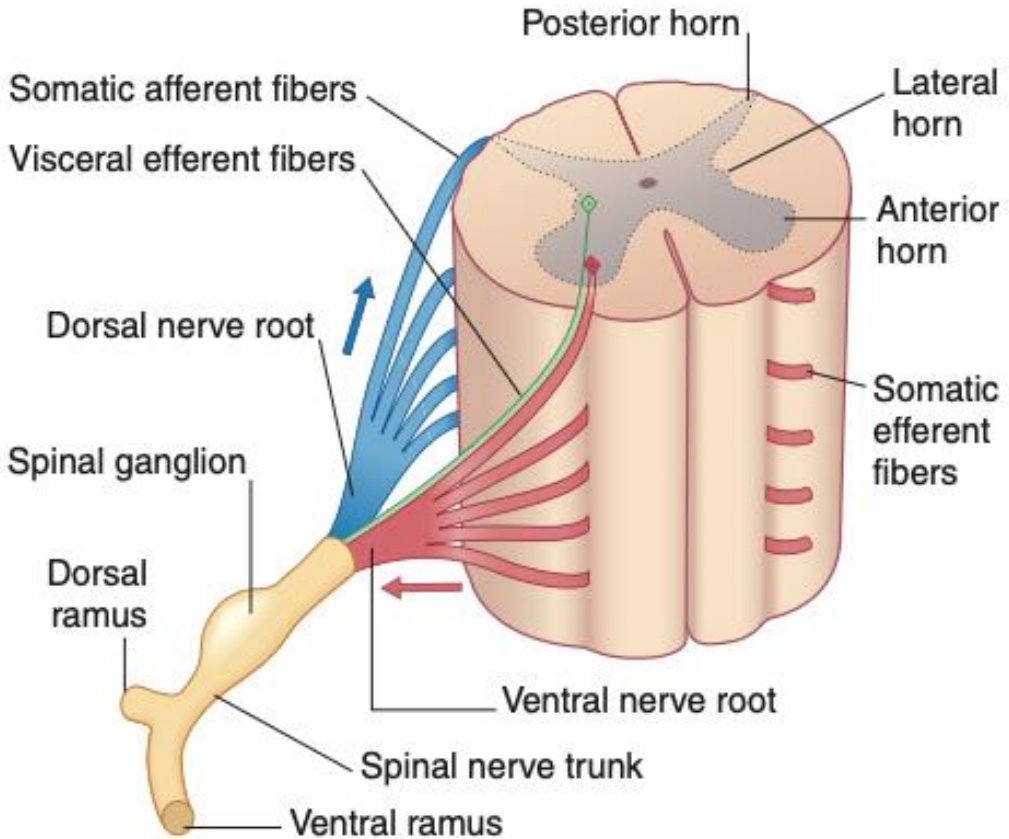
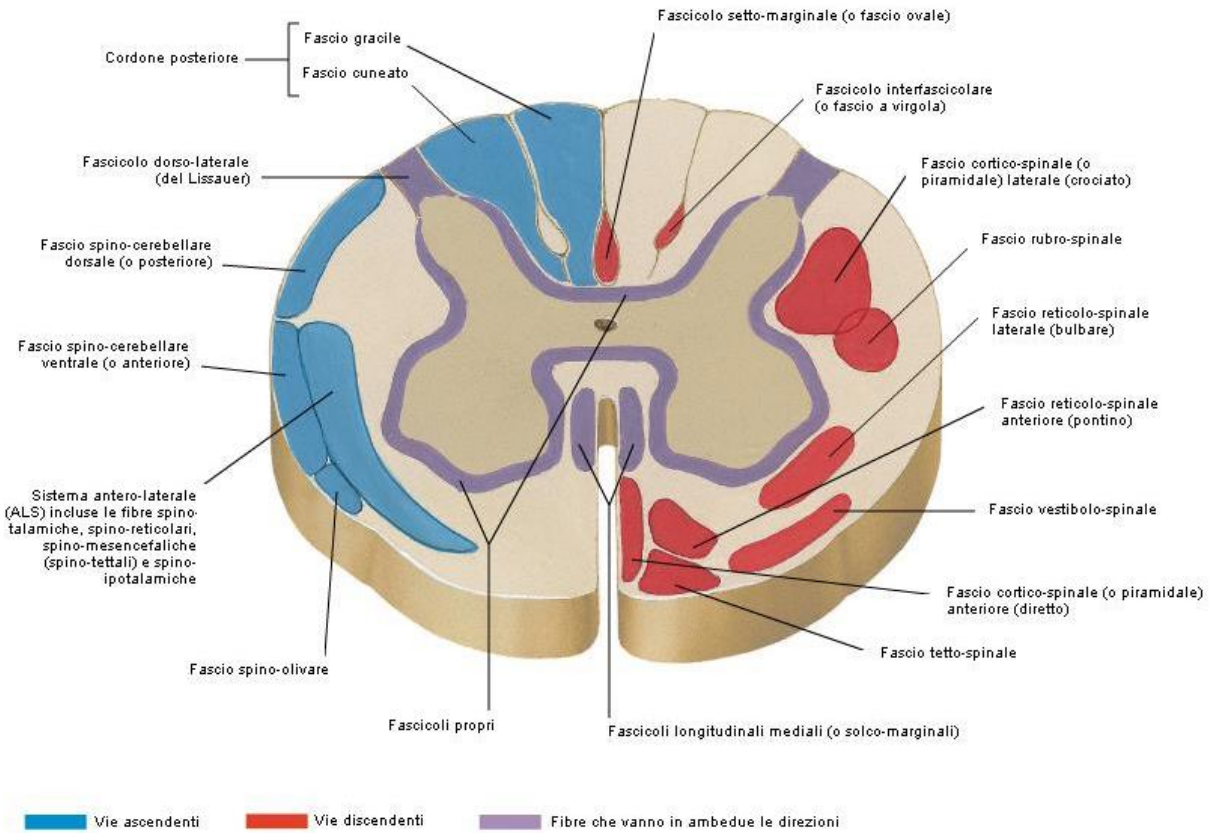


FIGURE 3.17 **(A)** Sagittal section of hindbrain. **(B)** Oblique section of cerebellum.

Spinal cord


Posterior horn
Somatic afferent fibers
Visceral efferent fibers
Lateral horn
Anterior horn
Dorsal nerve root
Somatic efferent fibers
Spinal ganglion
Dorsal ramus
Ventral nerve root
Spinal nerve trunk
Ventral ramus


Cordone posteriore
Fascio gracile
Fascio cuneato
Fascicolo setto-marginale (o fascio ovale)
Fascicolo interfascicolare (o fascio a virgola)
Fascicolo dorso-laterale (del Lissauer)
Fascio cortico-spinale (o piramidale) laterale (crociato)
Fascio spino-cerebellare dorsale (o posteriore)
Fascio rubro-spinale
Fascio spino-cerebellare ventrale (o anteriore)
Fascio reticolo-spinale laterale (bulbare)
Fascio reticolo-spinale anteriore (pontino)
Sistema antero-laterale (ALS) incluse le fibre spino-talamiche, spino-reticolari, spino-mesencefaliche (spino-tettali) e spino-ipotalamiche
Fascio vestibolo-spinale
Fascio cortico-spinale (o piramidale) anteriore (diretto)
Fascio tetto-spinale
Fascio spino-olivare
Fascicoli propri
Fascicoli longitudinali mediali (o solco-marginali)
Vie ascendenti
Vie discendenti
Fibre che vanno in ambedue le direzioni

The Ventricular System

Ventricular system

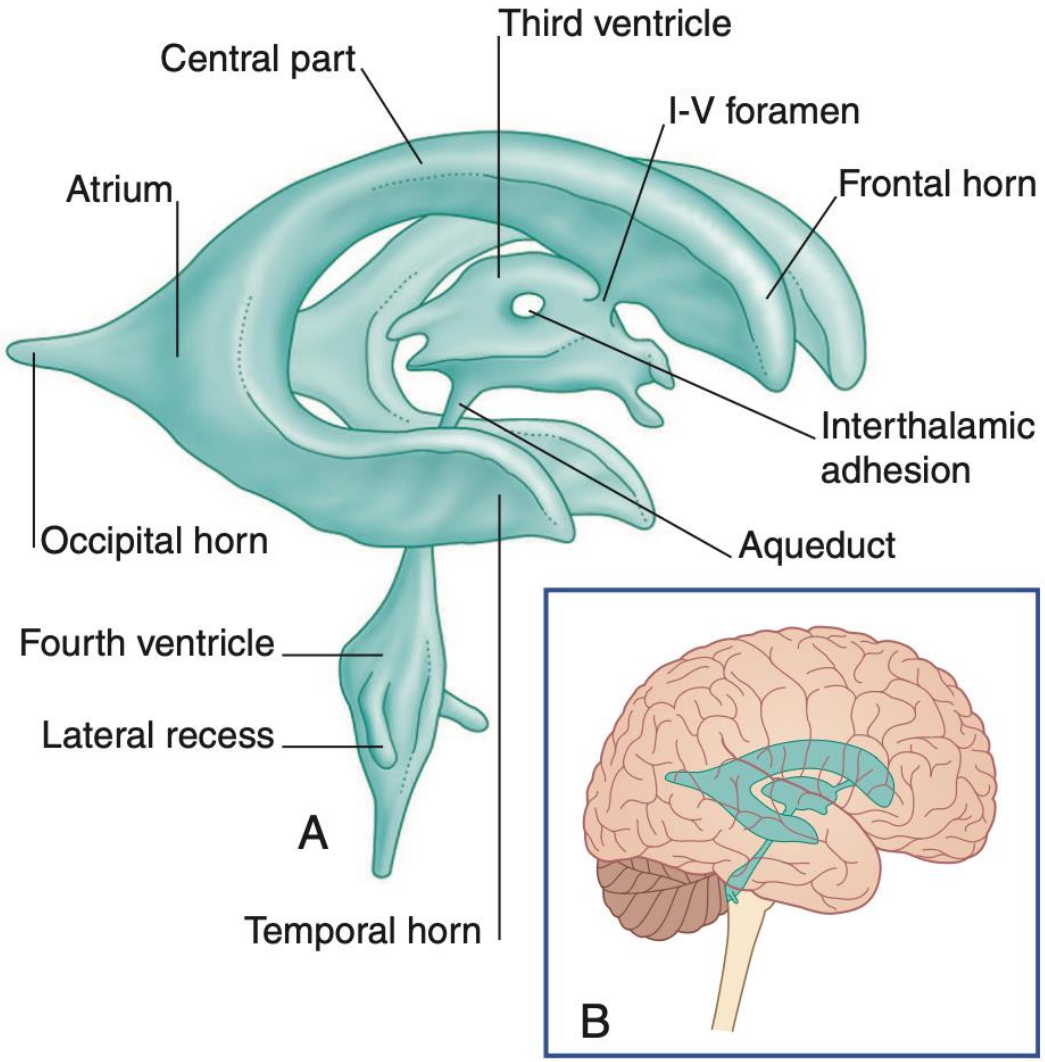
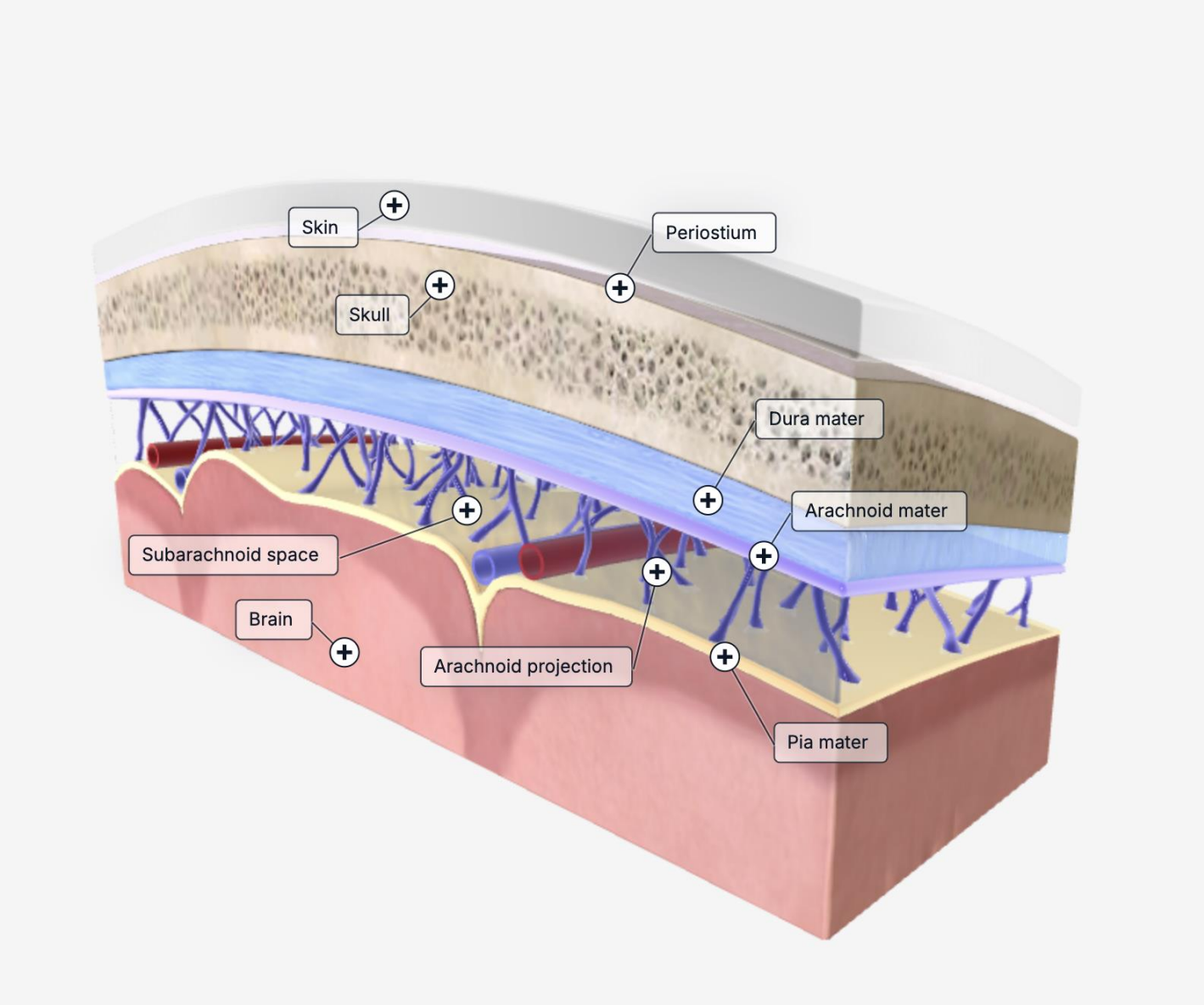
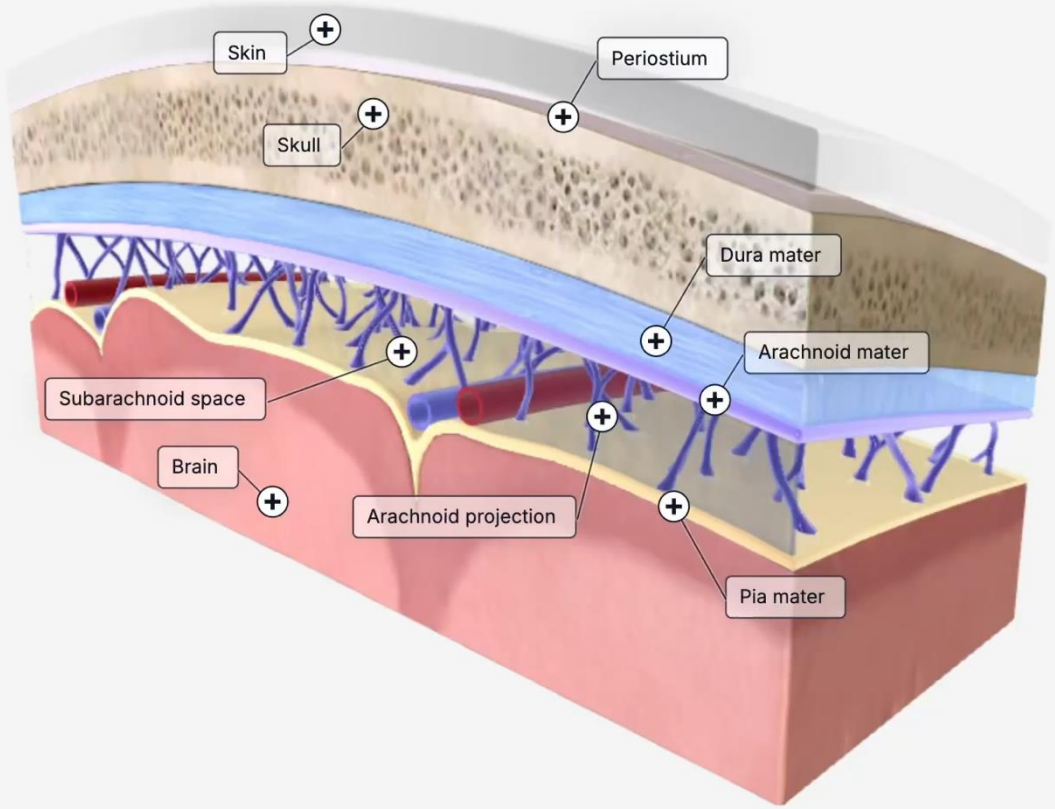


FIGURE 2.22 Ventricular system. **(A)** Isolated cast. **(B)** Ventricular system in situ.

Meninges

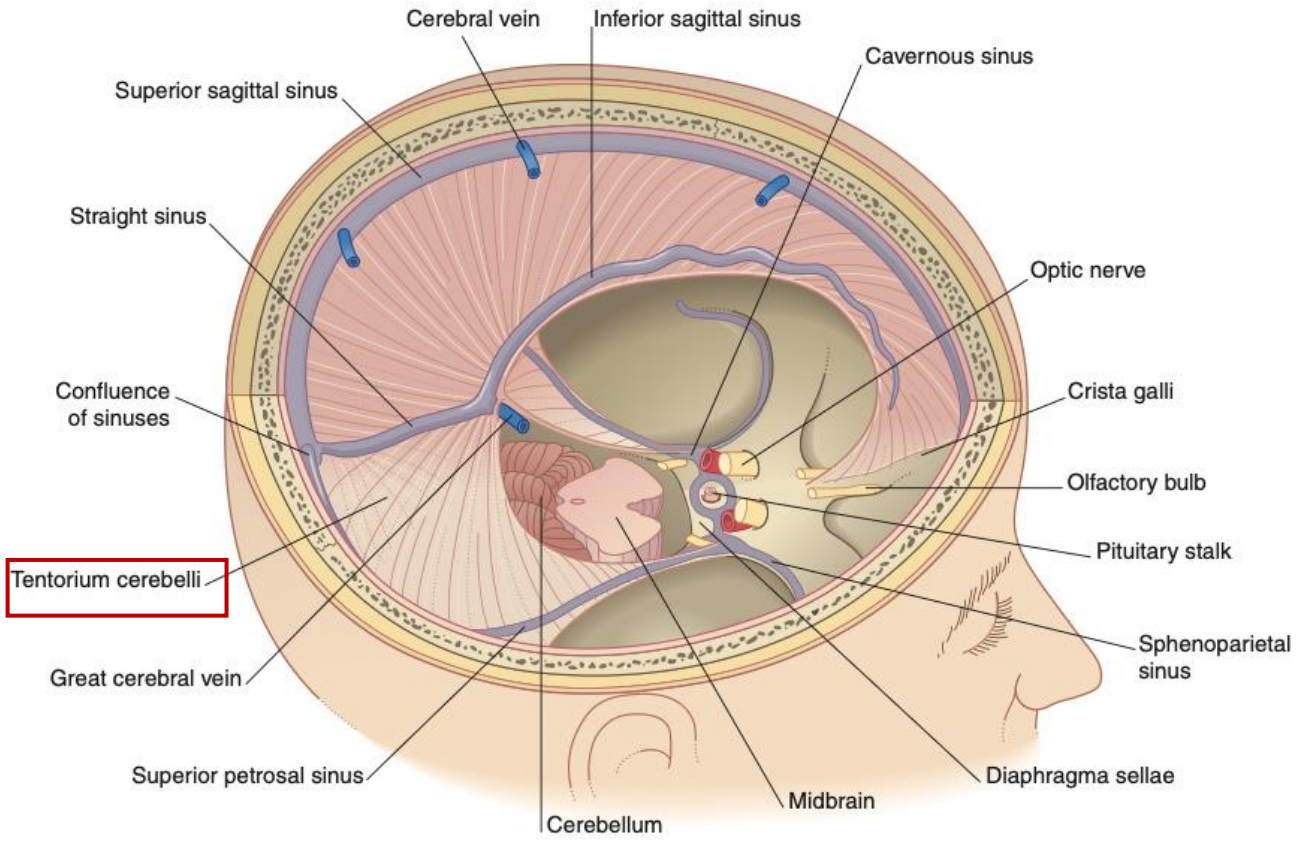

Skin
Periostium
Skull
Dura mater
Arachnoid mater
Subarachnoid space
Brain
Arachnoid projection
Pia mater

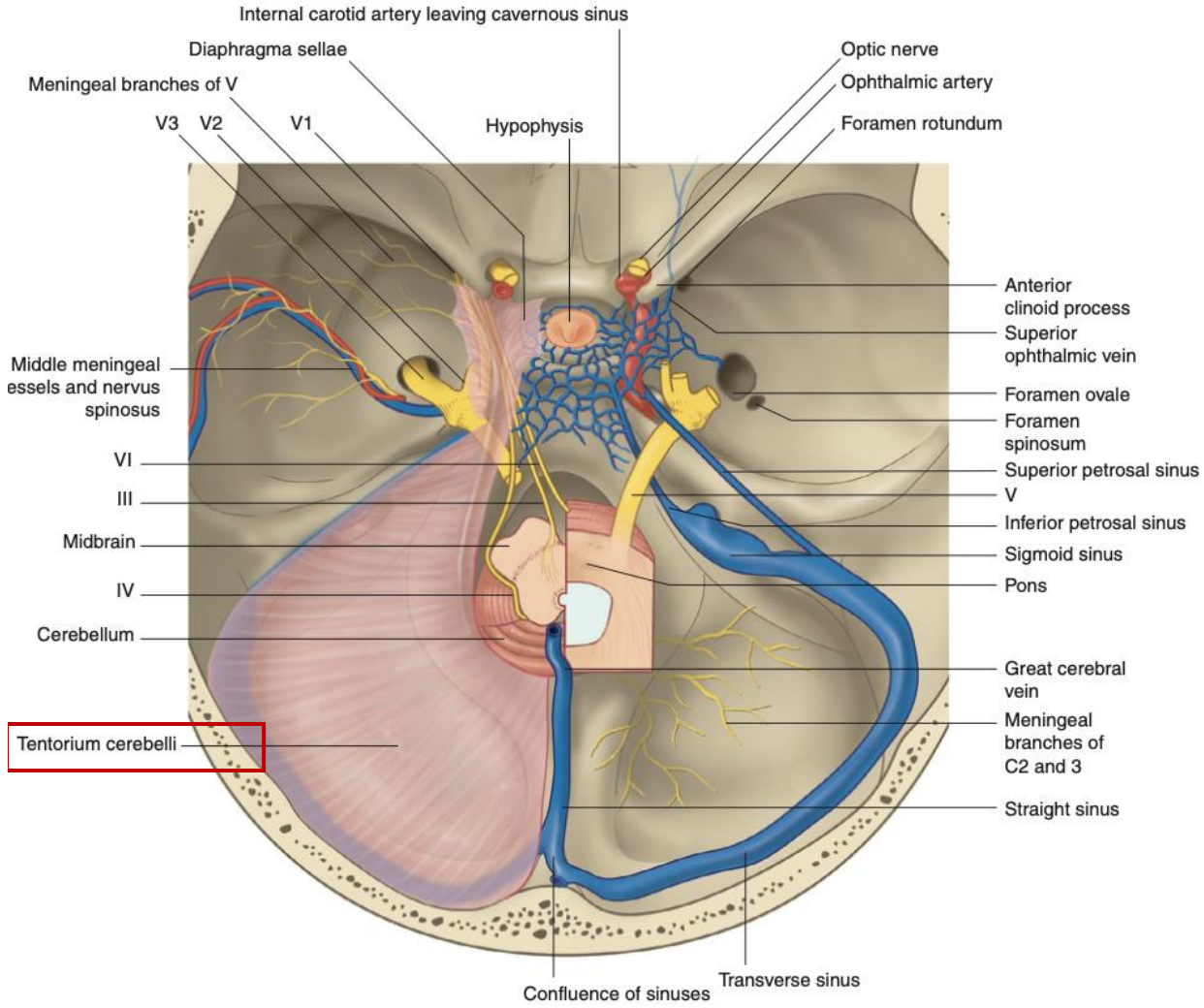
Meninges



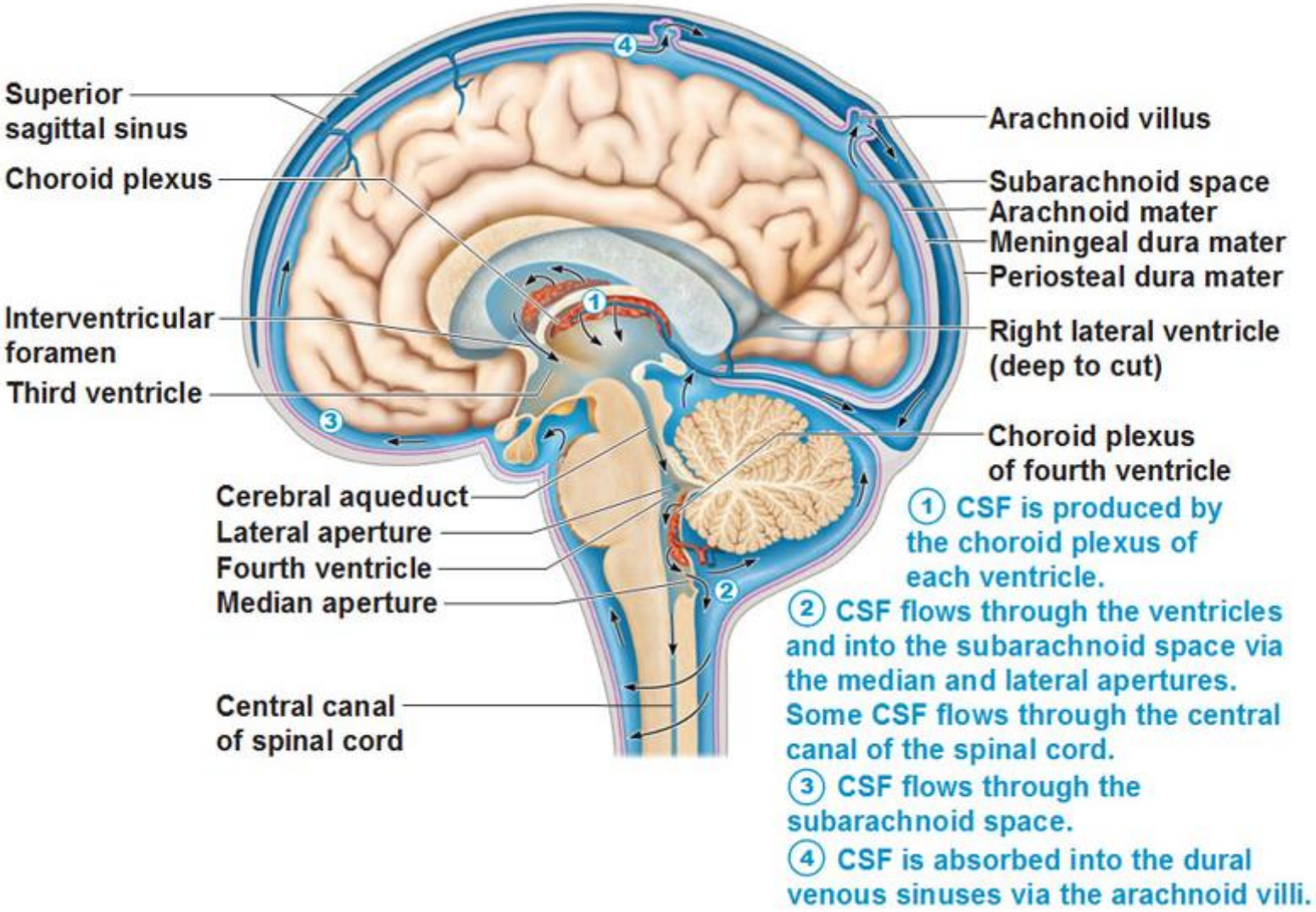
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Anatomage

Meninges

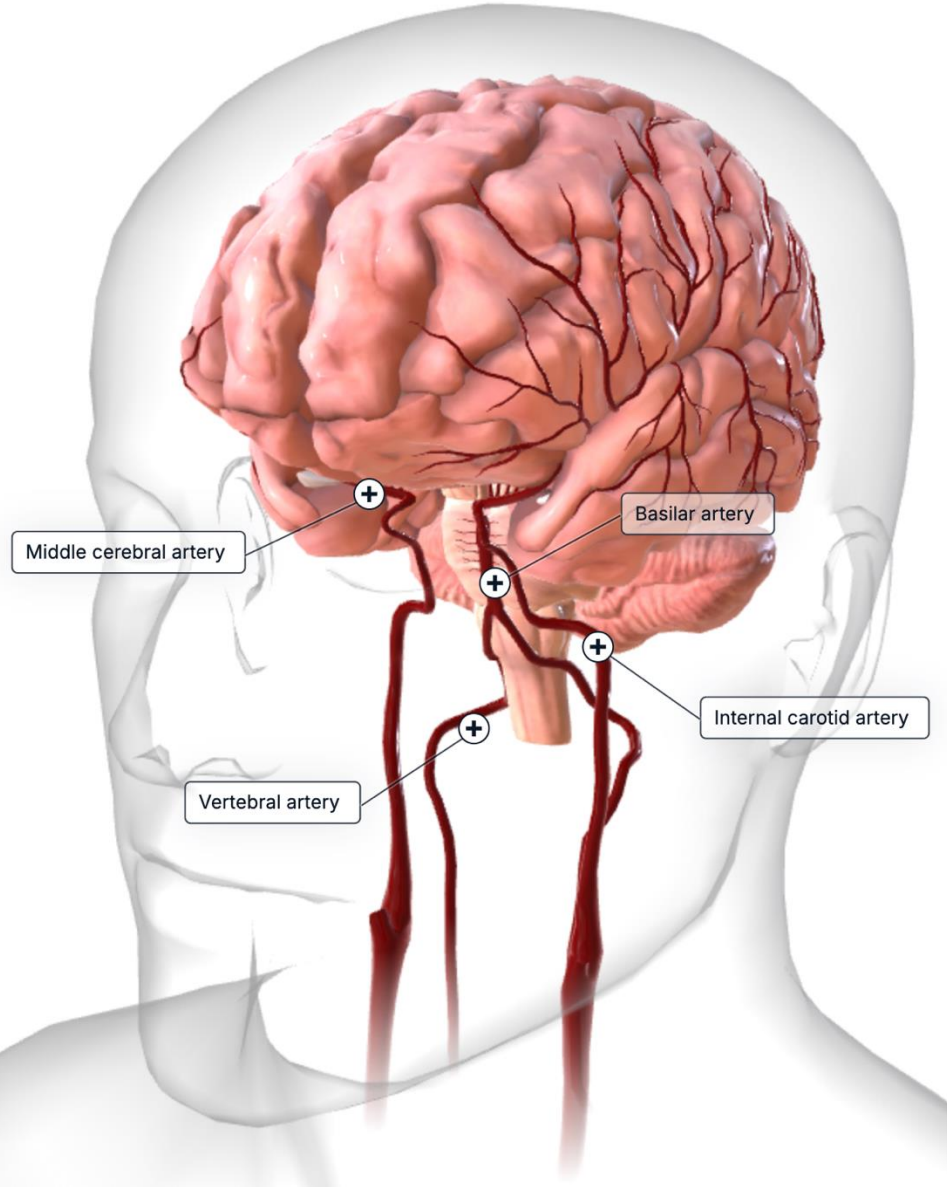

Cerebral vein
Inferior sagittal sinus
Cavernous sinus
Superior sagittal sinus
Straight sinus
Optic nerve
Confluence of sinuses
Crista galli
Olfactory bulb
Tentorium cerebelli
Pituitary stalk
Sphenoparietal sinus
Great cerebral vein
Superior petrosal sinus
Midbrain
Diaphragma sellae
Cerebellum


Internal carotid artery leaving cavernous sinus
Diaphragma sellae
Optic nerve
Meningeal branches of V
Ophthalmic artery
V3
V2
V1
Hypophysis
Foramen rotundum
Anterior clinoid process
Middle meningeal essels and nervus spinosus
Superior ophthalmic vein
Foramen ovale
Foramen spinosum
VI
Superior petrosal sinus
III
V
Inferior petrosal sinus
Midbrain
Sigmoid sinus
IV
Pons
Cerebellum
Great cerebral vein
Tentorium cerebelli
Meningeal branches of C2 and 3
Straight sinus
Confluence of sinuses
Transverse sinus

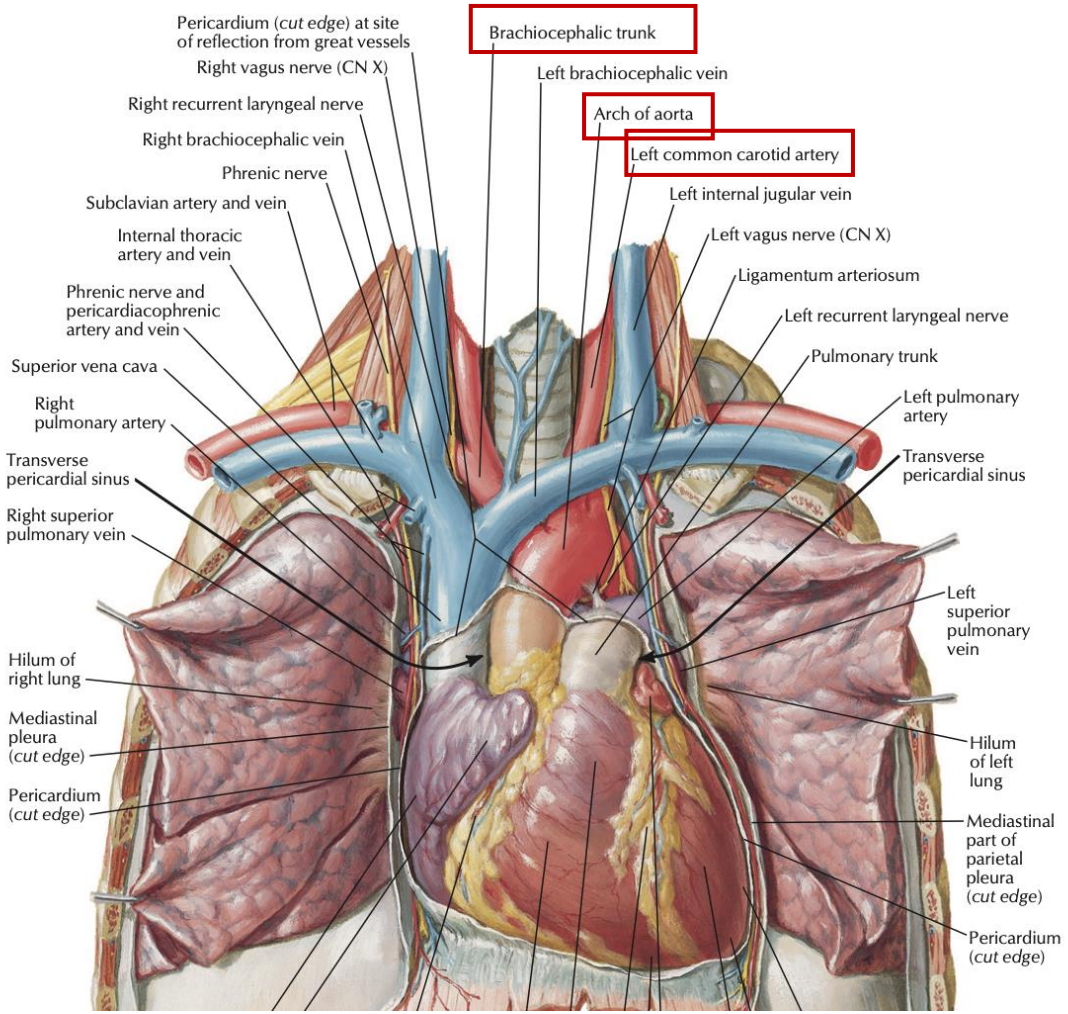
Circulation of the cerebrospinal fluid (CSF)



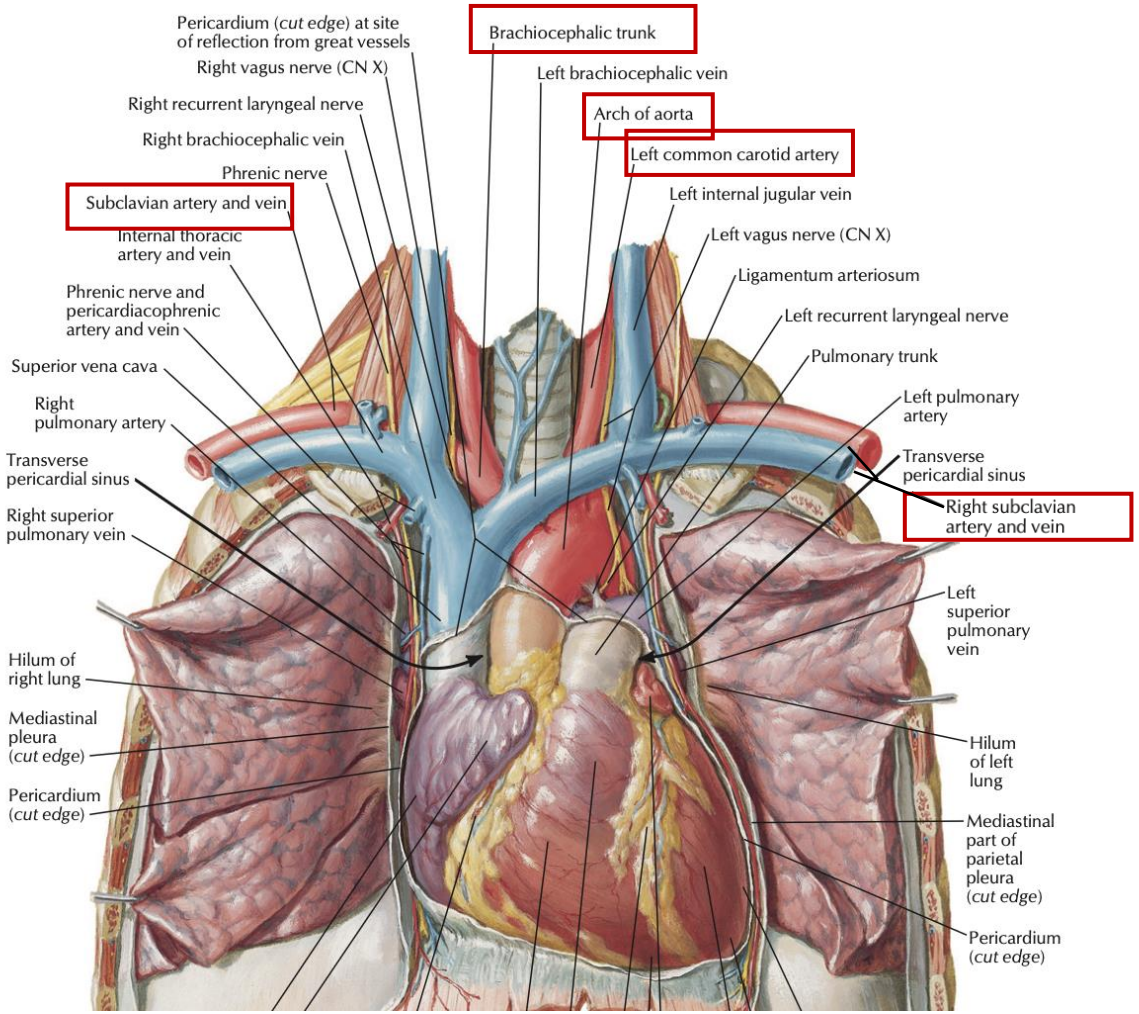
Vessels

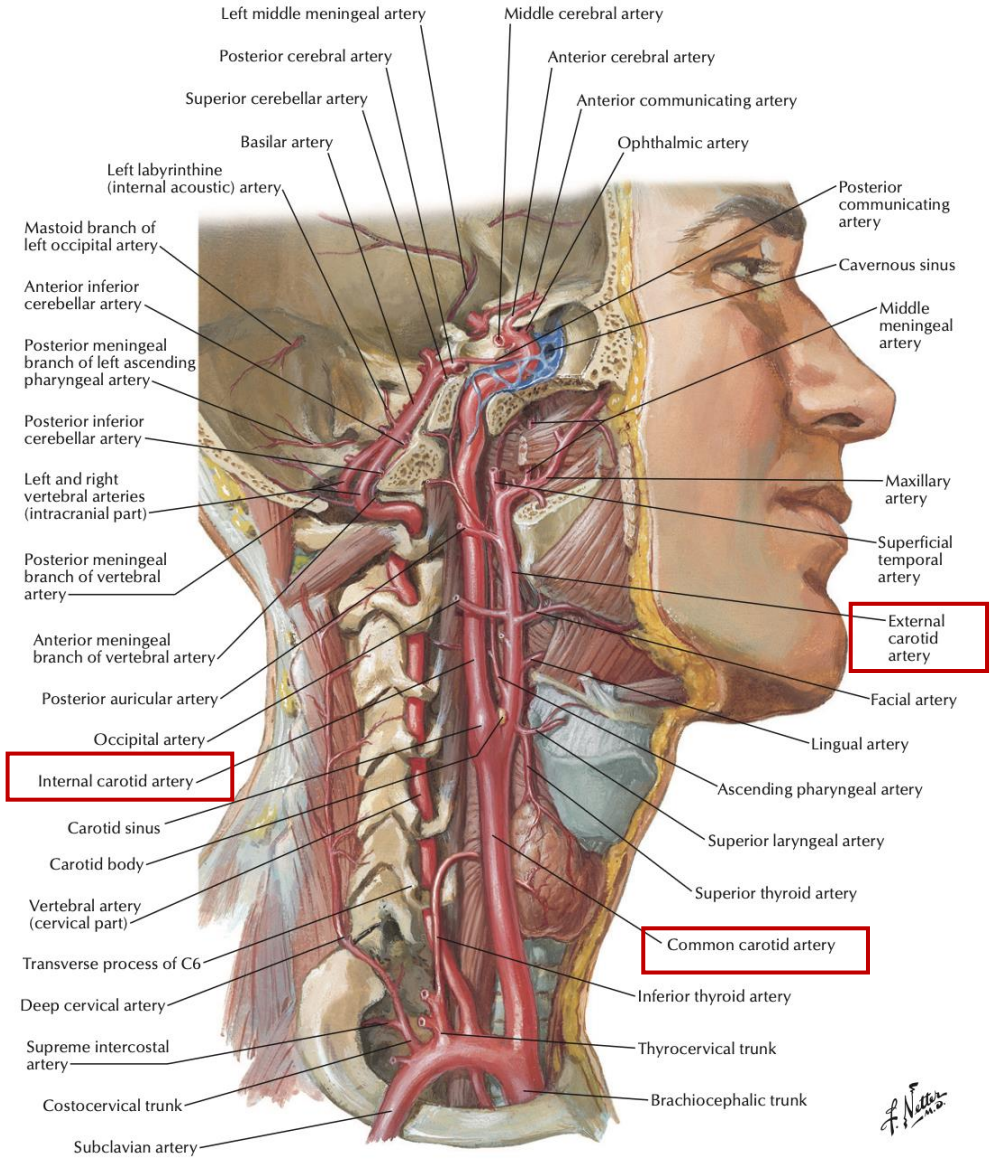

Middle cerebral artery
Basilar artery
Internal carotid artery
Vertebral artery

Vessels

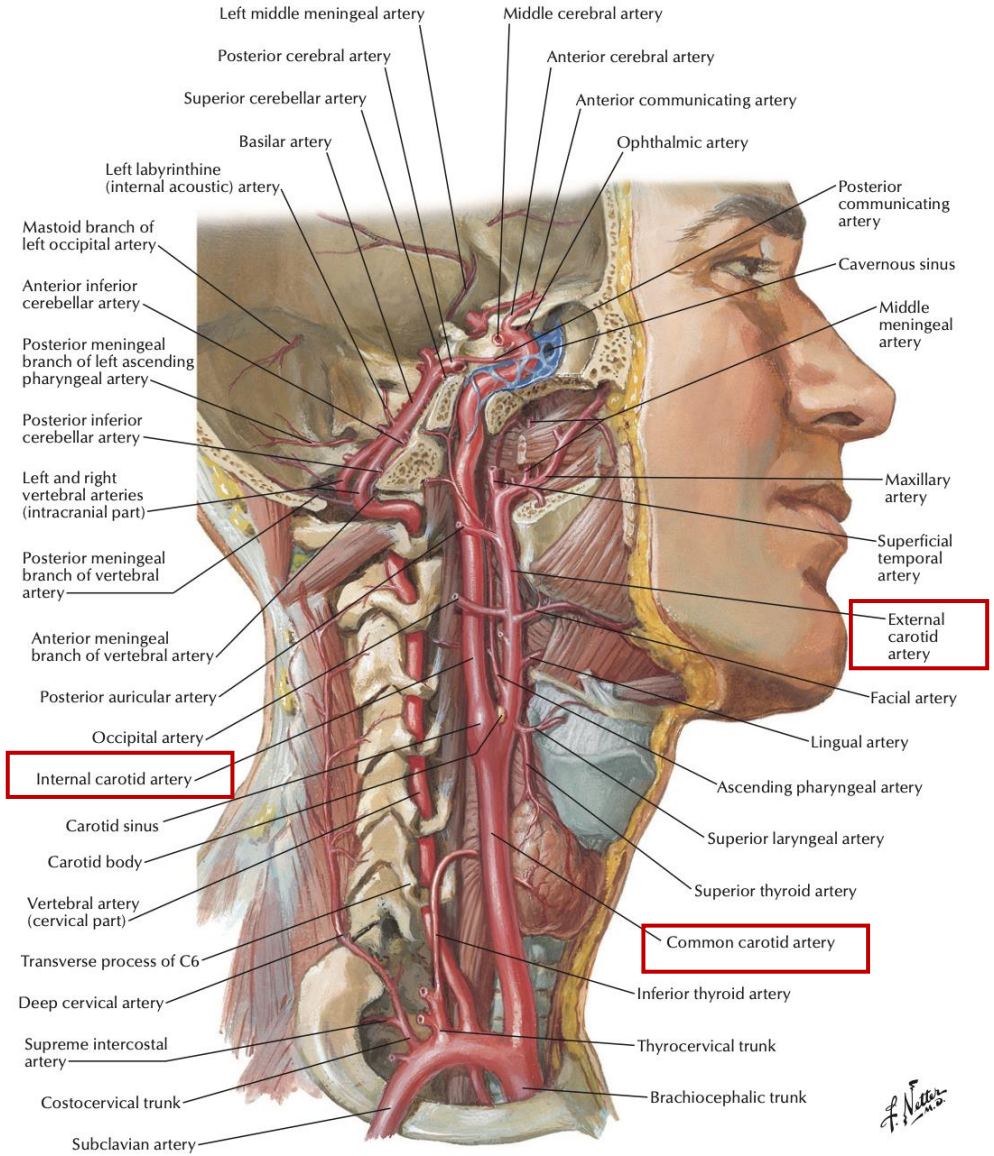

Pericardium (*cut edge*) at site of reflection from great vessels
Right vagus nerve (CN X)
Right recurrent laryngeal nerve
Right brachiocephalic vein
Phrenic nerve
Subclavian artery and vein
Internal thoracic artery and vein
Phrenic nerve and pericardiacophrenic artery and vein
Superior vena cava
Right pulmonary artery
Transverse pericardial sinus
Right superior pulmonary vein
Hilum of right lung
Mediastinal pleura (*cut edge*)
Pericardium (*cut edge*)
Brachiocephalic trunk
Left brachiocephalic vein
Arch of aorta
Left common carotid artery
Left internal jugular vein
Left vagus nerve (CN X)
Ligamentum arteriosum
Left recurrent laryngeal nerve
Pulmonary trunk
Left pulmonary artery
Transverse pericardial sinus
Left superior pulmonary vein
Hilum of left lung
Mediastinal part of parietal pleura (*cut edge*)
Pericardium (*cut edge*)

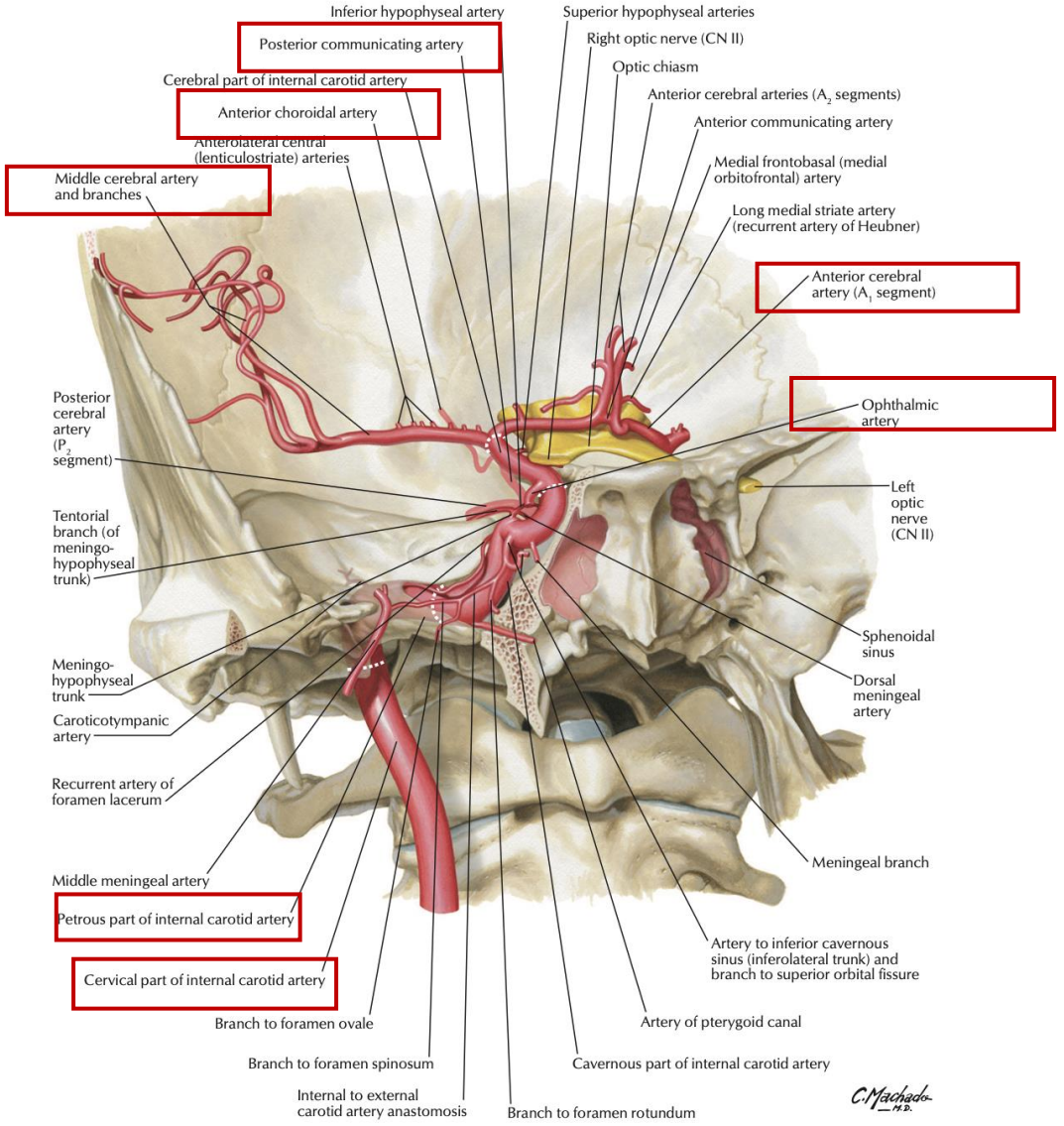
Arterial supply to the forebrain



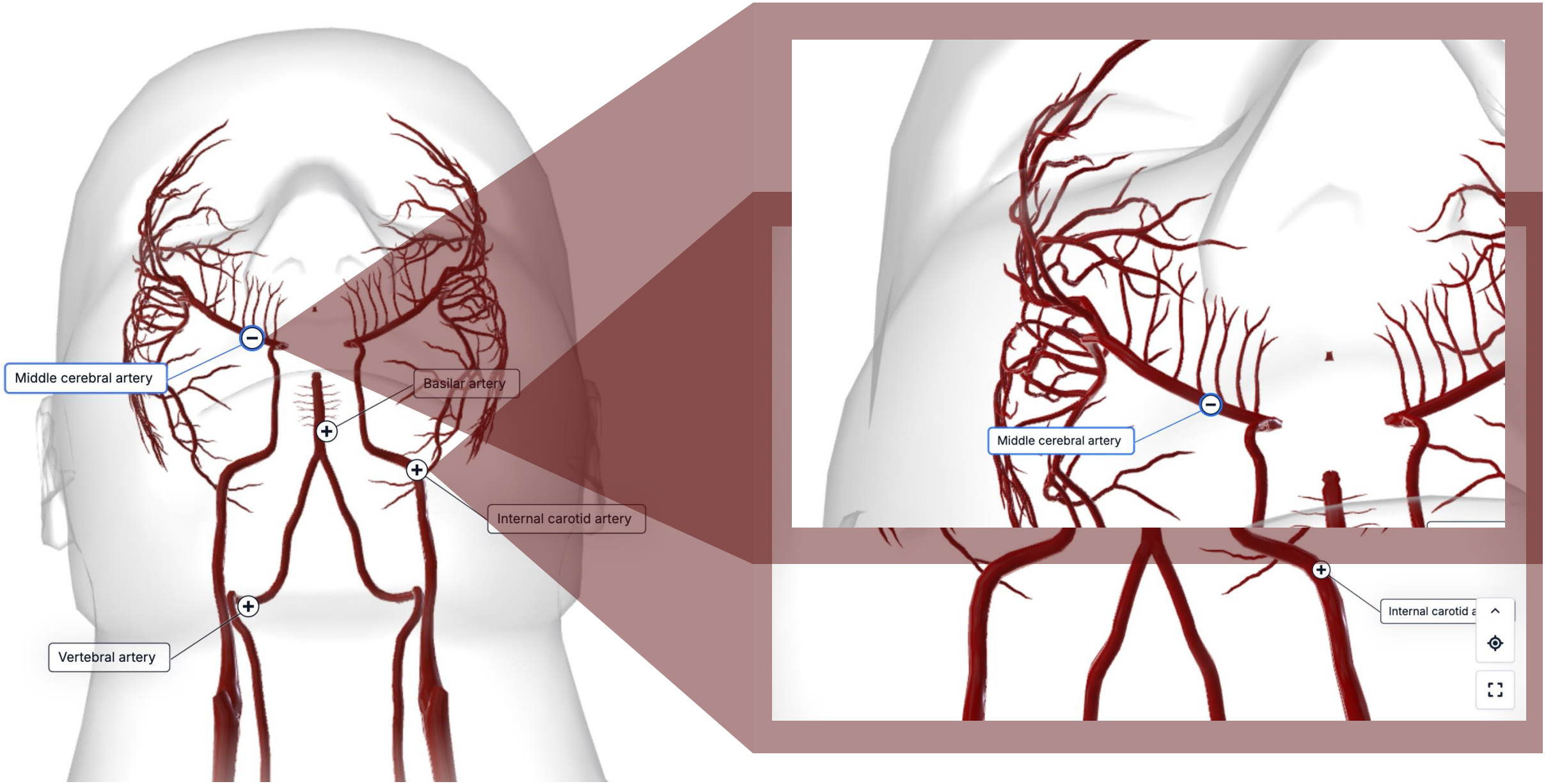


Arterial supply to the forebrain

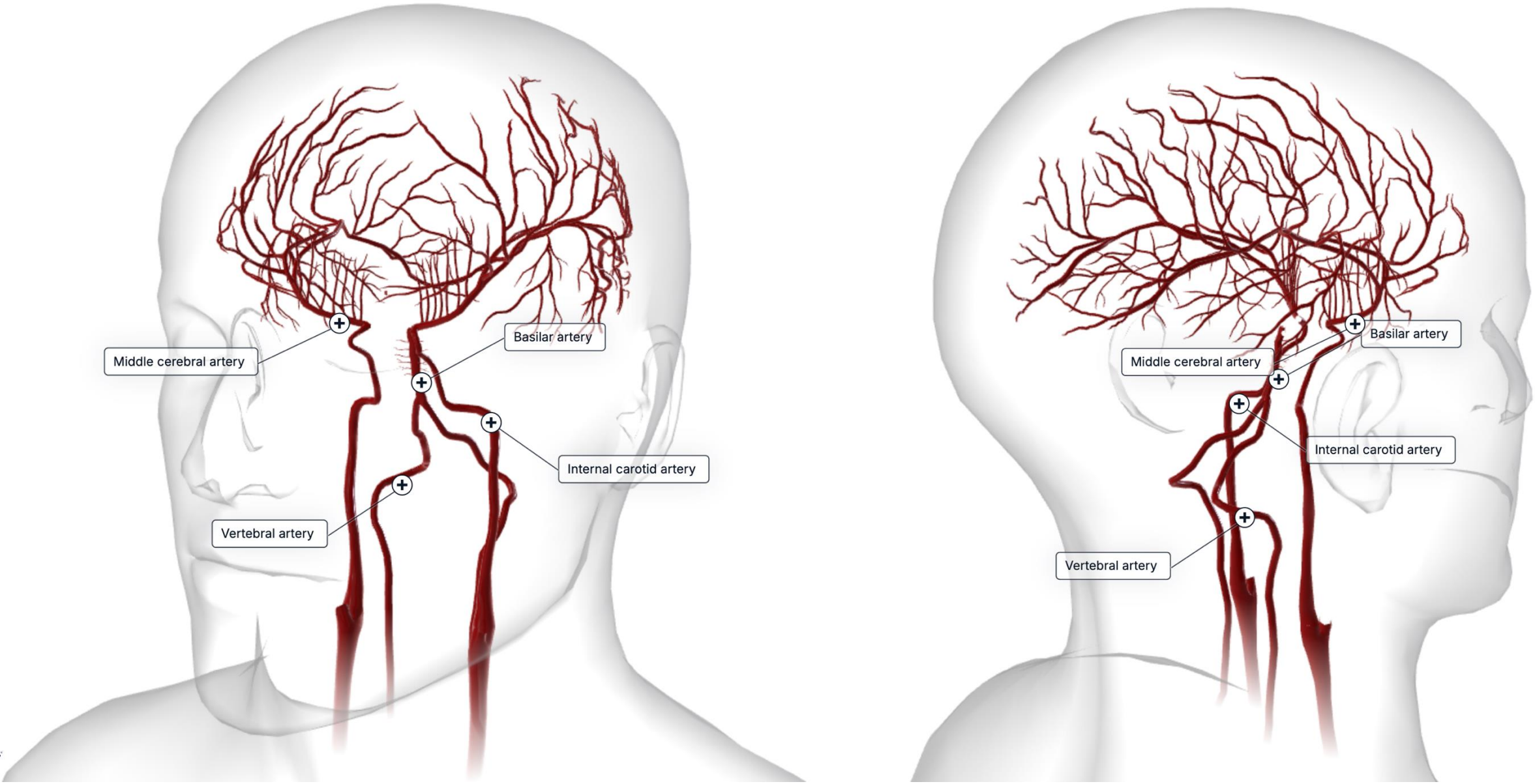




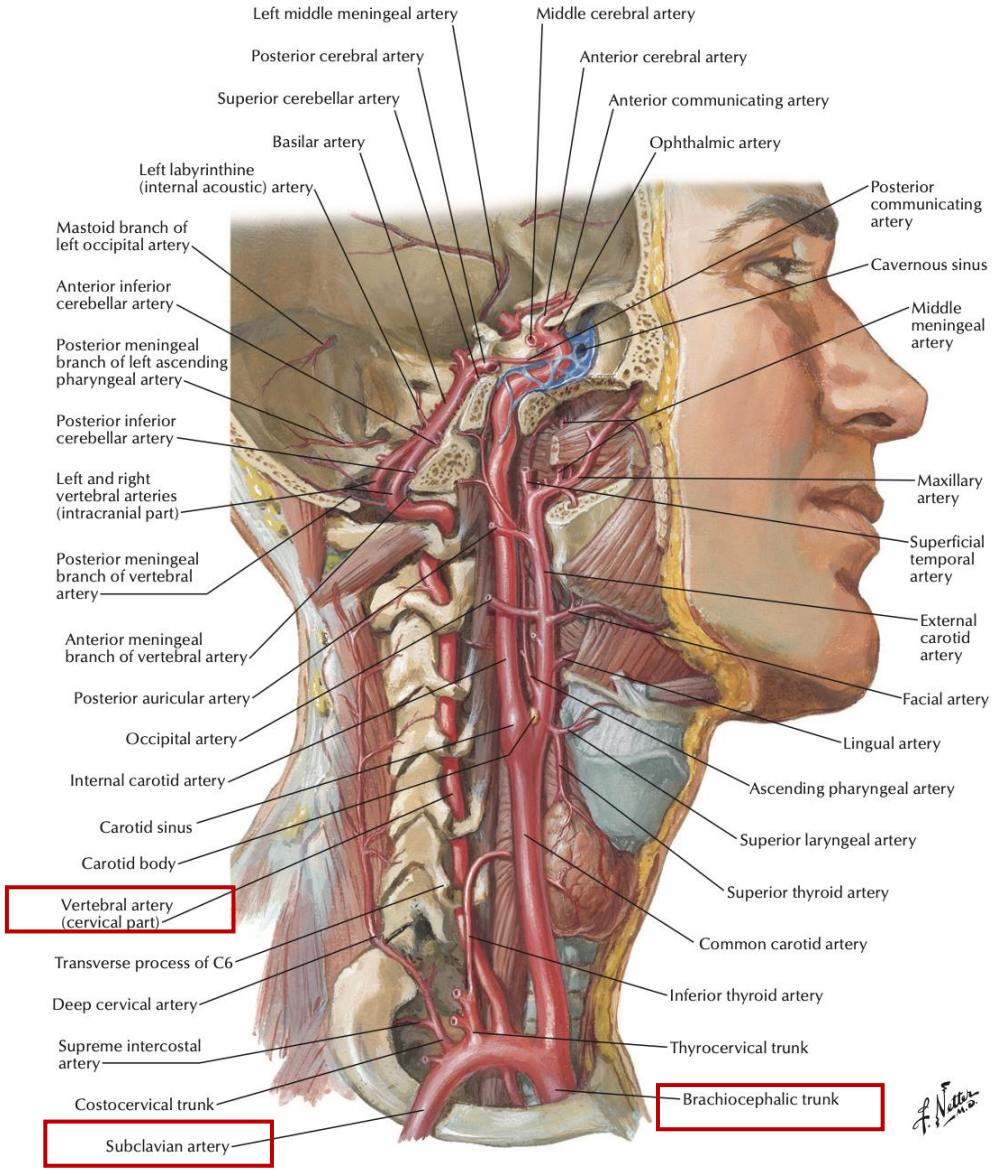
Arterial supply to the forebrain



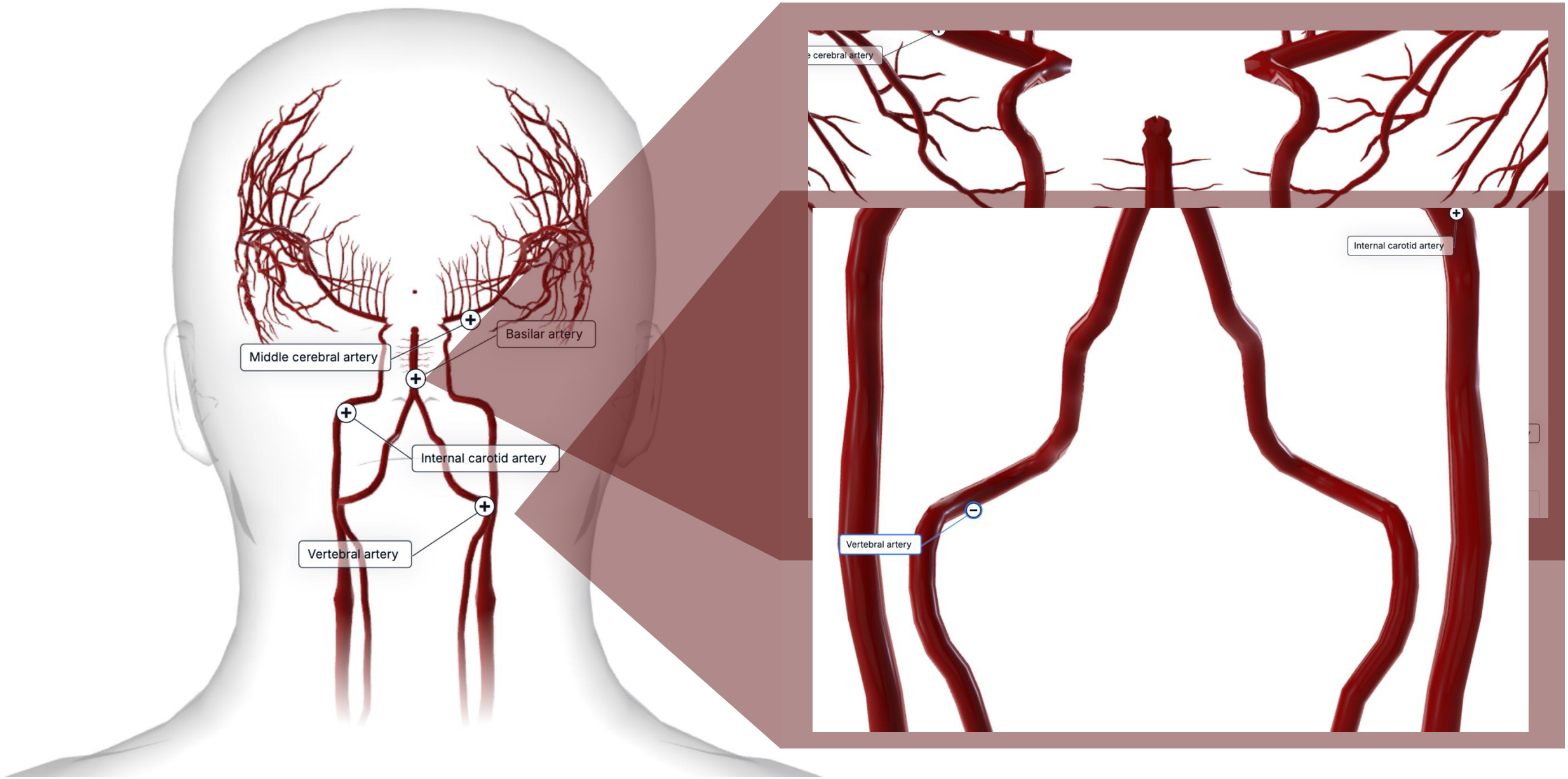
Arterial supply to the forebrain



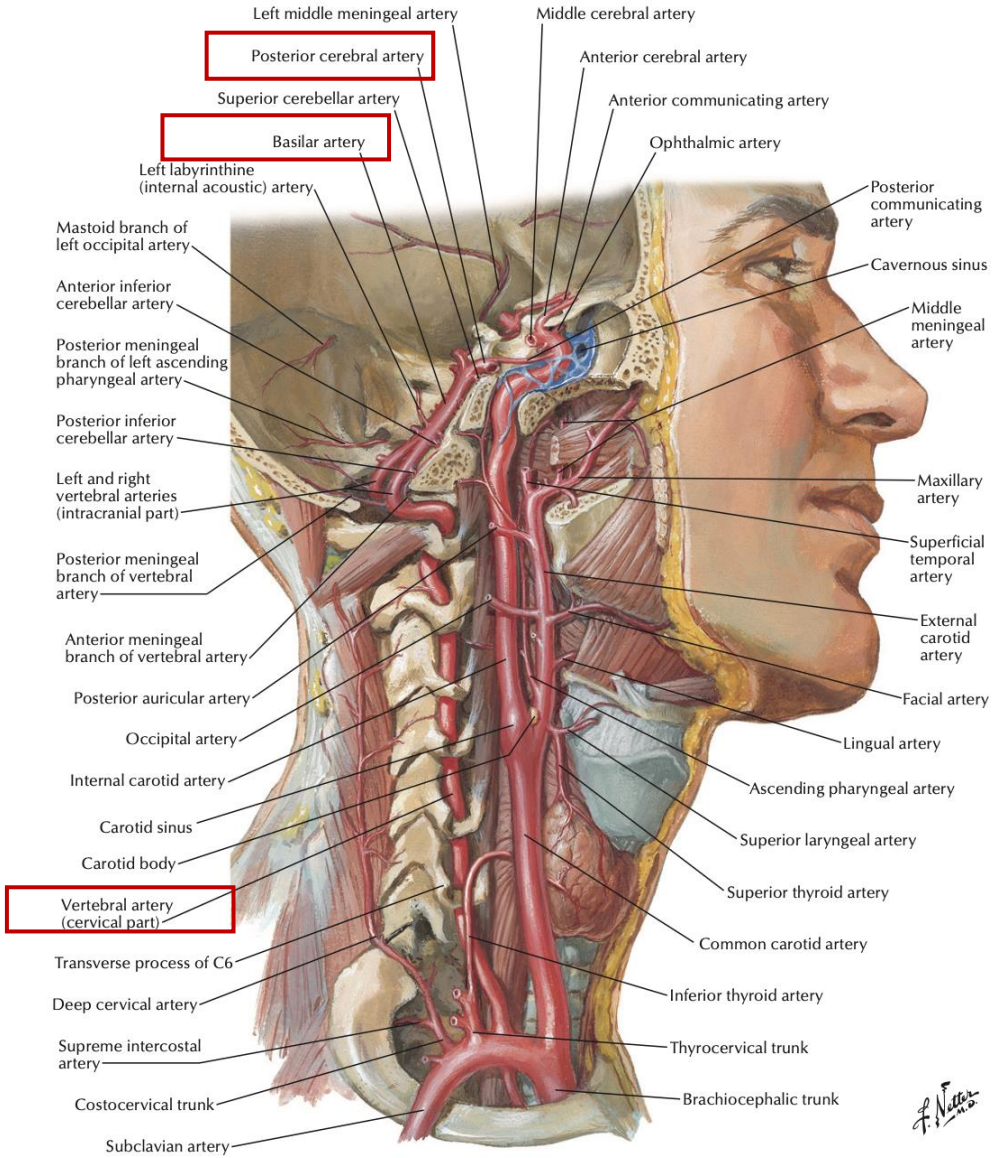
Vessels


Left middle meningeal artery
Middle cerebral artery
Posterior cerebral artery
Anterior cerebral artery
Superior cerebellar artery
Anterior communicating artery
Basilar artery
Ophthalmic artery
Left labyrinthine (internal acoustic) artery
Posterior communicating artery
Mastoid branch of left occipital artery
Cavernous sinus
Anterior inferior cerebellar artery
Middle meningeal artery
Posterior meningeal branch of left ascending pharyngeal artery
Posterior inferior cerebellar artery
Maxillary artery
Left and right vertebral arteries (intracranial part)
Superficial temporal artery
Posterior meningeal branch of vertebral artery
External carotid artery
Anterior meningeal branch of vertebral artery
Facial artery
Posterior auricular artery
Lingual artery
Occipital artery
Ascending pharyngeal artery
Internal carotid artery
Superior laryngeal artery
Carotid sinus
Superior thyroid artery
Carotid body
Common carotid artery
Vertebral artery (cervical part)
Inferior thyroid artery
Transverse process of C6
Thyrocervical trunk
Deep cervical artery
Brachiocephalic trunk
Supreme intercostal artery
Costocervical trunk
Subclavian artery

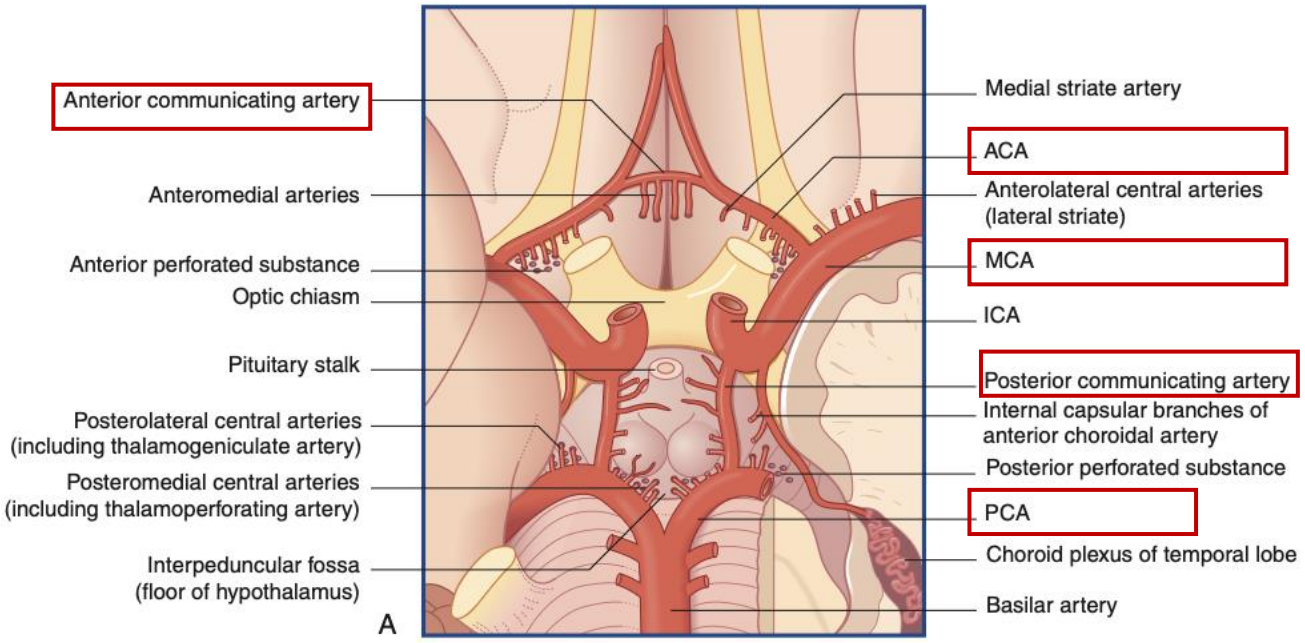
Vessels

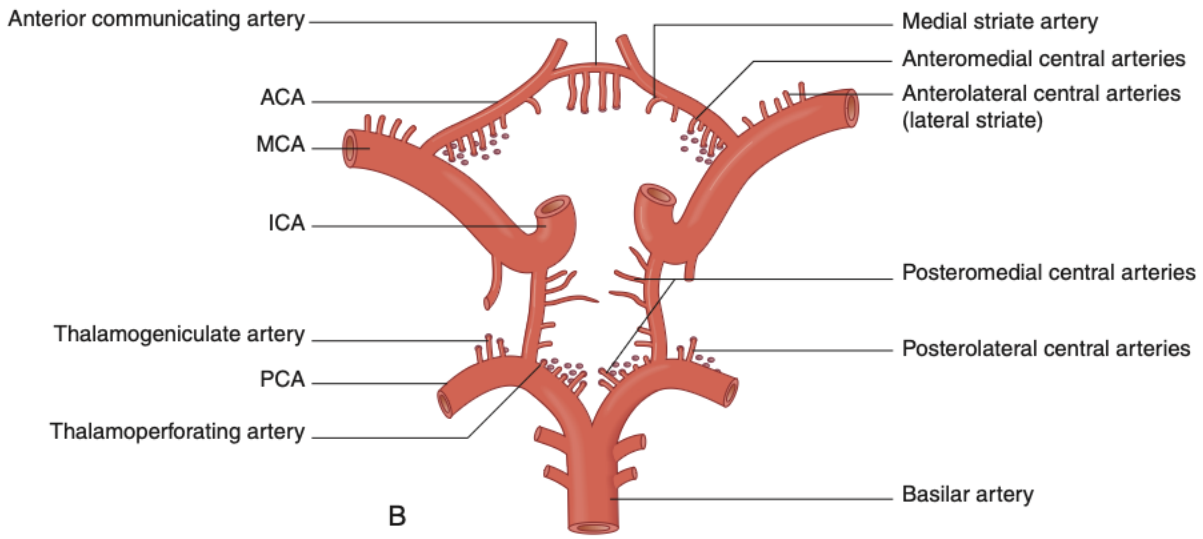

Middle cerebral artery
Basilar artery
Internal carotid artery
Vertebral artery
cerebral artery
Internal carotid artery
Vertebral artery

Arterial supply to the forebrain



Arterial supply to the forebrain





PCA= posterior cerebral artery; MCA= medial cerebral artery; ACA= anterior cerebral artery; ICA= internal carotid artery

Vessels: ACA

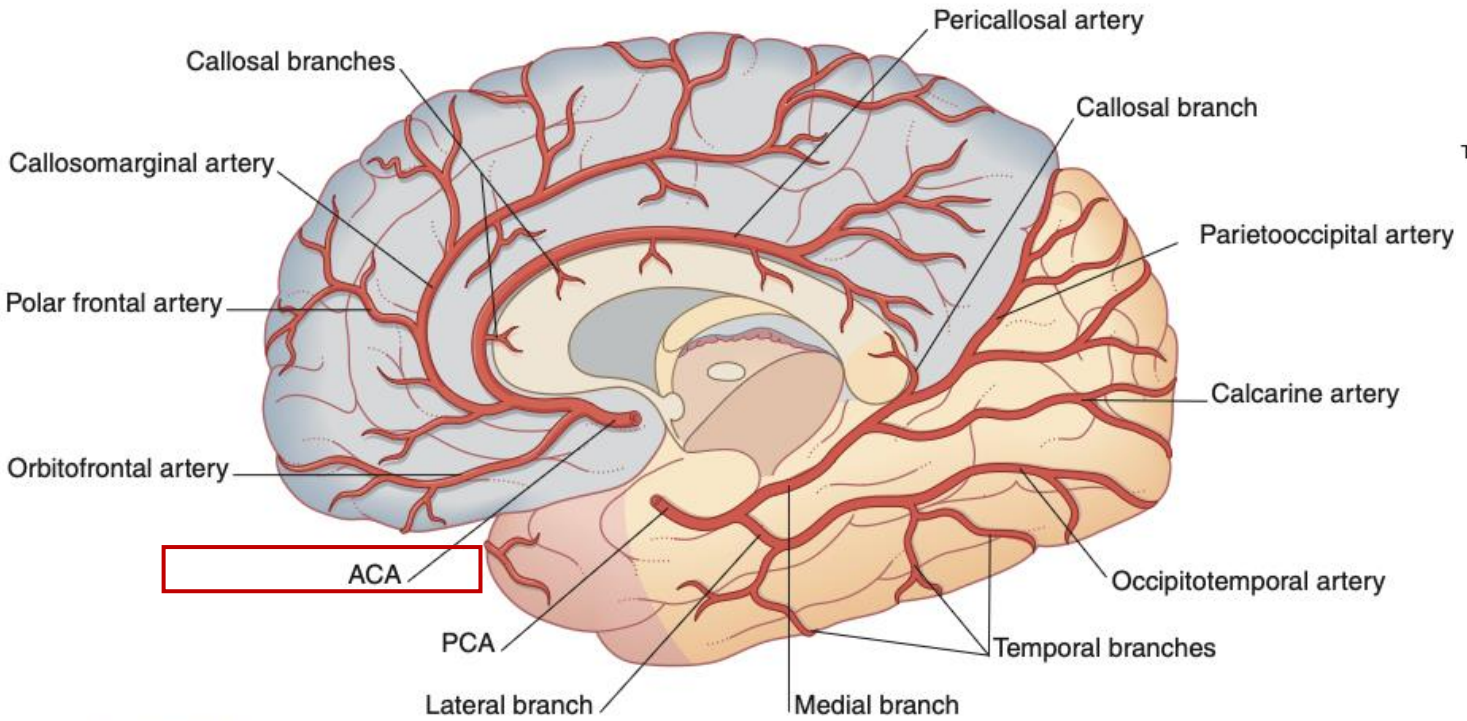


FIGURE 5.2 Medial view of the right hemisphere, showing the cortical branches and territories of the three cerebral arteries. ACA, PCA, anterior, posterior cerebral arteries.

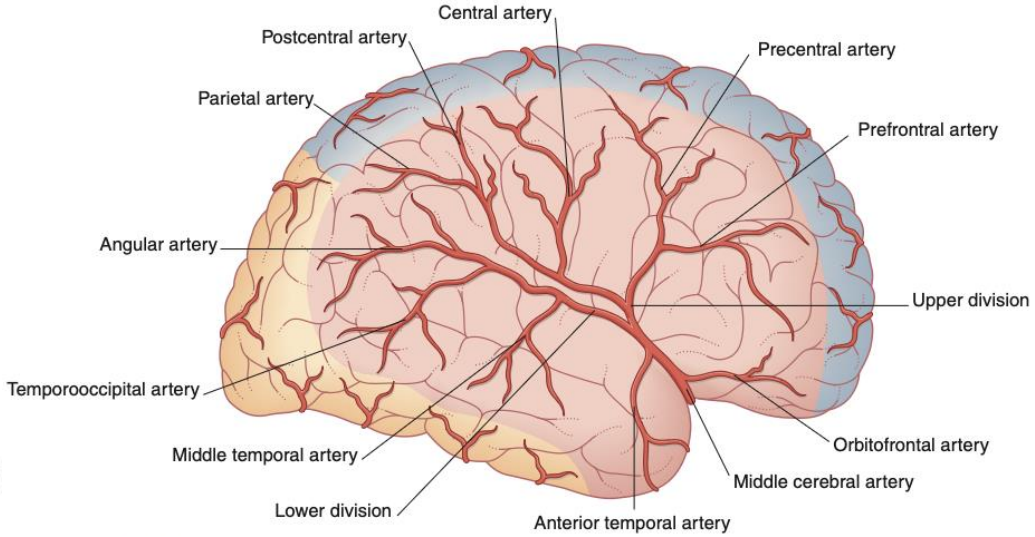


FIGURE 5.3 Lateral view of the right cerebral hemisphere, showing the cortical branches and territories of the three cerebral arteries.

PCA= posterior cerebral artery; MCA= medial cerebral artery; ACA= anterior cerebral artery; ICA= internal carotid artery

Vessels: MCA

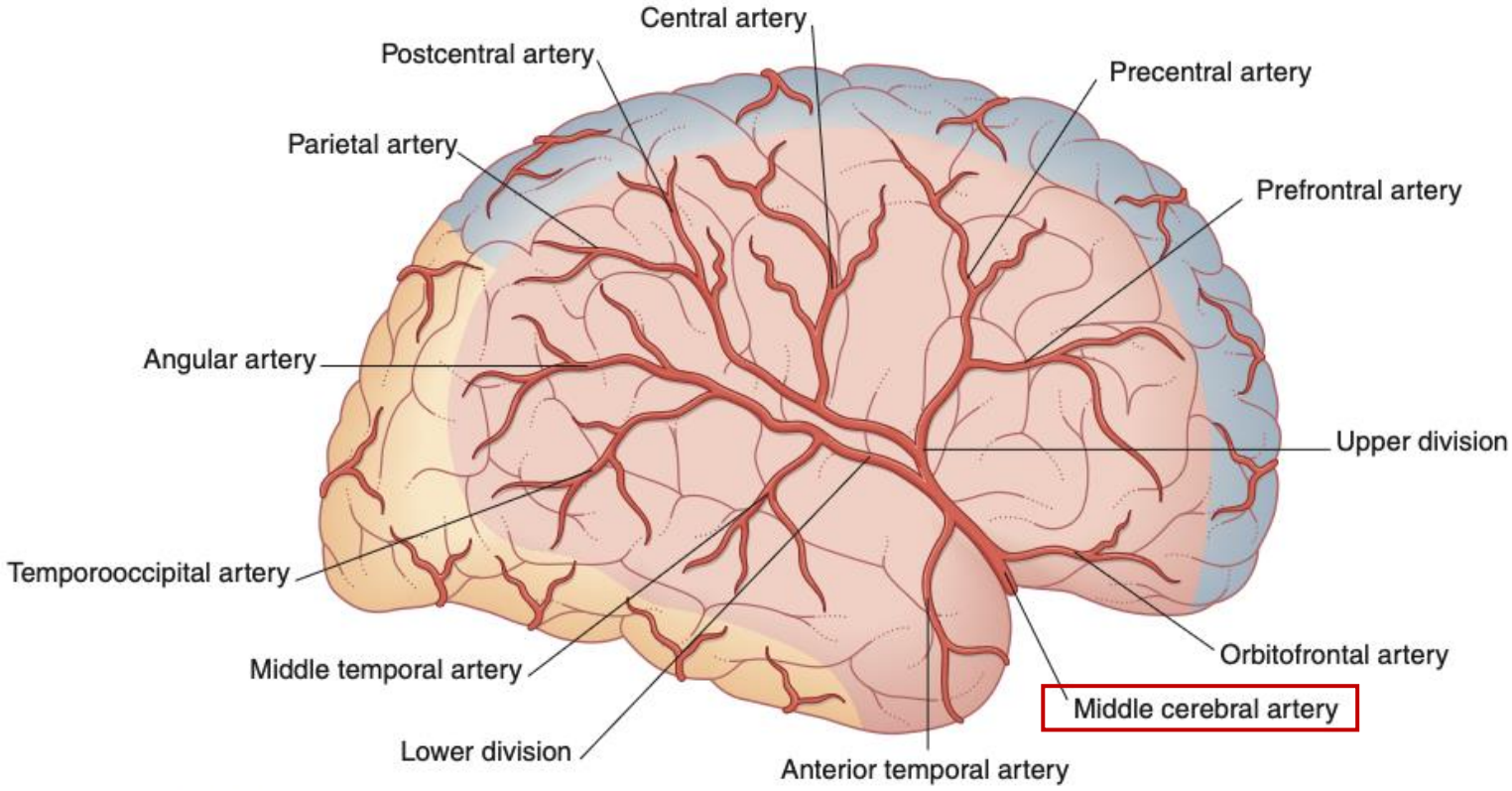


FIGURE 5.3 Lateral view of the right cerebral hemisphere, showing the cortical branches and territories of the three cerebral arteries.

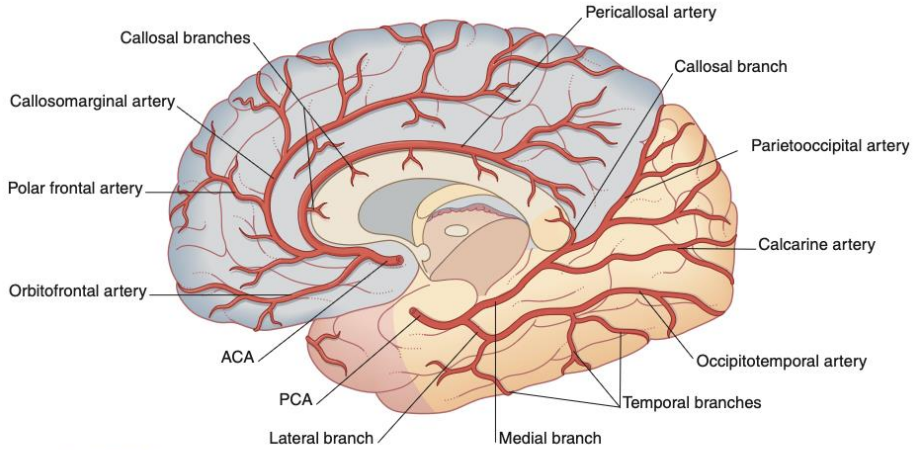


FIGURE 5.2 Medial view of the right hemisphere, showing the cortical branches and territories of the three cerebral arteries. ACA, PCA, anterior, posterior cerebral arteries.

PCA= posterior cerebral artery; MCA= medial cerebral artery; ACA= anterior cerebral artery; ICA= internal carotid artery

Vessels: PCA

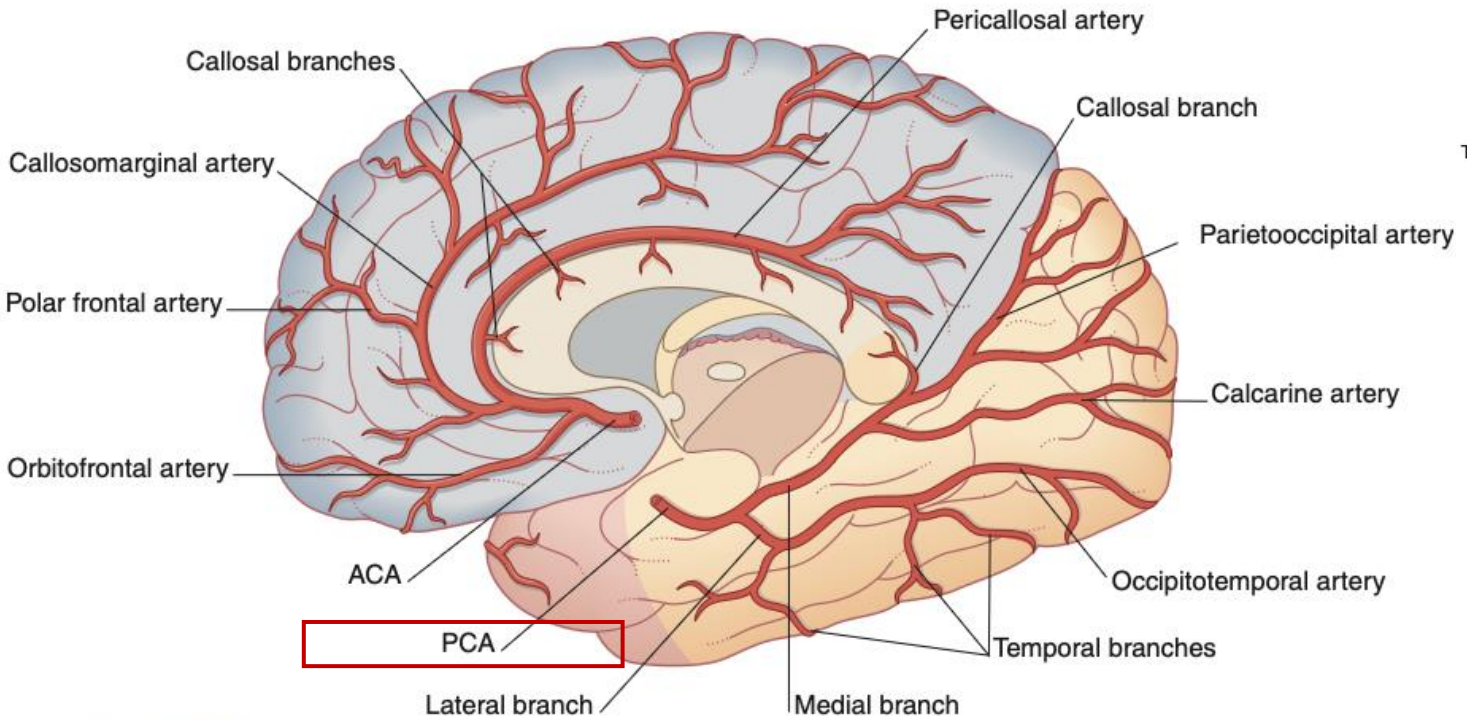


FIGURE 5.2 Medial view of the right hemisphere, showing the cortical branches and territories of the three cerebral arteries. ACA, PCA, anterior, posterior cerebral arteries.

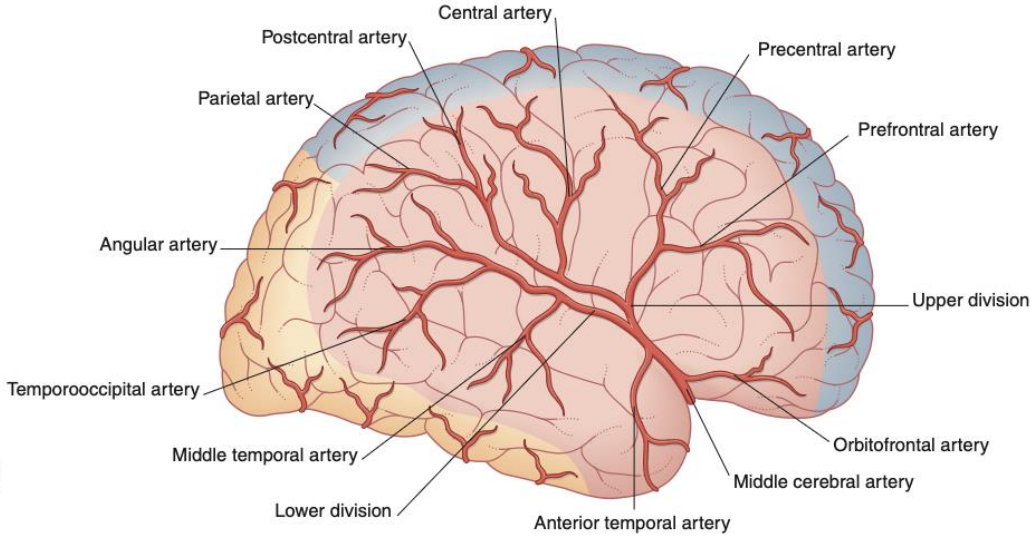


FIGURE 5.3 Lateral view of the right cerebral hemisphere, showing the cortical branches and territories of the three cerebral arteries.

PCA= posterior cerebral artery; MCA= medial cerebral artery; ACA= anterior cerebral artery; ICA= internal carotid artery

Arterial supply to the forebrain

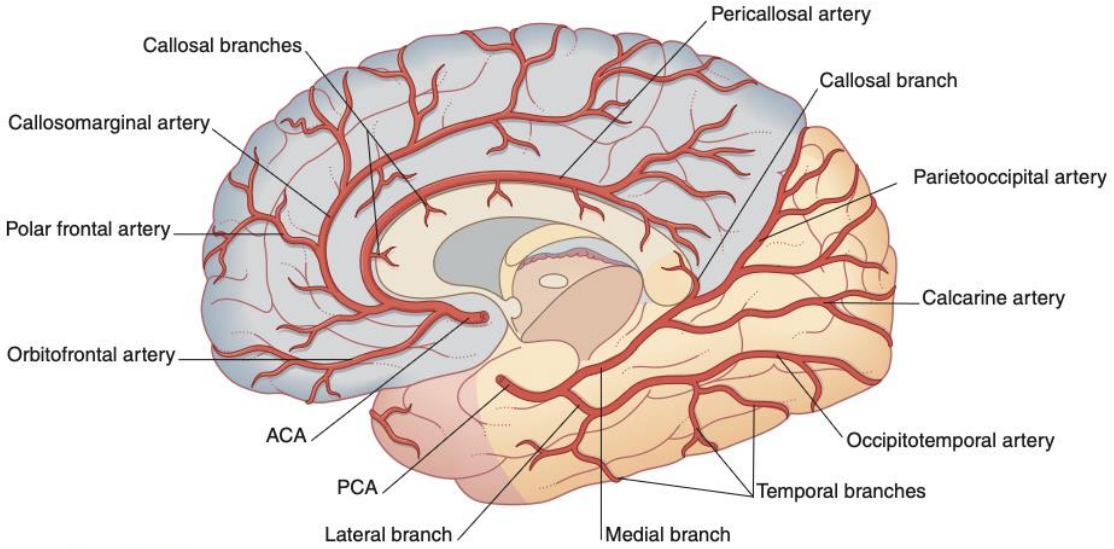


FIGURE 5.2 Medial view of the right hemisphere, showing the cortical branches and territories of the three cerebral arteries. ACA, PCA, anterior, posterior cerebral arteries.

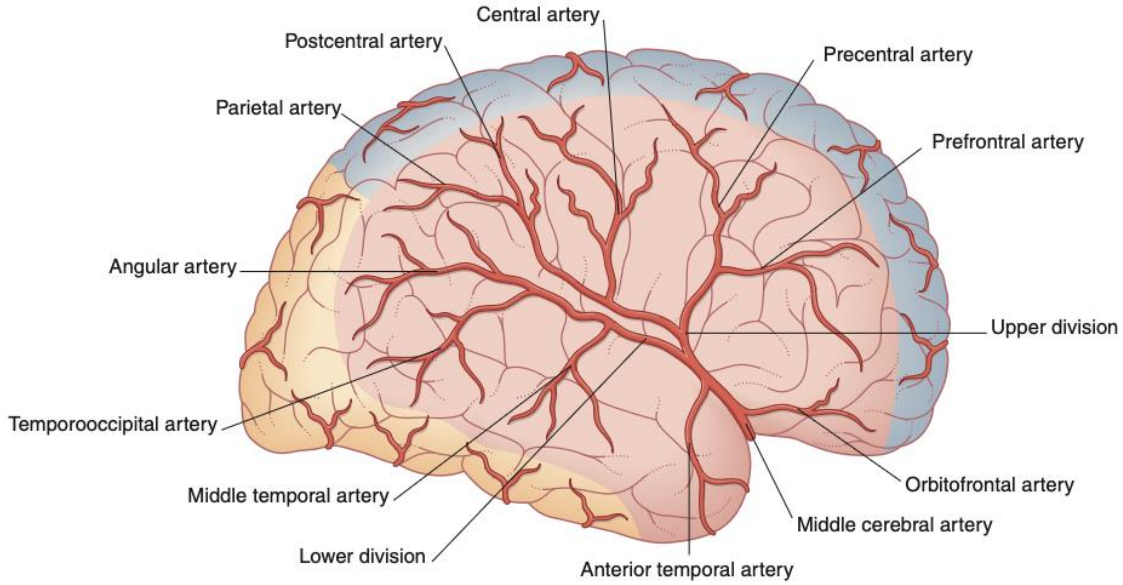
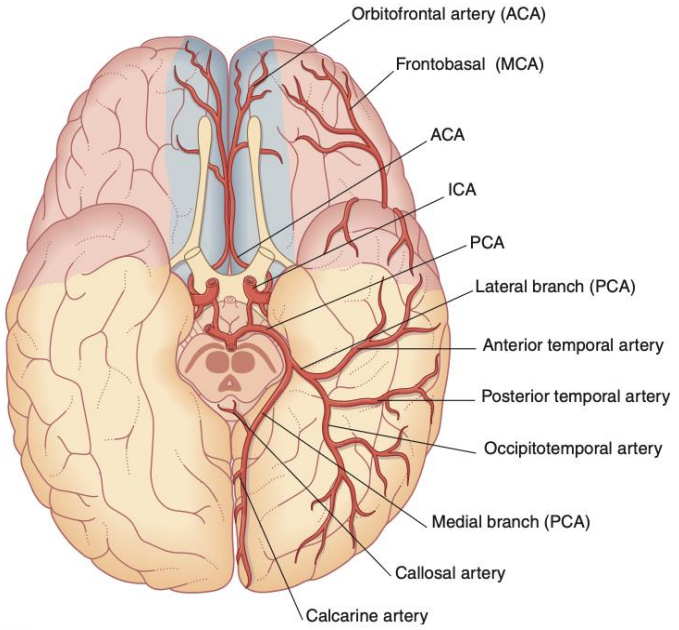


FIGURE 5.3 Lateral view of the right cerebral hemisphere, showing the cortical branches and territories of the



Arterial supply to the forebrain

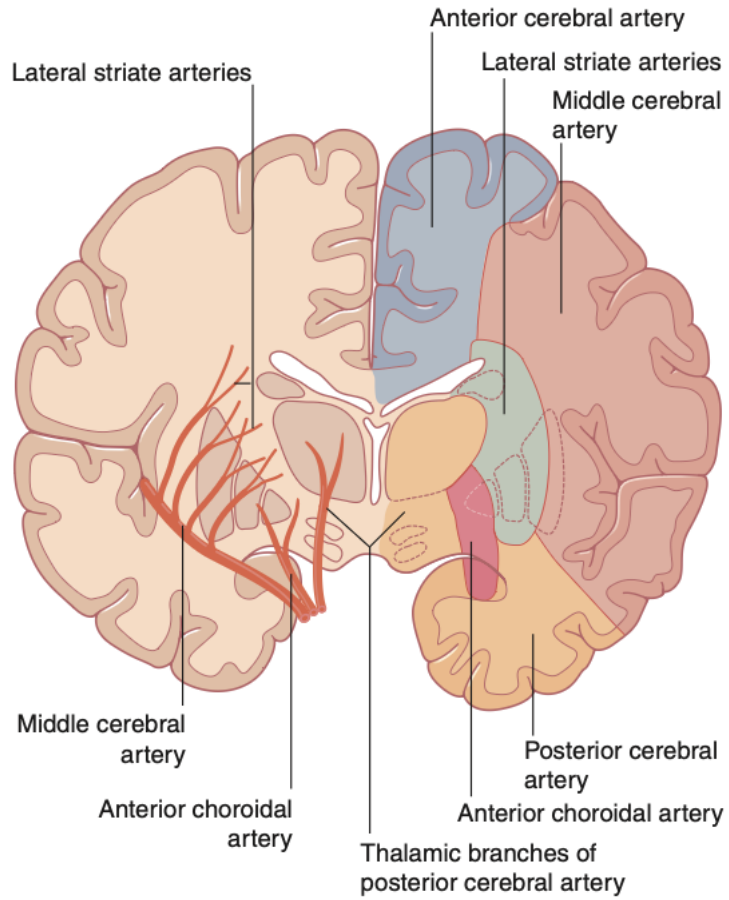


FIGURE 5.4 Distribution of perforating branches of the middle cerebral, anterior choroidal, and posterior cerebral arteries (schematic). The anterior choroidal artery arises from the internal carotid.

TABLE 5.1 Named cortical* branches of the anterior cerebral artery

Branch	Territory
Orbitofrontal	Orbital surface of frontal lobe
Polar frontal	Frontal pole
Callosomarginal	Cingulate and superior frontal gyri; paracentral lobule
Pericallosal	Corpus callosum

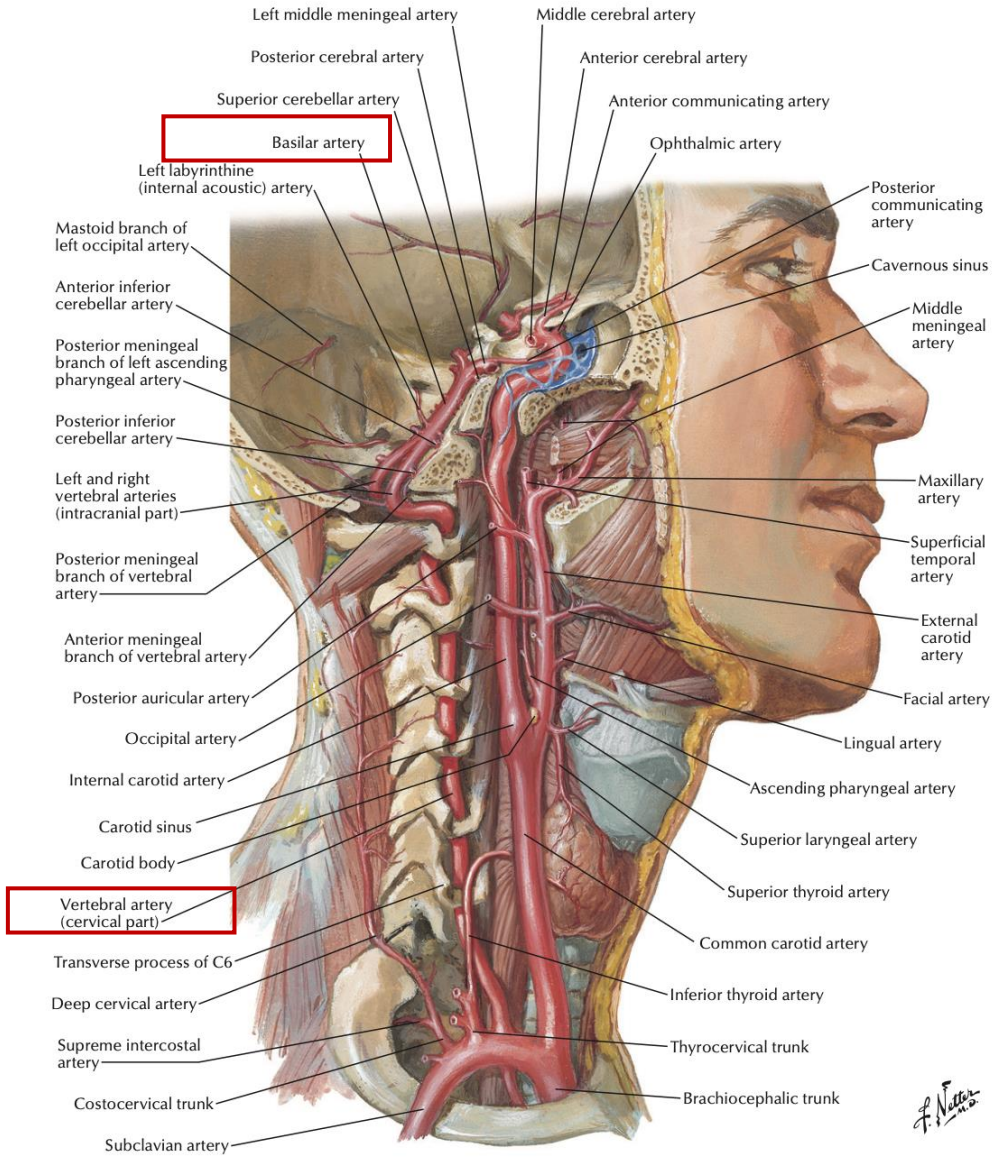
TABLE 5.2 Cortical branches of the middle cerebral artery

Origin	Branch(es)	Territory
Stem	Frontobasal	Orbital surface of frontal lobe
	Anterior temporal	Anterior temporal cortex
Upper division	Prefrontal	Prefrontal cortex
	Precentral	Premotor areas
	Central	Pre- and postcentral gyri
	Postcentral	Postcentral and anterior parietal cortex
	Parietal	Posterior parietal cortex
Lower division	Middle temporal	Midtemporal cortex
	Temporooccipital	Temporal and occipital cortex
	Angular	Angular and neighbouring gyri

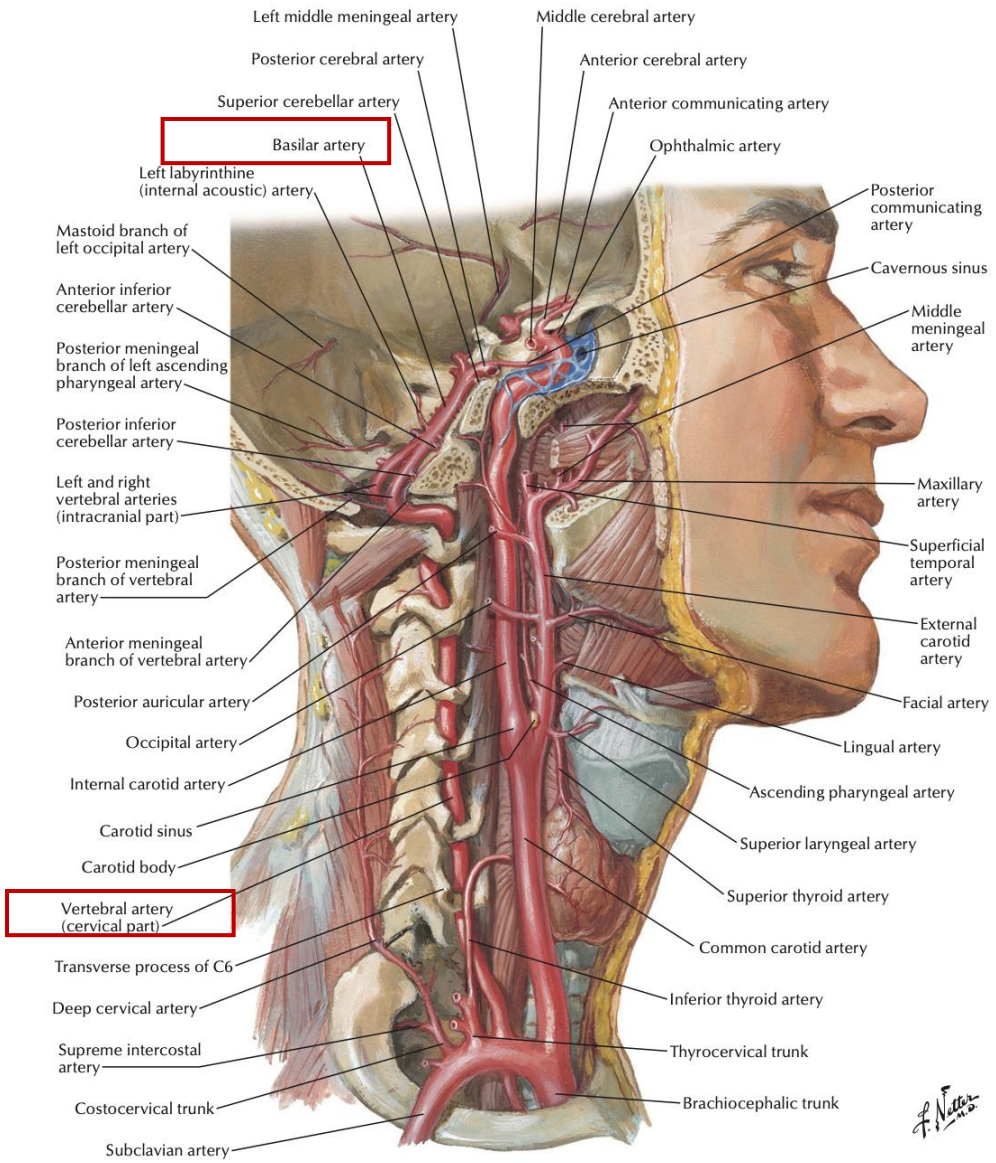
TABLE 5.3 Named cortical branches of the posterior cerebral artery

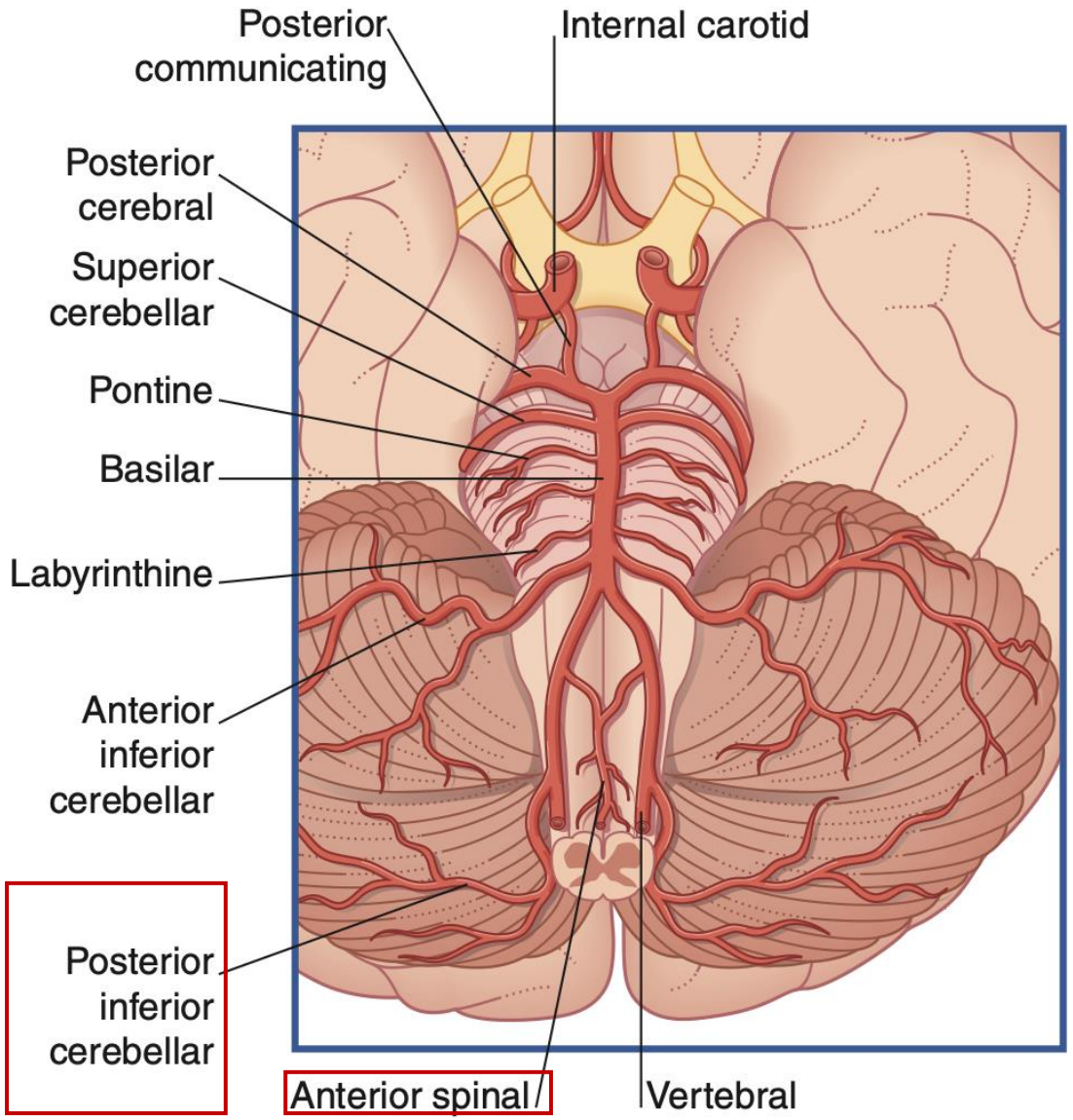
Branch	Artery	Territory
Lateral	Anterior temporal	Anterior temporal cortex
	Posterior temporal	Posterior temporal cortex
	Occipitotemporal	Posterior temporal and occipital cortex
Medial	Calcarine	Calcarine cortex
	Parietooccipital	Cuneus and precuneus
	Callosal	Splenium of corpus callosum

Arterial supply to the brainstem

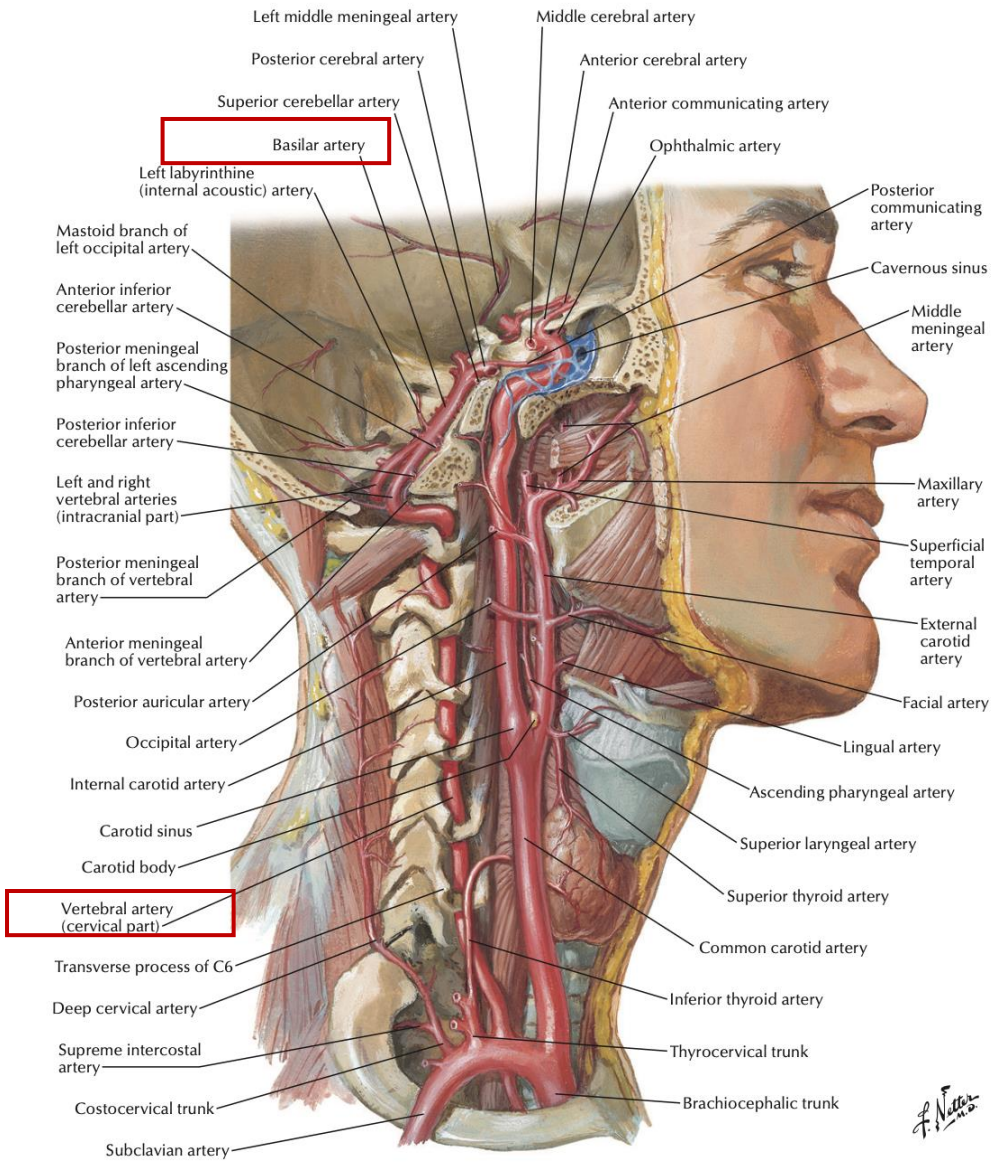


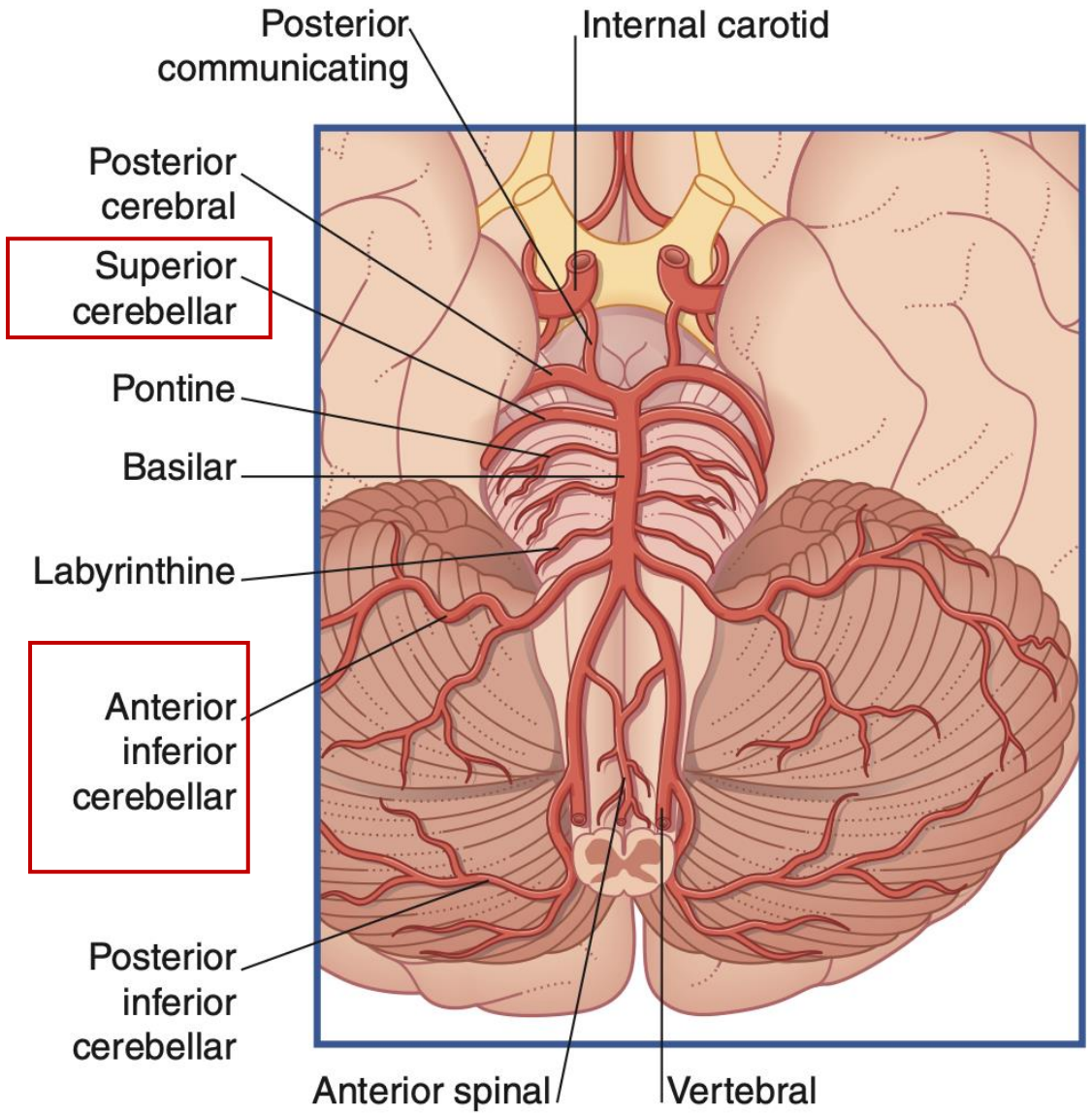
Arterial supply to the brainstem



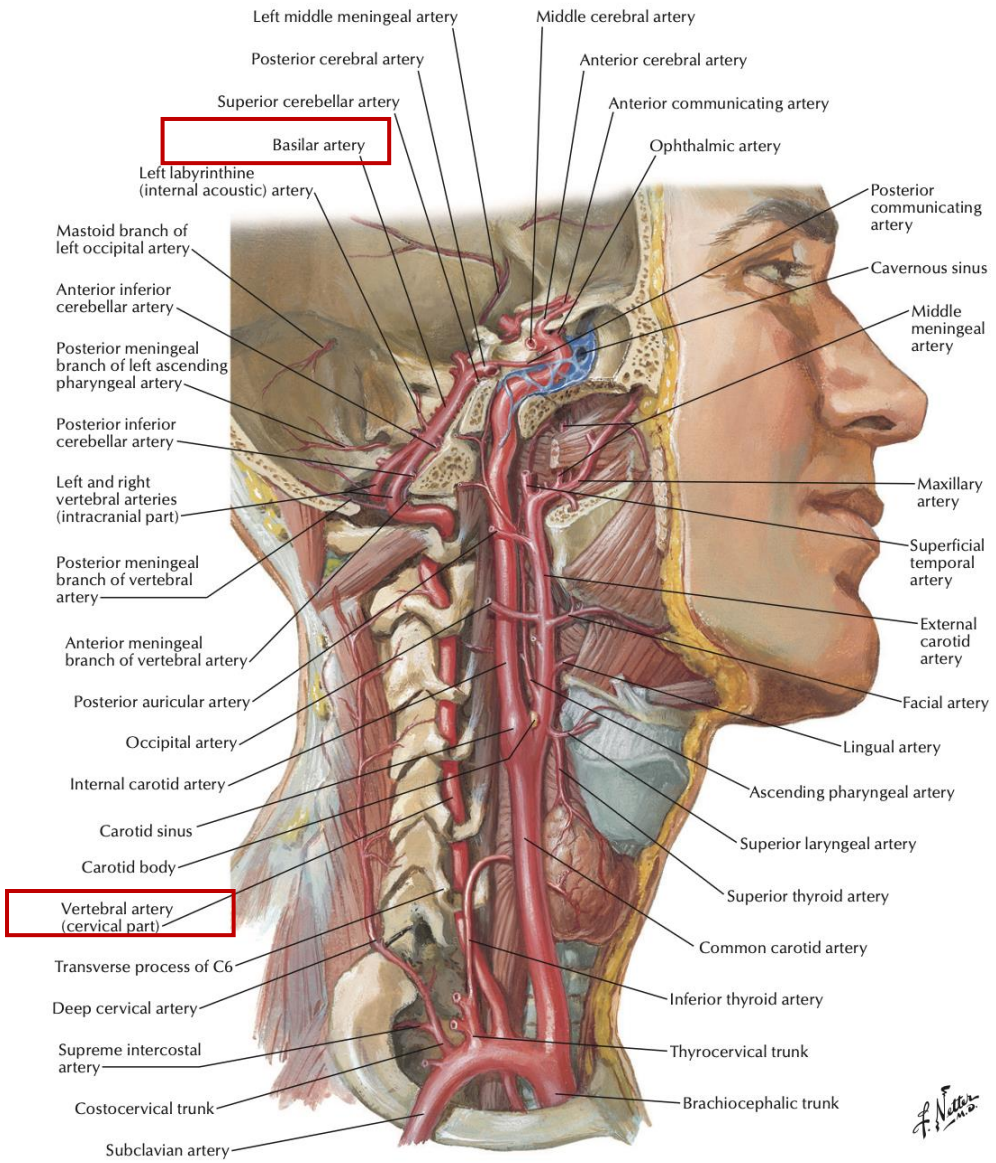


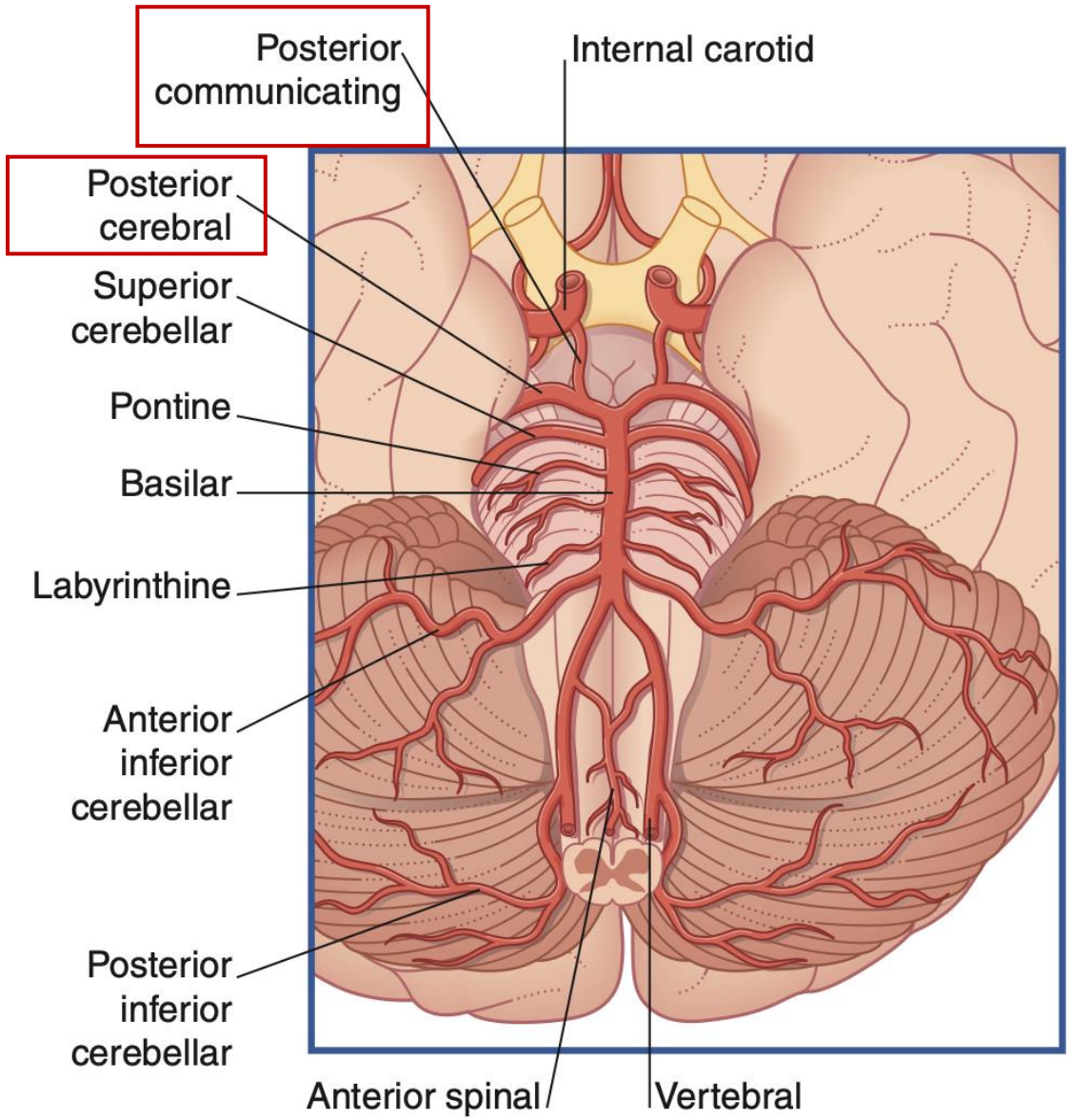
Arterial supply to the brainstem



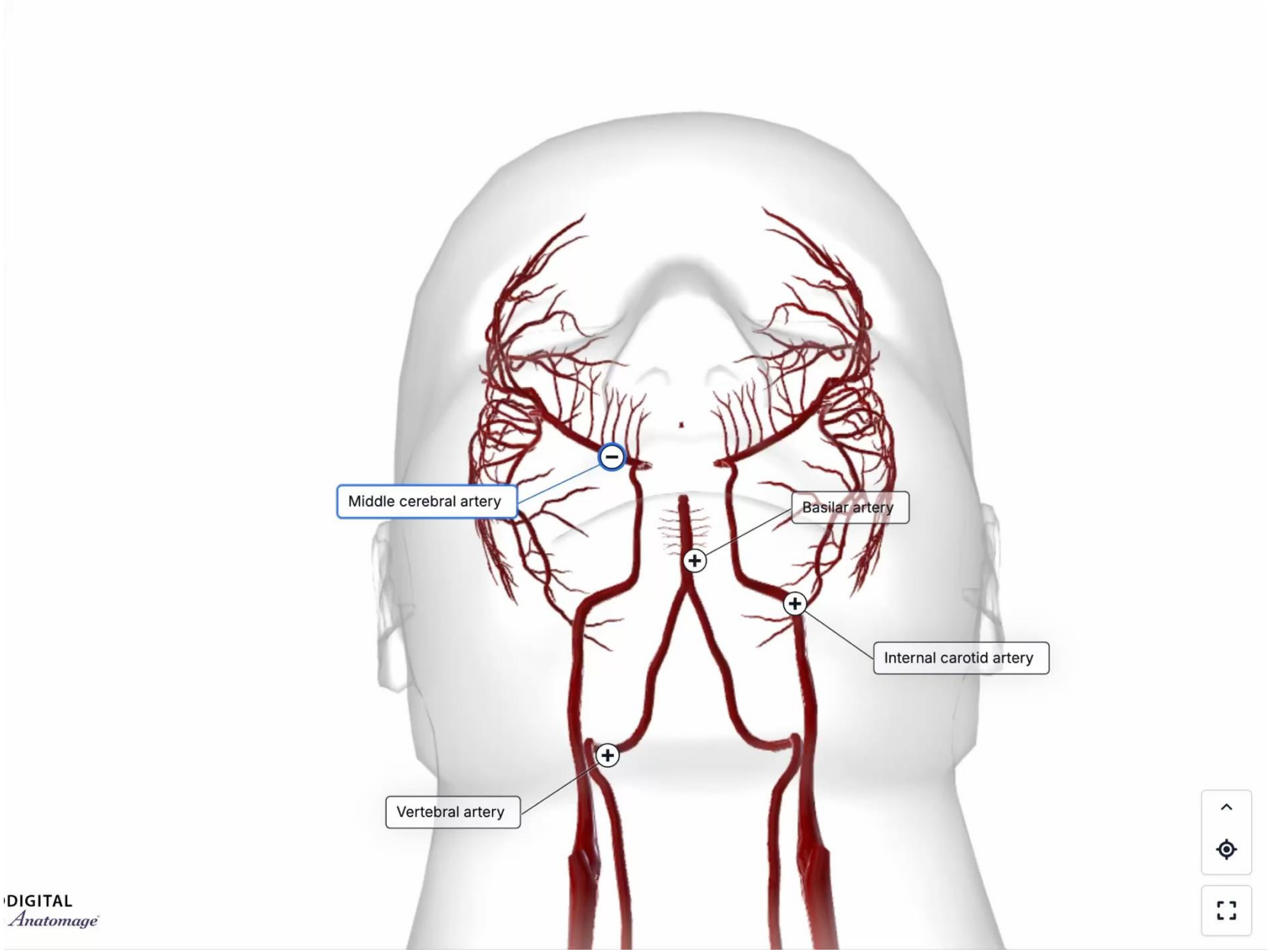


Arterial supply to the brainstem

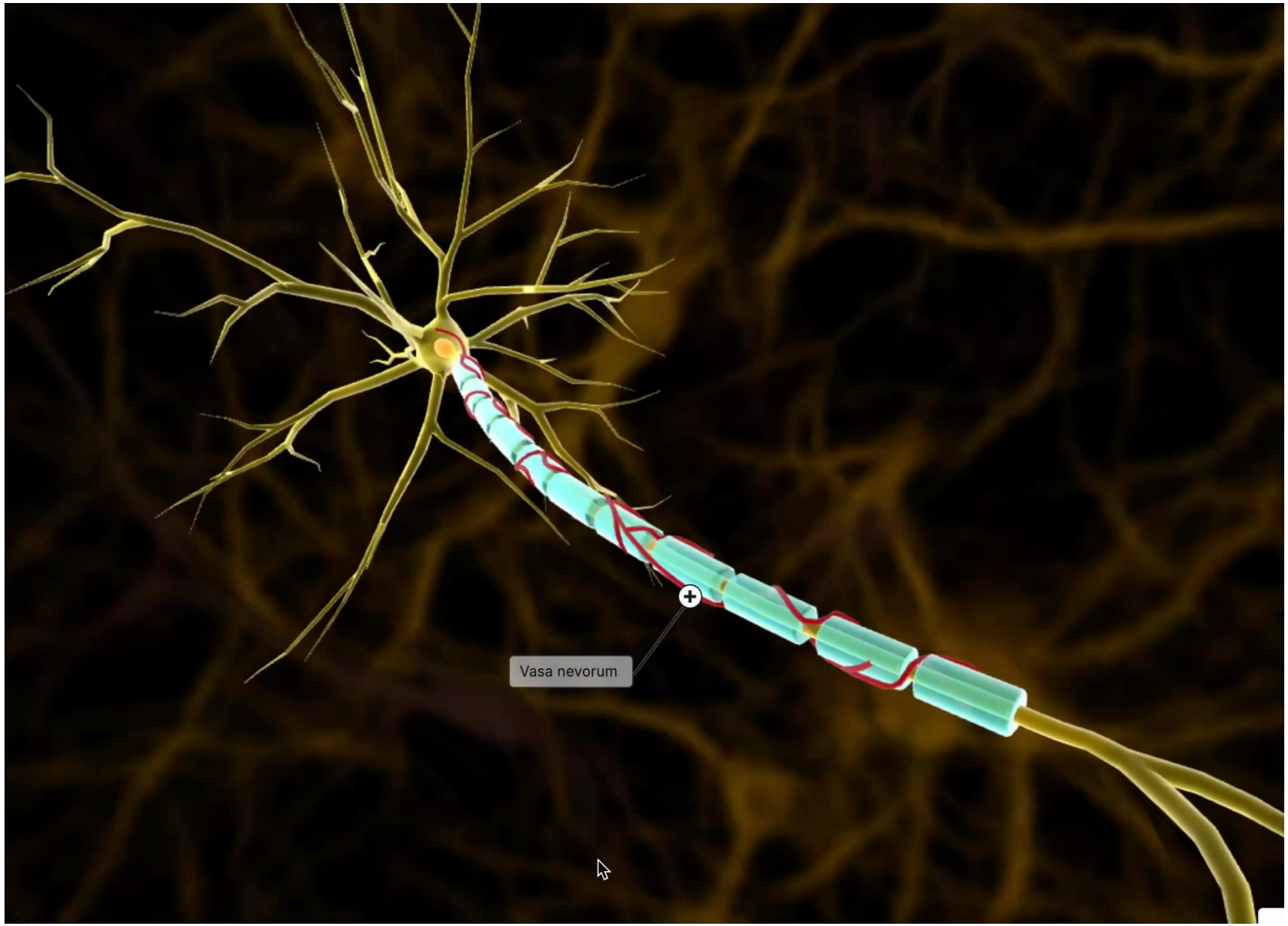




Vessels


Middle cerebral artery
Basilar artery
Internal carotid artery
Vertebral artery
DIGITAL
Anatomage

Vessels: vasa nervorum



Venous drainage of the brain

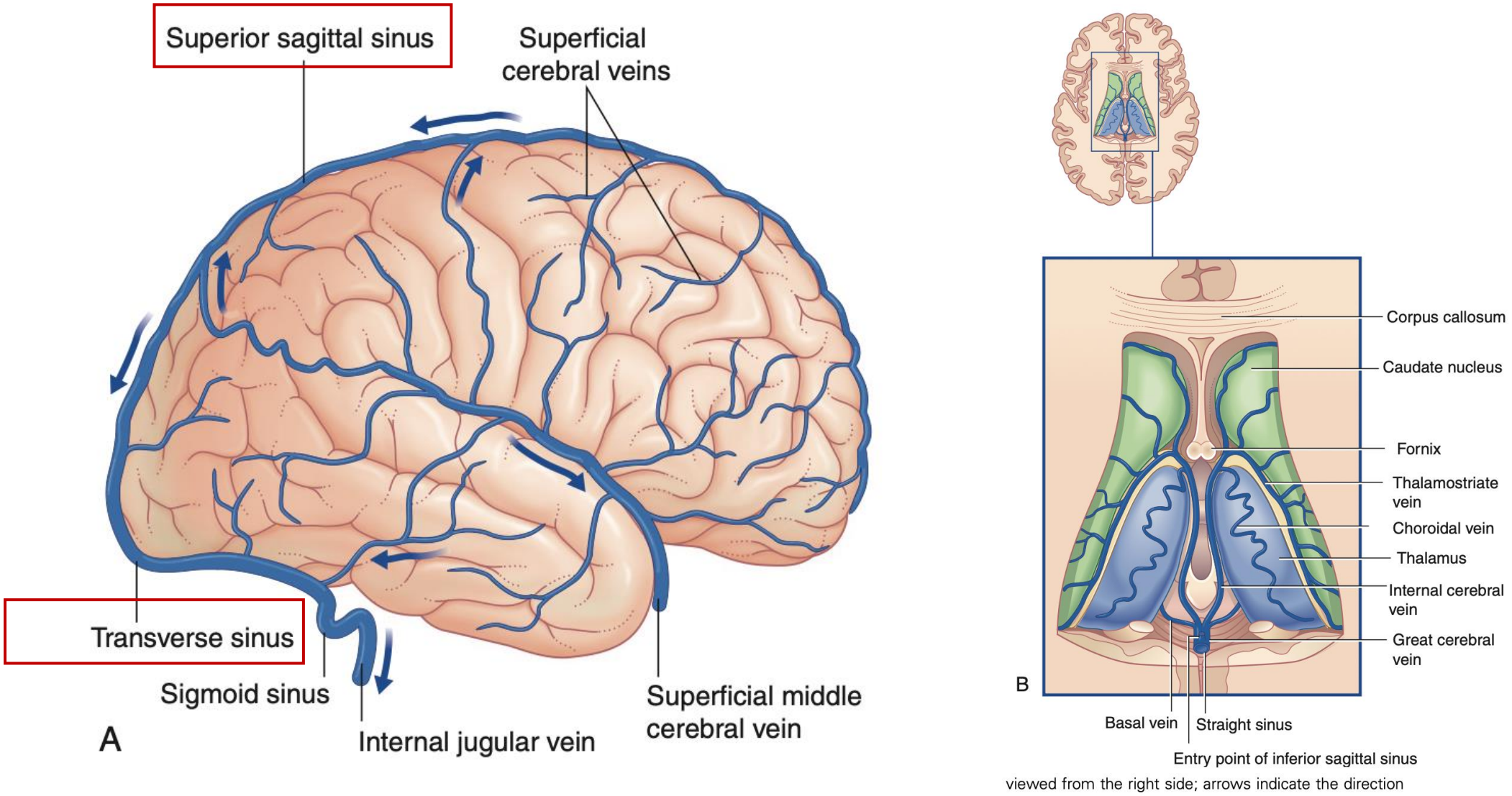


FIGURE 5.13 Cerebral veins. **(A)** Superficial veins viewed from the right side; arrows indicate the direction of blood flow. **(B)** Deep veins viewed from above.