



Oliver
Systems Neuroscience

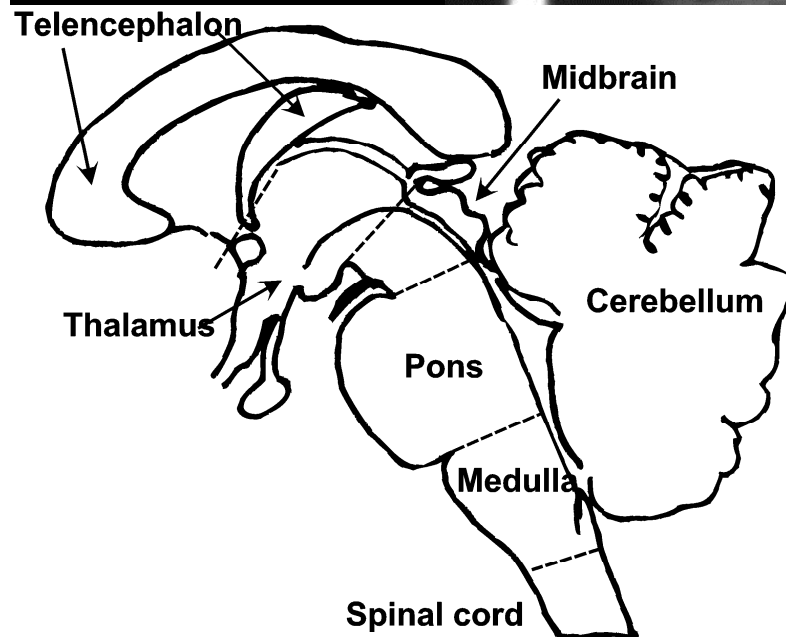
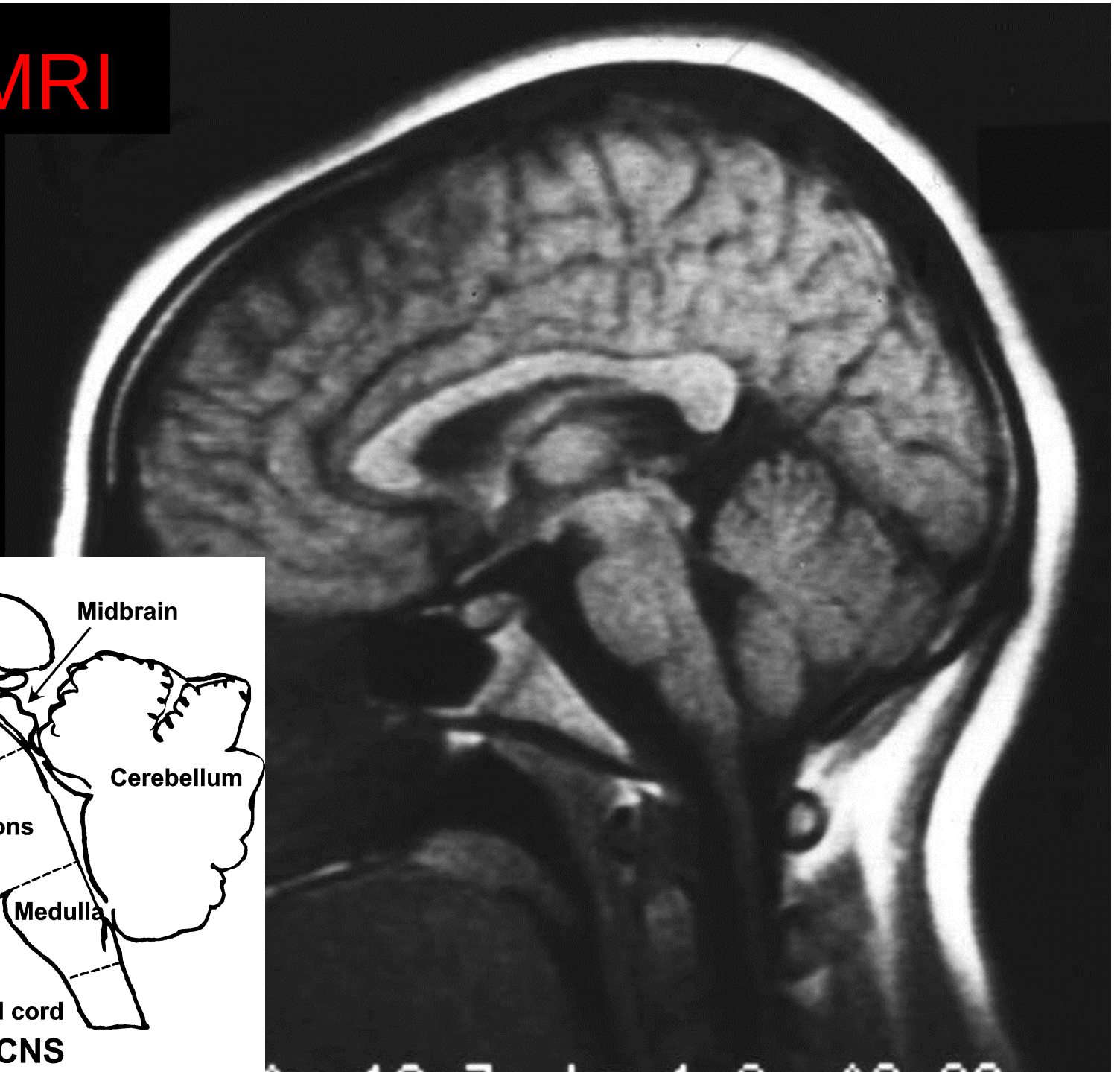


BRAINSTEM AND CRANIAL NERVE NUCLEI

How to Look at Sections

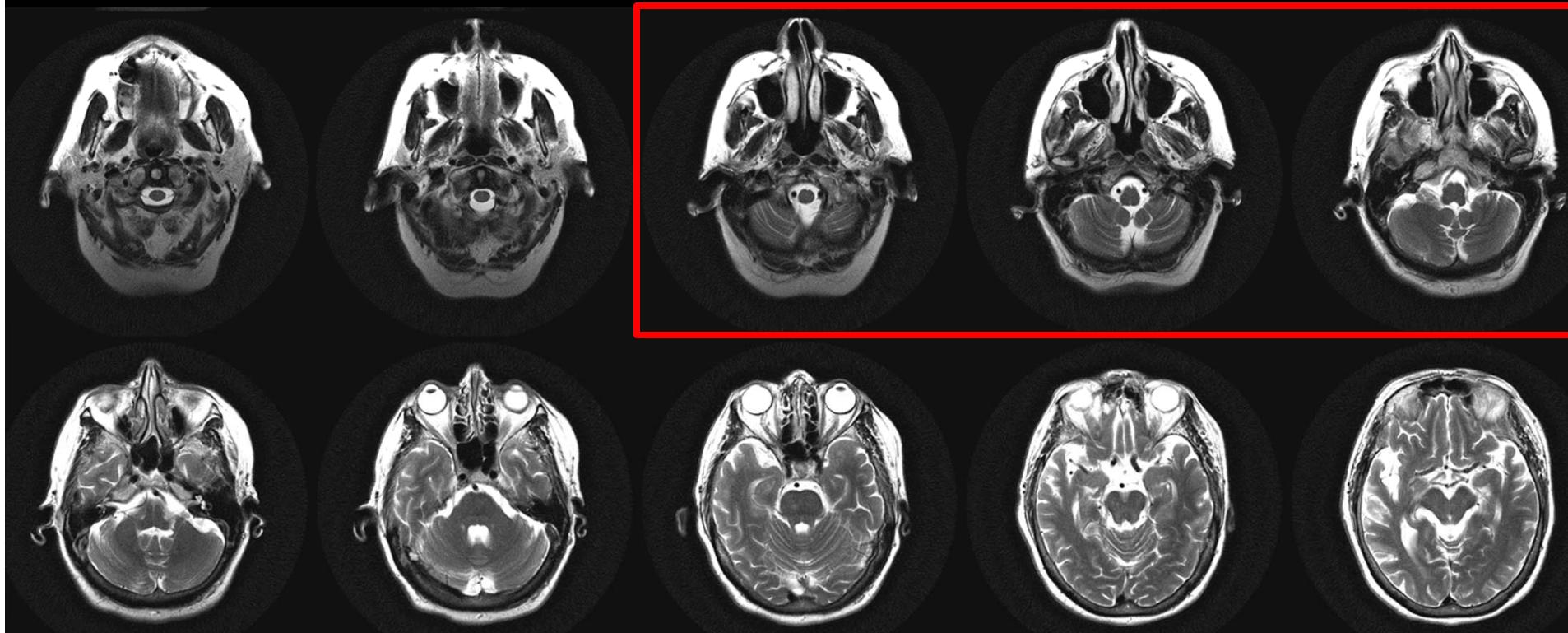
- What part of the brain is it?
 - Shape of the section
 - Critical structures for identification.
- What cranial nerves are present at this location?
 - Memorize the entry points of the cranial nerves.
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- Where are the sensory and motor nuclei?
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Midline MRI



MAIN REGIONS OF CNS

T2 MRI Brainstem sections



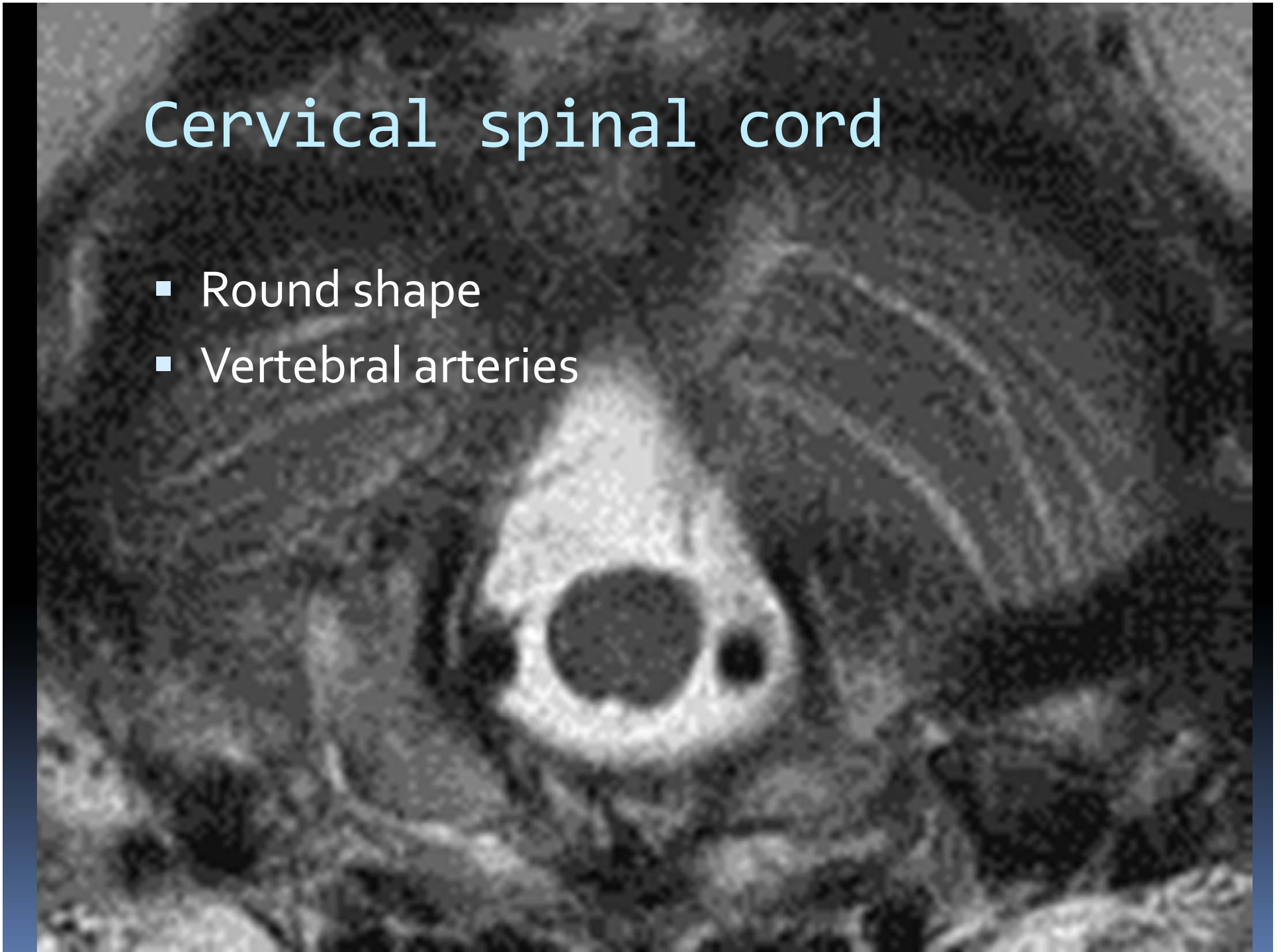
Mid medulla, caudal medulla, spinal cord



- Key features are the pyramids, 4th ventricle rostrally, and the vertebral arteries

Cervical spinal cord

- Round shape
- Vertebral arteries



Upper cervical spinal cord (C1)



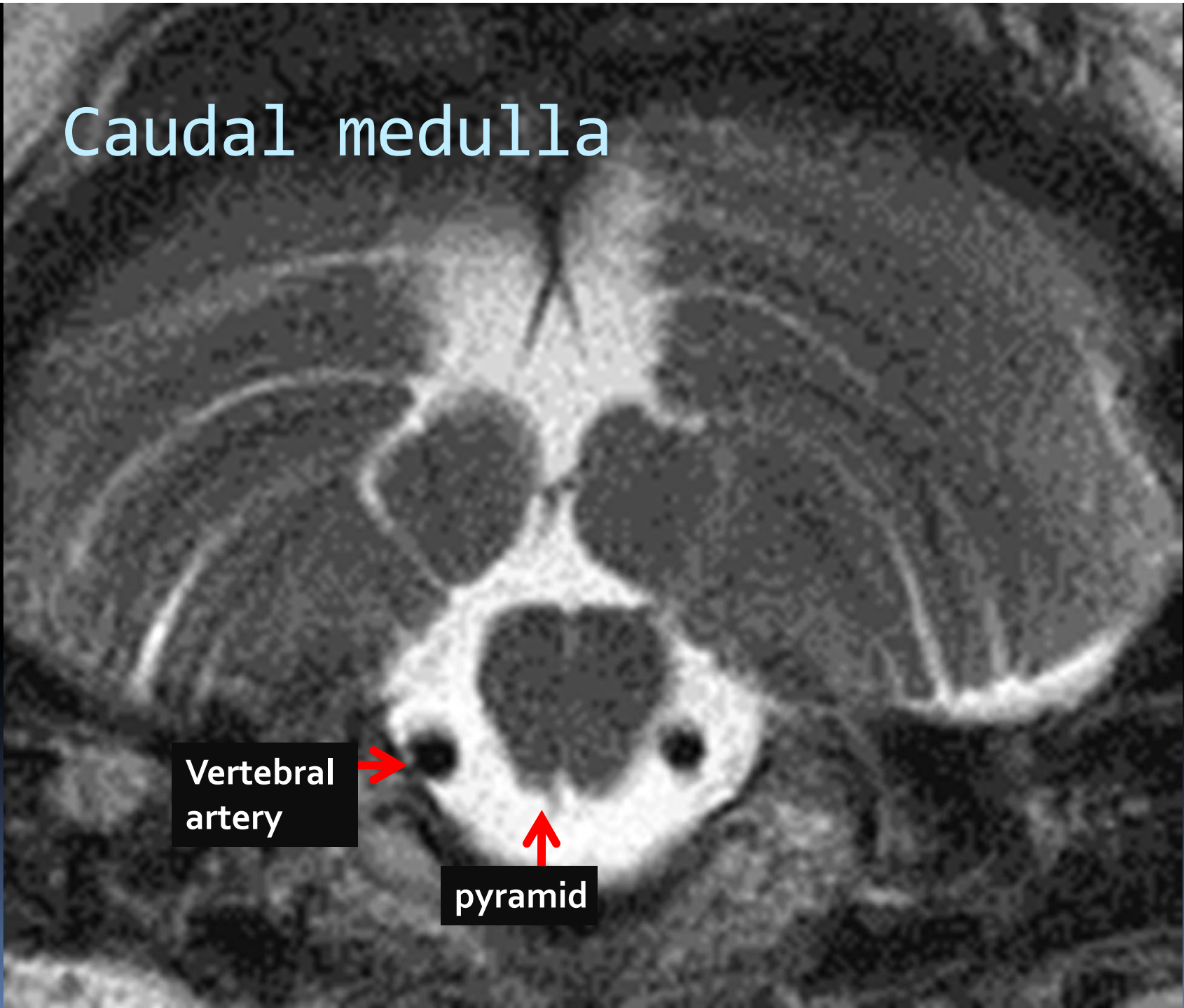
- Note round shape and white matter

Caudal medulla

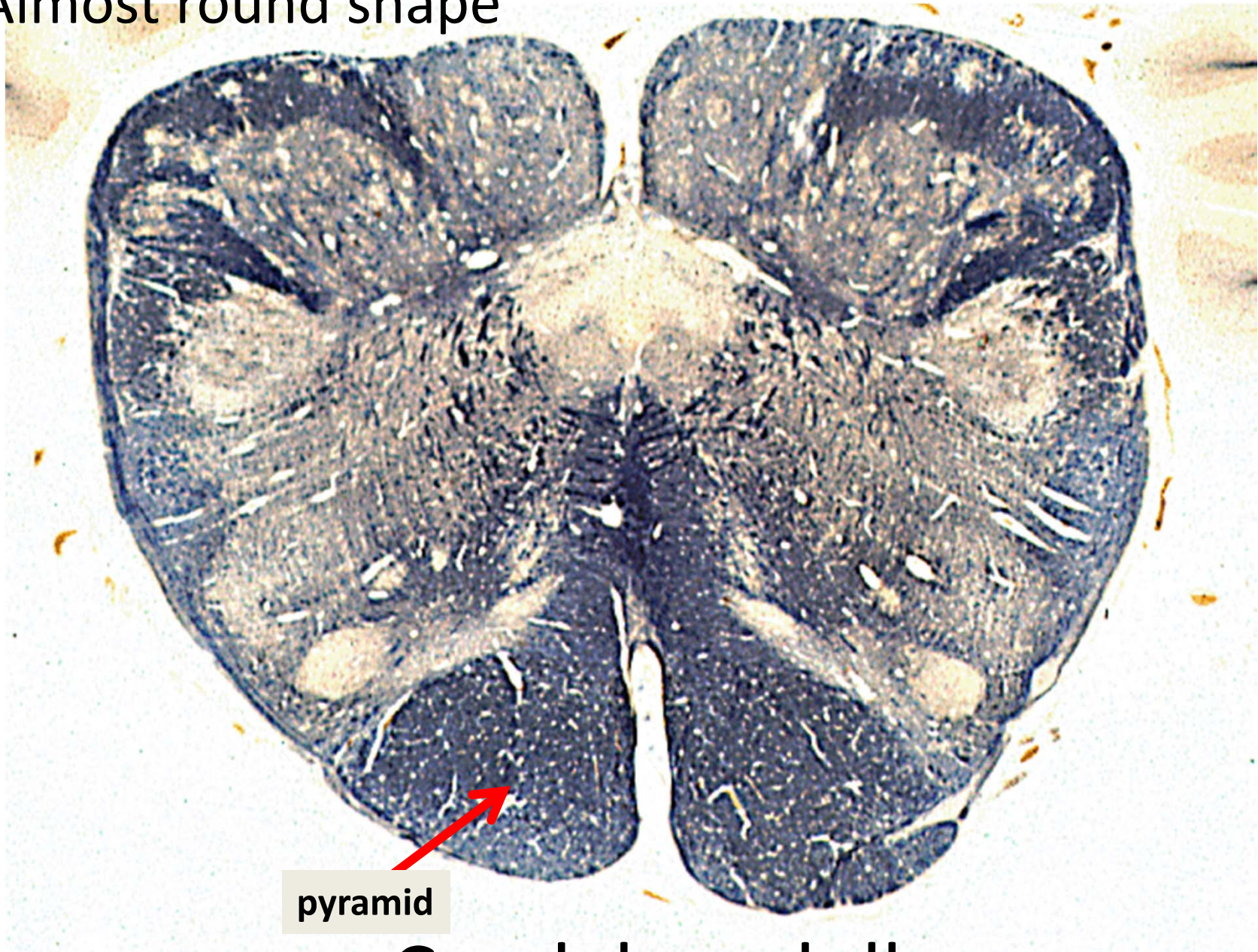
Vertebral
artery



pyramid



- Almost round shape

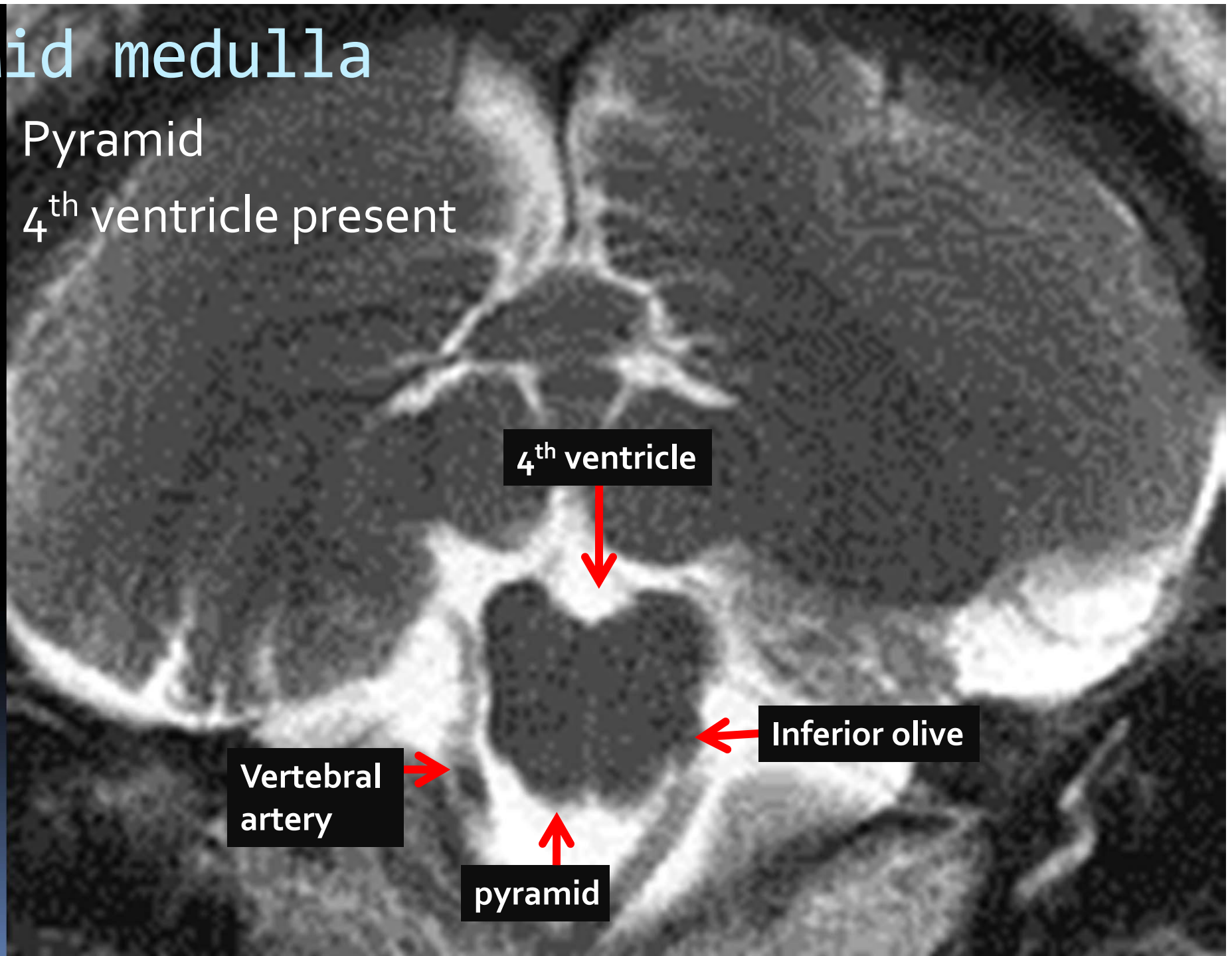


pyramid

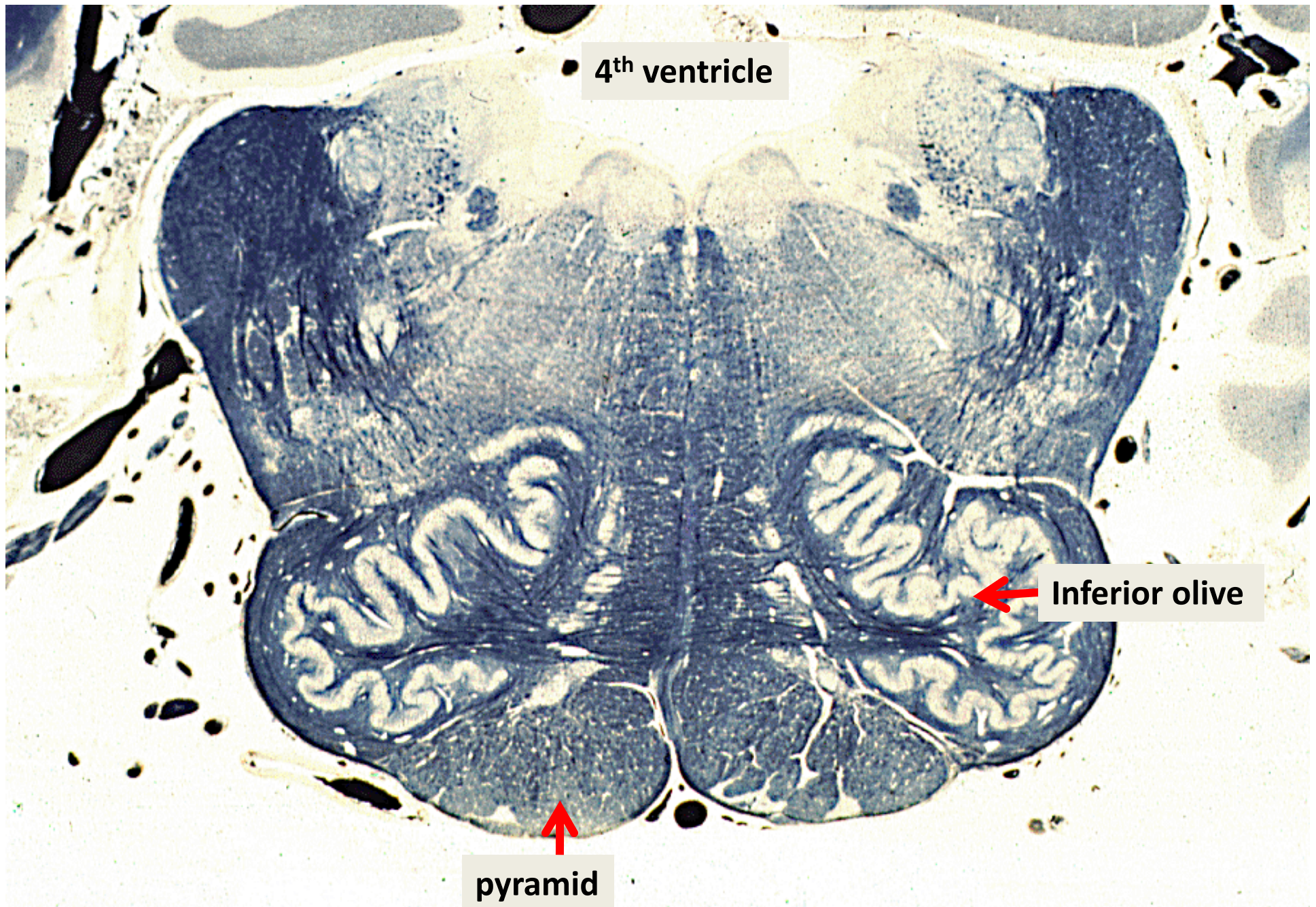
Caudal medulla

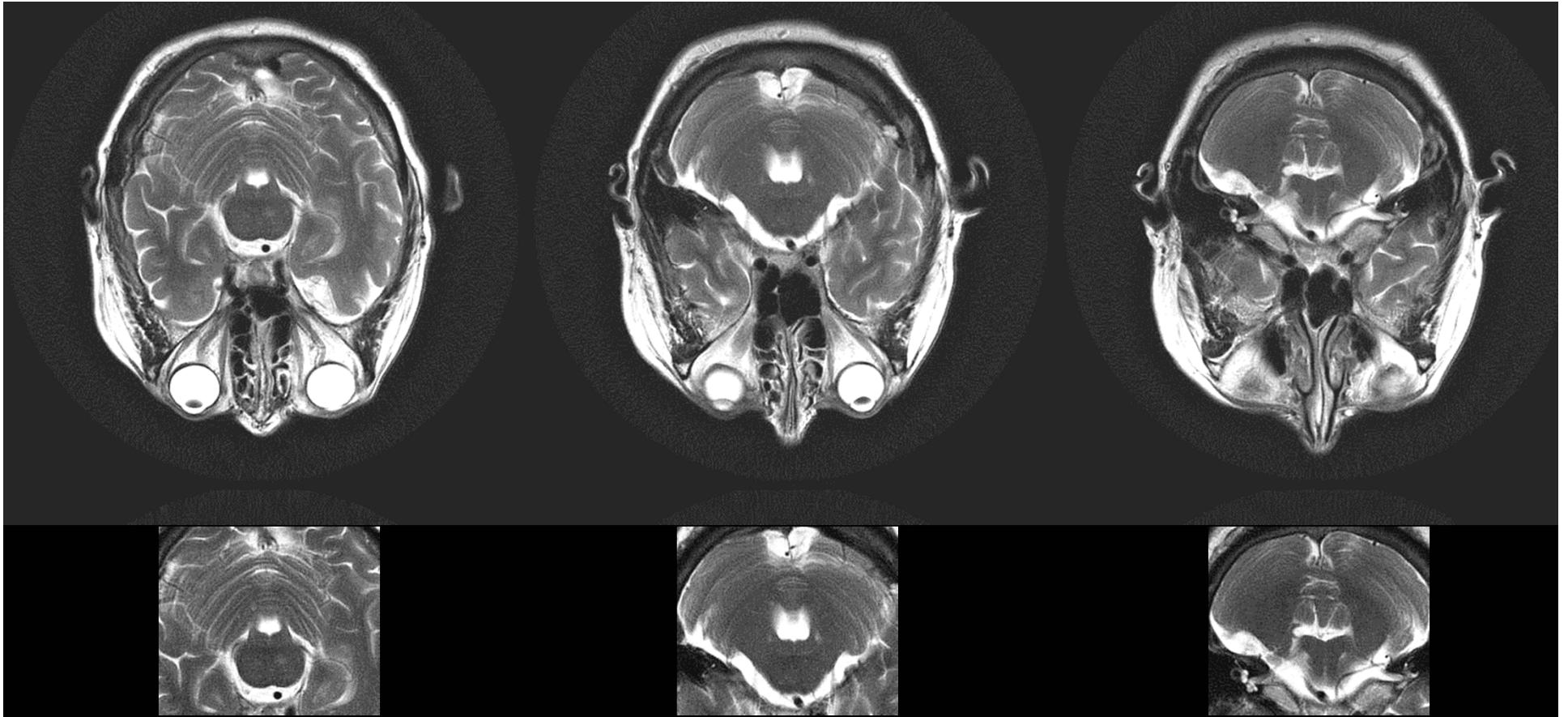
Mid medulla

- Pyramid
- 4th ventricle present



Mid Medulla





Mid pons, caudal pons, rostral medulla

- Key features of pons is pontine nuclei, cerebellar peduncles, basilar artery

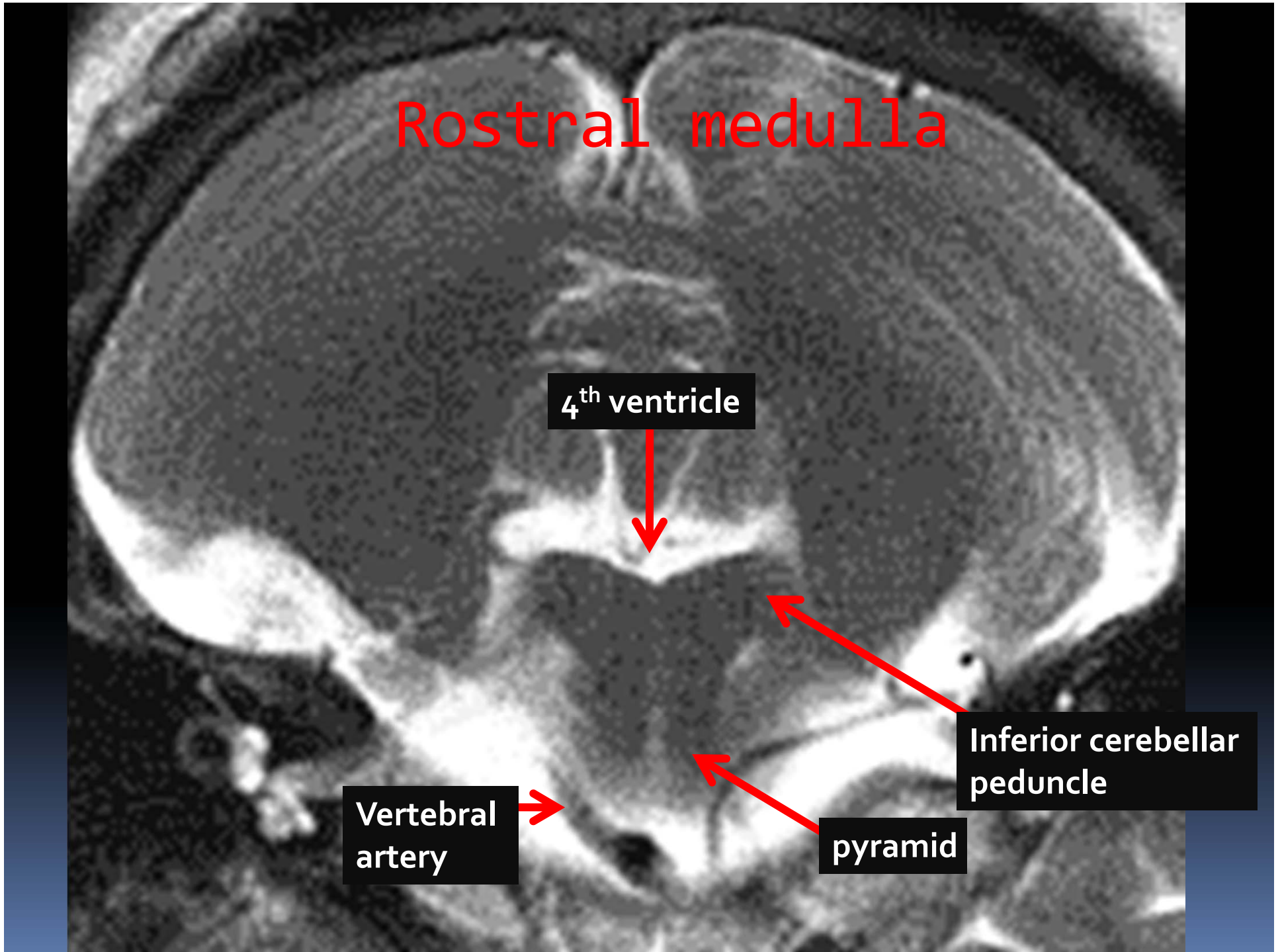
Rostral medulla

4th ventricle

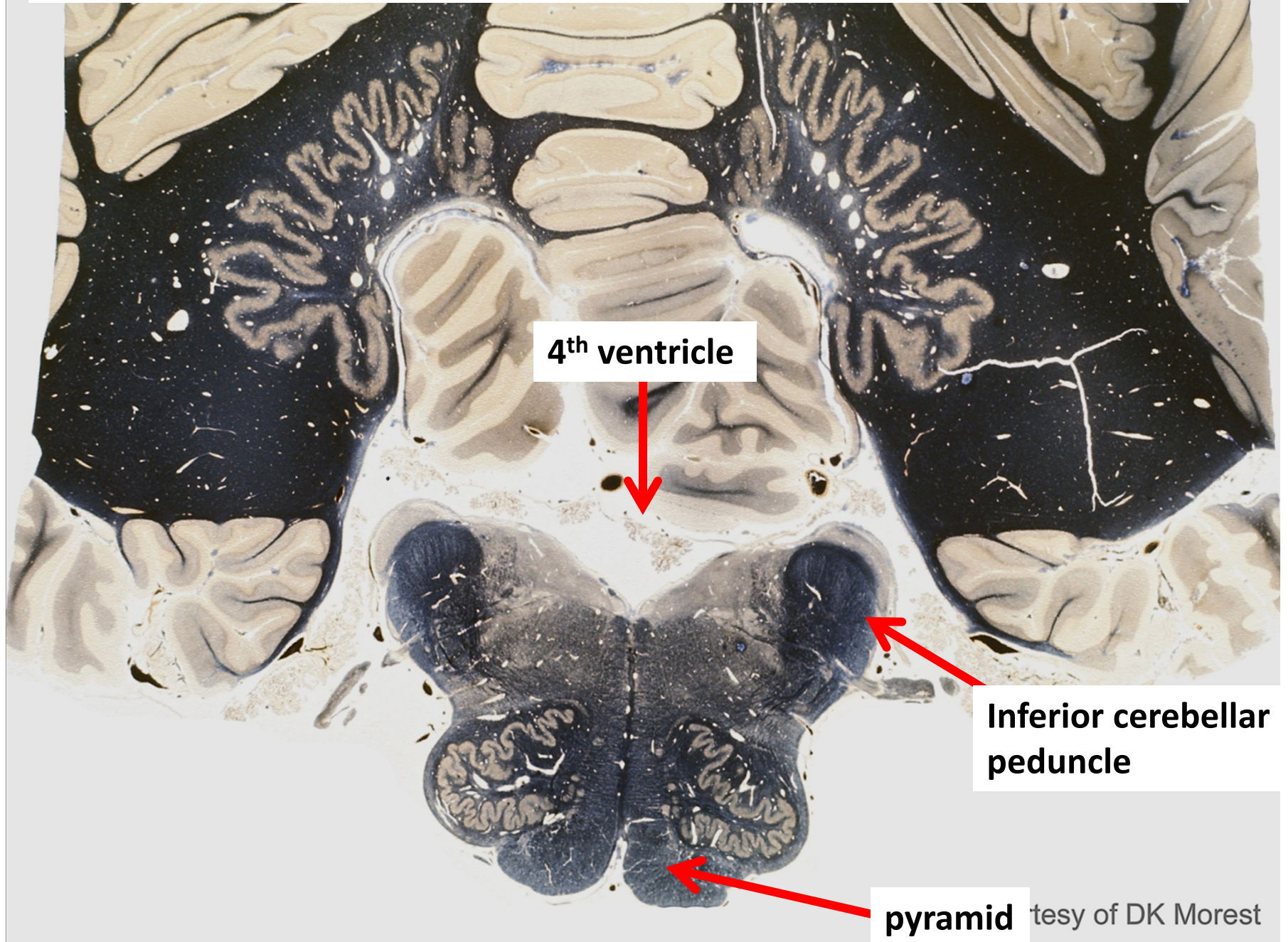
Vertebral
artery

Inferior cerebellar
peduncle

pyramid



Rostral medulla



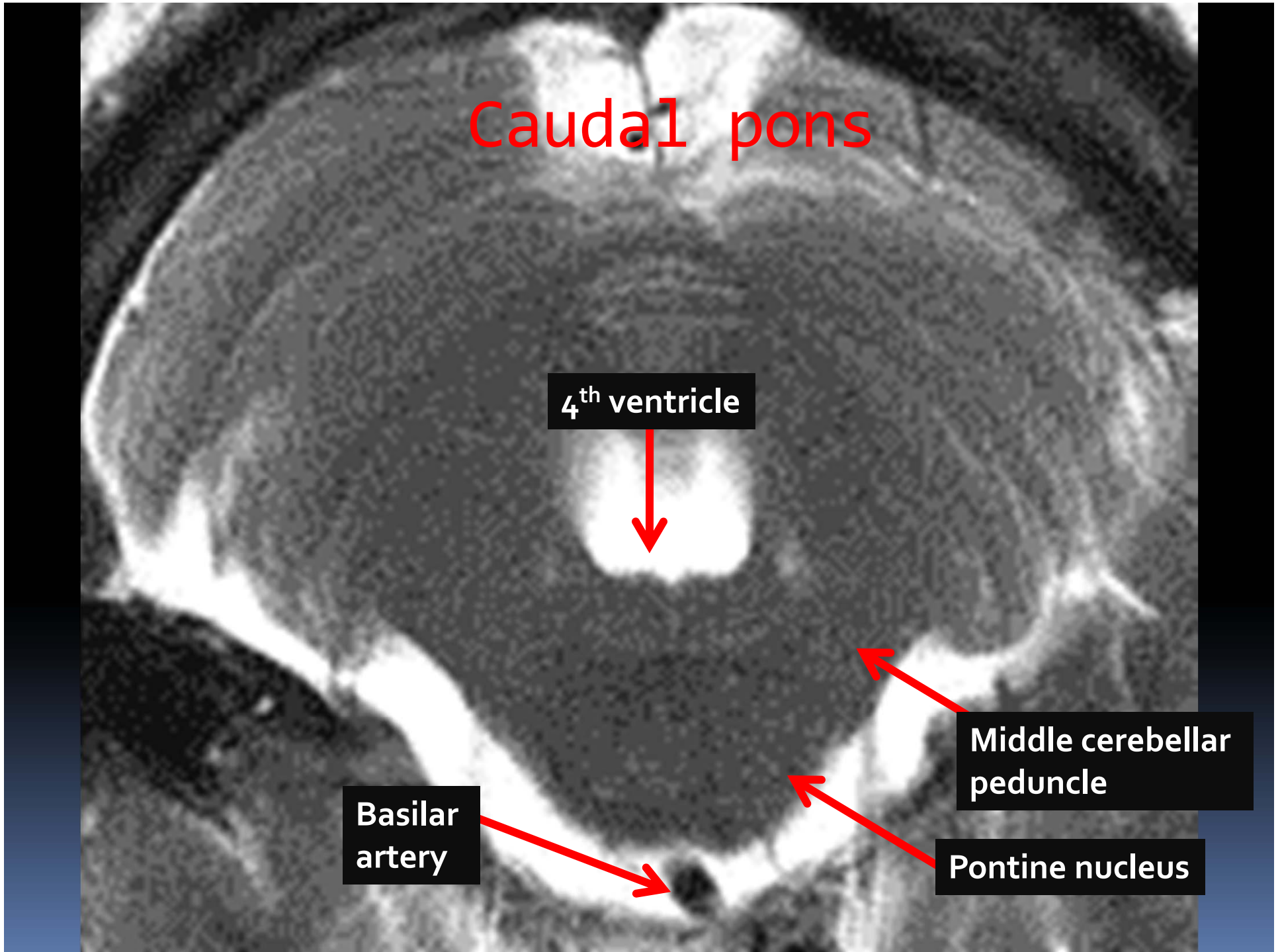
Caudal pons

4th ventricle

Basilar
artery

Middle cerebellar
peduncle

Pontine nucleus



Caudal Pons

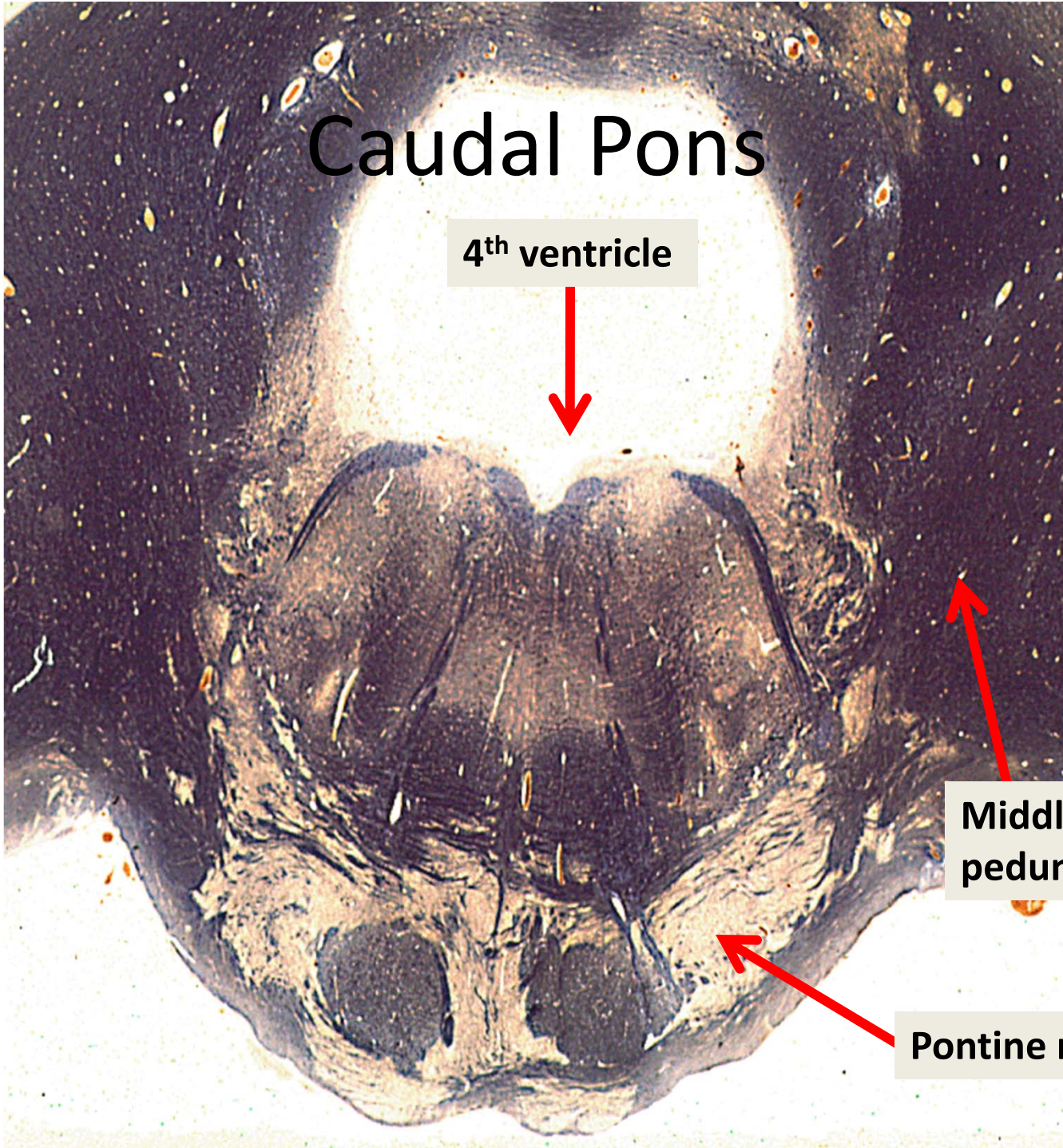
4th ventricle



Middle cerebellar peduncle



Pontine nucleus



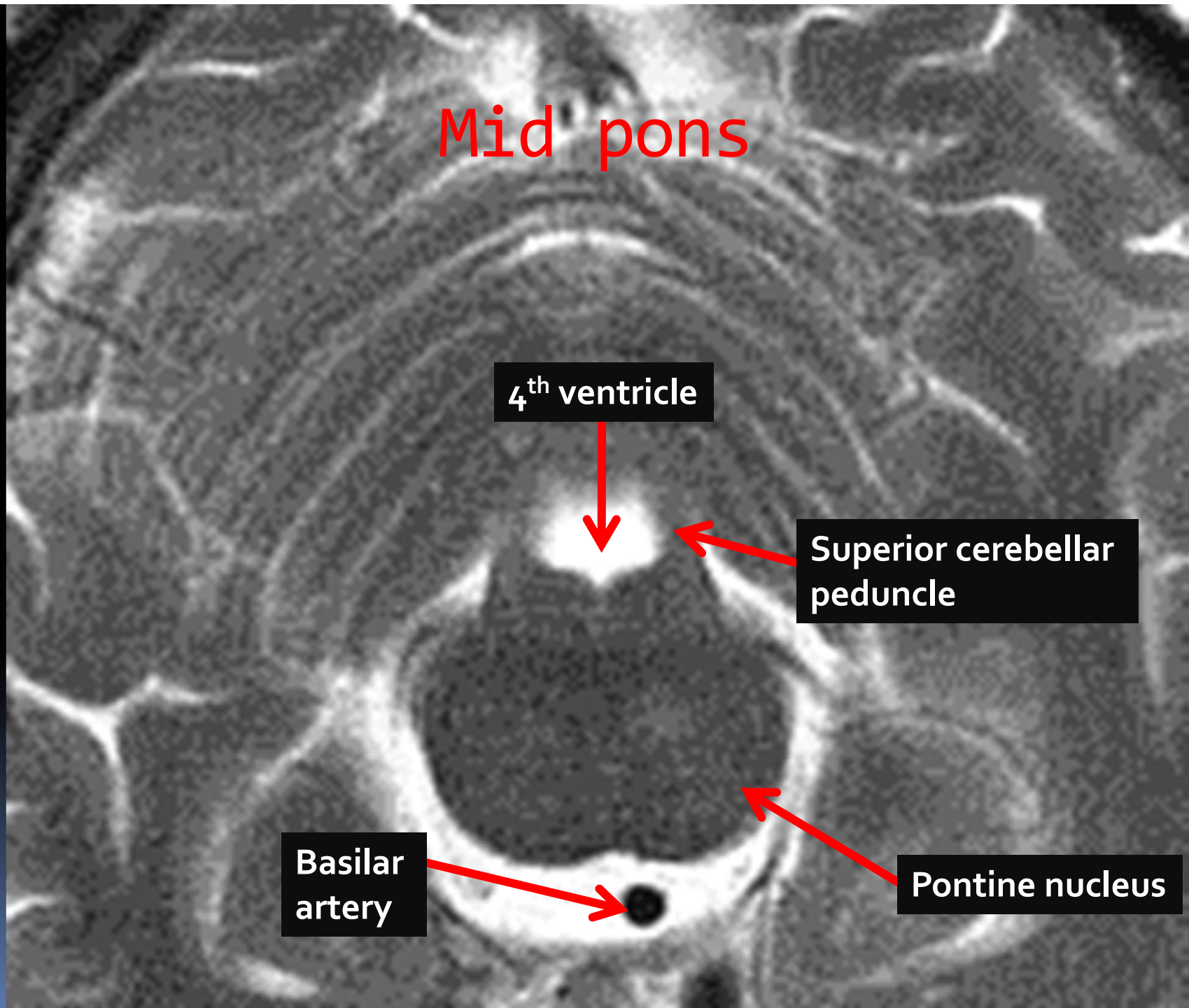
Mid pons

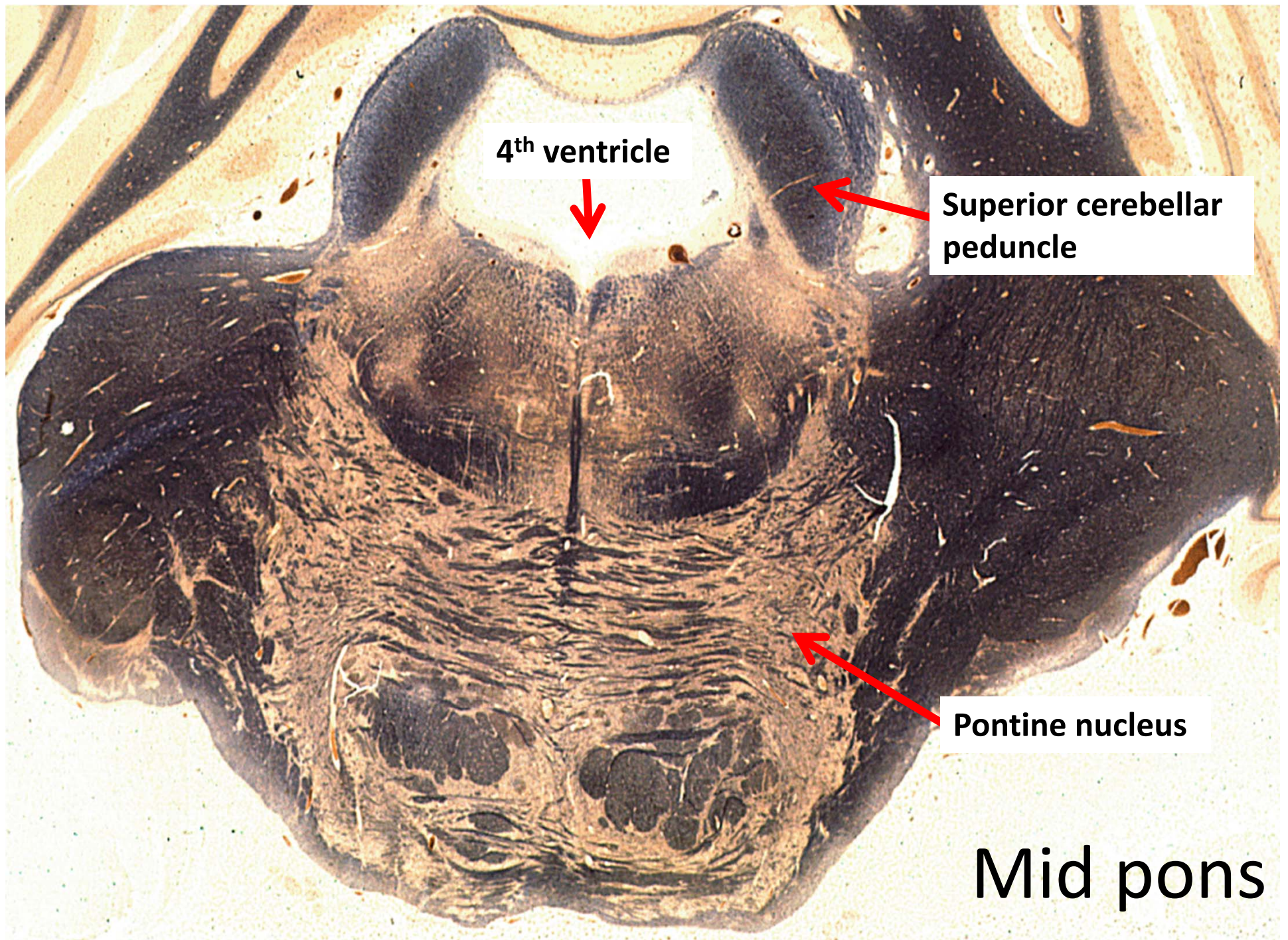
4th ventricle

Superior cerebellar
peduncle

Basilar
artery

Pontine nucleus



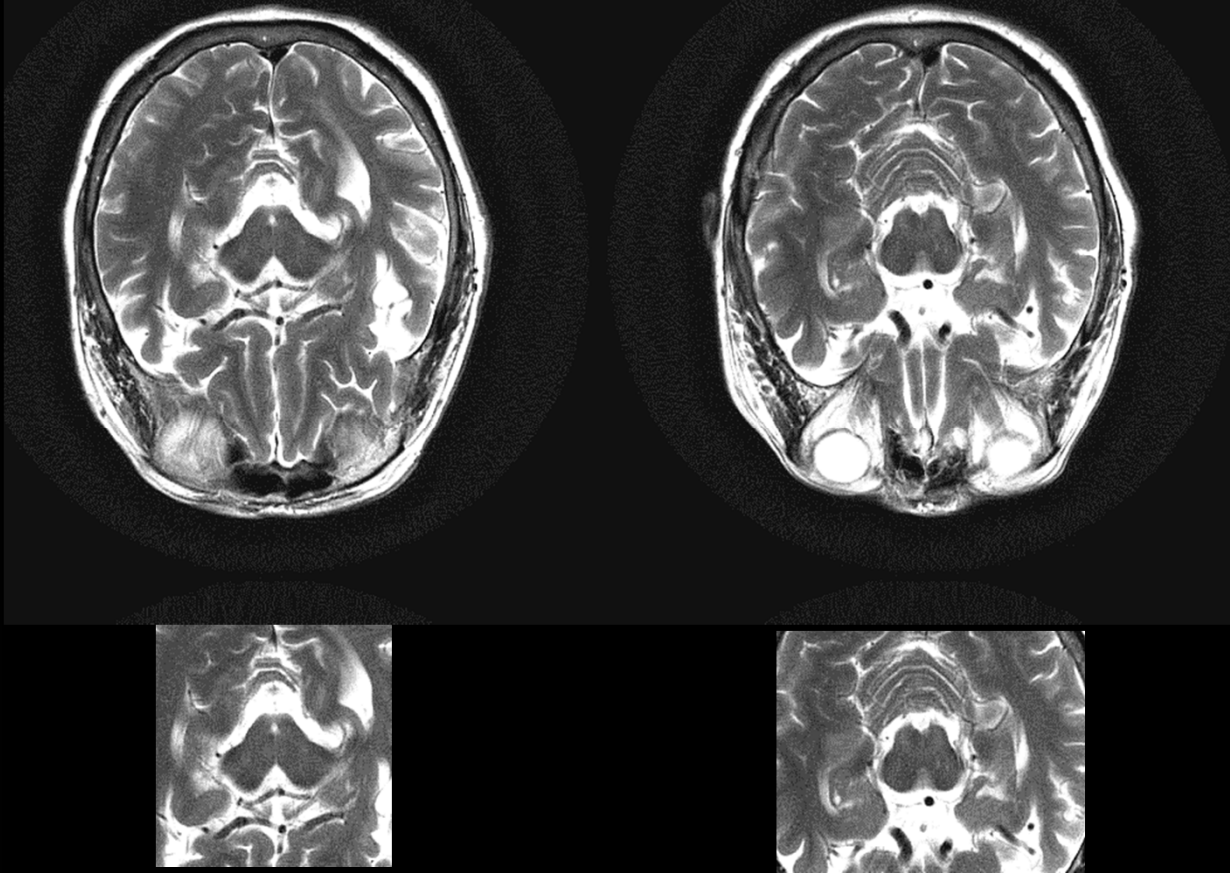


4th ventricle

Superior cerebellar
peduncle

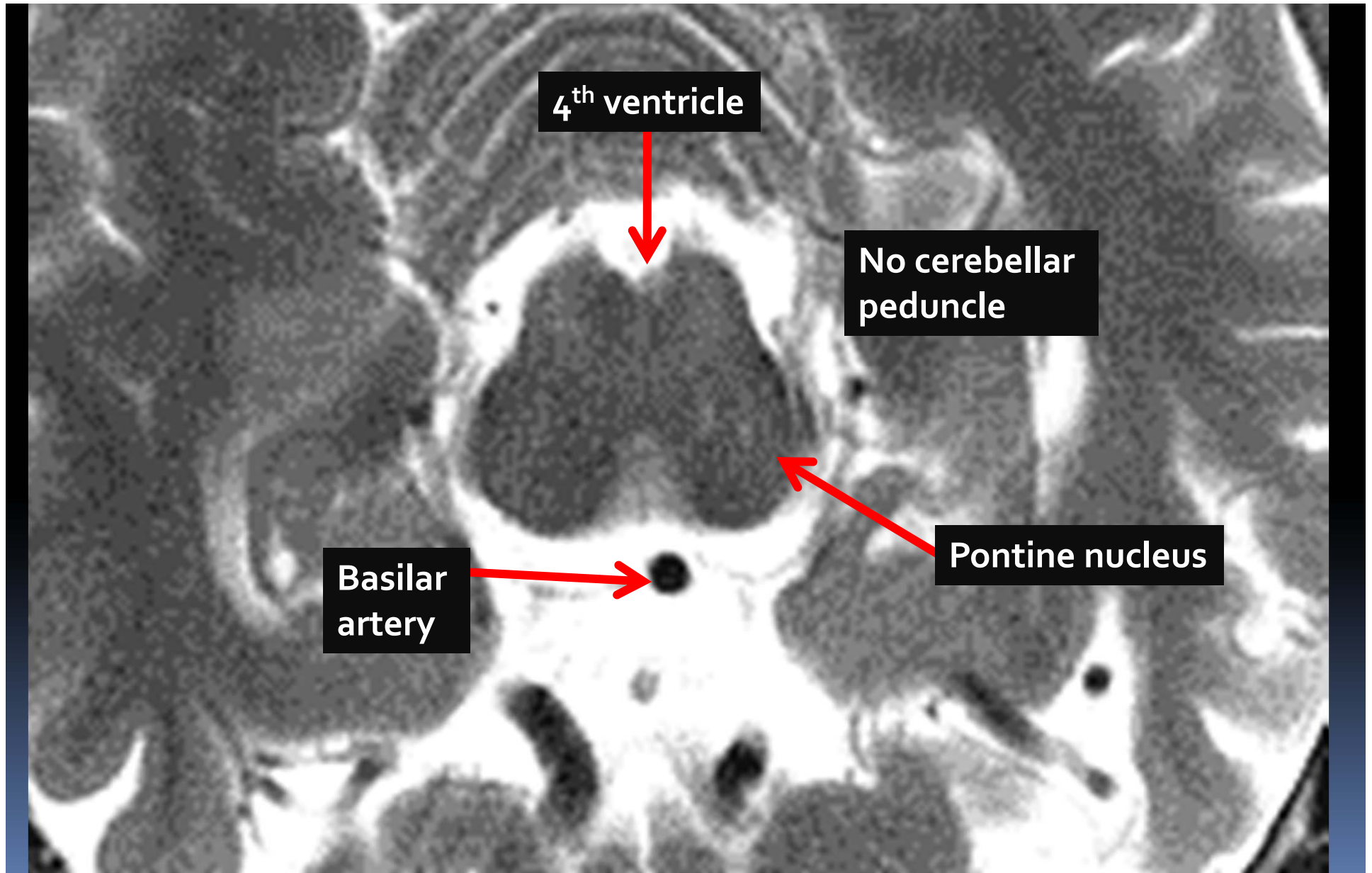
Pontine nucleus

Mid pons

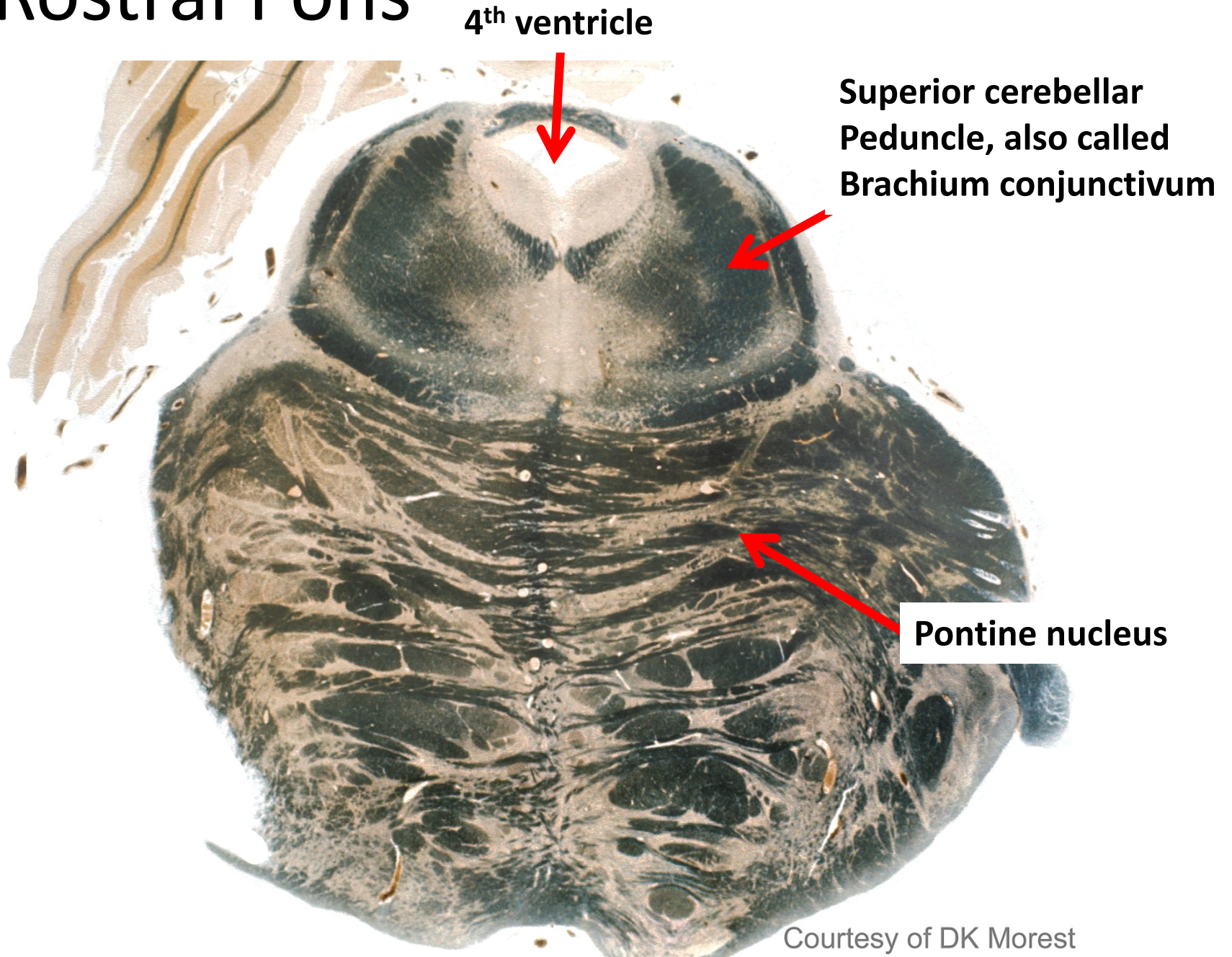


Caudal midbrain, rostral pons

Rostral pons transition (inferior colliculus not visible)



Rostral Pons



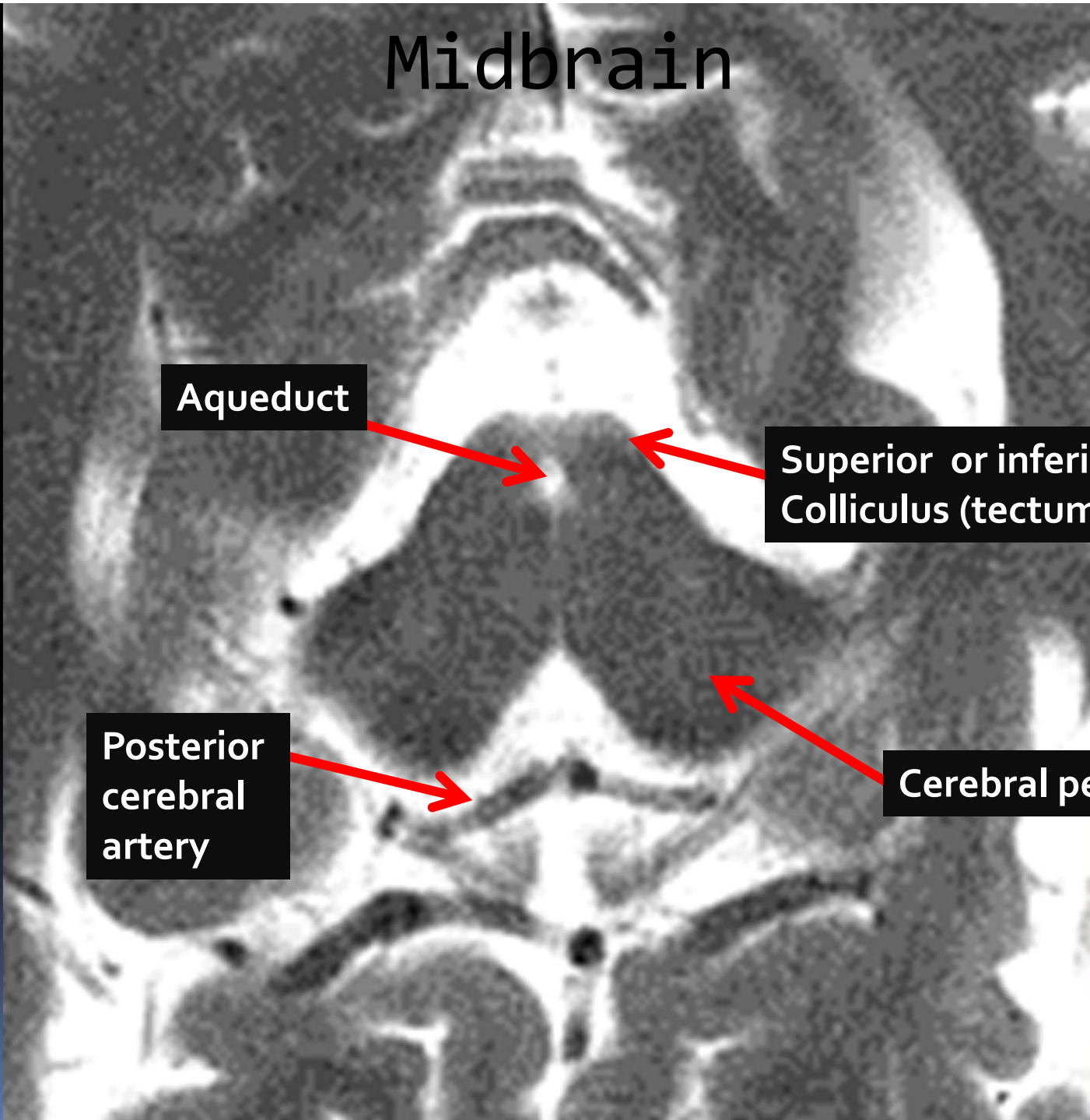
Midbrain

Aqueduct

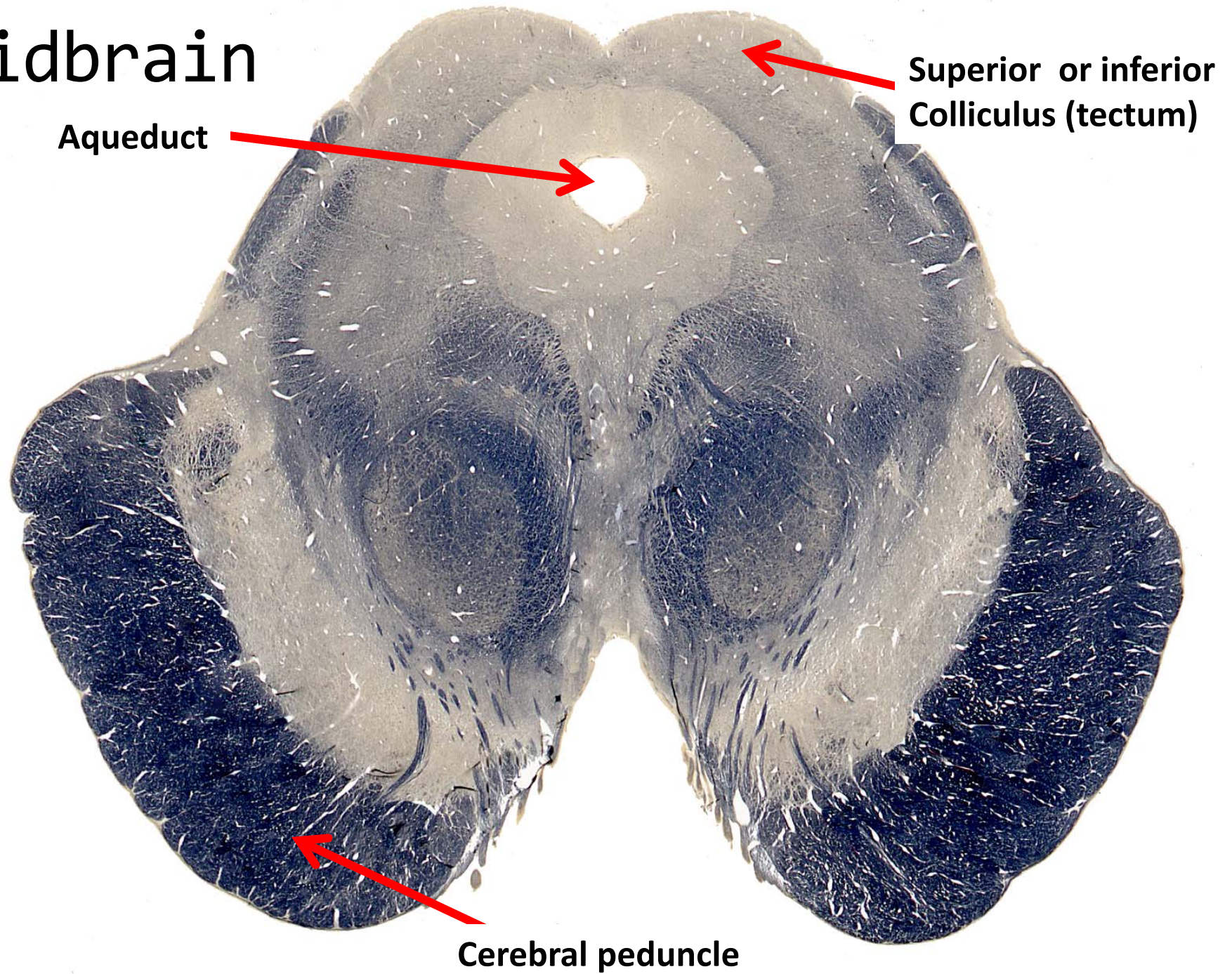
Superior or inferior
Colliculus (tectum)

Posterior
cerebral
artery

Cerebral peduncle



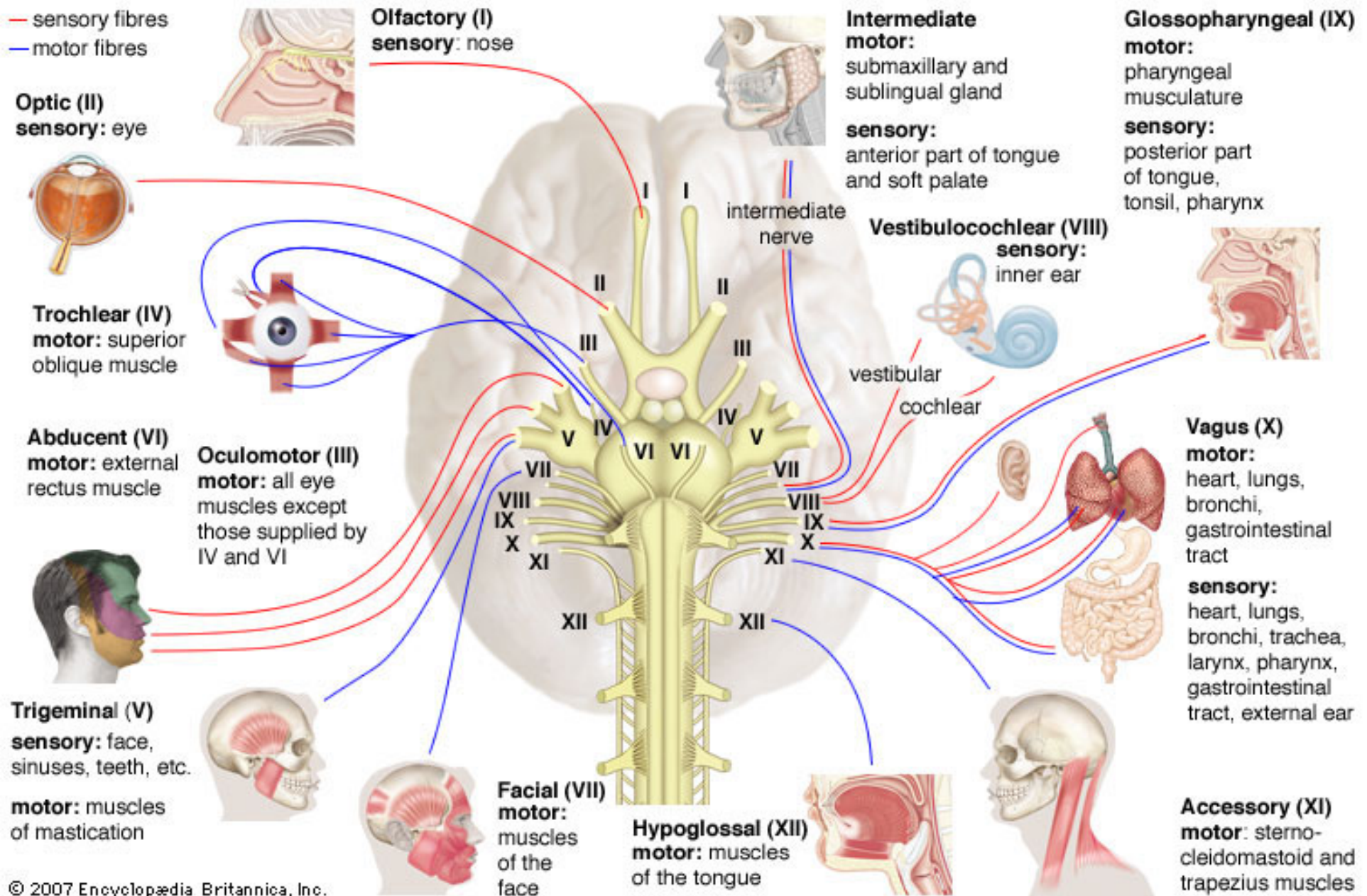
Midbrain



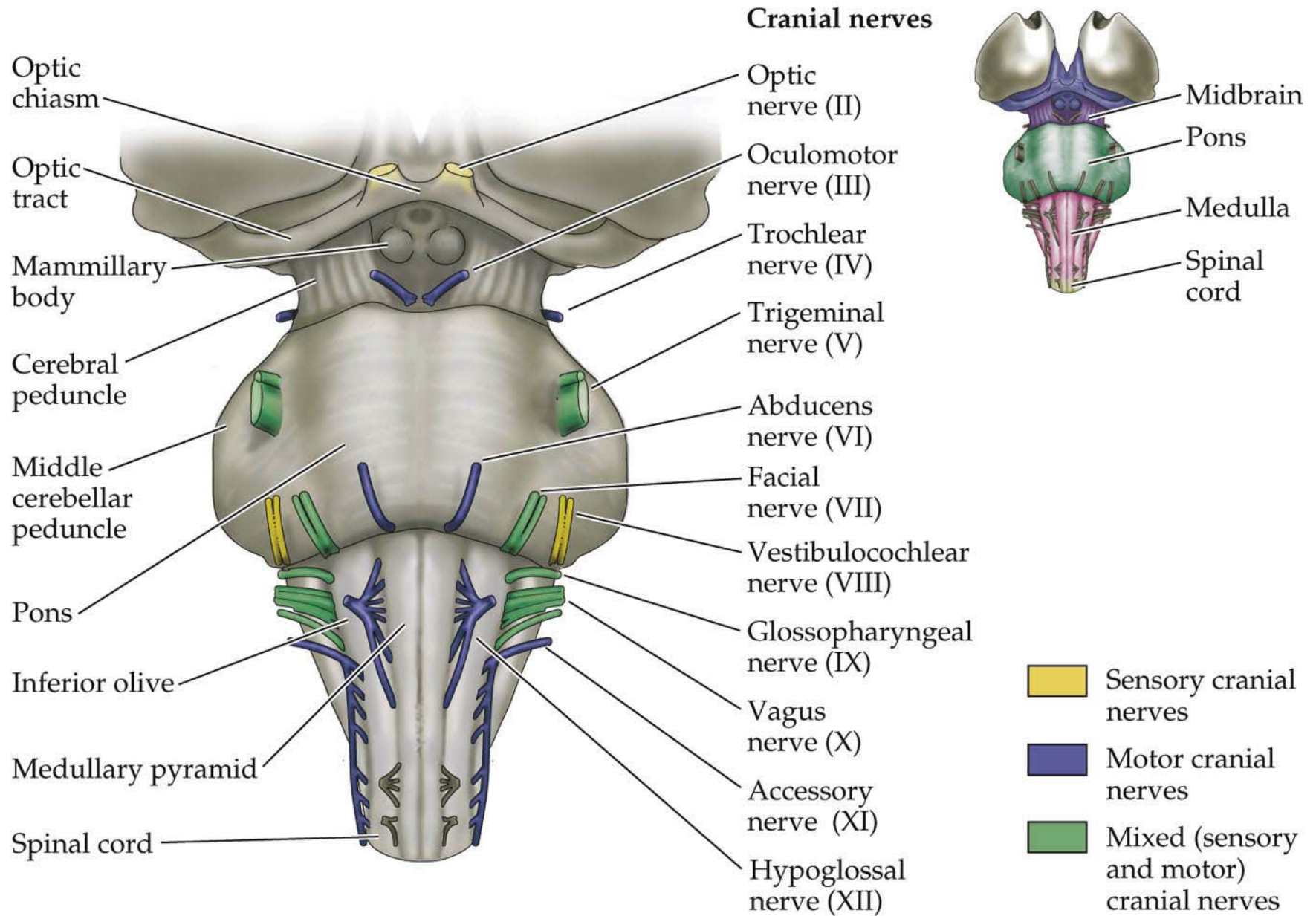
How to Look at Sections

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Cranial Nerves



A1 Ventral view of the brainstem showing the locations of the cranial nerves.

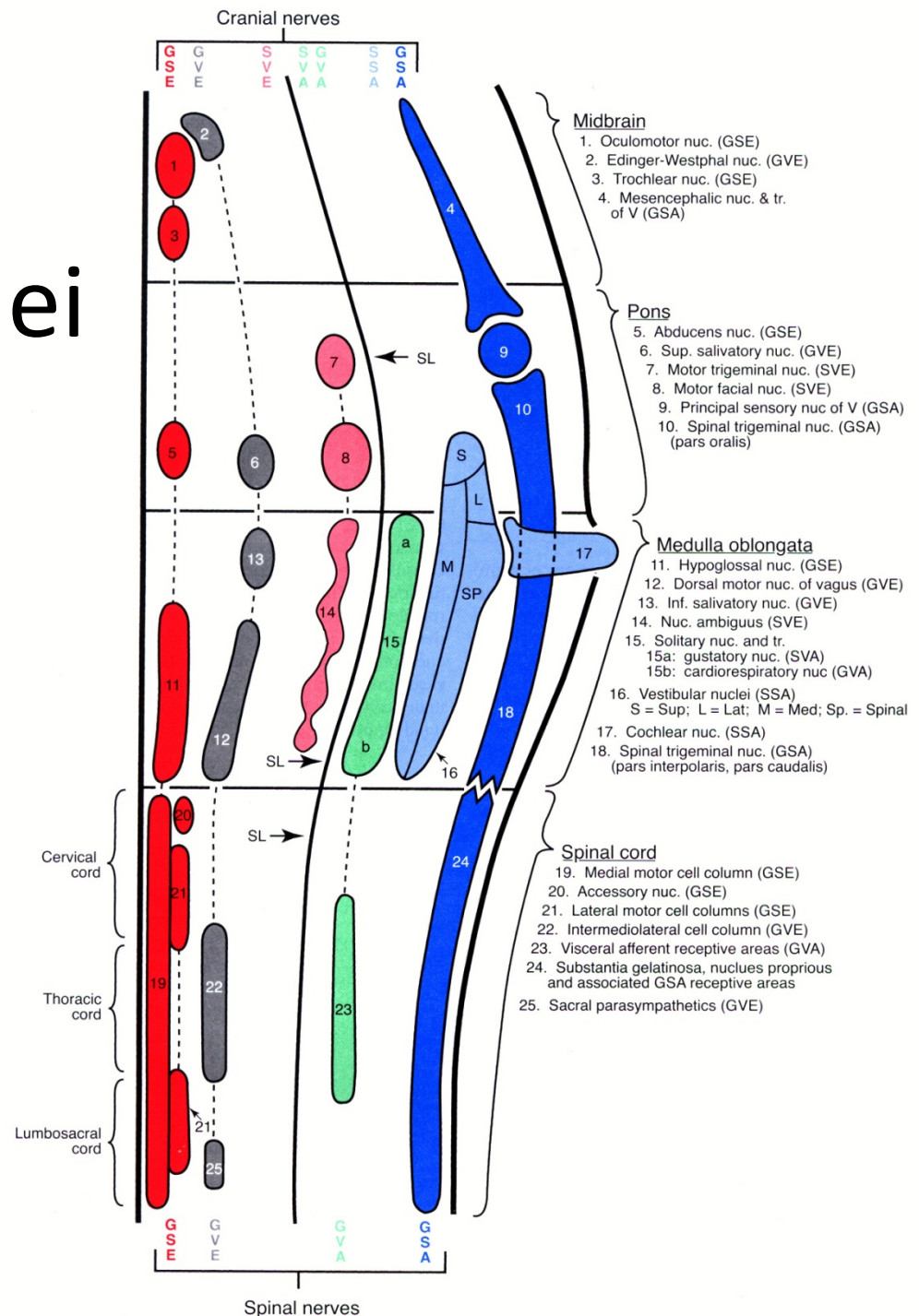


REGION	IDENTIFYING STRUCTURES	CRANIAL NERVE
Spinal Cord	Dorsal roots Ventral roots	XI. Spinal accessory cranial nerve, Motor
Myelencephalon -Medulla	Pyramids Fourth Ventricle Inferior Olive	XII. Hypoglossal , Motor X. Vagus , Motor, Parasympathetic, Visceral Sensory, General Sensory IX. Glossopharyngeal , Motor, Parasympathetic, Visceral Sensory, General Sensory
Medulla – Pons Junction		VIII. Vestibulocochlear , Special Sensory VII. Facial , Motor, Parasympathetic, Visceral Sensory, General Sensory VI. Abducens , Motor
Metencephalon – Pons	Cerebellum Pontine protuberance Fourth ventricle	V. Trigeminal , Motor, General Sensory
Mesencephalon - Midbrain	Tectum Cerebral peduncles	III. Oculomotor , Motor, Parasympathetic IV. Trochlear , Motor
Diencephalon- Thalamus	Optic chiasm Hypothalamus	II. Optic cranial nerve, Special Sensory
Telencephalon	basal ganglia cerebral cortex Frontal, Parietal, Occipital, Temporal lobes	I. Olfactory cranial nerve, Special Sensory

How to Look at Sections

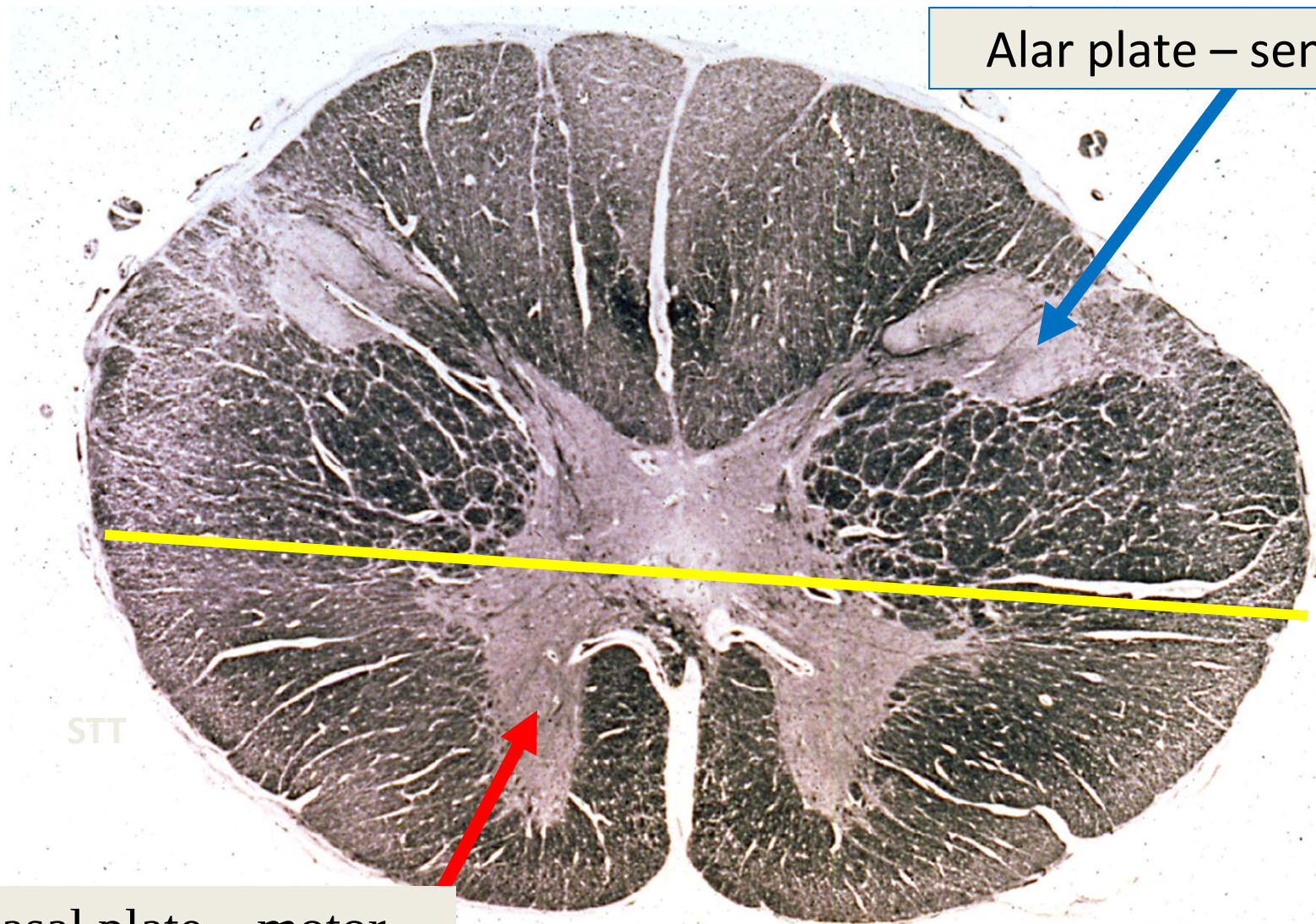
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Organization of cranial nerve nuclei



Haines (2008) Neuroanatomy, An Atlas of Structures, sections, and Systems. 7th edition, Fig. 8.2

Where are the sensory and motor nuclei? Upper cervical

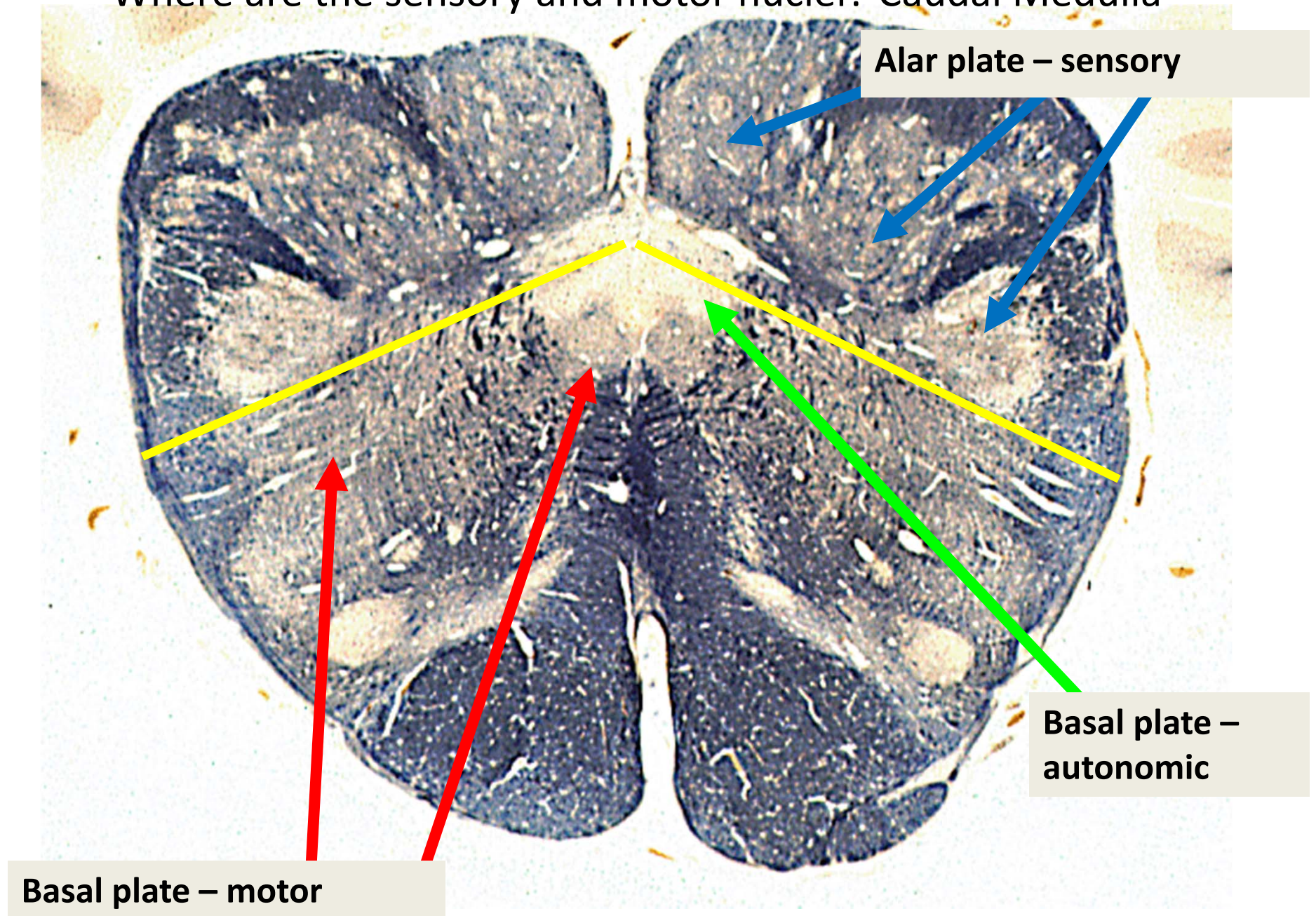


Alar plate – sensory

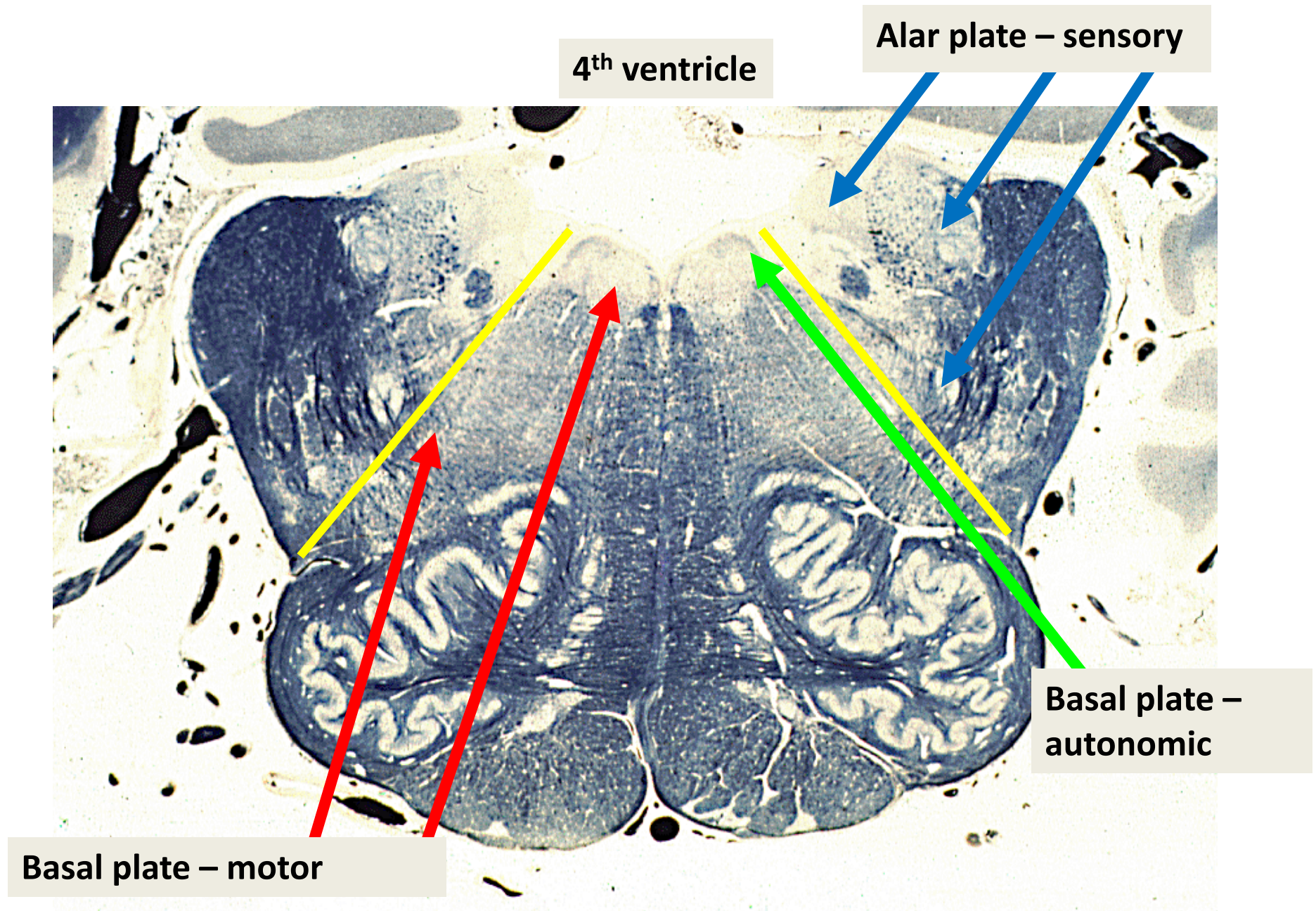
•Basal plate – motor

STT

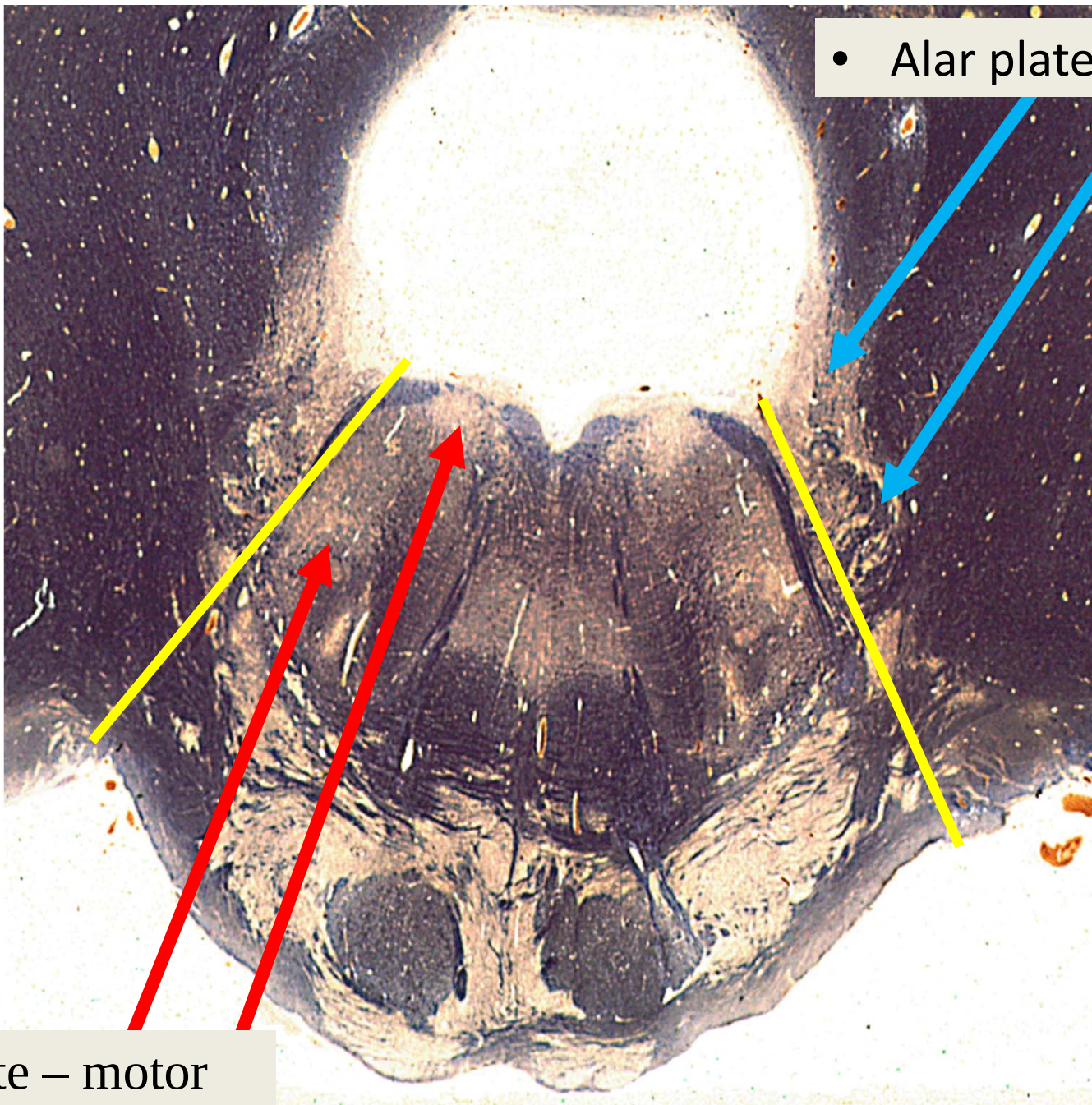
Where are the sensory and motor nuclei? Caudal Medulla



Where are the sensory and motor nuclei? Mid Medulla



Where are the sensory and motor nuclei? Caudal Pons

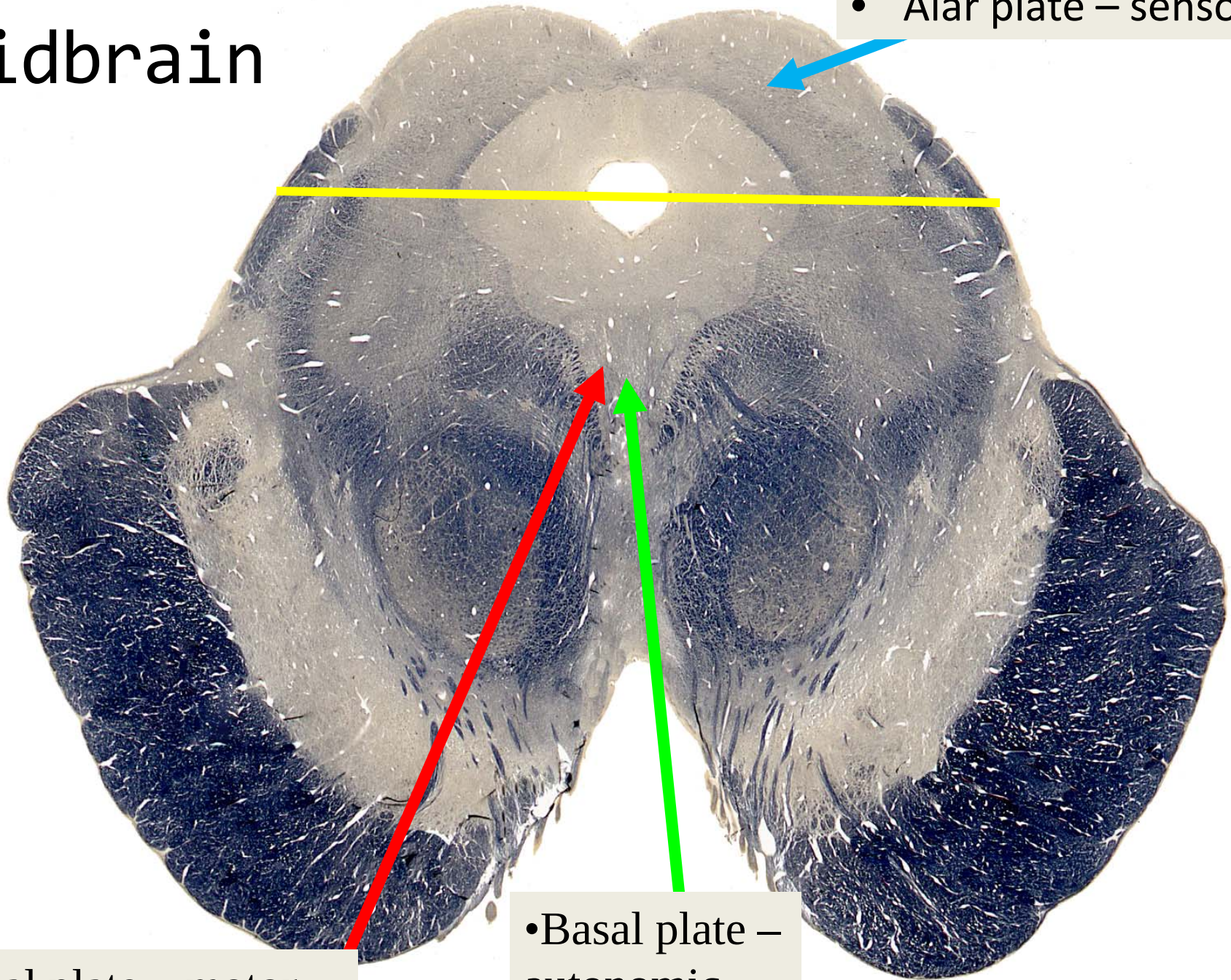


- Alar plate – sensory

- Basal plate – motor

Midbrain

- Alar plate – sensory



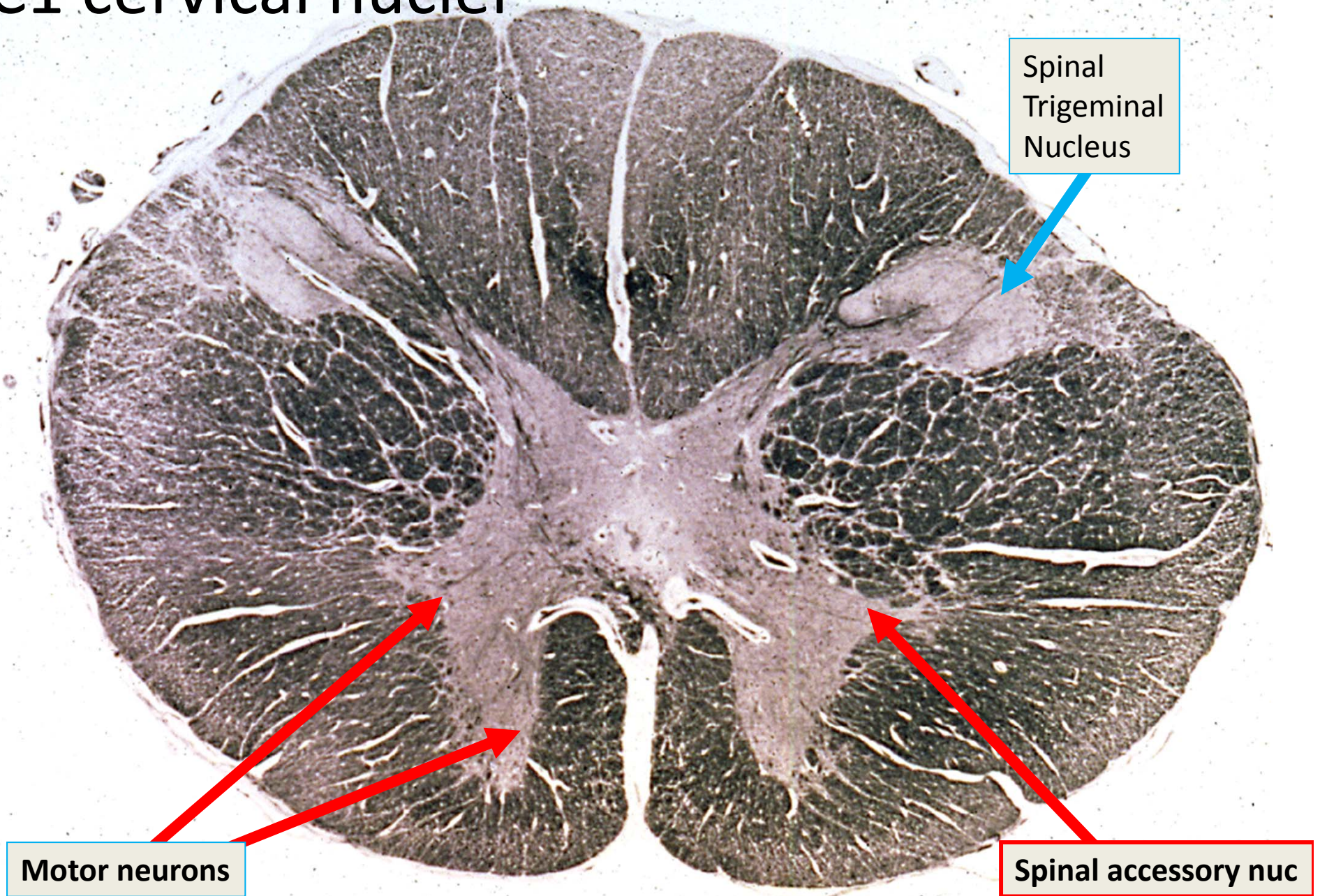
- Basal plate – motor

- Basal plate – autonomic

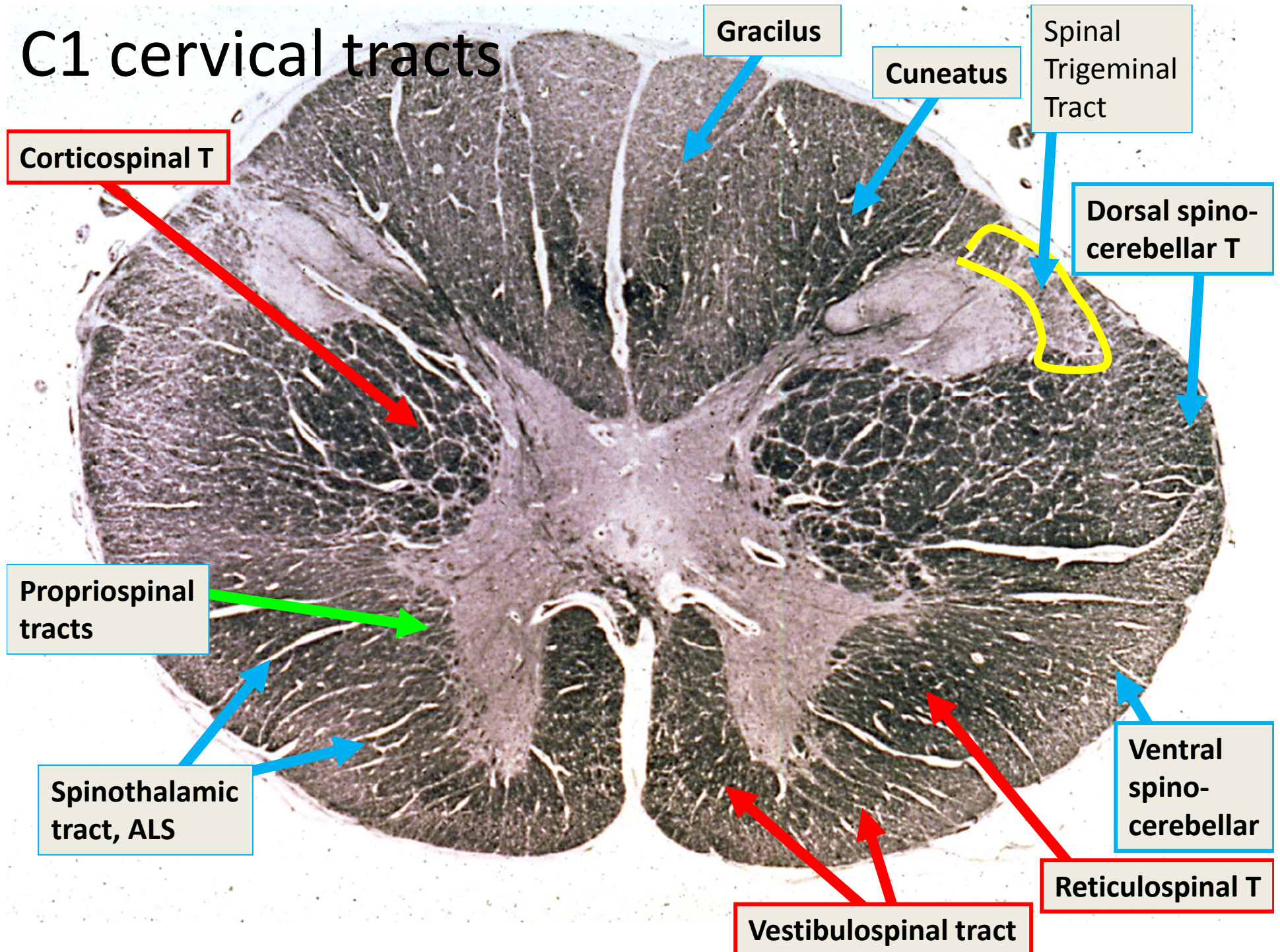
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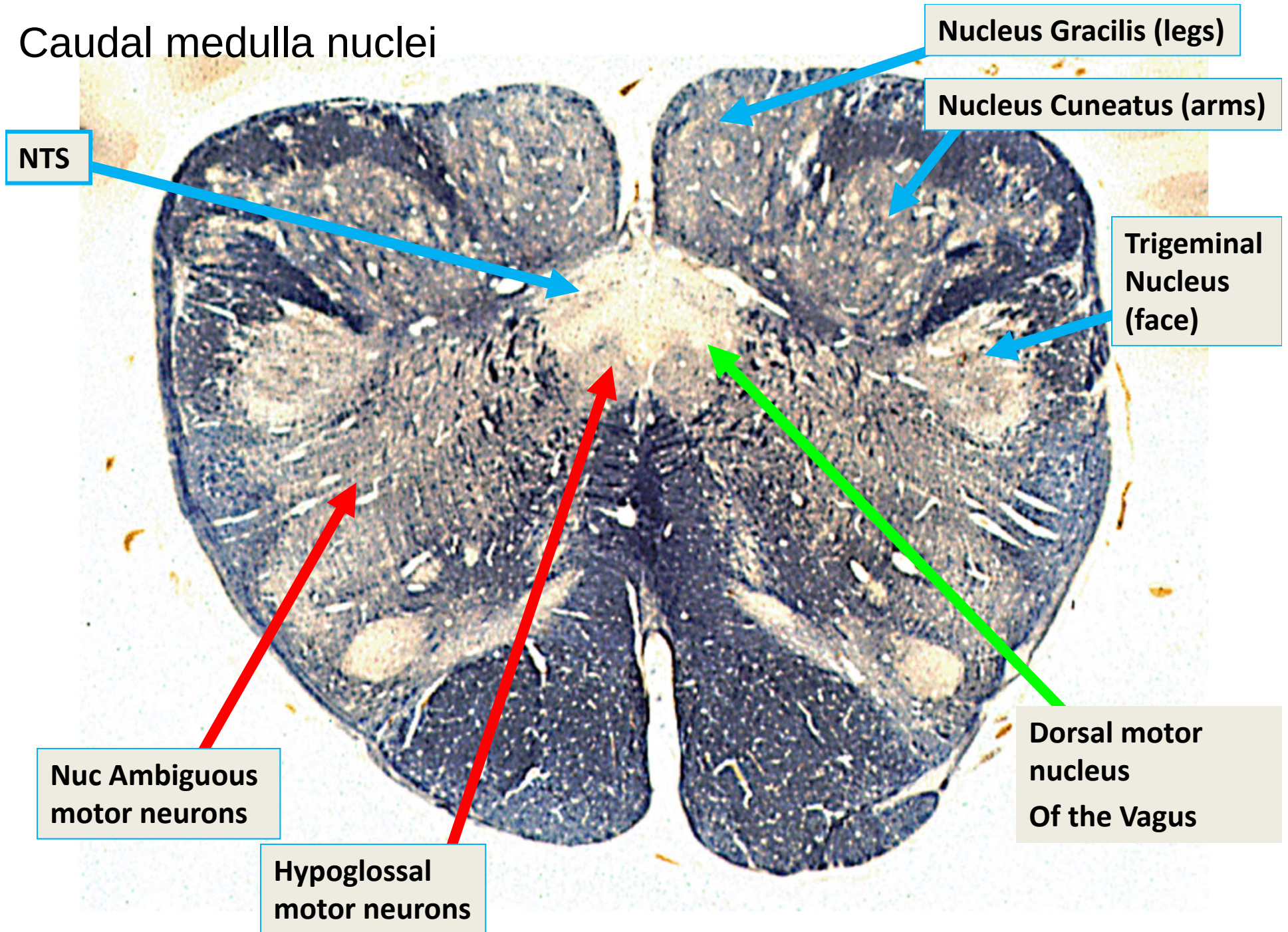
C1 cervical nuclei



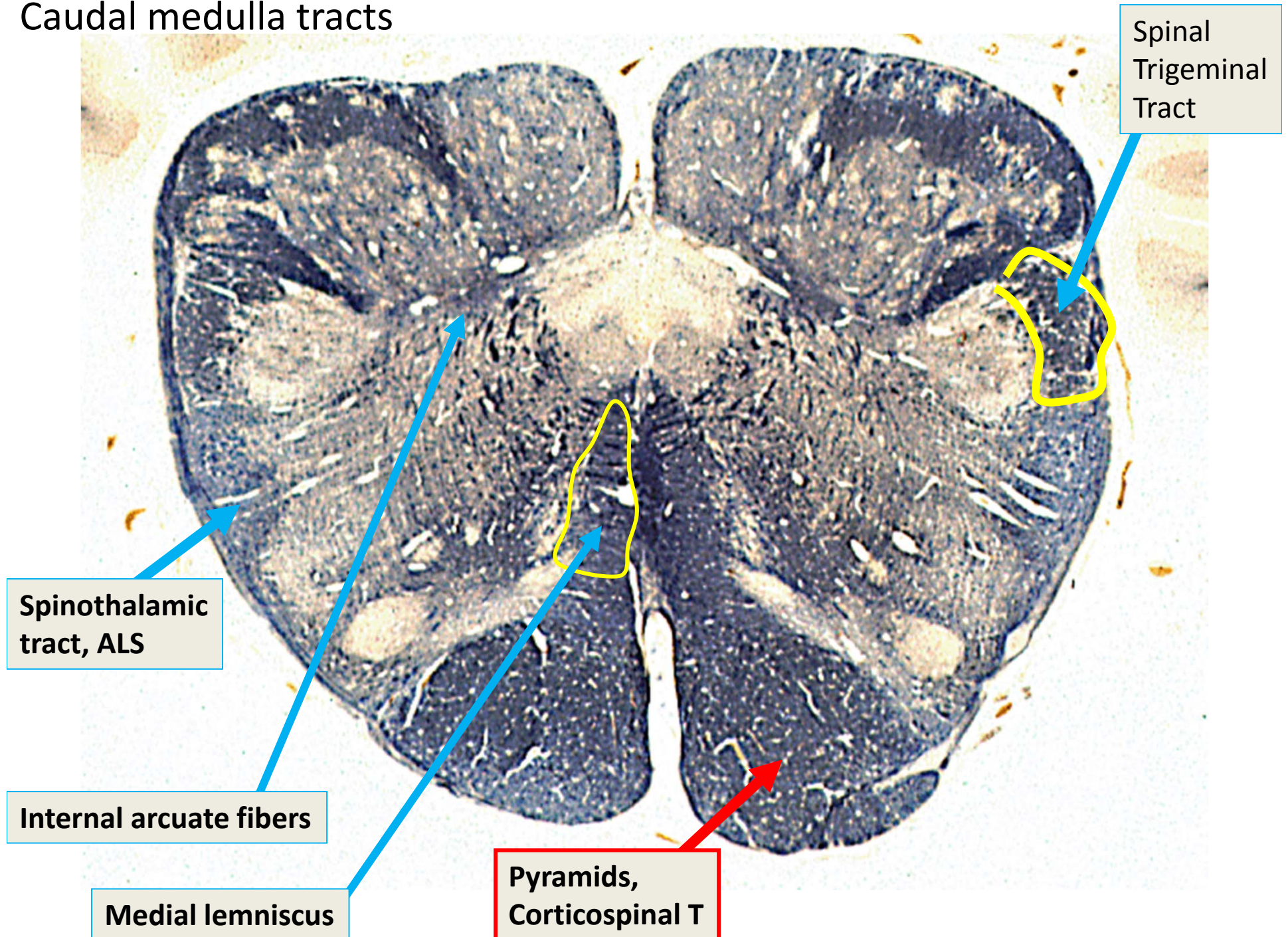
C1 cervical tracts



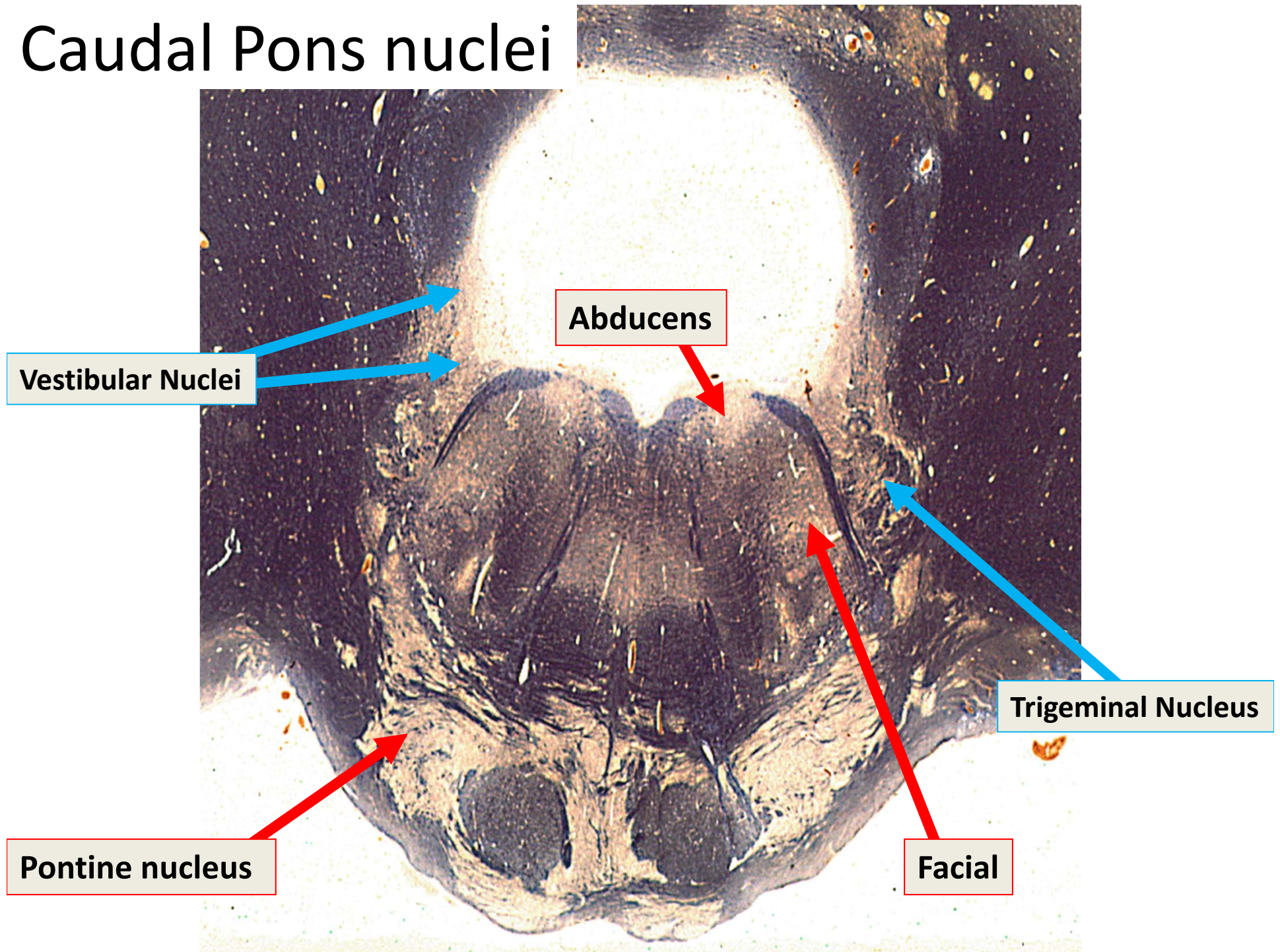
Caudal medulla nuclei



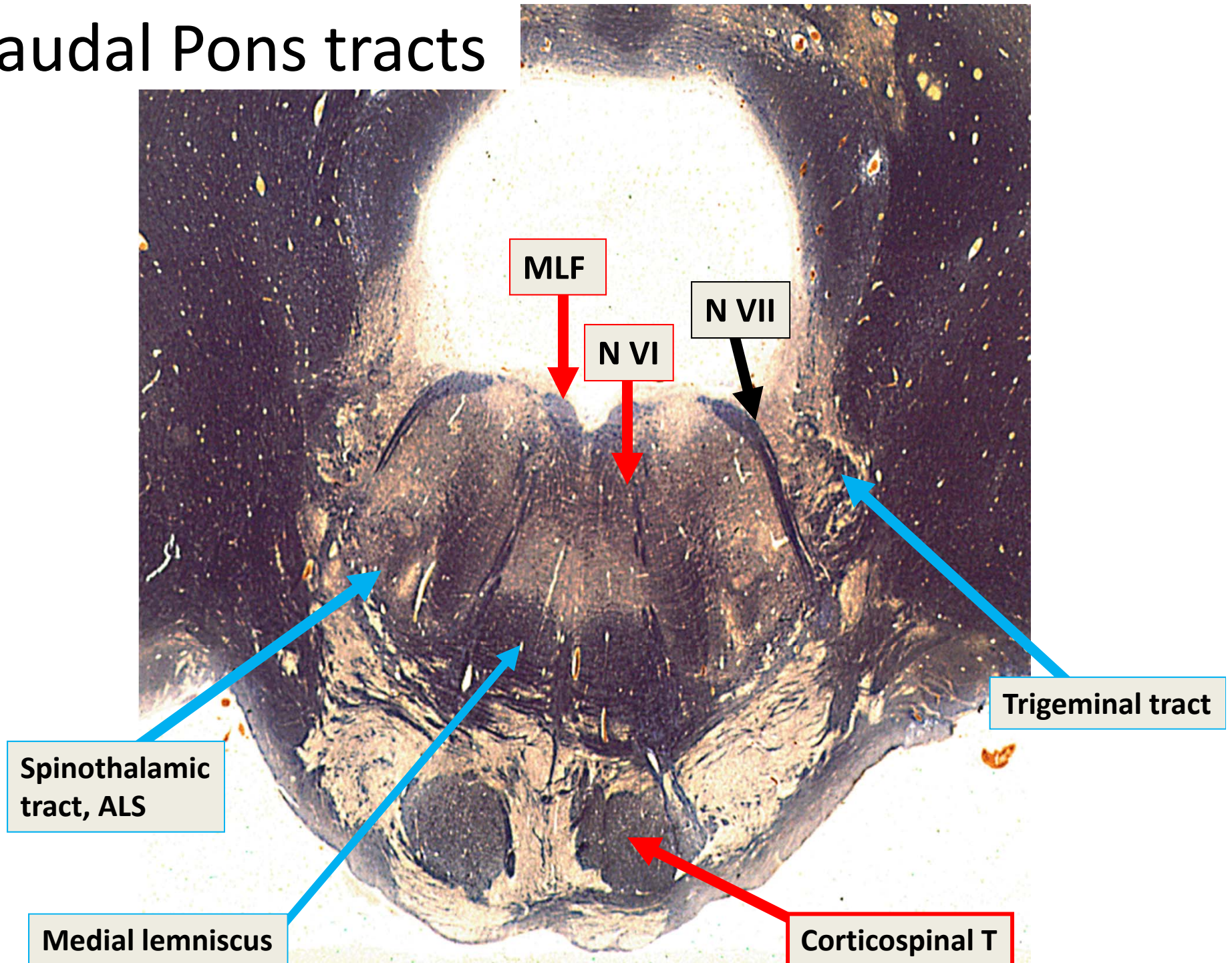
Caudal medulla tracts

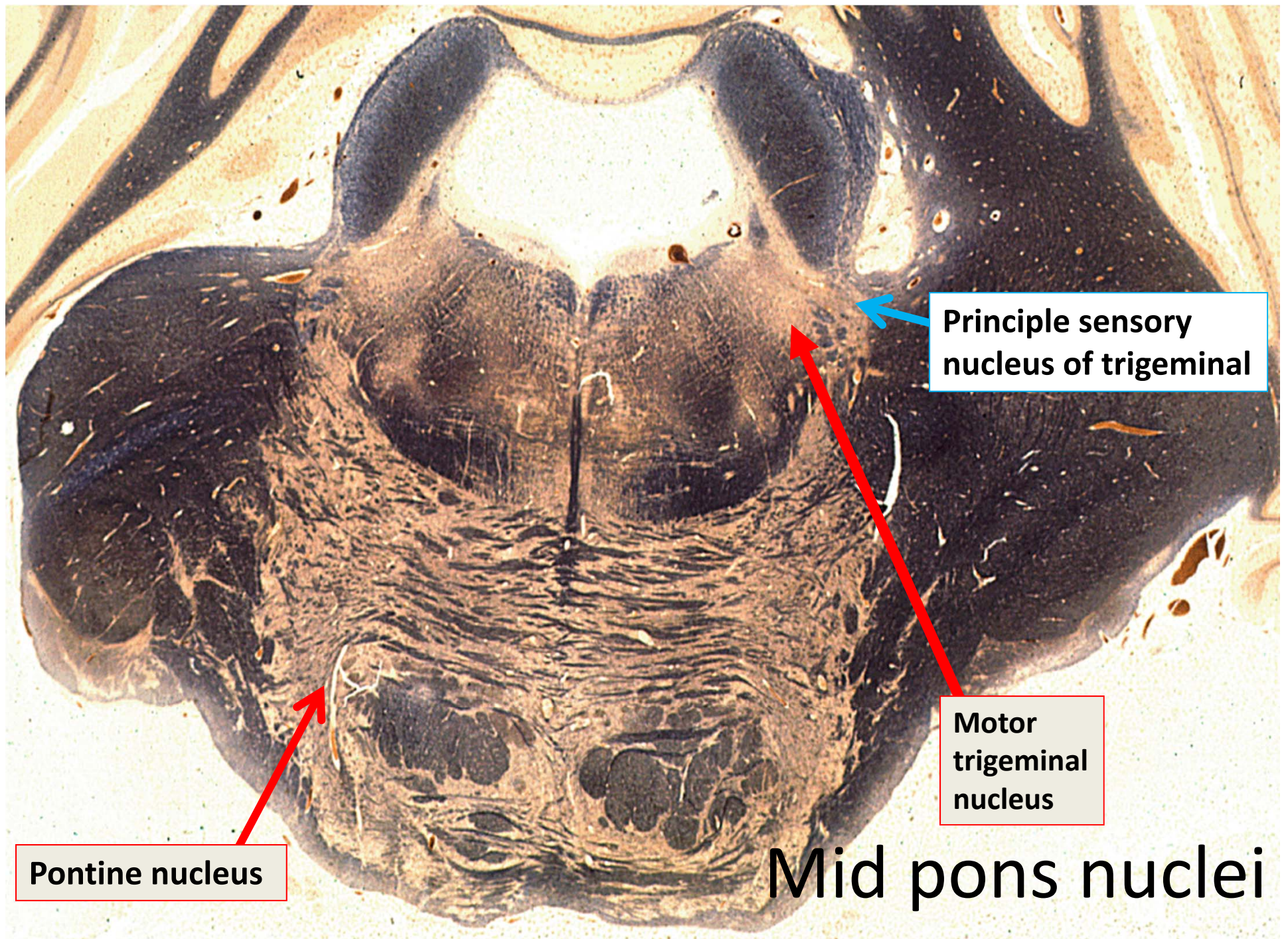


Caudal Pons nuclei



Caudal Pons tracts



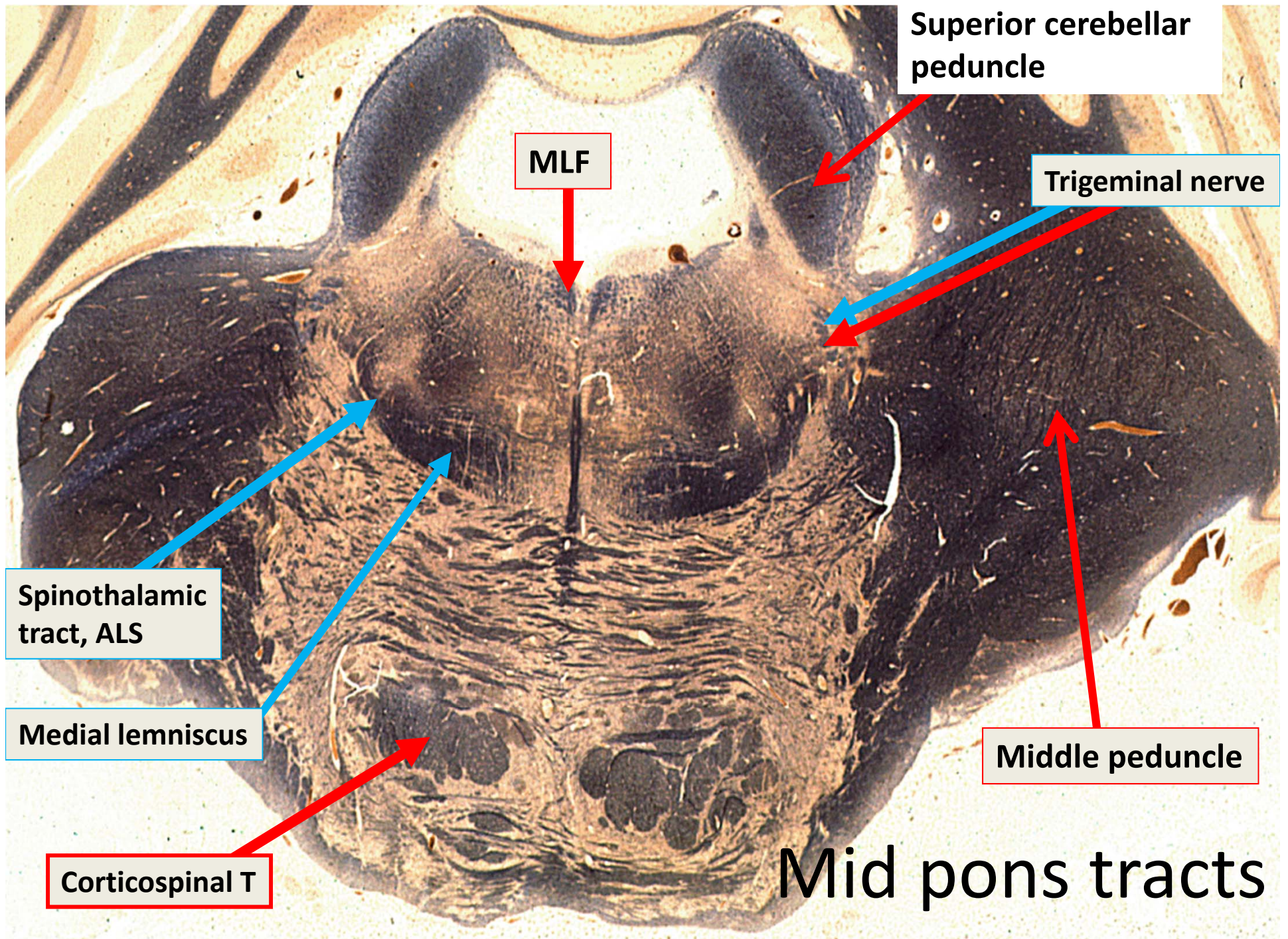


Principle sensory
nucleus of trigeminal

Motor
trigeminal
nucleus

Pontine nucleus

Mid pons nuclei



Superior cerebellar peduncle

MLF

Trigeminal nerve

Spinothalamic tract, ALS

Medial lemniscus

Middle peduncle

Corticospinal T

Mid pons tracts

Midbrain nuclei

Superior colliculus

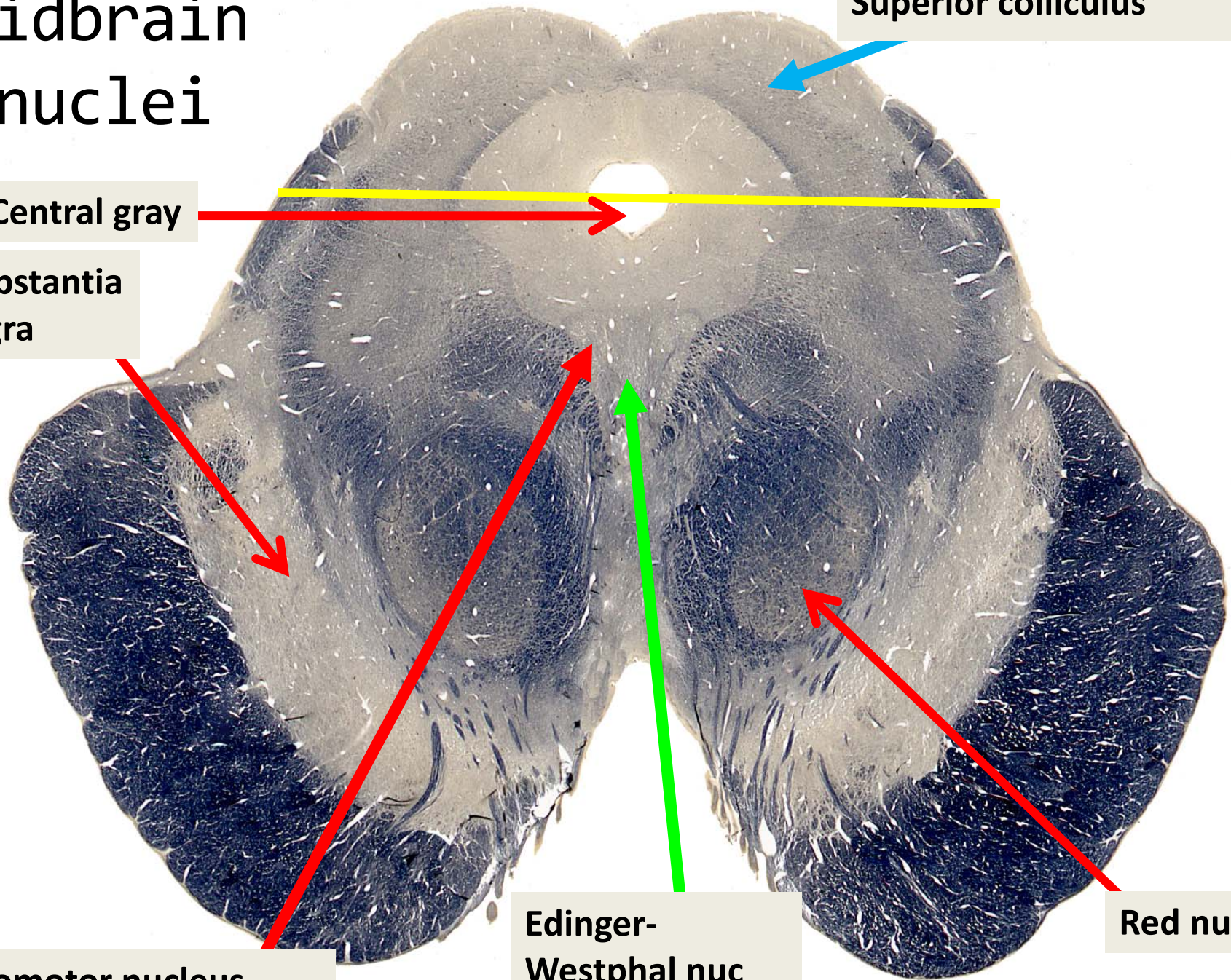
Central gray

Substantia
nigra

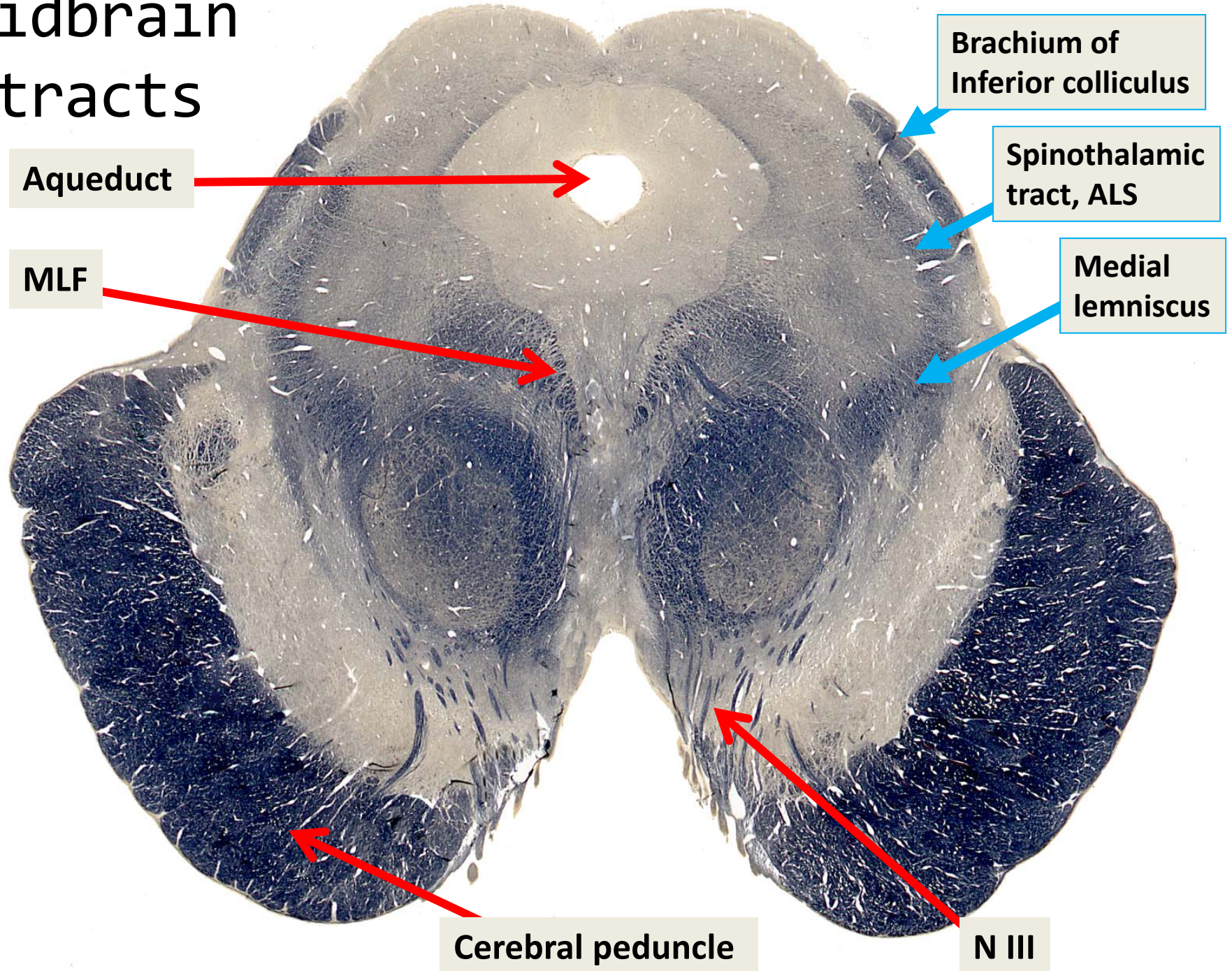
Edinger-
Westphal nuc

Red nuc

Oculomotor nucleus



Midbrain tracts



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