Brain Stem Sections

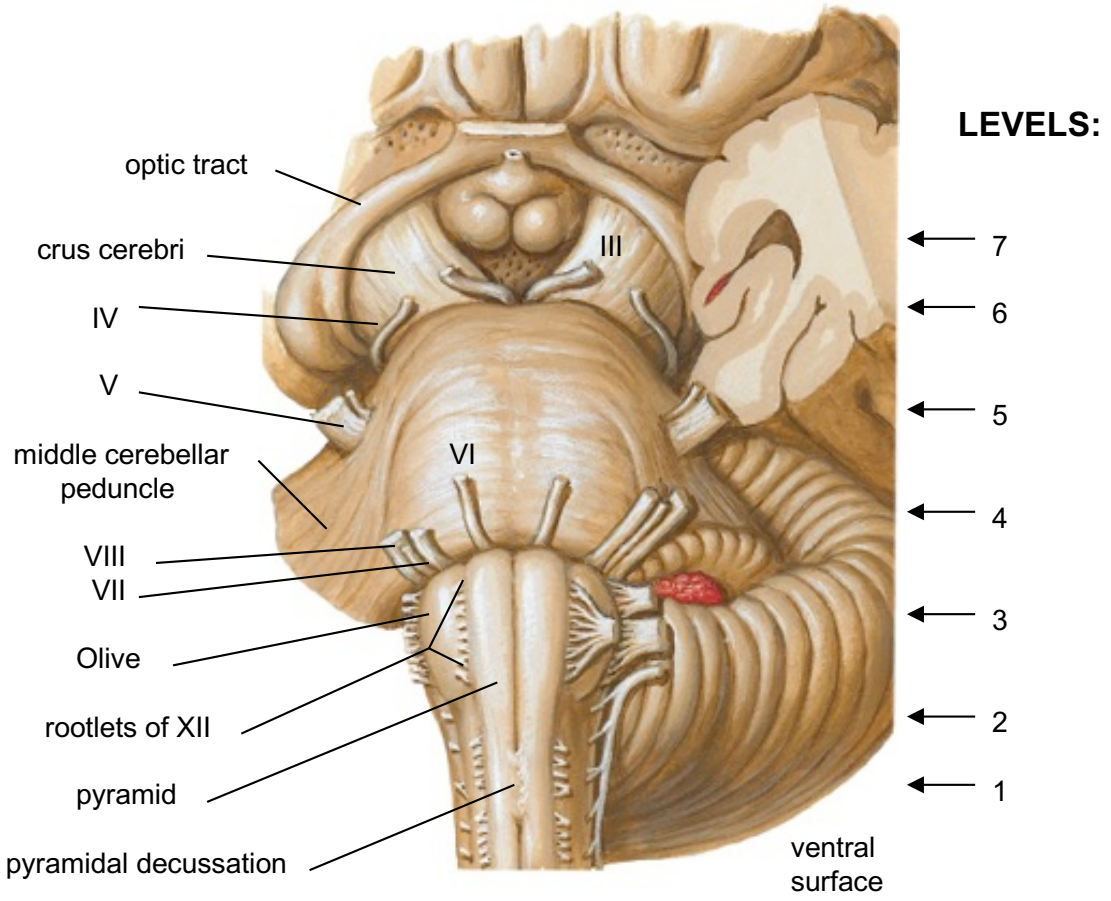
Objectives:

Learn to differentiate **seven levels** of the brain stem by external and internal anatomical landmarks on myelin-stained histologic sections.

Recognize at each level the **medial vs. lateral** groups of cranial nerve nuclei and major fiber tracts.

Specimens Required:

Rubber brain stem model
Hemisected whole brain



Brain Stem Sections

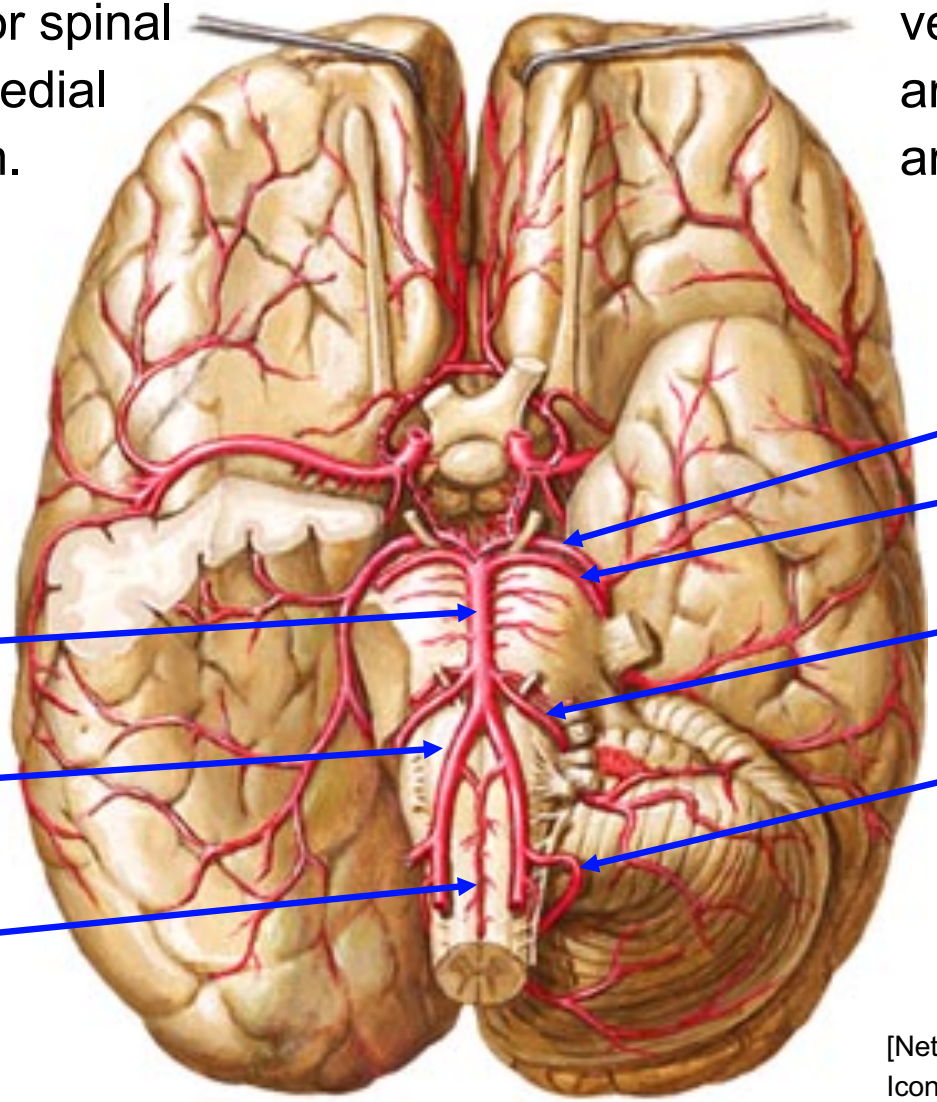
Vascular lesions can selectively damage the **medial vs. lateral** areas of the brain stem.

Medial Brain Stem

Direct branches of the basilar, vertebral, and anterior spinal arteries supply the medial part of the brain stem.

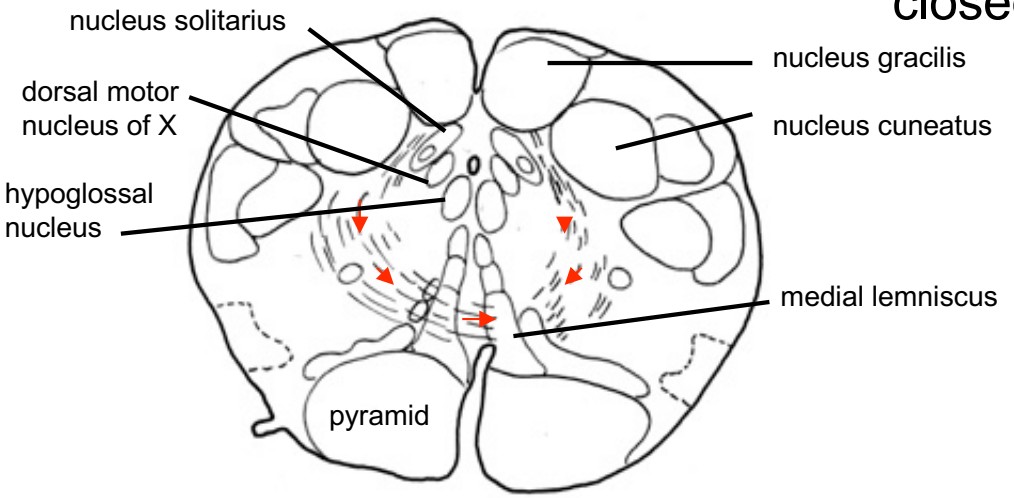
Lateral Brain Stem

Lateral branches of the vertebral and basilar arteries supply the lateral areas of the brain stem.

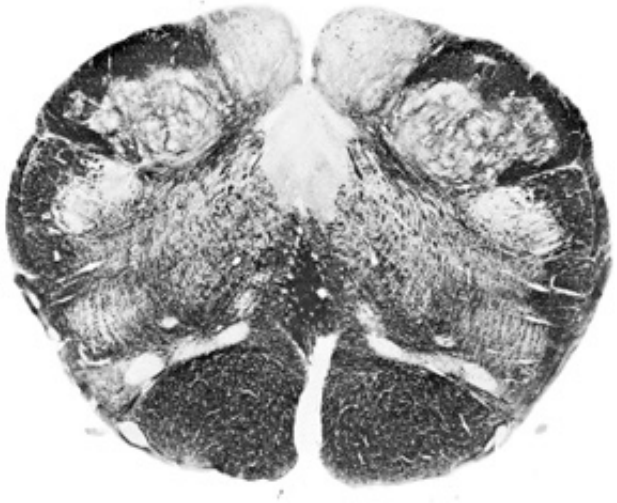


Brain Stem Sections

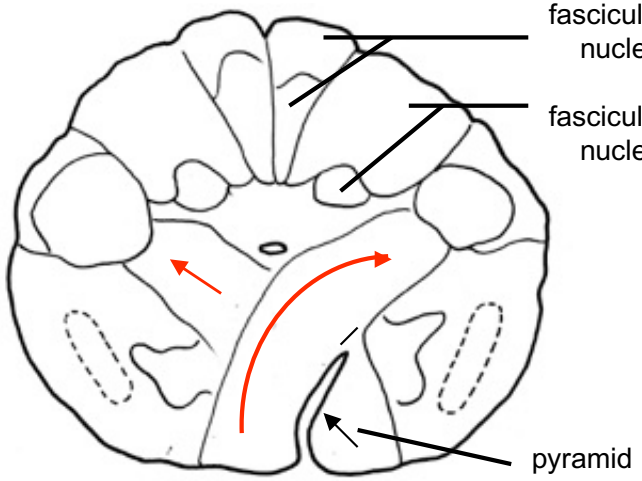
Motor and Sensory Decussations in the Medial Closed Medulla Pyramidal and lemniscal system fibers cross in the medial part of the closed medulla.



SENSORY DECUSSATION



LEVEL 2



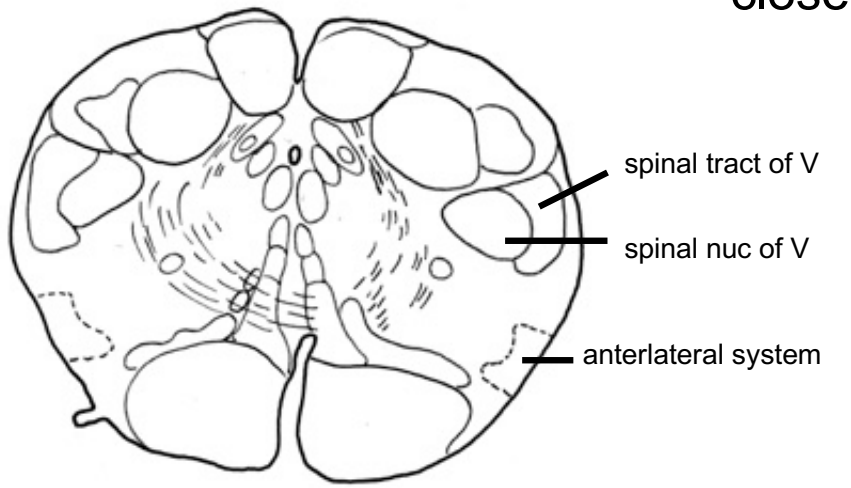
PYRAMIDAL (MOTOR) DECUSSATION

LEVEL 1

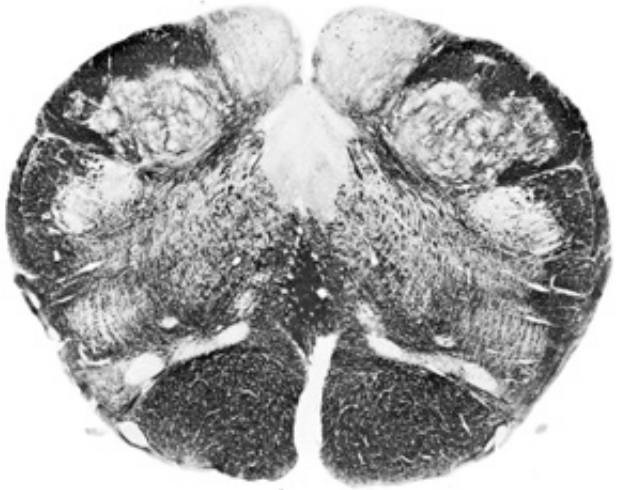
(Fig 40, 41. *From Structure of the Human Brain: A Photographic Atlas*, 3/E by SJ DeArmond and MM Fusco and MD Dewey, 1974, 1976, 1989 by Oxford University Press, Inc. Used by permission of Oxford University Press, Inc.)

Brain Stem Sections

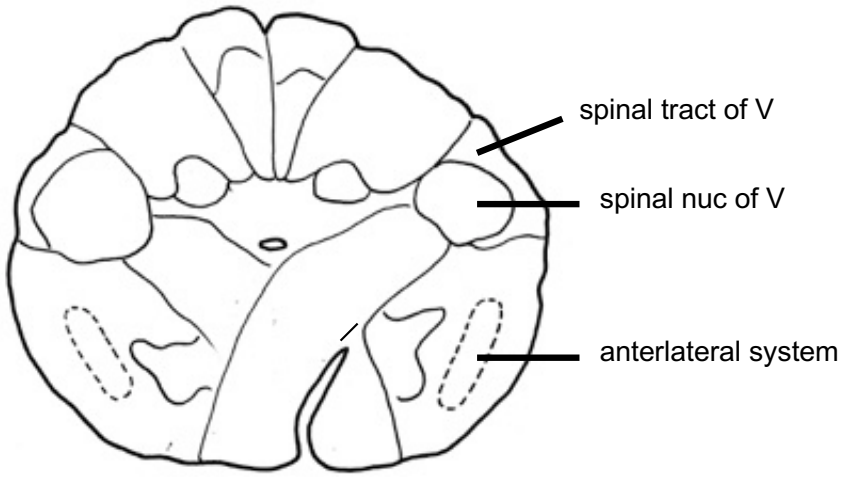
Pain Systems in the Lateral Closed Medulla
Pain fibers from the ipsilateral face and contralateral body are more lateral in the closed medulla.



SENSORY DECUSSATION



LEVEL 2



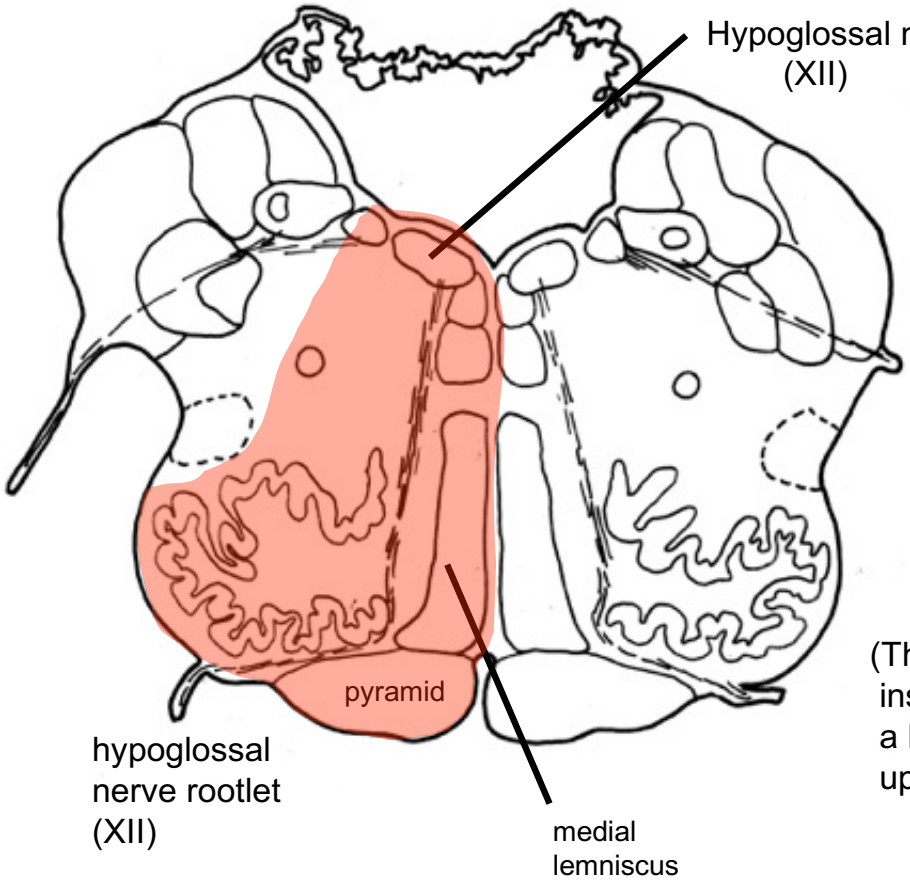
PYRAMIDAL (MOTOR) DECUSSATION

LEVEL 1

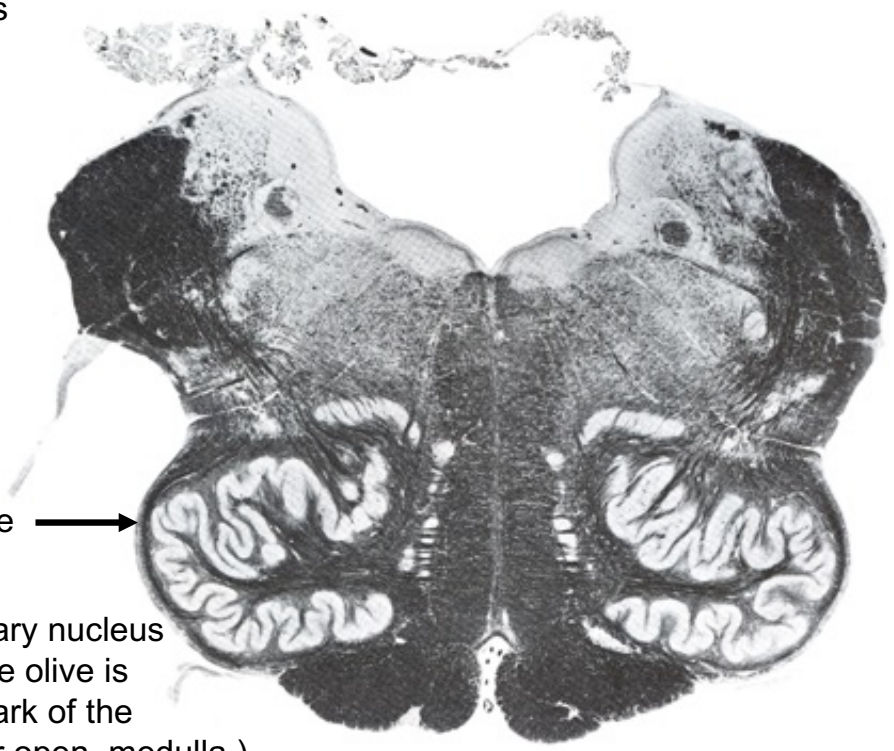
(Fig 40, 41. *From Structure of the Human Brain: A Photographic Atlas*, 3/E by SJ DeArmond and MM Fusco and MD Dewey, 1974, 1976, 1989 by Oxford University Press, Inc. Used by permission of Oxford University Press, Inc.)

Brain Stem Sections

Medial Structures of the Open Medulla



LEVEL 3

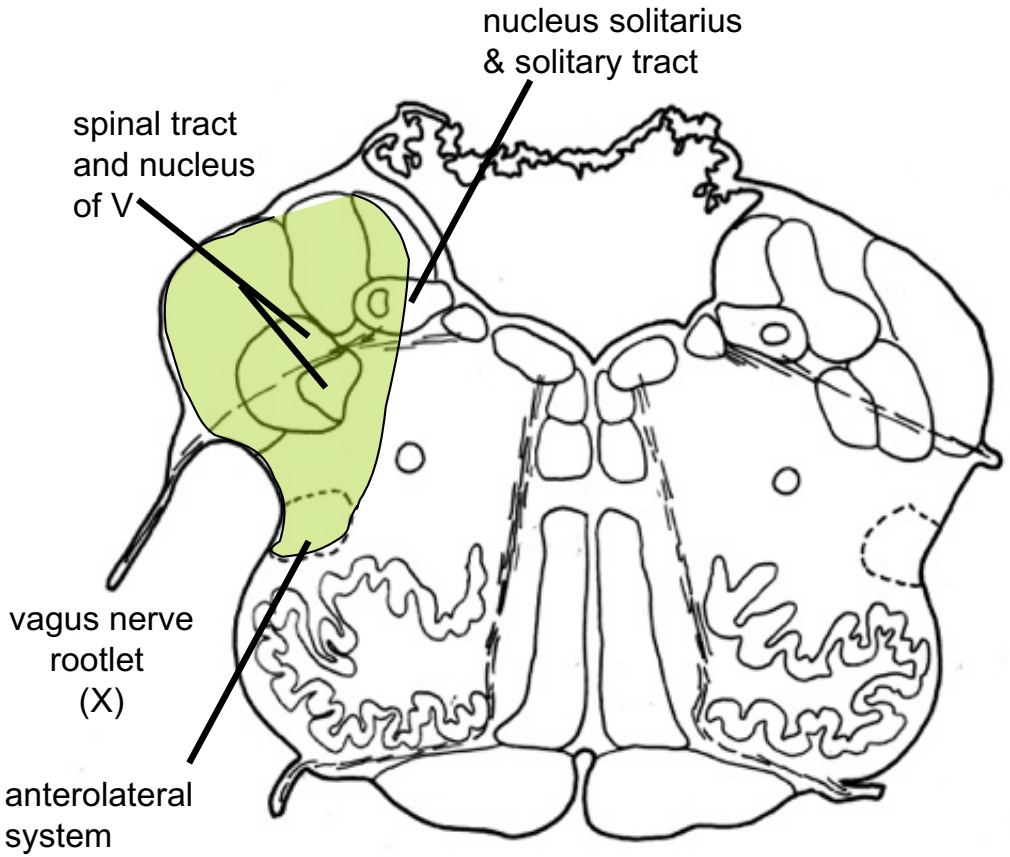


(The olivary nucleus inside the olive is a landmark of the upper, or open, medulla.)

= ANTERIOR SPINAL AND VERTEBRAL ARTERIES

Brain Stem Sections

Lateral Structures of the Open Medulla

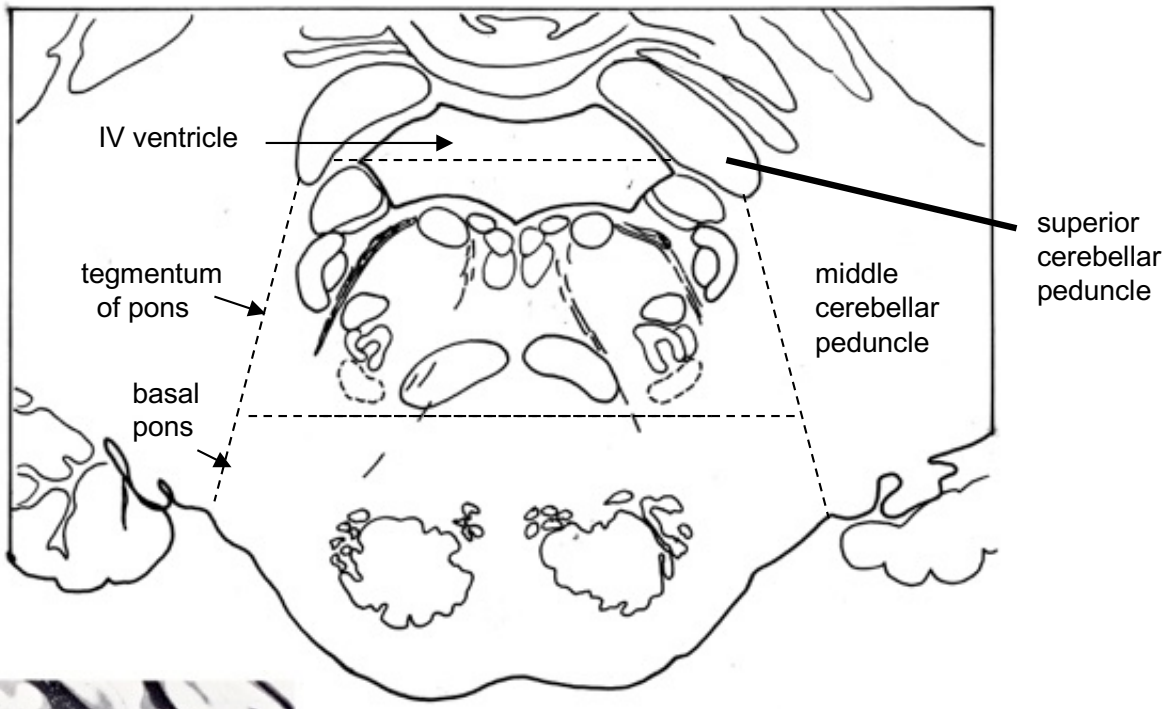


= POSTERIOR INFERIOR CEREBELLAR ARTERY

Brain Stem Sections

Lower Pons

The level of the abducens (VI) and facial (VII) cranial nerve nuclei and nerve roots in the tegmentum of the pons



LEVEL 4

Brain Stem Sections

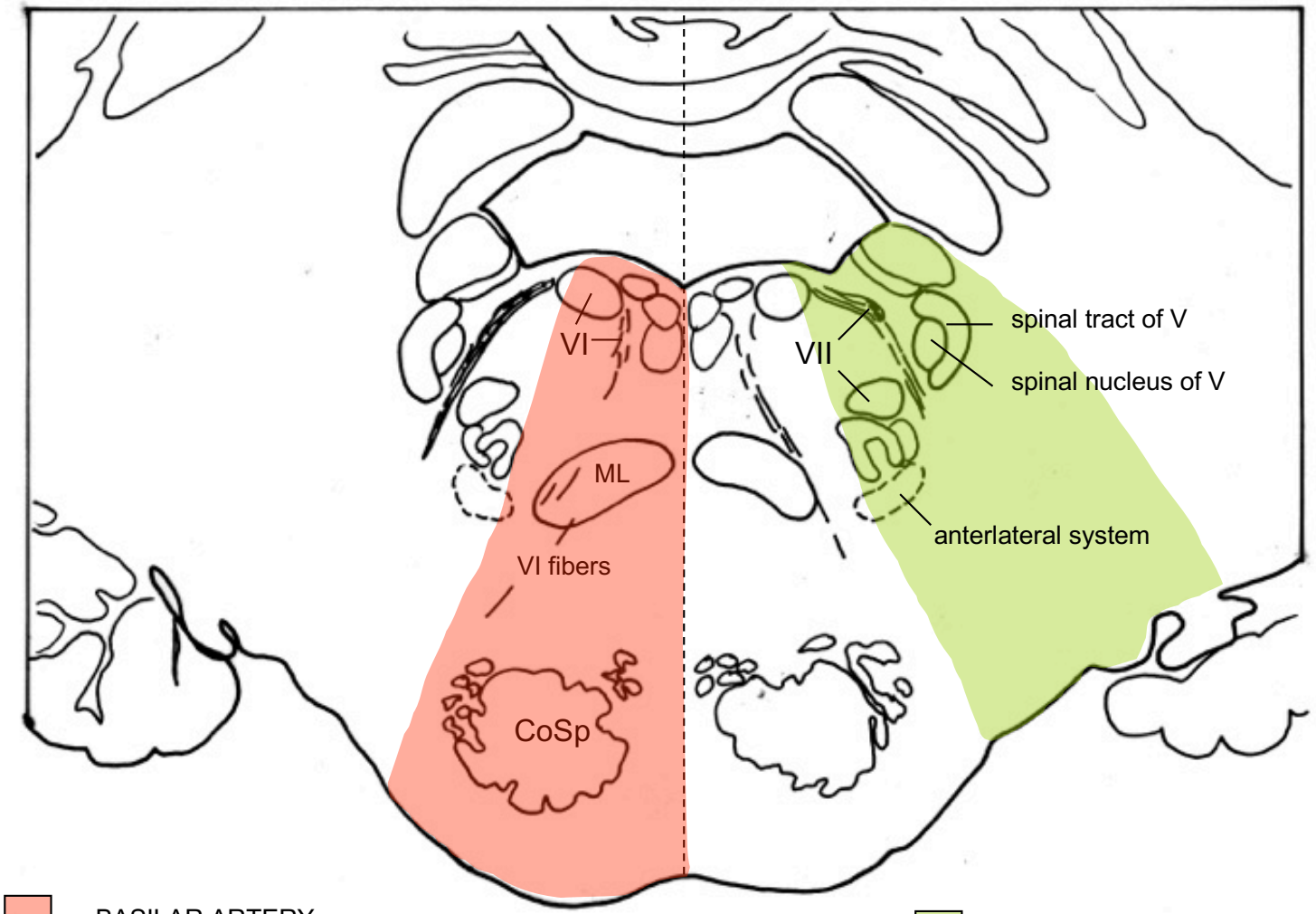
Medial Lower Pons

nucleus and fibers of VI
medial lemniscus (ML)
corticospinal fibers (CoSp)

Lateral Lower Pons

nucleus and fibers of VII
snterolateral system
spinal tract and nucleus of V

LEVEL 4



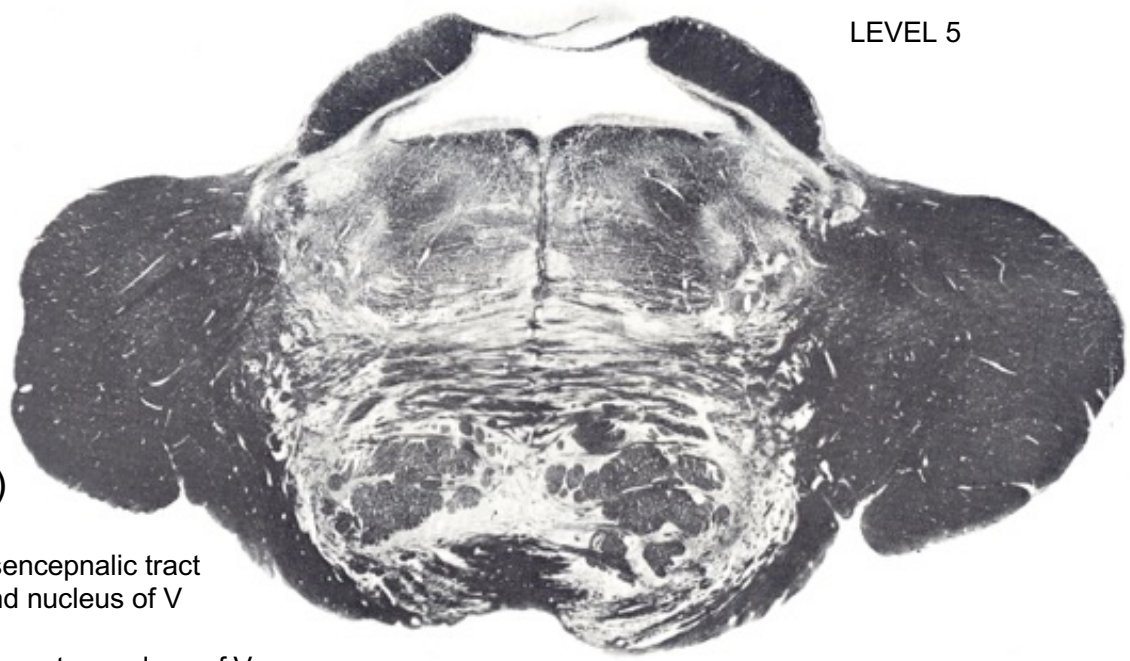
= BASILAR ARTERY

= ANTERIOR INFERIOR CEREBELLAR ARTERY

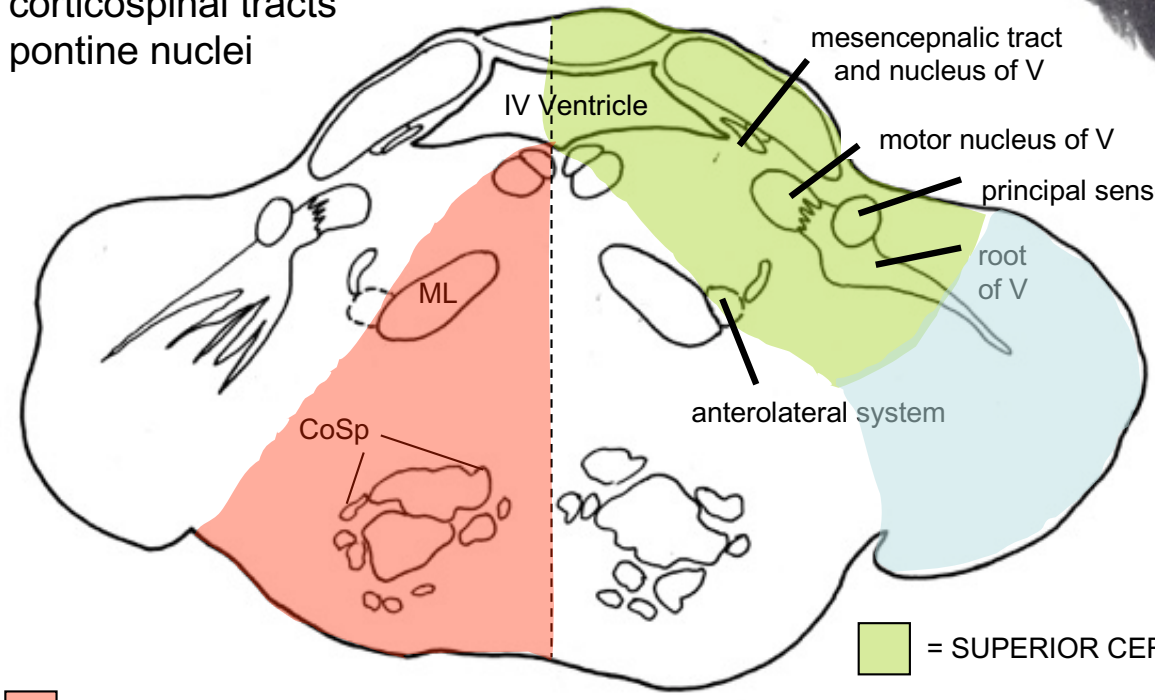
Brain Stem Sections

The Upper Pons

(level of the principal sensory, motor, and mesencephalic nuclei and the root fibers of the trigeminal nerve)



Medial Upper Pons:
medial lemniscus (moving laterally as it ascends)
corticospinal tracts
pontine nuclei



Lateral Upper Pons:
principal sensory nucleus of V
motor nucleus of V
mesencephalic nucleus of V
root fibers of V
anterolateral system
middle cerebellar peduncle

= SUPERIOR CEREBELLAR ARTERY

= BASILAR ARTERY

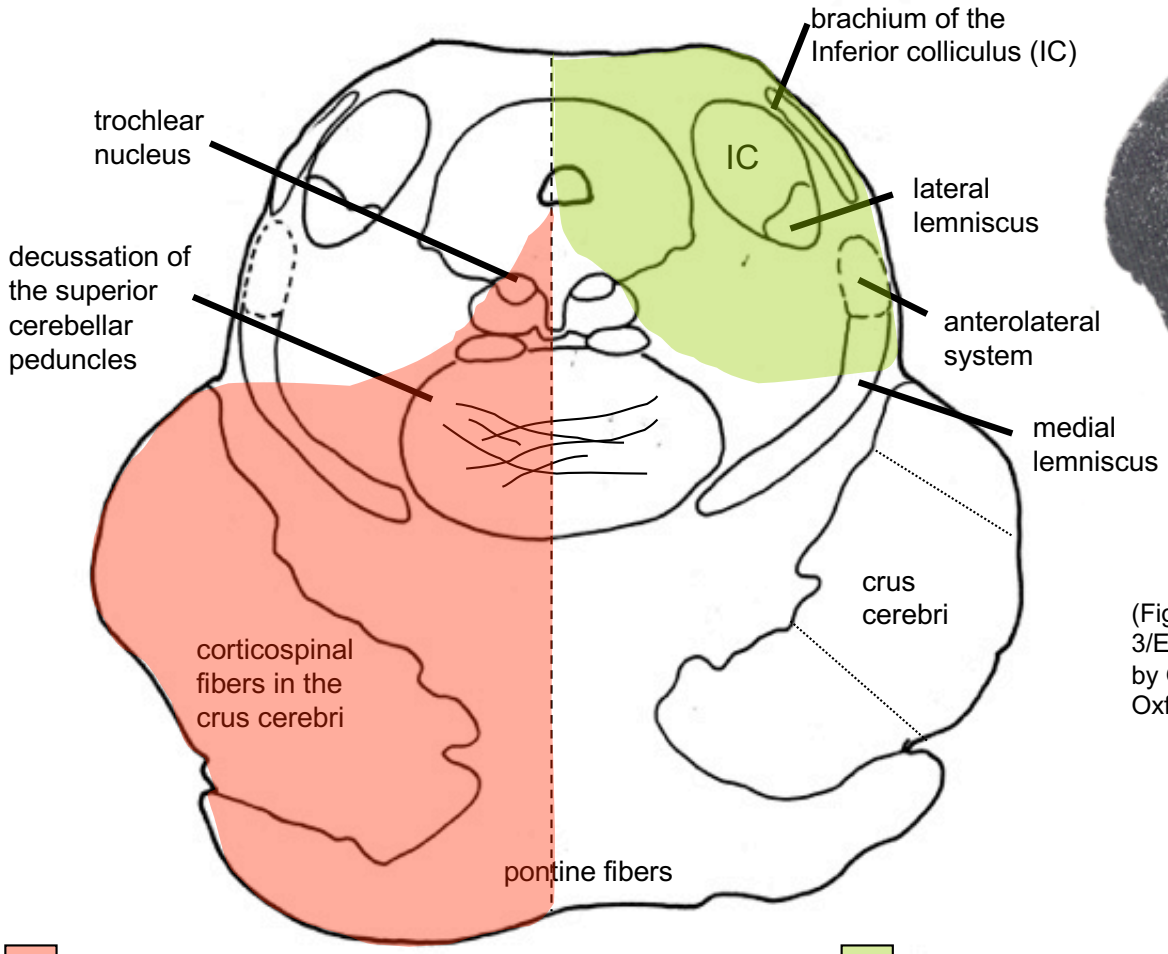
= ANTERIOR INFERIOR CEREBELLAR ARTERY

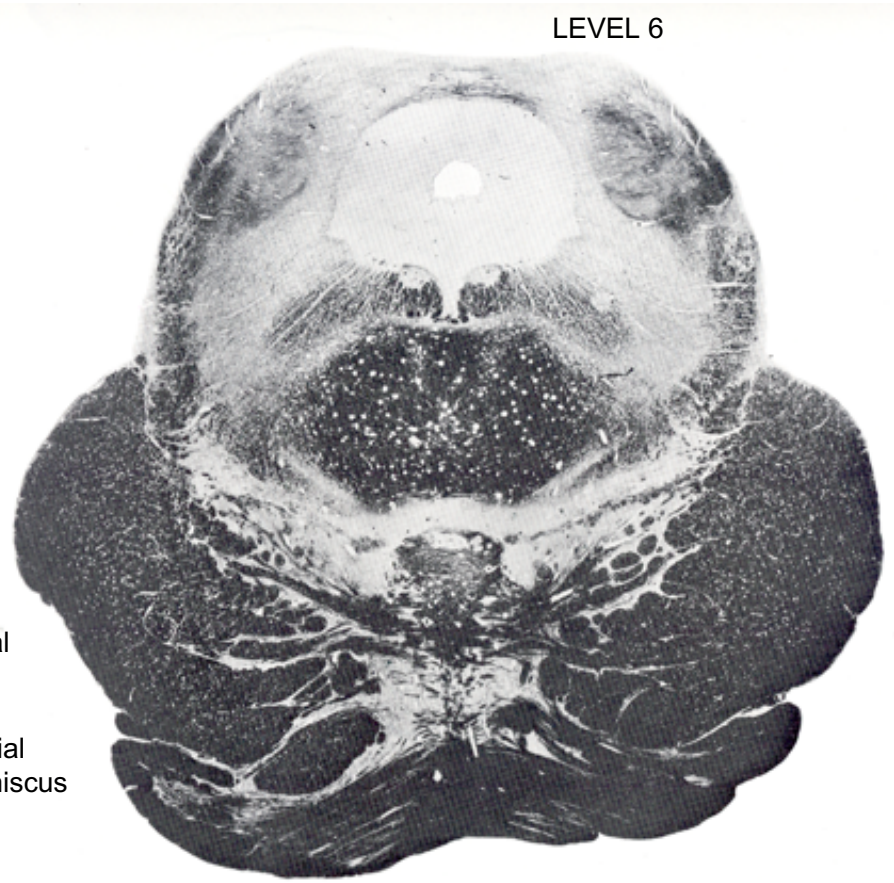
Brain Stem Sections

Inferior Colliculus in the Lower Midbrain
(level of the trochlear nerve and the decussation of the superior cerebellar peduncles)

Medial Lower Midbrain:

Lateral Lower Midbrain:





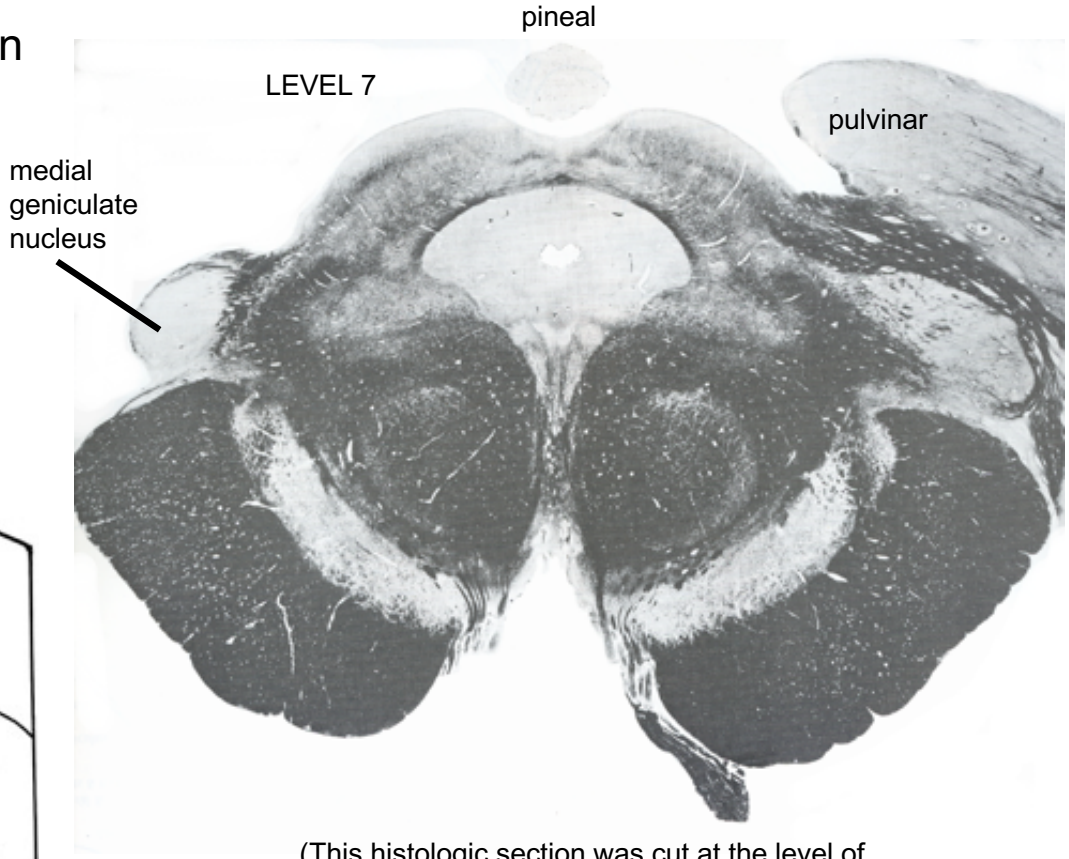
(Fig 52. *From Structure of the Human Brain: A Photographic Atlas*, 3/E by SJ DeArmond and MM Fusco and MD Dewey, 1974, 1976, 1989 by Oxford University Press, Inc. Used by permission of Oxford University Press, Inc.)

= BASILAR ARTERY

= SUPERIOR CEREBELLAR ARTERY

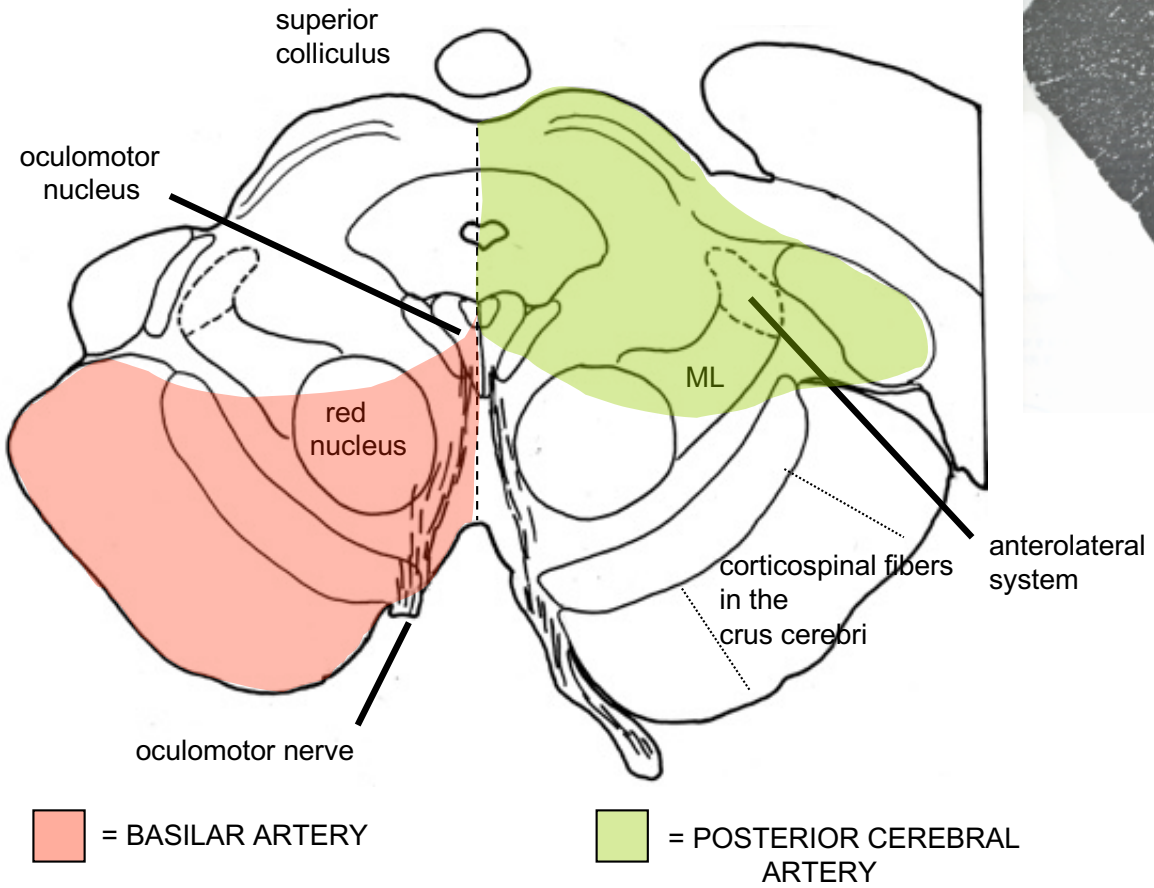
Brain Stem Sections

Superior Colliculus in the Upper Midbrain
(level of the oculomotor nucleus and fibers and the red nucleus)



(This histologic section was cut at the level of the transition between the midbrain and the diencephalon. The medial geniculate nucleus and the pulvinar of the thalamus are lateral to the midbrain. The pineal gland is dorsal to the superior colliculi.)

Medial Upper Midbrain: Lateral Upper Midbrain:



(Fig 54. *From Structure of the Human Brain: A Photographic Atlas*, 3/E by SJ DeArmond and MM Fusco and MD Dewey, 1974, 1976, 1989 by Oxford University Press, Inc. Used by permission of Oxford University Press, Inc.)

Question 1

Match each of the cranial nerve nuclei (1 - 10) with the brain stem level (or levels) (A - F) in which it is located.

_____1. Oculomotor nucleus
_____2. Abducens nucleus
_____3. Hypoglossal nucleus
_____4. Trigeminal motor nucleus
_____5. Spinal nucleus of V
_____6. Trochlear nucleus
_____7. Facial nucleus
_____8. Dorsal motor nucleus of X
_____9. Principal sensory nucleus of V
_____10. Nucleus solitarius

A. Closed medulla
B. Open medulla
C. Lower Pons
D. Upper Pons
E. Lower Midbrain
F. Upper Midbrain

Question 2

Match each of the brain stem structures (1 - 10) with the brain stem area (or areas) (A - F) in which it is located.

_____1. Oculomotor nucleus
_____2. Abducens nucleus
_____3. Hypoglossal nucleus
_____4. Trigeminal motor nucleus
_____5. Red nucleus
_____6. Trochlear nucleus
_____7. Pyramid
_____8. Spinal nucleus of V
_____9. Anterolateral system

A. Medial Medulla
B. Lateral Medulla
C. Medial Pons
D. Lateral Pons
E. Medial Midbrain
F. Lateral Midbrain

Answers

Question 1

1. F
2. C
3. A, B
4. D
5. A, B, C
6. E
7. C
8. A, B
9. D
10. A, B

Question 2

1. E
2. C
3. A
4. D
5. E
6. C
7. A
8. B, D
9. B, D, F