PSYCH 260

Neuroanatomy II

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2022-01-25 08:03:41

Prelude (7:06)

(Wellcome Collection, 2012)

Prelude (1:22)

(ctdalilah, 2006)

Today's topics

- Quiz 1 on Thursday
- Warm-up
- More neuroanatomy

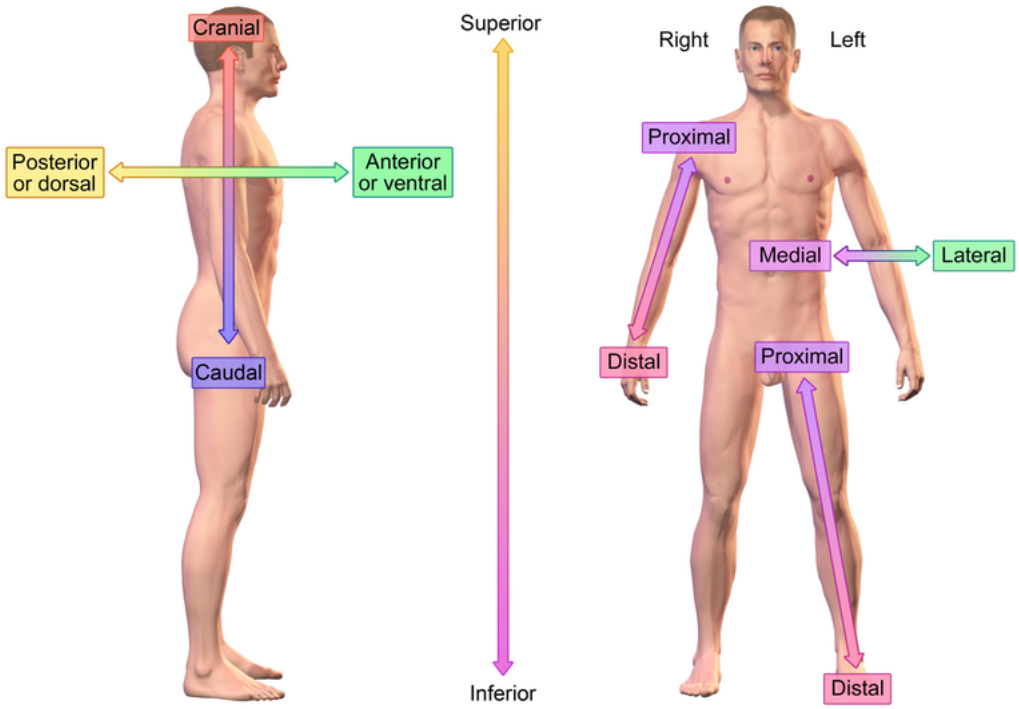
Warm-up

Neural structures that are “belly-ward” from the spinal cord are also called…

- A. Dorsal
- B. Ventral
- C. Medial
- D. Rostral

Neural structures that are “belly-ward” from the spinal cord are also called…

- A. ~~Dorsal~~
- B. Ventral
- C. ~~Medial~~
- D. ~~Rostral~~



Lateral view

Anterior view

Directional References

The blood/brain barrier is especially thin in which hindbrain area?

- A. Pons
- B. 4th ventricle
- C. Cerebellum
- D. Medulla oblongata (medulla)

The blood/brain barrier is especially thin in which hindbrain area?

- A. ~~Pons~~
- B. ~~4th ventricle~~
- C. ~~Cerebellum~~
- D. Medulla oblongata (medulla)

Which of the cerebral ventricles is most caudal (closest to the spinal cord)?

- Cerebral aqueduct
- Lateral ventricles
- 3rd ventricle
- 4th ventricle

Which of the cerebral ventricles is most caudal (closest to the spinal cord)?

- ~~Cerebral aqueduct~~
- ~~Lateral ventricles~~
- ~~3rd ventricle~~
- 4th ventricle

More neuroanatomy

Organization of the brain

Major division	Ventricular Landmark	Embryonic Division	Structure
Forebrain	Lateral	Telencephalon	Cerebral cortex
			Basal ganglia
			Hippocampus, amygdala
	Third	Diencephalon	Thalamus
			Hypothalamus
Midbrain	Cerebral Aqueduct	Mesencephalon	Tectum, tegmentum

Organization of the brain

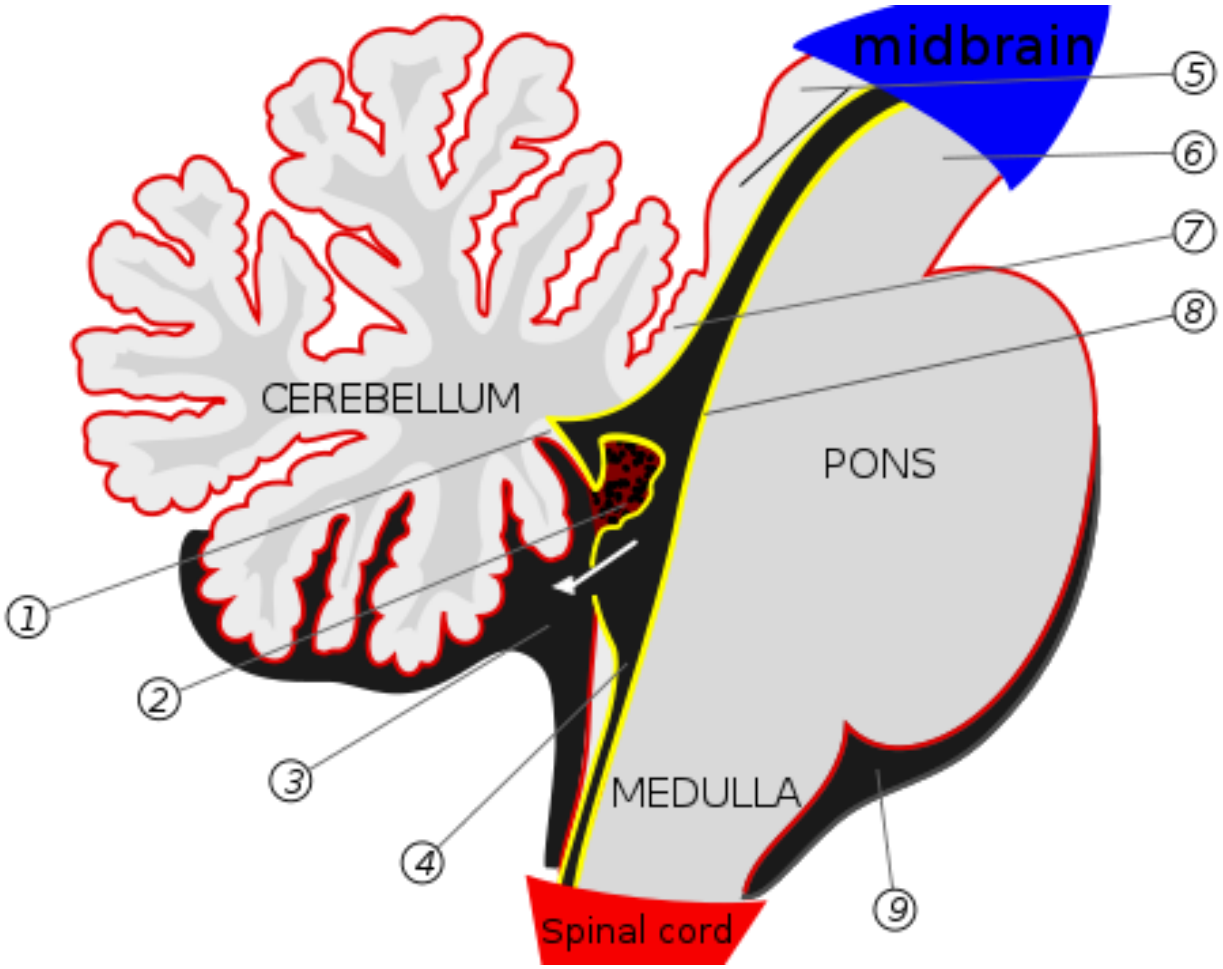
Major division	Ventricular Landmark	Embryonic Division	Structure
Hindbrain	4th	Metencephalon	Cerebellum, pons
	–	Mylencephalon	Medulla oblongata

Hindbrain

Structures adjacent to 4th ventricle

- Medulla oblongata
- Cerebellum
- Pons

Hindbrain



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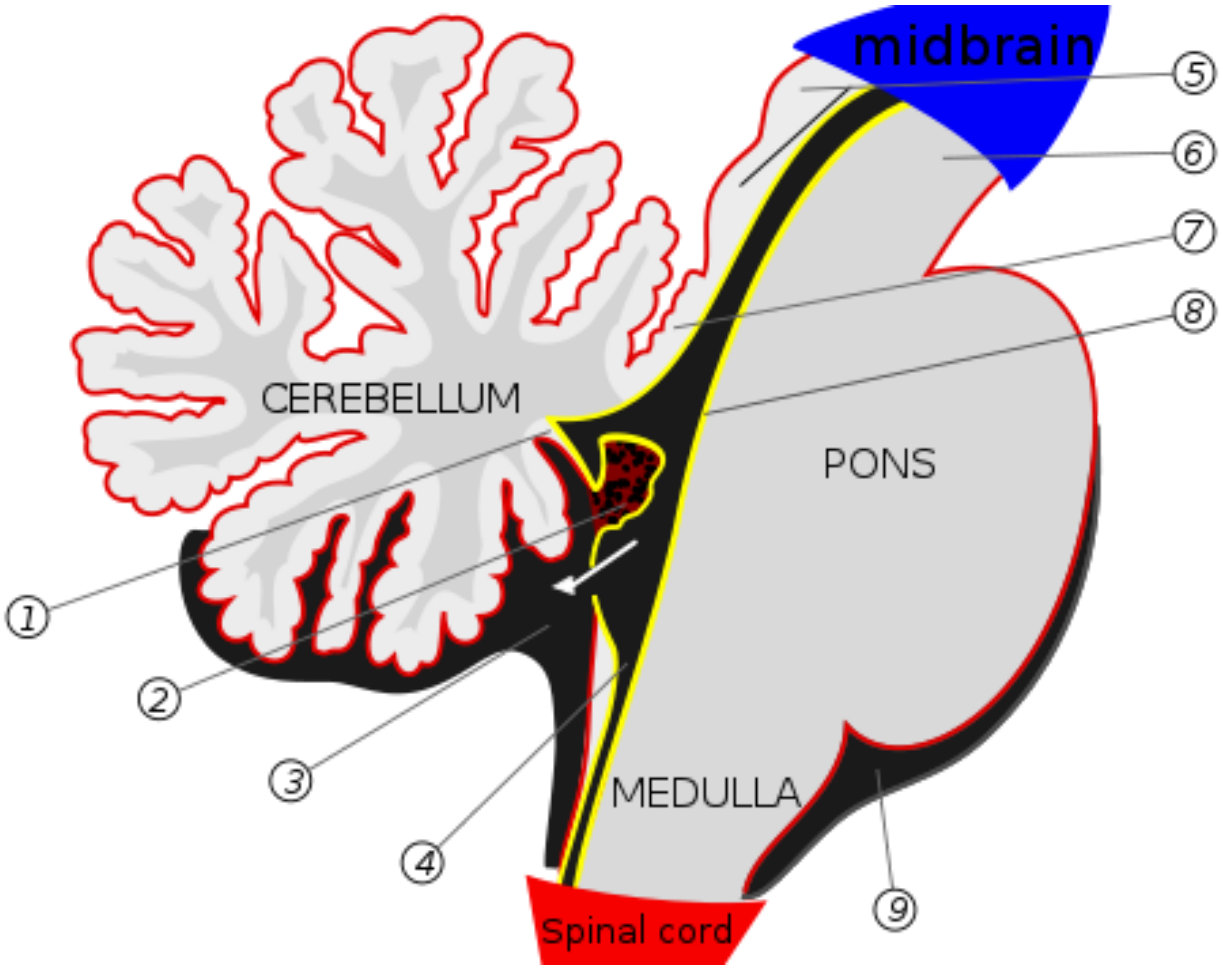
Medulla oblongata



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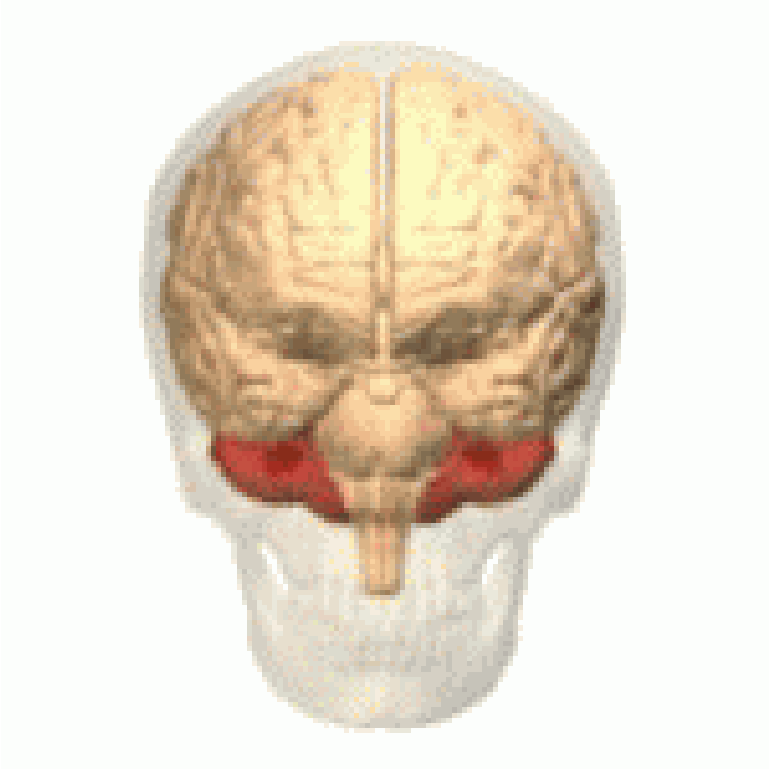
- Fibers of passage (to/from spinal cord)
- Cranial nerves VI-XII
- Cardiovascular regulation
- Muscle tone

Cerebellum

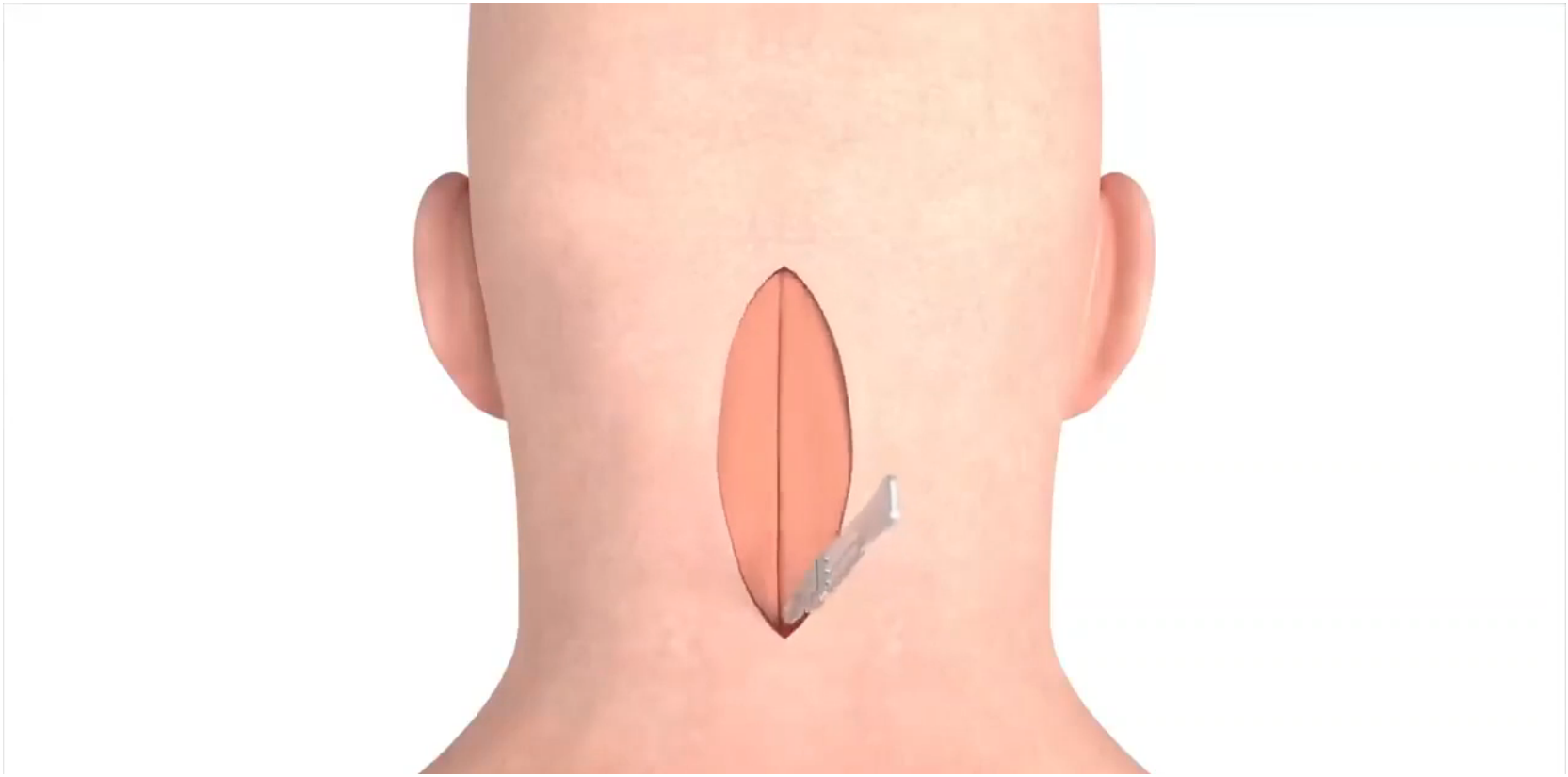
- “Little brain”
- Dorsal to pons
- Movement coordination, classical conditioning (associative learning), + ???



https://en.wikipedia.org/wiki/Cerebellum

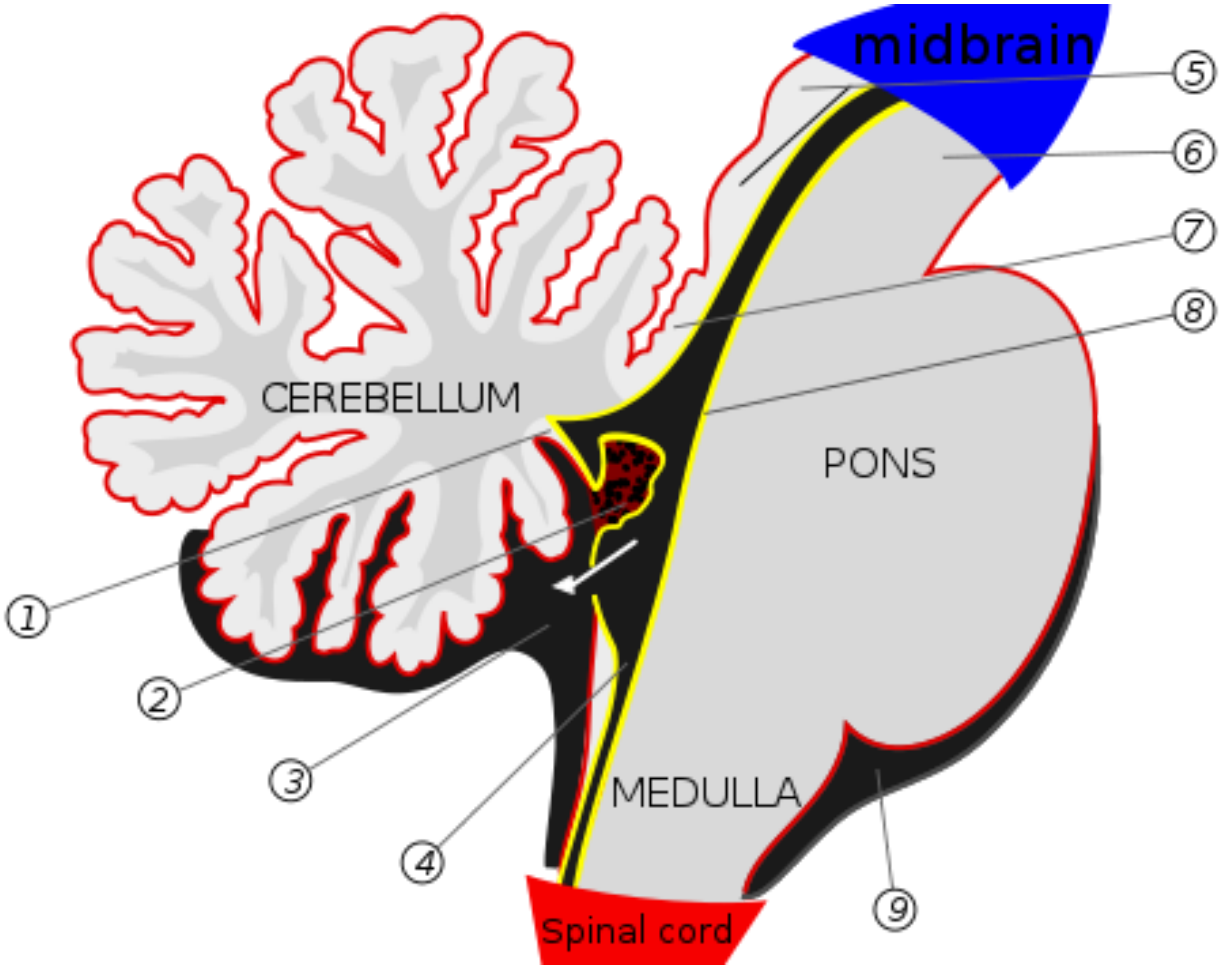
r/interestingasfuck • Posted by u/NotABedlessPro 2 days ago /r/ALL

How a craniectomy is performed to remove a tumor from the brain.



Pons

- Bulge on brain stem
- Neuromodulatory nuclei
- Relay to cerebellum
- Cranial nerve V



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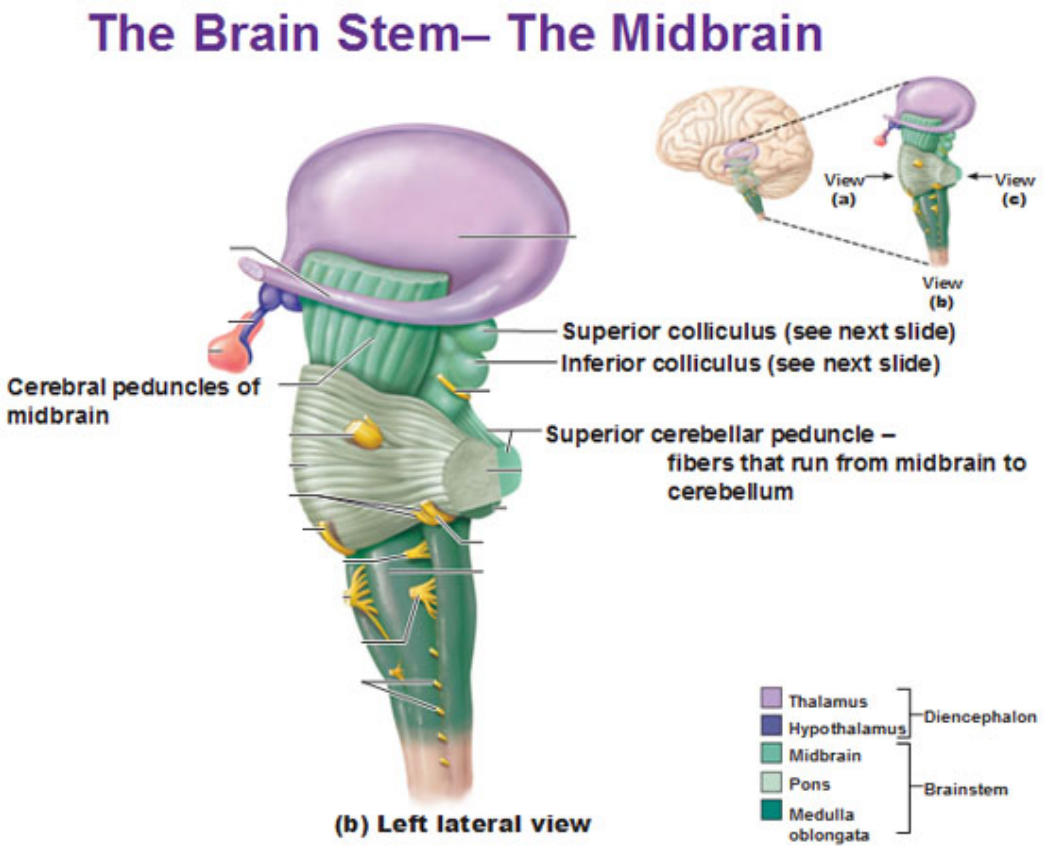
Midbrain



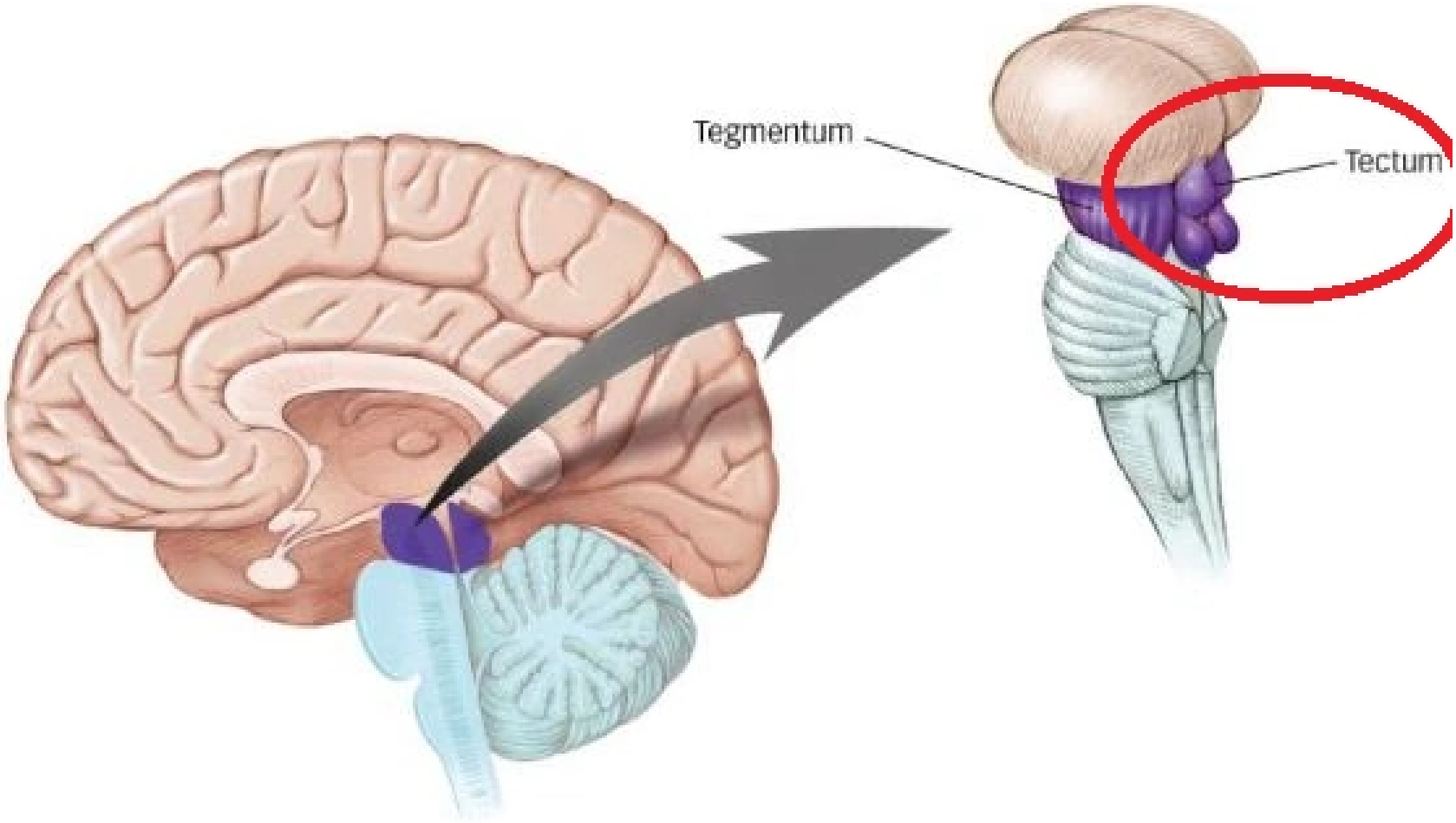
http://antranik.org/wp-content/uploads/2011/11/the-brain-stem-mid-brain-left-lateral-view-superior-colliculus-inferior-cerebellar-peduncle.jpg

Midbrain components

Tectum

Tegmentum

Midbrain



https://vignette.wikia.nocookie.net/brain-for-ai/images/b/bd/Tectum.png/revision/latest?cb=20170613125935

Tectum

- Tectum -> “roof”
- *Superior colliculus* (reflexive orienting of eyes, head, ears)
- *Inferior colliculus* (sound/auditory processing)

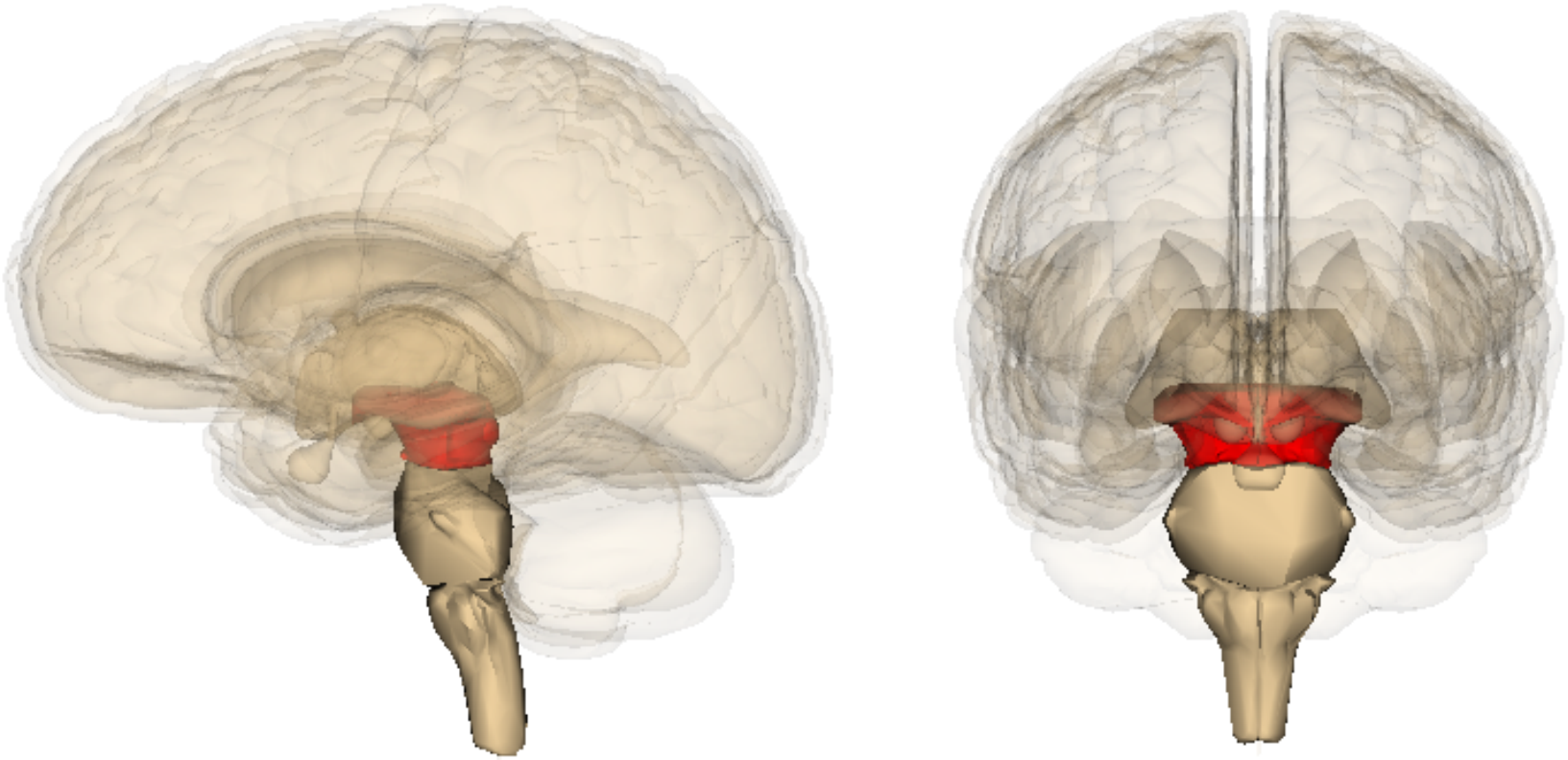
Tegmentum

- Tegmentum -> “floor”
- Species-typical movement sequences (e.g., cat: hissing, pouncing)
- Cranial nerves III, IV

Tegmentum

- *Nuclei* that release modulatory neurotransmitters ("neuromodulators")
  - *Dopamine (DA)*
  - *Norepinephrine (NE)*
  - *Serotonin (5-HT)*

Forebrain



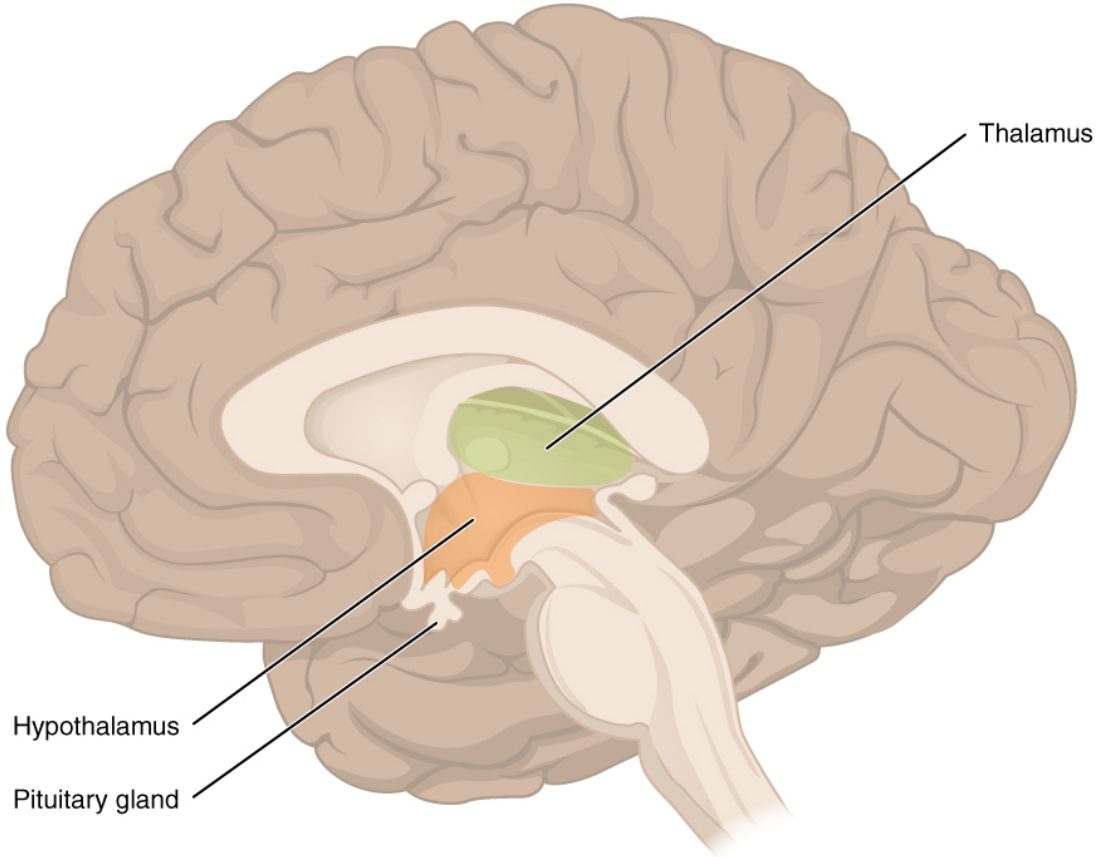
(Samanthi, 2019)

Forebrain Components

Diencephalon (“between” brain)

Telencephalon

Diencephalon

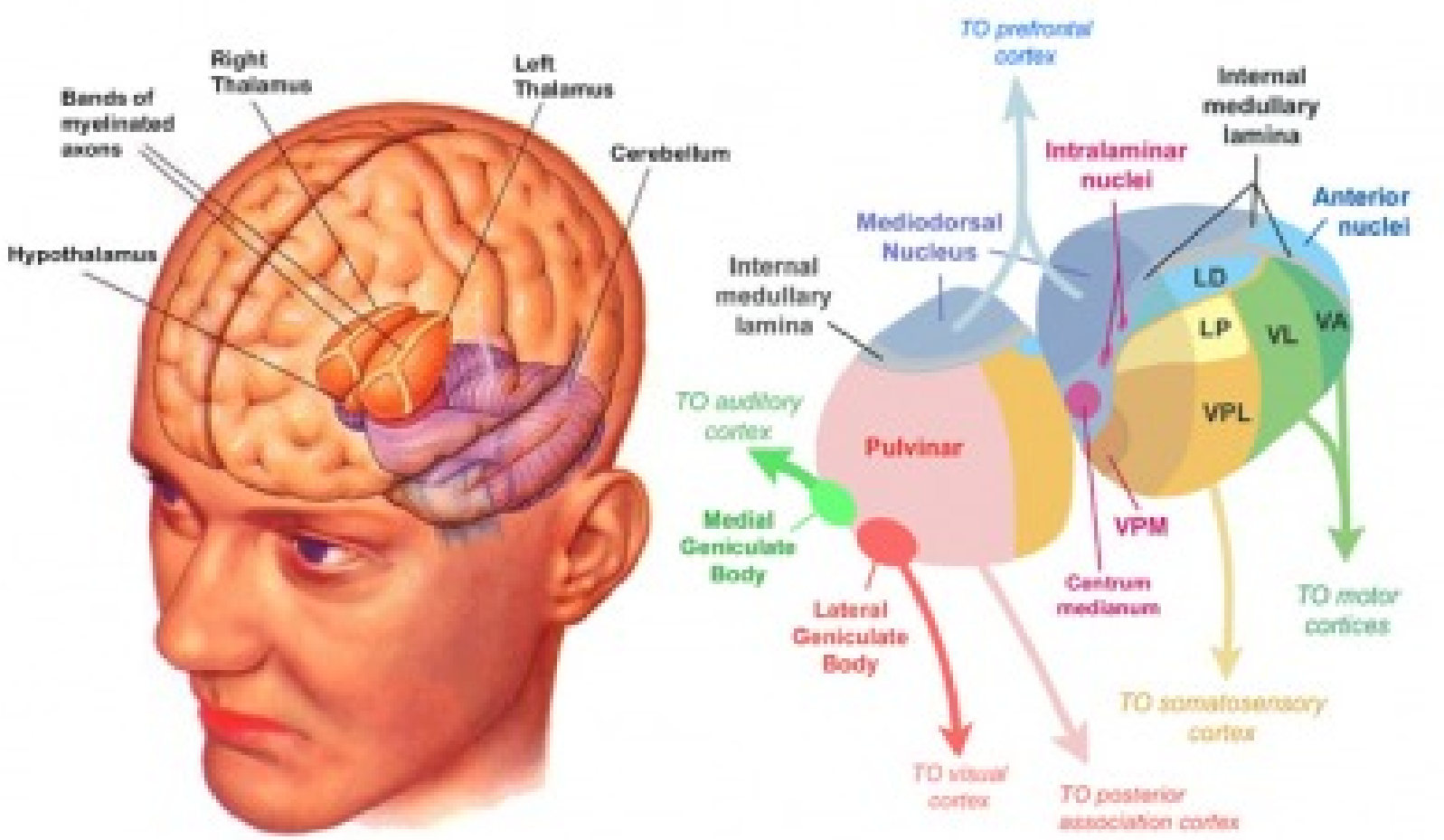


https://upload.wikimedia.org/wikipedia/commons/a/a0/1310_Diencephalon.jpg

Diencephalon Components

- *Thalamus*
- *Hypothalamus*

Thalamus



http://neurobiologychapter3.weebly.com/uploads/1/4/1/8/1418733/5118342.jpg?401x231

Thalamus functions

- Input to cortex
- Functionally distinct nuclei (collection of neurons)
  - *Lateral geniculate nucleus (LGN)*, vision
  - *Medial geniculate nucleus (MGN)*, audition

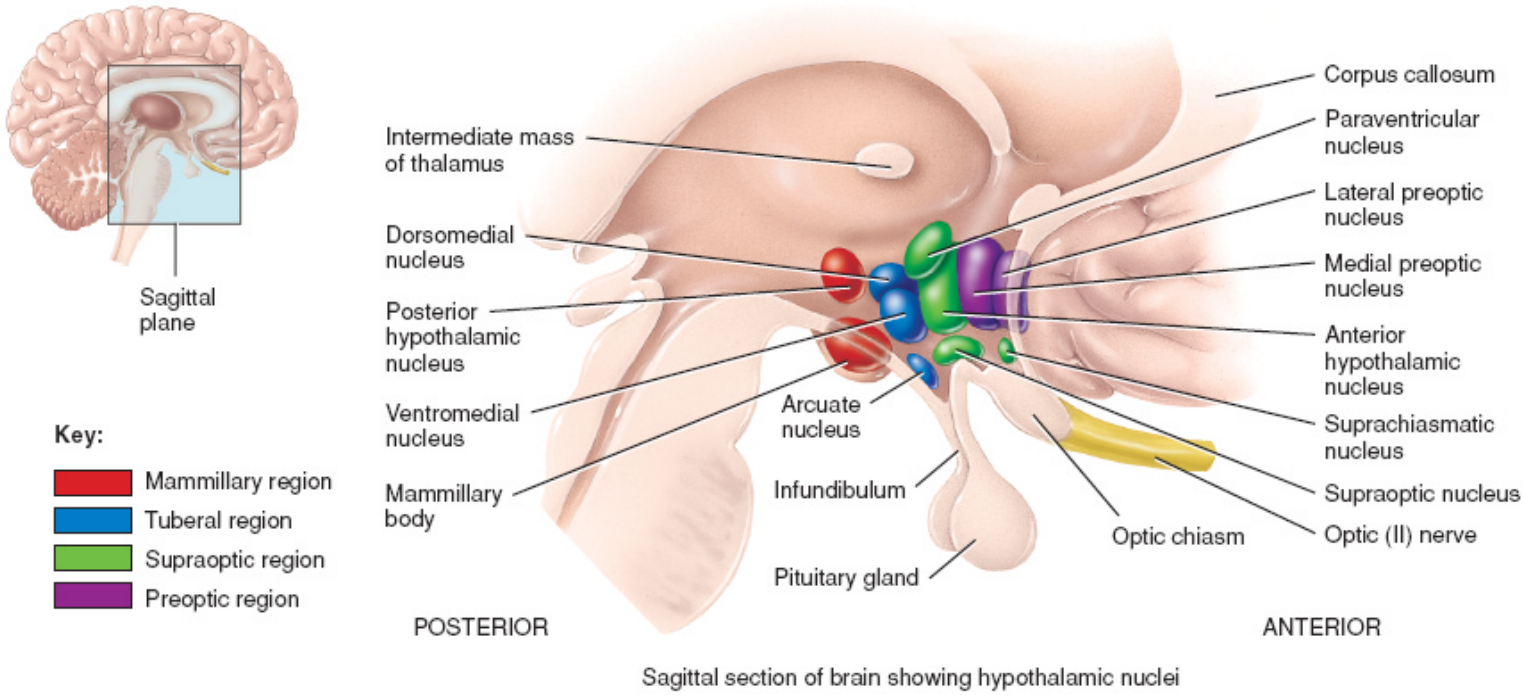
Hypothalamus

- Five Fs: fighting, fleeing/freezing, feeding, and reproduction
- Controls *Autonomic Nervous System (ANS)*
  - Sympathetic branch
  - Parasympathetic branch

Hypothalamus

- Controls *endocrine system* via *pituitary gland* (“master” gland)
  - *Anterior pituitary* (indirect release of hormones)
  - *Posterior* (direct release of hormones)
    - *Oxytocin*
    - *Vasopressin*

Hypothalamus



Sagittal section of brain showing hypothalamic nuclei

http://higheredbcs.wiley.com/legacy/college/tortora/0470565101/hearthis_ill/pap13e_ch14_illustr_audio_mp3_ar

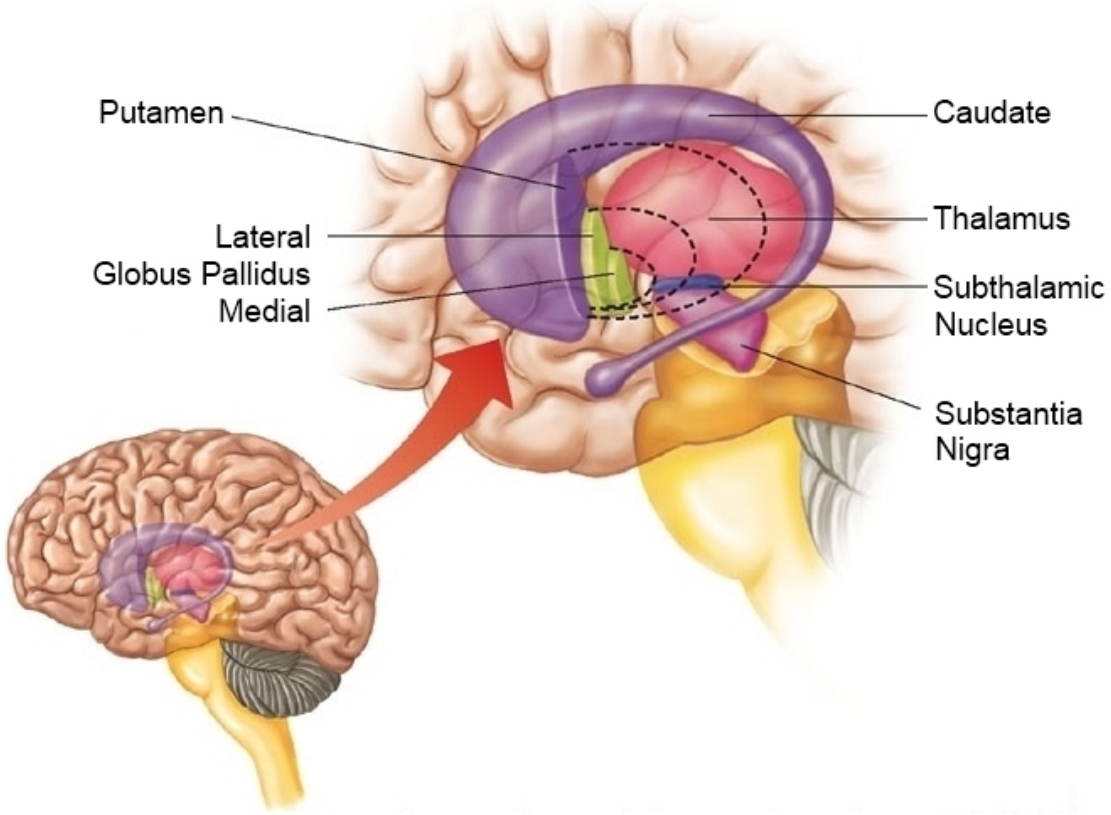
Telencephalon components

- Basal (not basil) ganglia
- Hippocampus
- Amygdala
- Cerebral cortex

Basal ganglia

- Skill and habit learning
- Sequencing of movement
- Example: Parkinson’s Disease

Basal ganglia



http://humanphysiology.academy/Neurosciences%202015/Images/5/basalganglia%20sehati_org.jpeg

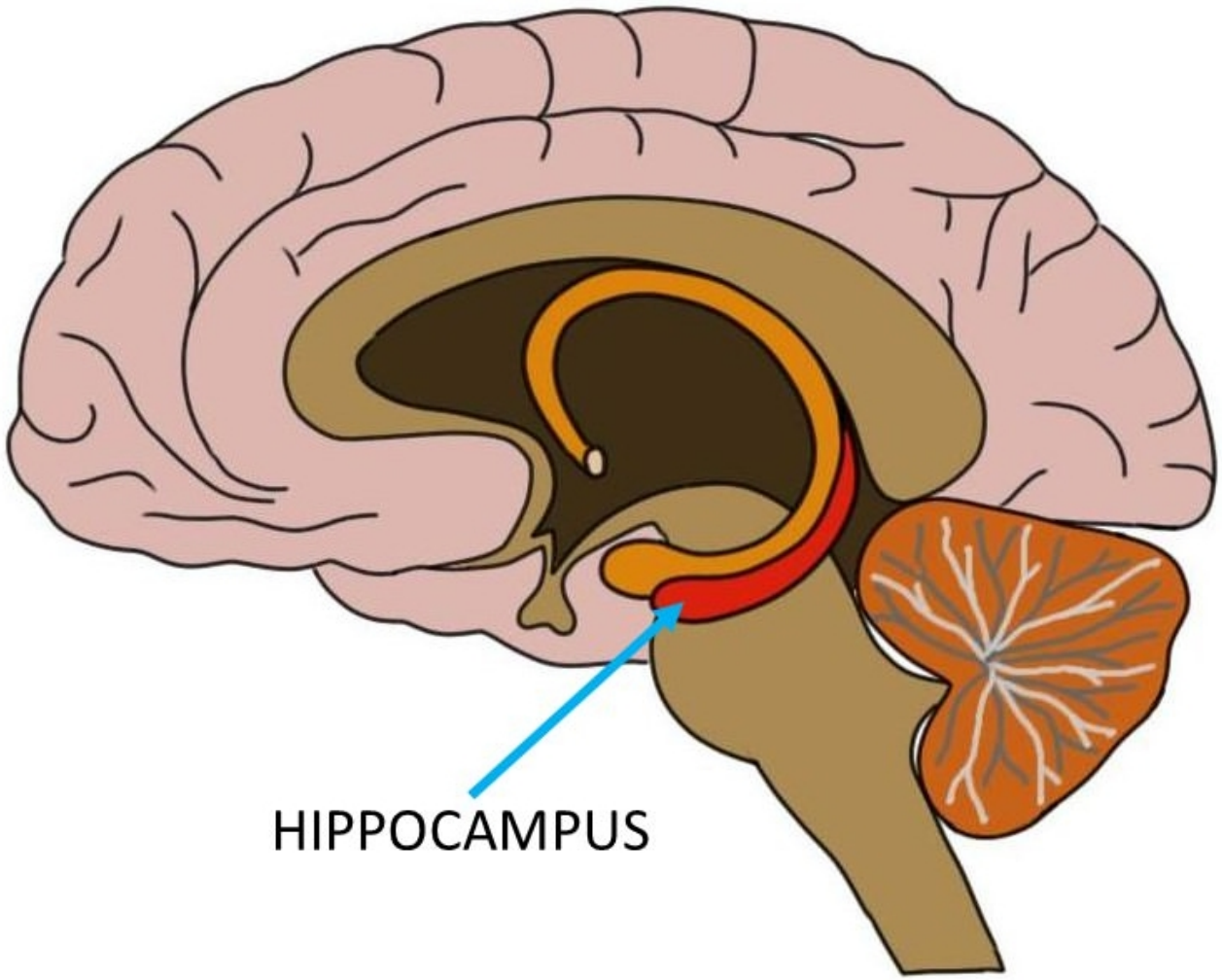
Basal ganglia

- Striatum
  - Dorsal
    - Caudate nucleus
    - Putamen
  - Ventral
    - Nucleus accumbens (NAcc)

Basal ganglia

- Globus pallidus
- Subthalamic nucleus
- Substantia nigra (in tegmentum)

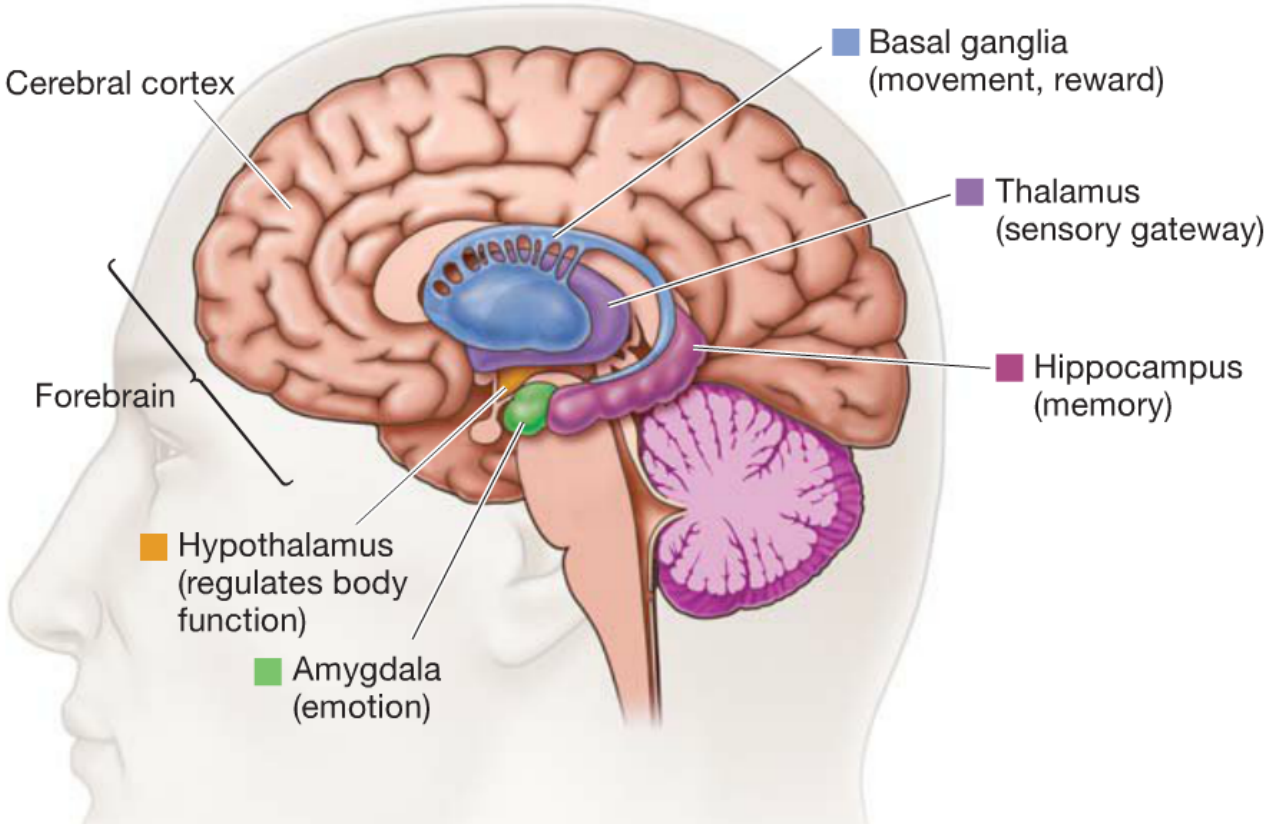
Hippocampus



Hippocampus

- From Greek for “sea horse”
- Immediately lateral to (inferior) lateral ventricles
- Memories of specific facts or events, spatial locations
- Implicated in Alzheimer’s Disease
- Fornix projects to hypothalamus
- Mammillary bodies

Amygdala



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Amygdala

- “almond”
- Physiological state, behavioral readiness, affect
- NOT the fear center! (LeDoux, 2015).

Next time…

- Neuroanatomy III (The cerebral cortex and beyond…)
- Quiz 1

References

ctdalilah. (2006, October). Pinky and the brain-brainstem. Youtube. Retrieved from https://www.youtube.com/watch?v=snO68aJTOpM

LeDoux, J. (2015, August 10). The Amygdala Is NOT the Brain's Fear Center. *Psychology Today*. Retrieved from https://www.psychologytoday.com/blog/i-got-mind-tell-you/201508/the-amygdala-is-not-the-brains-fear-center

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