

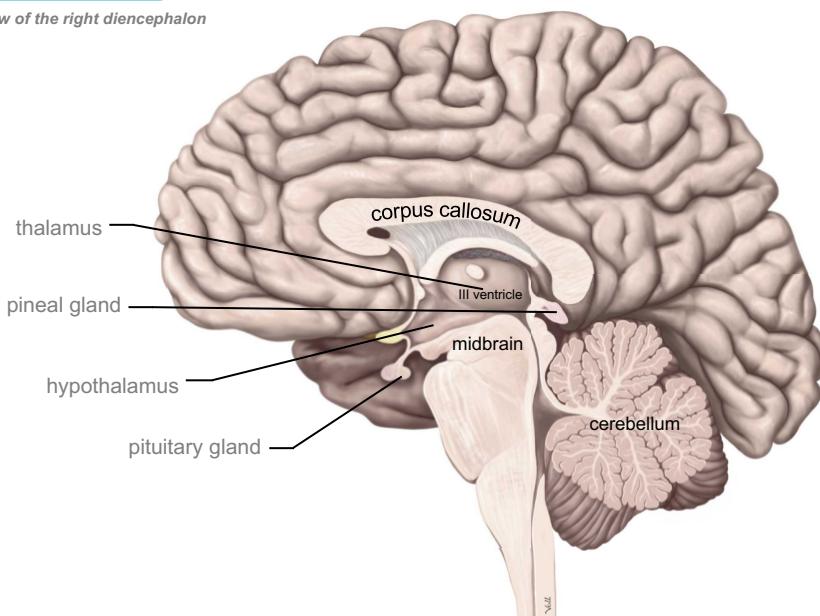
Diencephalon, Brainstem, Cerebellum

Diencephalon

1. Thalamus – memory, motor, sensory relay nucleus, gateway nucleus, “selective attention”
2. Hypothalamus
 - a. Autonomic nervous system regulation
 - i. Blood pressure
 - ii. Heart rate
 - iii. Digestion
 - iv. Respiratory rate
 - v. Pupil size
 - b. Pleasure, fear, rage
 - c. Temperature regulation
 - d. Appetite
 - e. Water intake and thirst
 - f. Sleep
 - g. Hormones
3. Posterior pituitary
 - a. Oxytocin
 - b. ADH - Water retention
 - c. Raise blood pressure
4. Pineal
 - a. Melatonin – sleep, circadian rhythms

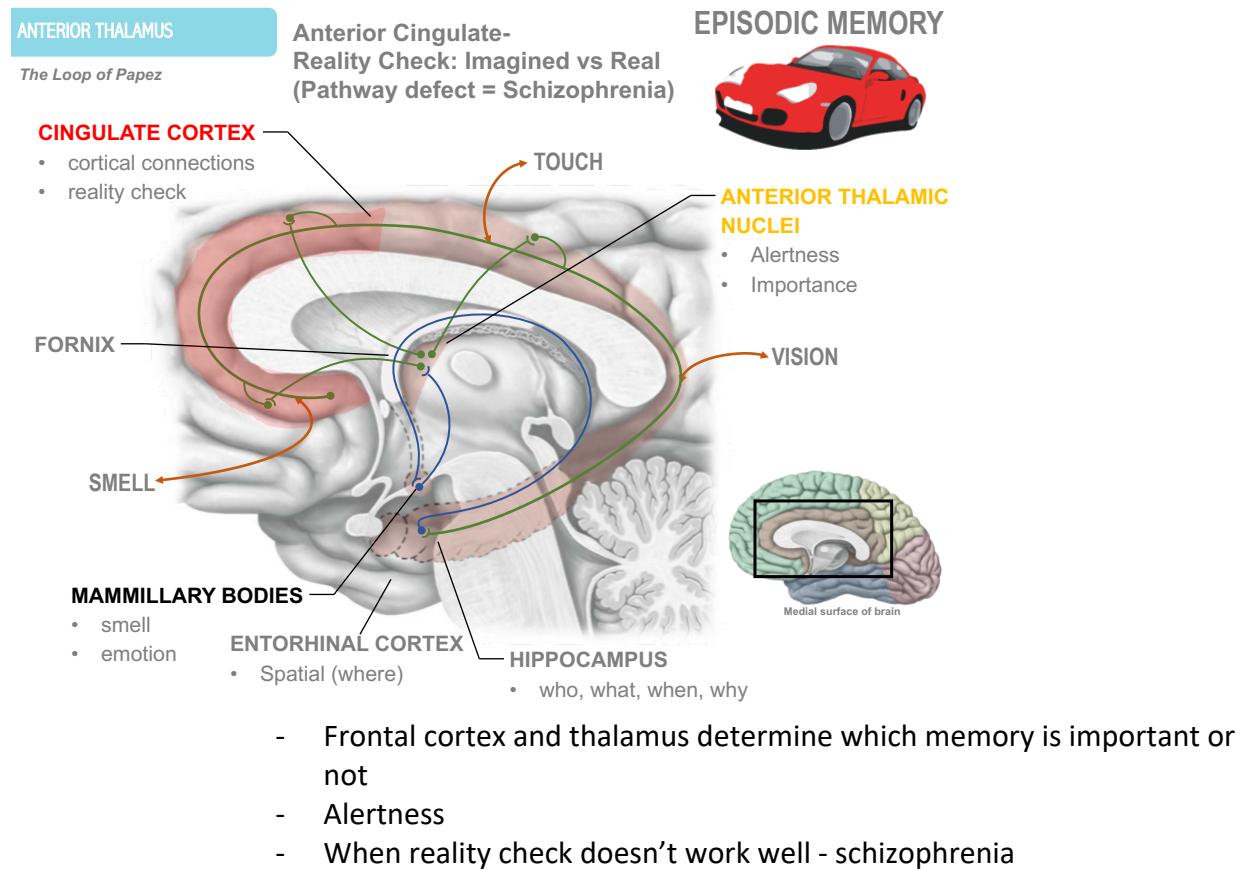
DIENCEPHALON

Medial view of the right diencephalon



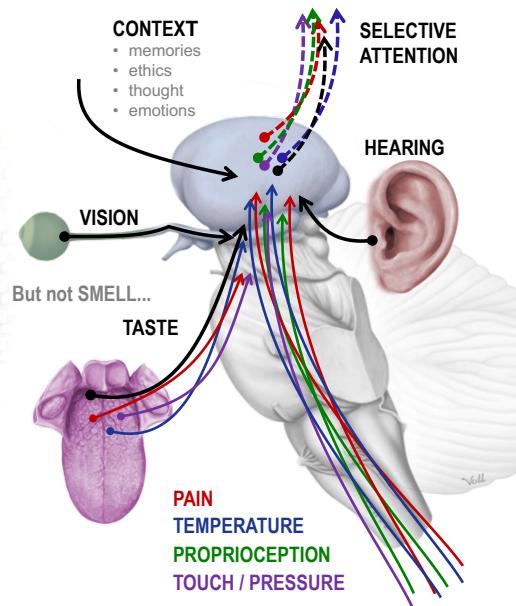
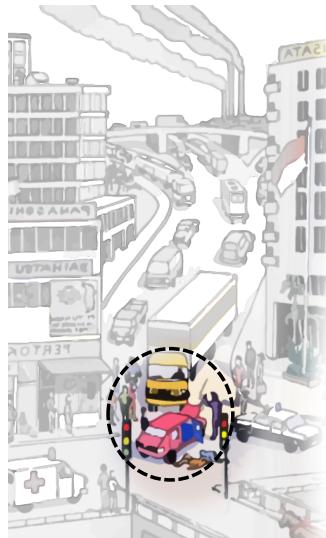
Thalamus - Relay nuclei for memory motor and sensation to the cerebral cortex

1. Memory
 - a. Links mammillary bodies to cingulate cortex
2. Motor
 - a. Determines balance between basal nuclei output to premotor cortex (routine vs novel)
3. Sensations
 - a. Vision
 - b. Hearing
 - c. Temperature
 - d. Pain
 - e. Touch
 - f. Pressure
 - g. Proprioception
4. Cortical input
 - a. Inputs from cerebral cortex determine which sensations should be conveyed to cortex.
 - b. Selective attention – a spotlight on important information



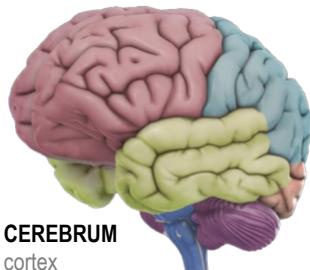
THALAMUS

The function of the thalamus in selective attention

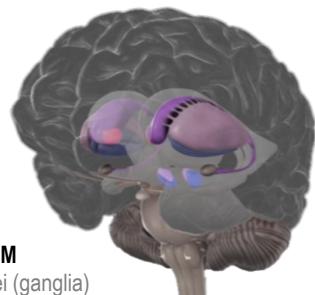


All of these (not smell) synapse in the thalamus and thalamus decides which to send up to the cortex

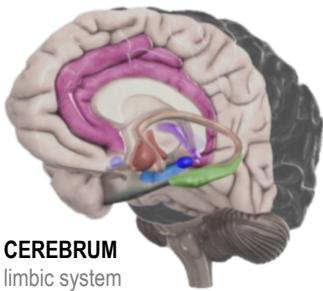
OVERVIEW



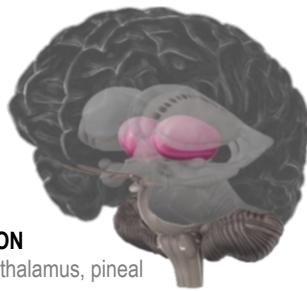
CEREBRUM
cortex



CEREBRUM
basal nuclei (ganglia)



CEREBRUM
limbic system

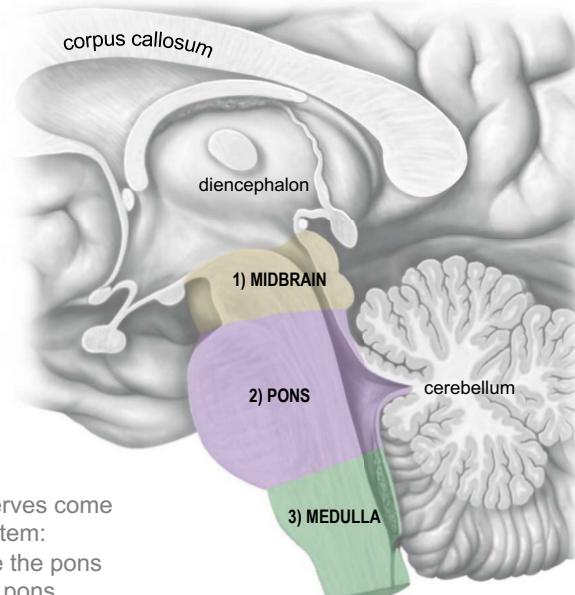


DIENCEPHALON
thalamus, hypothalamus, pineal

Brain Stem

BRAINSTEM

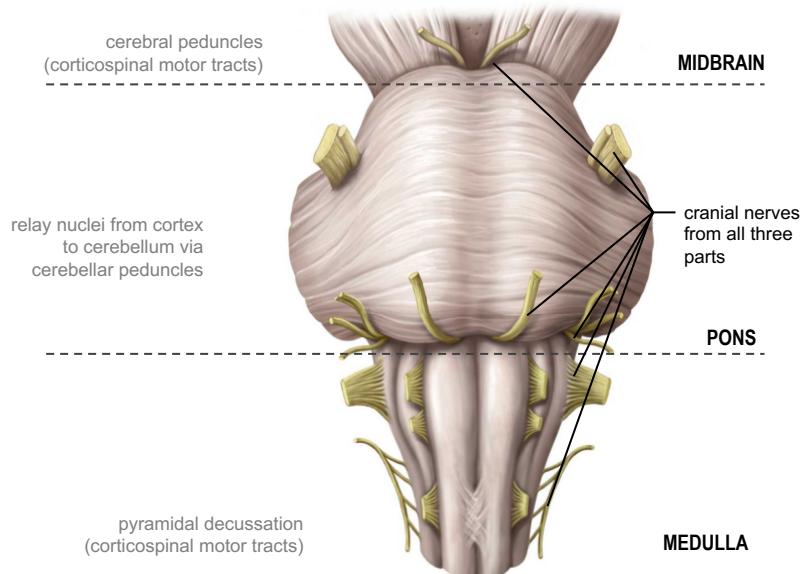
3 Regions of the Brainstem



Most cranial nerves come from the brainstem:
4 nerves above the pons
4 nerves in the pons
4 nerves below the pons

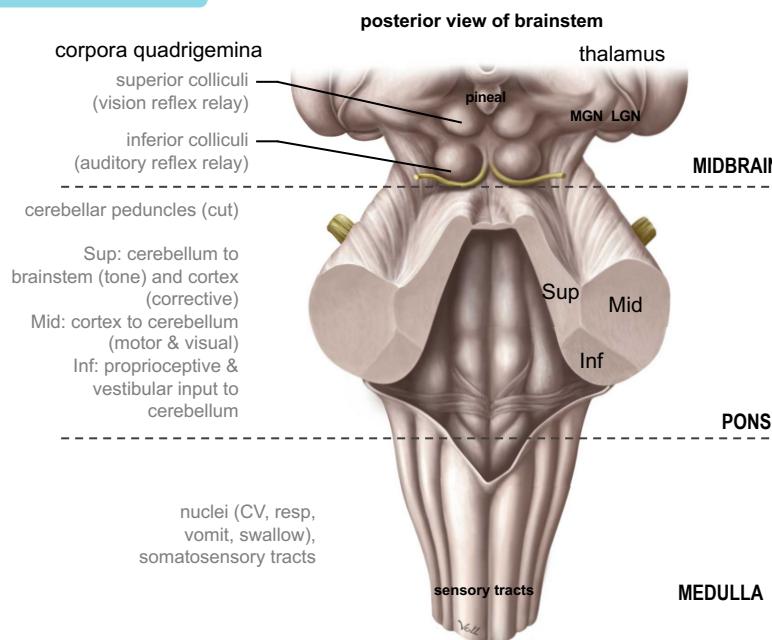
BRAINSTEM

anterior view of brainstem



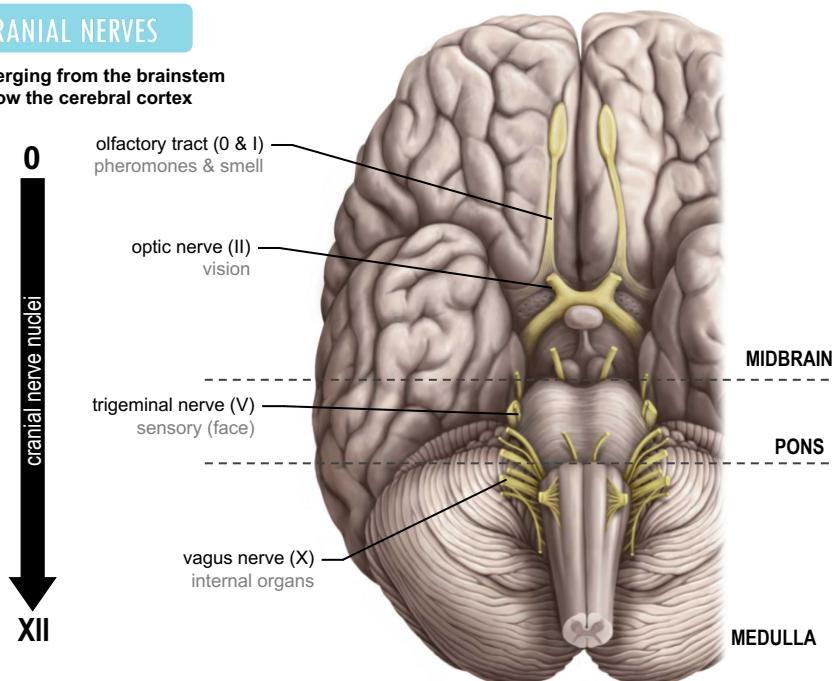
Corticospinal motor tracts – group of axons of motor neurons from primary motor cortex
Pyramidal decussation – crossover of motor information

BRAINSTEM

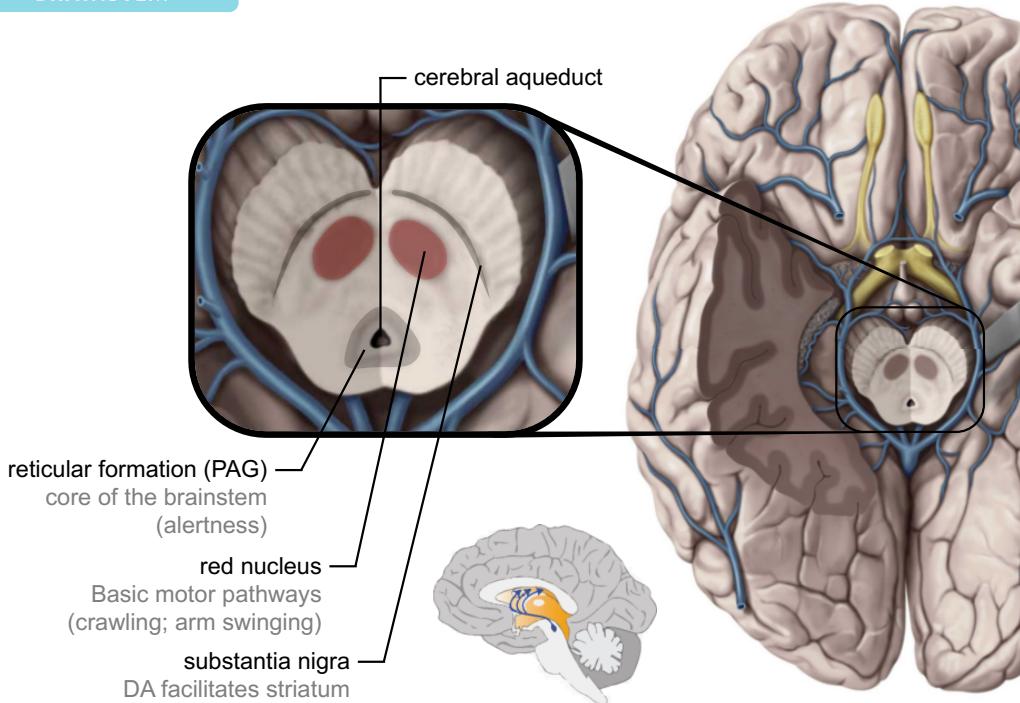


CRANIAL NERVES

emerging from the brainstem below the cerebral cortex

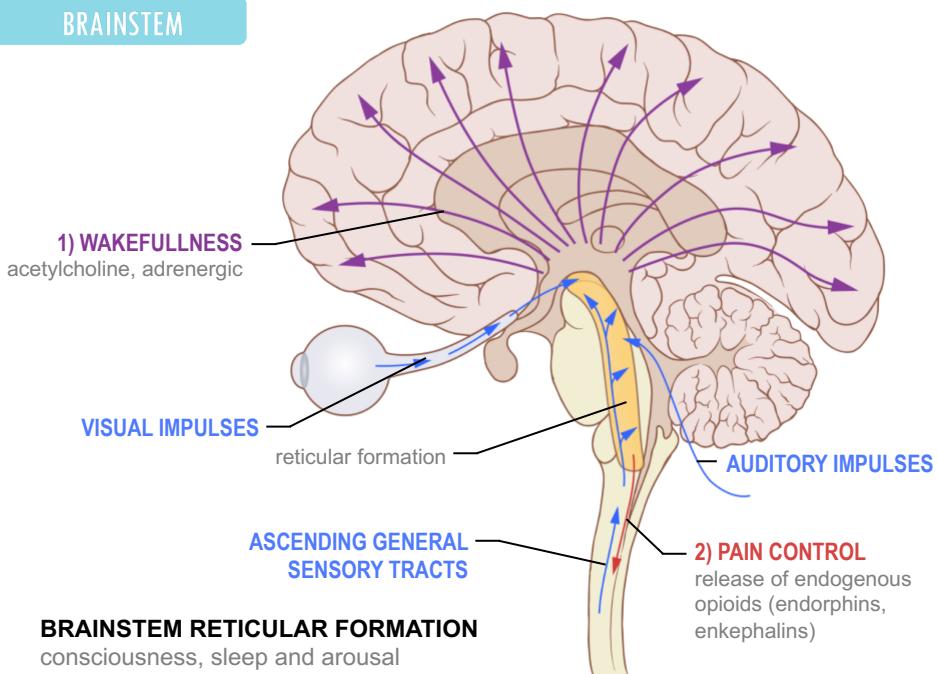


BRAINSTEM



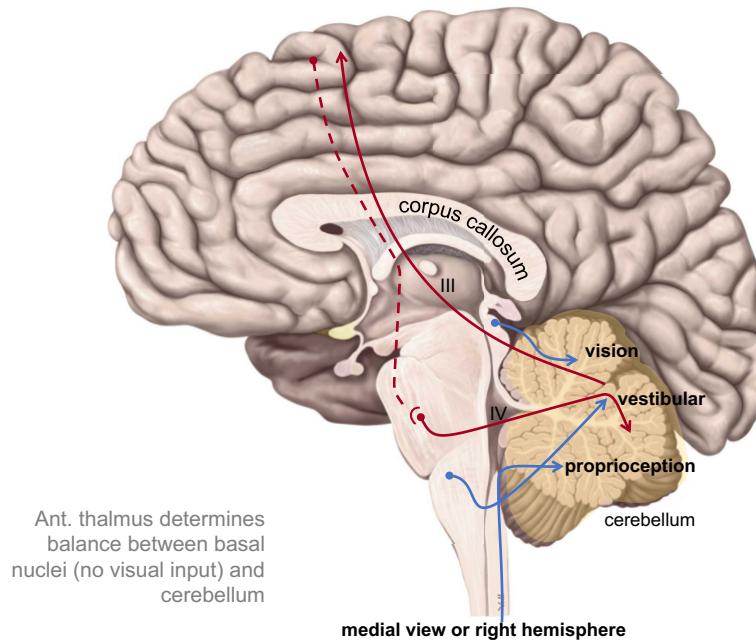
Substantia nigra release dopamine – helps get motor routines out of basal ganglia (parkinsons)

BRAINSTEM



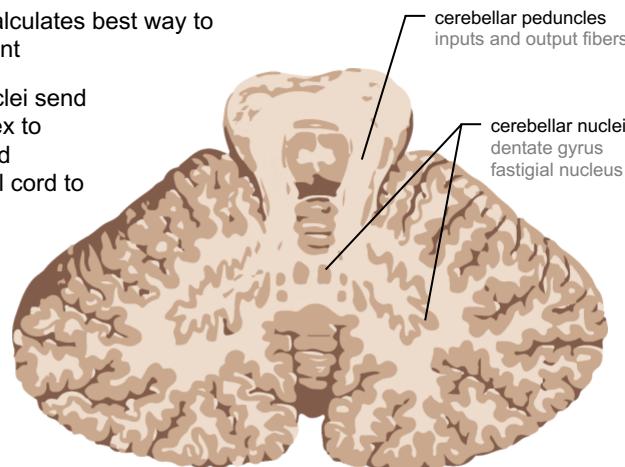
Cerebellum – control of voluntary movement, and maintaining balance

CEREBELLUM

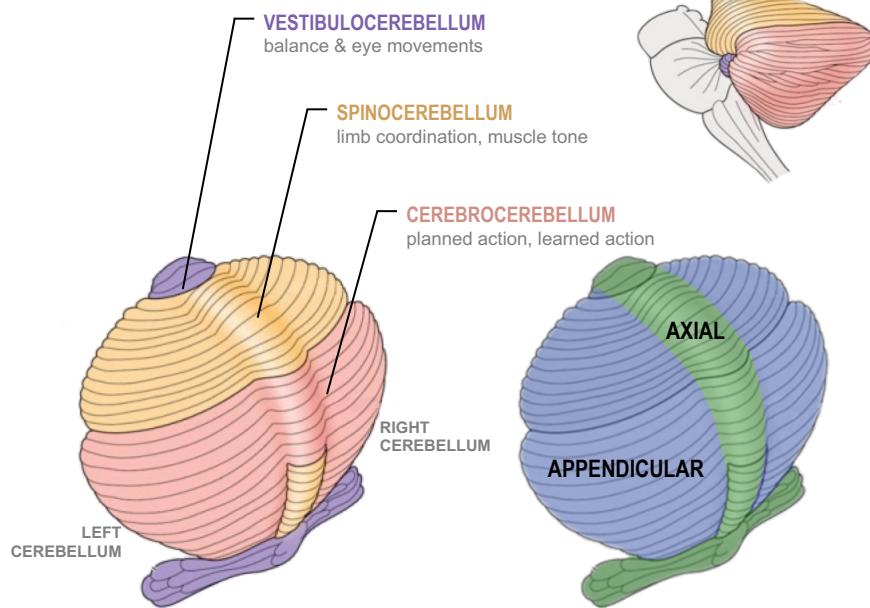


CEREBELLUM

- 1) Frontal cortex notifies cerebellum of intention to make a movement
- 2) Proprioceptors in muscles and tendons, visual input and vestibular input inform cerebellum about the position of the body and limbs
- 3) Cerebellar cortex calculates best way to coordinate movement
- 4) Deep cerebellar nuclei send “blueprint” to cortex to initiate a coordinated movement, to spinal cord to maintain posture

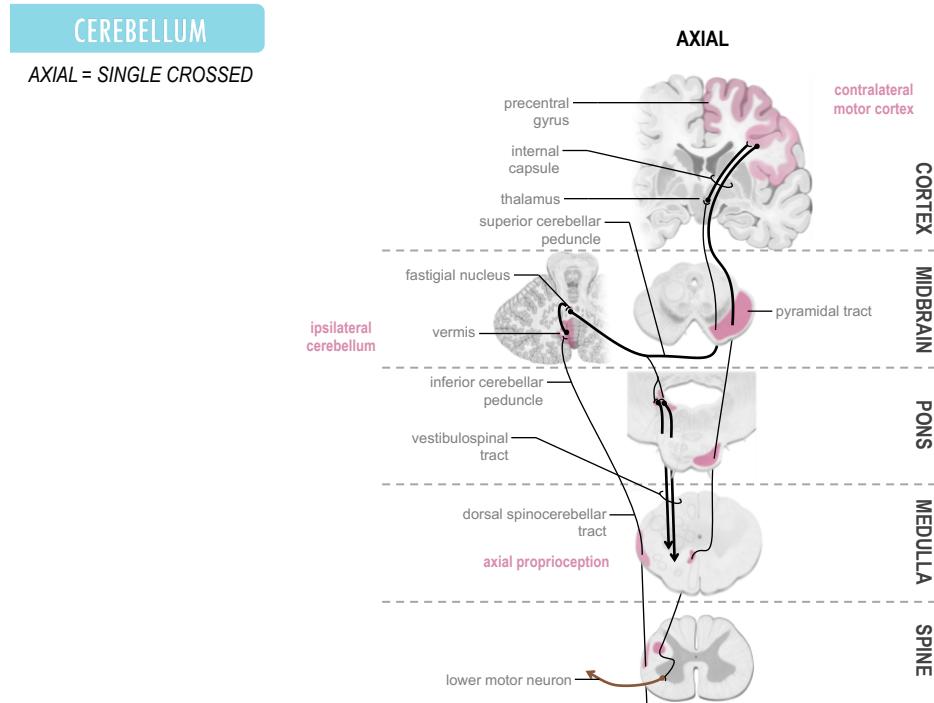


CEREBELLUM



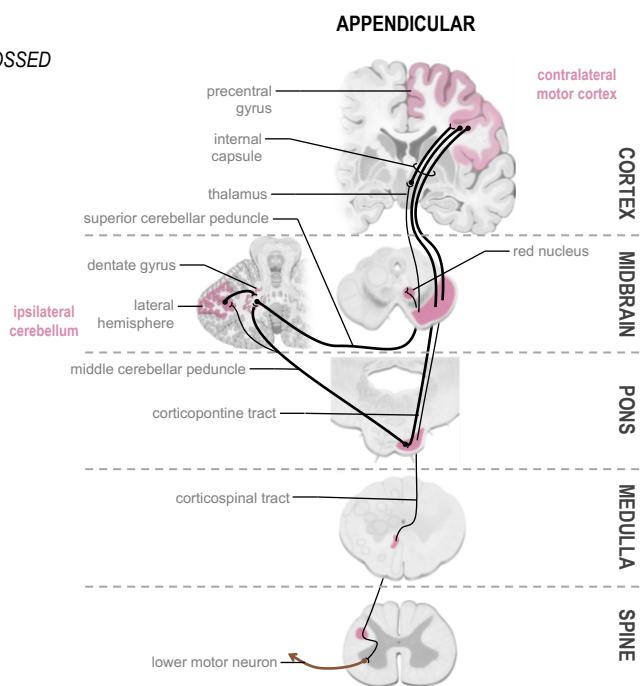
Middle controls muscles of axial (posture and balance) – single crossed (right side of cerebellum shares information with muscles on right side)

Lateral parts control appendicular muscles (upper and lower limbs) – double crossed



CEREBELLUM

APPENDICULAR = DOUBLE CROSSED



Diseases of the cerebellum

1. Ataxia – difficulty with balance (injury to medial part of cerebellum)
2. Intention Tremor – difficulty moving limbs (injury to lateral part of cerebellum)

**cerebellum works on same side it controls