# Cerebral Cortex and Cerebellum Anatomy

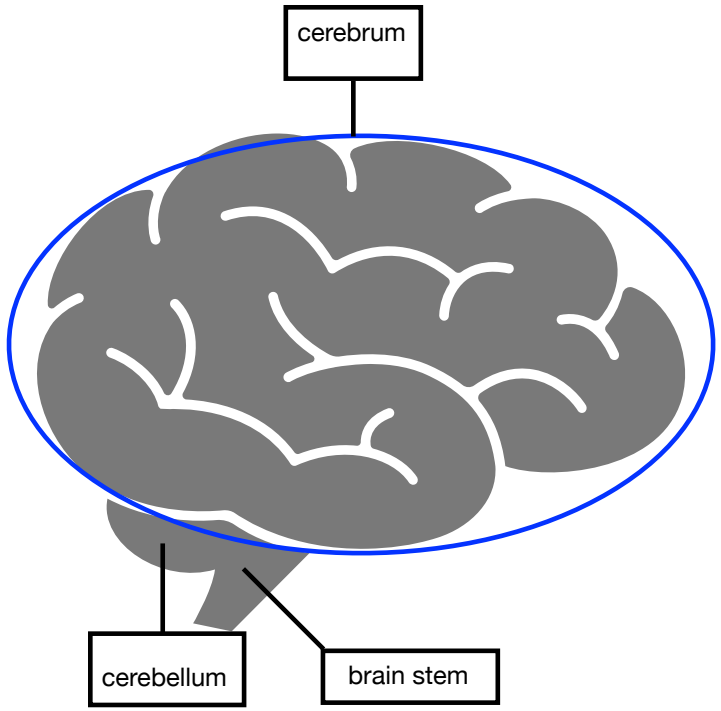
# Brain Overview

purpose: to control essential body functions

cerebellum: coordinates movement and balance

cerebrum: controls functions not controlled by the cerebellum

The cerebrum and cerebellum are divided into right and left hemispheres.  The cerebral hemispheres are connected by the corpus callosum.



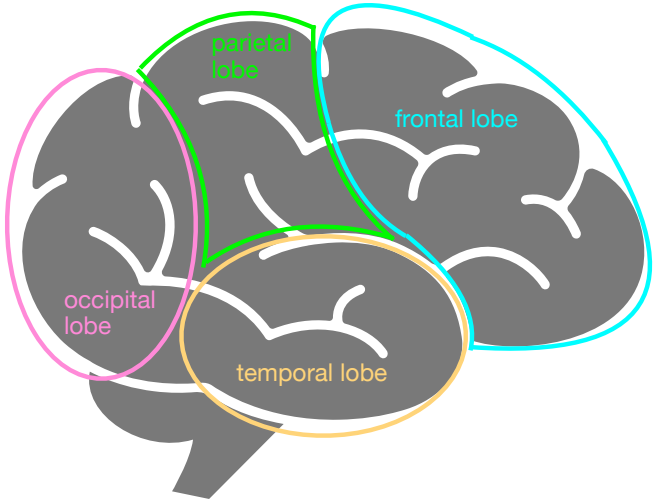
# Cerebral Cortex Lobes

occipital lobe: receive and recognize visual stimuli

frontal lobe: primary motor cortex, premotor cortex, eye movement (frontal eye fields), prefrontal cortex (restraint, order, initiative), speech production (Broca area)

parietal lobe: receive contralateral somatosensory information (contains primary somatosensory cortex), language comprehension (Wernicke area)

temporal lobe: auditory cortex



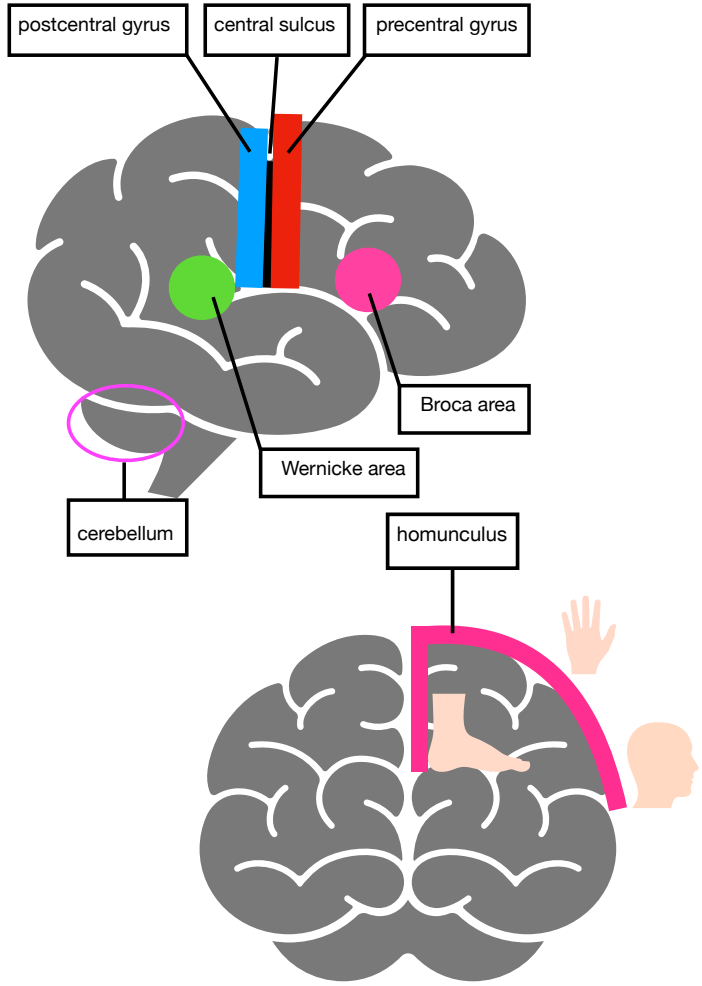
# Cerebral Cortex Special Areas

precentral gyrus (anterior to the central sulcus): primary motor cortex

postcentral gyrus (posterior to the central sulcus): primary sensory cortex

Wernicke area (junction of the temporal and parietal lobes): language comprehension

Broca area (in the frontal lobe): produces speech

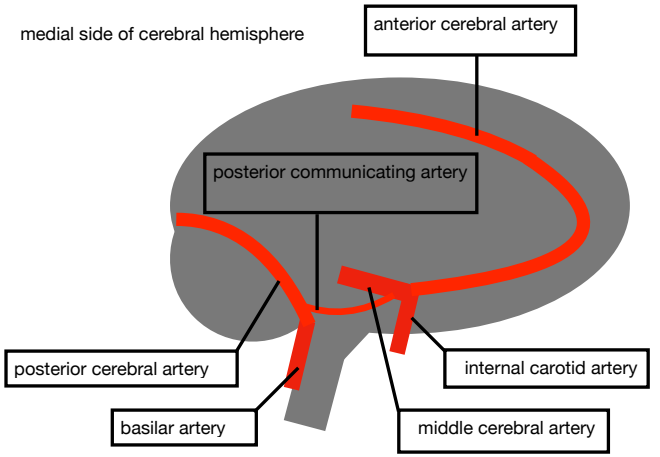


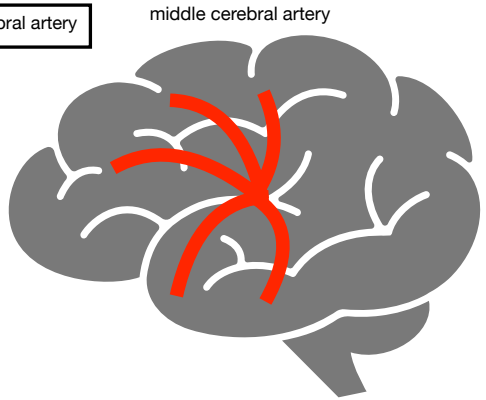
# Cerebral Blood Supply

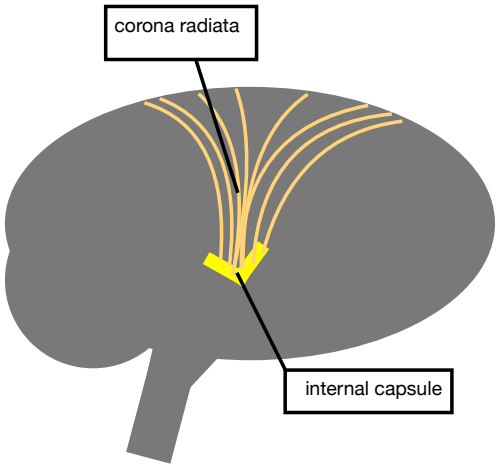
middle cerebral artery (MCA): supplies most of the lateral brain and the posterior limb and genu of the internal capsule

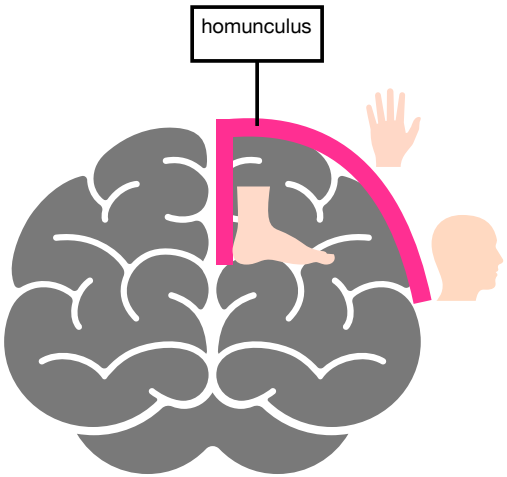
anterior cerebral artery (ACA): runs along the medial cerebral hemisphere, supplies the medial surfaces of the parietal and frontal lobes and the anterior limb of the internal capsule

posterior cerebral artery (PCA): supplies the occipital lobes



# Key Features of Cerebral Strokes

posterior cerebral artery strokes: contralateral hemianopsia with macular sparing
- Half of retinal signals go to one side of the brain, while the other half go to the other side.
- The macula is supplied by the central retinal artery, which is separate from the posterior cerebral artery.

anterior cerebral artery strokes: contralateral lower limb motor and sensory deficits

middle cerebral artery strokes: contralateral face and upper limb motor and sensory deficits, Broca's aphasia (if the superior division in the dominant hemisphere is affected) Wernicke's aphasia (if the inferior division in the dominant hemisphere is affected)

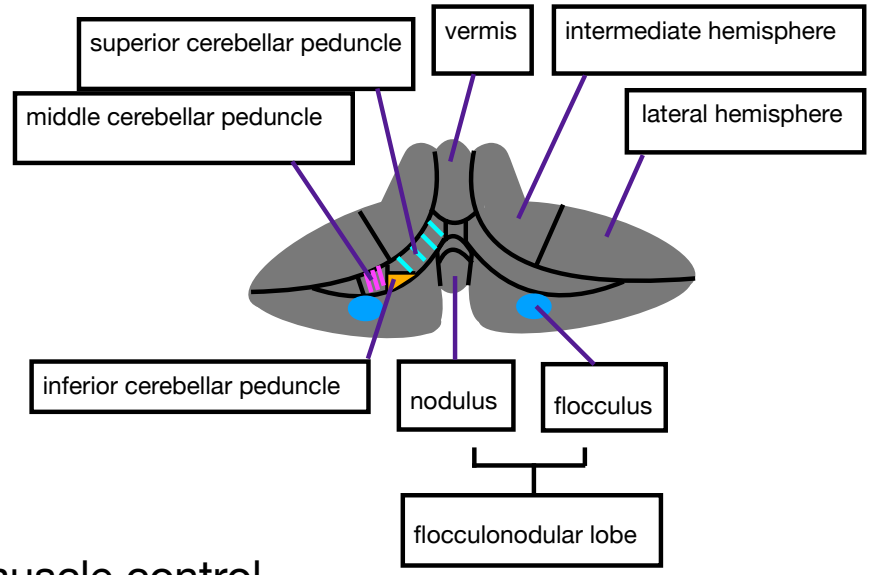
# Cerebellum

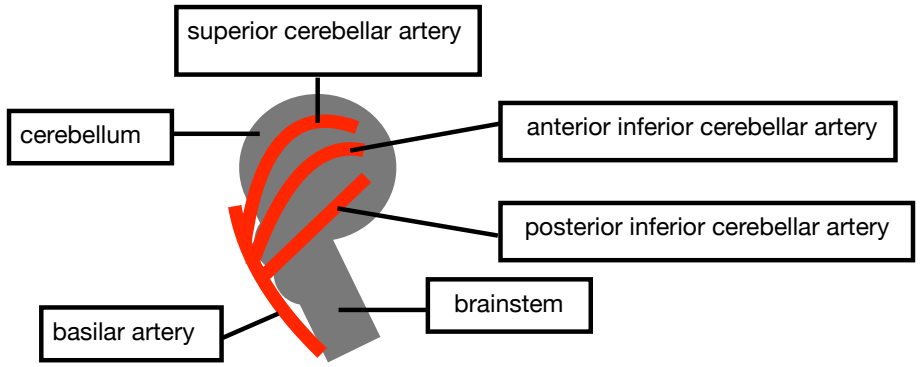
vermis: provides proximal and truncal muscle control
- Lesions cause truncal ataxia with wide, unsteady gait.

flocculonodular lobes: provide vestibulo-ocular control
- synapse to the vestibular nucleus
- Lesions cause eye movement abnormalities.

cerebellar hemisphere lesions: cause ipsilateral ataxia

cerebellar hemisphere parts:
- lateral hemisphere: provides motor planning
- intermediate hemisphere: provides distal appendicular muscle control



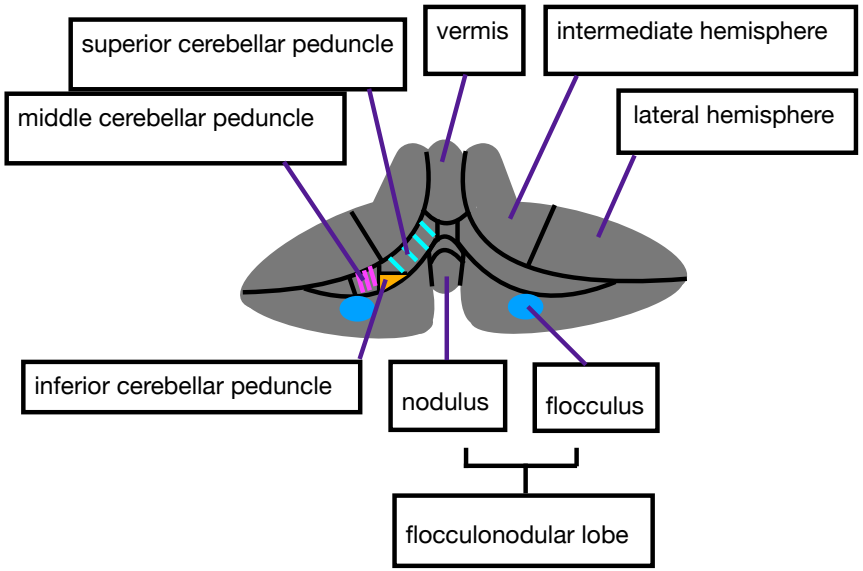



# Cerebellar Inputs

brain → pontocerebellar and climbing fibers → middle cerebellar peduncle → cerebellum

spinal cord → spinocerebellar and climbing fibers → inferior cerebellar peduncle → cerebellum

vestibular system→ juxtarestiform body (in the inferior cerebellar peduncle) → cerebellum

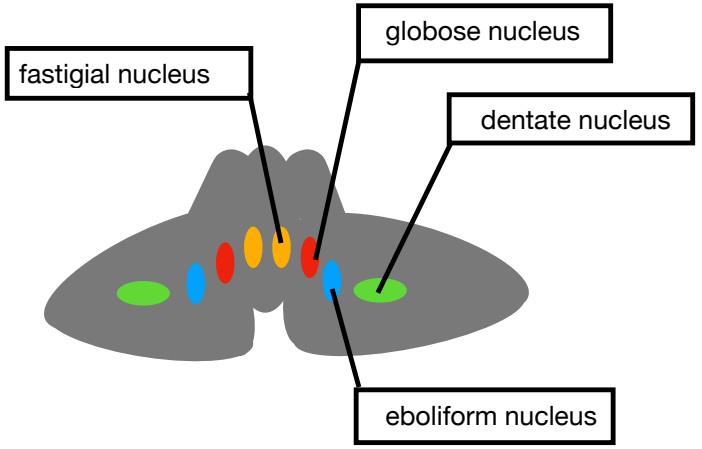


# Deep Cerebellar Nuclei and Cerebellar Outputs

lateral cerebellum Purkinje cells → dentate nucleus → superior cerebellar peduncle → contralateral VL of the thalamus → motor cortex and supplementary motor areas (influence corticospinal system for motor planning)

intermediate cerebellum Purkinje cells → eboliform and globose nuclei → superior cerebellar peduncle → contralateral VL of the thalamus → motor cortex and supplementary motor areas to influence the lateral corticospinal tract

vermis Purkinje cells → fastigial nucleus → medial motor system




mnemonic (lateral to medial): Don't eat greasy foods.

# Hypothalamus

anterior part: dissipates heat via parasympathetics

posterior part: retains heat via sympathetic input

lateral part: promotes appetite

ventromedial nucleus: inhibits appetite

suprachiasmatic nuclei: regulate circadian rhythms

supraoptic and paraventricular nuclei: synthesize vasopressin and oxytocin