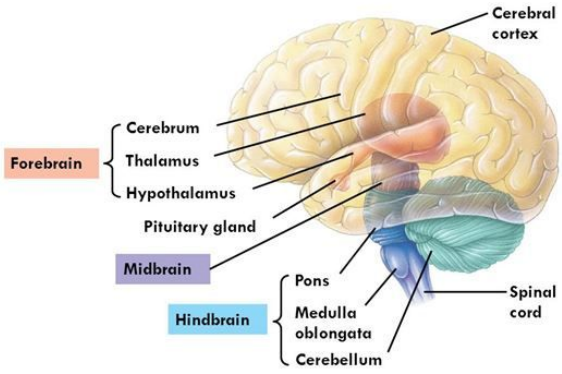
Final Review

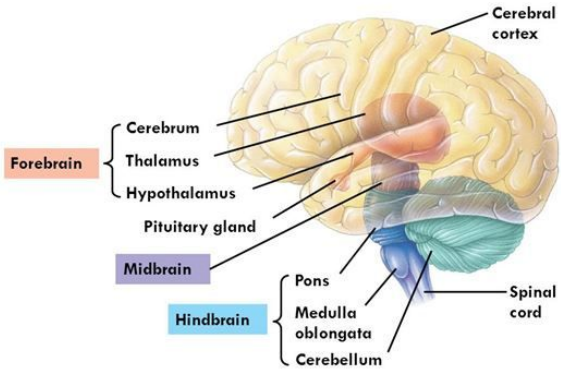
8.3.17

What are the functions of these regions?



- Thalamus:
- Hypothalamus:
- Tectum:
- Tegmentum:
- Pons:
- Medulla:

What are the functions of these regions?

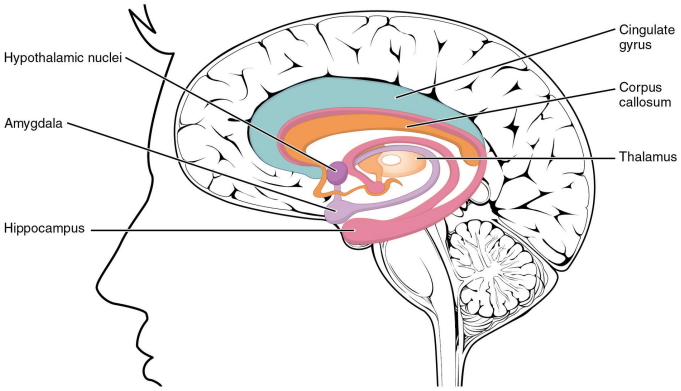


- Thalamus: **sensory and motor "relay center"**
- Hypothalamus: **4 Fs (feeding, fighting, fleeing, sex)**
- Tectum: **sensory pathways**
- Tegmentum: **motor pathways**
- Pons: **carries info throughout cortex**
- Medulla: **vital reflexes**

What are the regions of the limbic system and their functions?

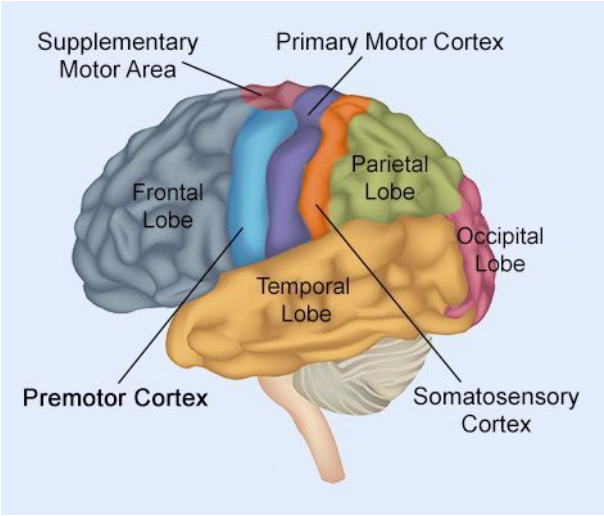
- H_____
- A_____
- C_____
- O_____

What are the regions of the limbic system and their functions?



- Hippocampus - memory formation
- Amygdala - emotion regulation
- Cingulate gyrus - risk assessment
- Olfactory bulb - smell info

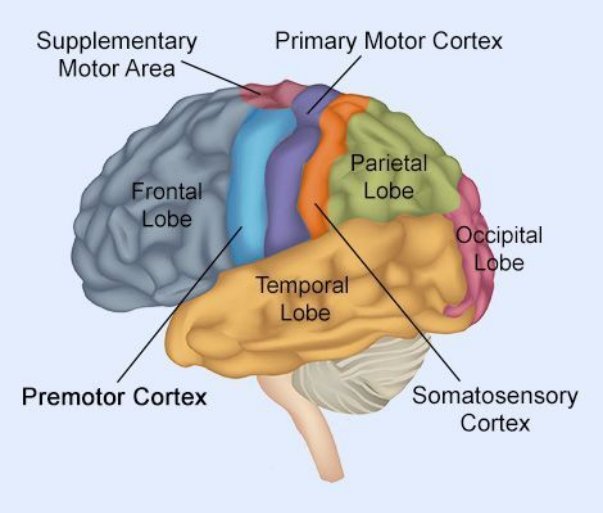
Describe the frontal lobe



- The frontal lobe contains which region involved in long-term planning, executive functioning, inhibition?

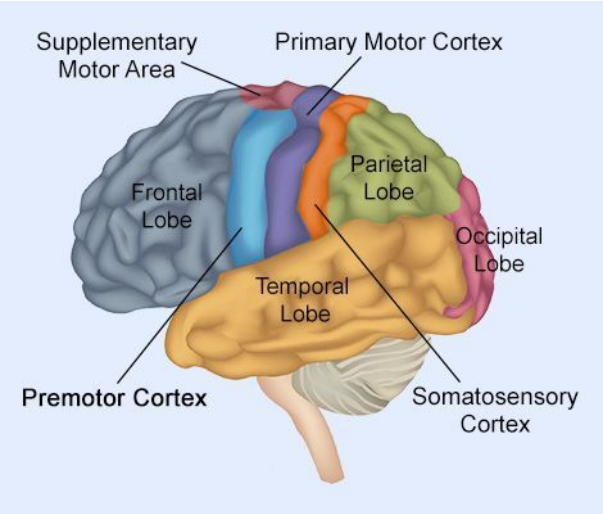
- What part of the above region is associated with social emotional behavior?

Describe the frontal lobe



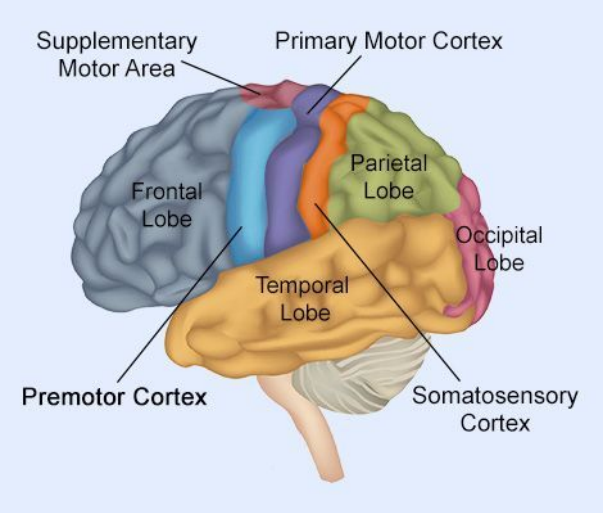
- The frontal lobe contains which region involved in long-term planning, executive functioning, inhibition? **PFC**
- What part of the above region is associated with social emotional behavior? **OFC**

Describe the motor cortex



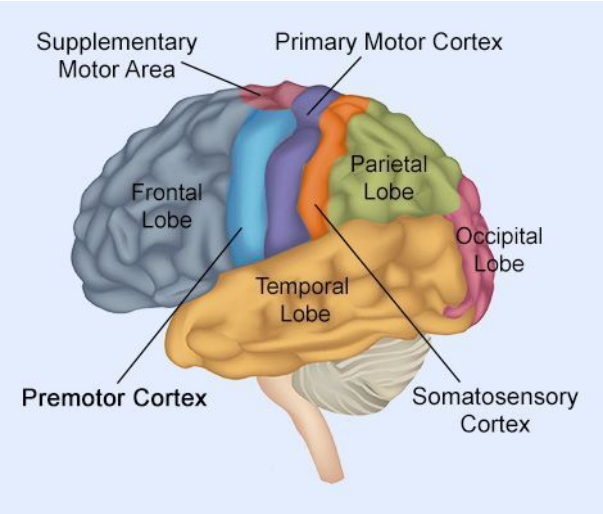
- The primary motor cortex is located in what lobe?
- What language region near it leads to impairments in sign language if damaged?
- What is the difference between the primary motor cortex and the premotor cortex?
- The primary motor cortex lies in the (pre/post)-central gyrus.

Describe the motor cortex



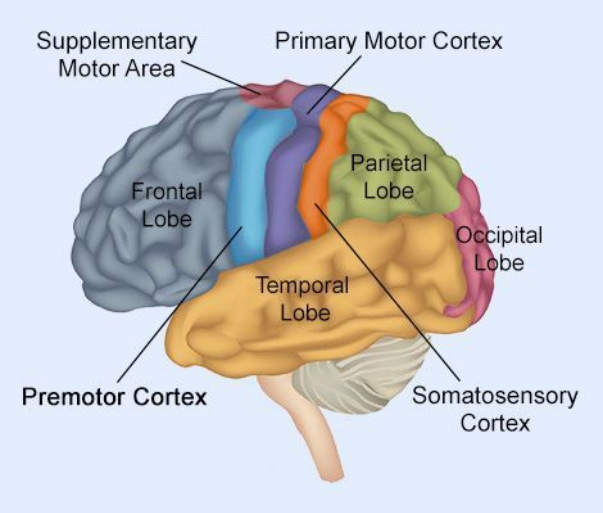
- The primary motor cortex is located in what lobe? **Frontal**
- What language region near it leads to impairments in sign language if damaged? **Broca's Area**
- What is the difference between the primary motor cortex and the premotor cortex? **Premotor involved in planning movement**
- The primary motor cortex lies in the (**pre**/post)-central gyrus.

Describe the parietal lobe



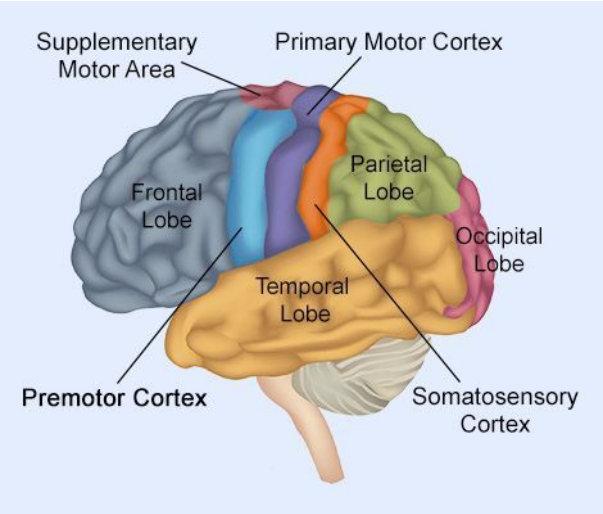
- The parietal lobe is associated with what?
- The somatosensory cortex is in the (pre/post)-central gyrus
- The parietal lobe is part of what visual pathway?
- Can this visual pathway detect direction of motion?

Describe the parietal lobe



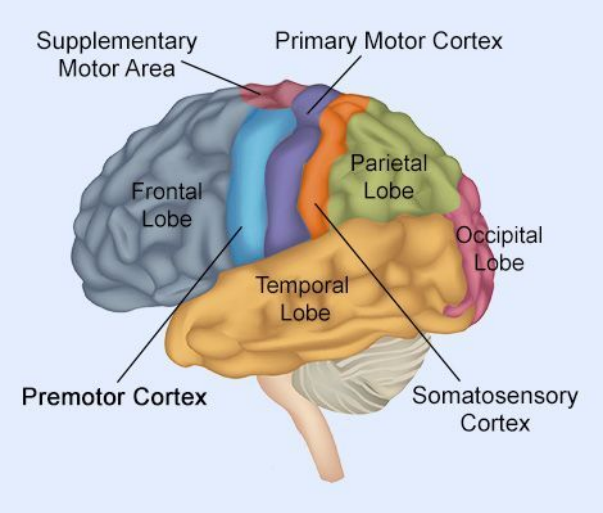
- The parietal lobe is associated with what? **Somatosensory cortex**
- The somatosensory cortex is in the (pre/**post**)-central gyrus
- The parietal lobe is part of what visual pathway? **Dorsal**
- Can this visual pathway detect direction of motion? **Yes**

Describe the temporal lobe



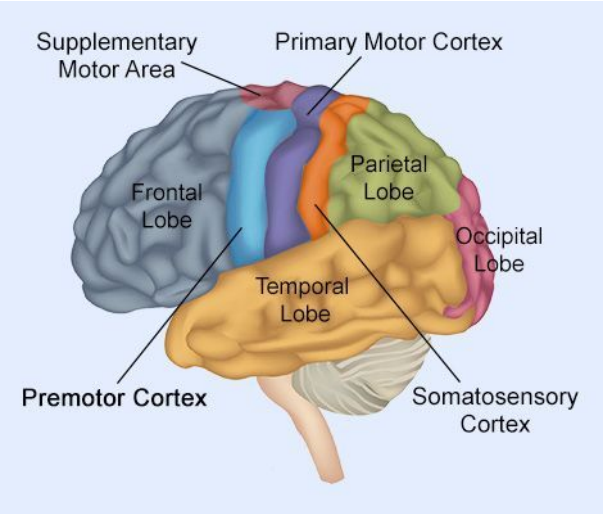
- The temporal cortex contains what primary sensory cortex?
- What region of the temporal lobe is the end of the ventral visual pathway?
- What region of the temporal lobe is associated with memory?
- What language region in the temporal lobe is associated with deficits in language comprehension?

Describe the temporal lobe



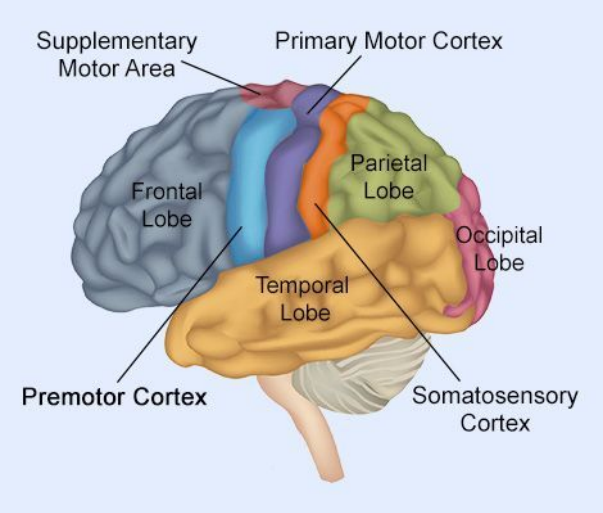
- The temporal cortex contains what primary sensory cortex? **auditory**
- What region of the temporal lobe is the end of the ventral visual pathway? **Inferior temporal**
- What region of the temporal lobe is associated with memory? **Medial temporal lobe**
- What language region in the temporal lobe is associated with deficits in language comprehension? **Wernicke's Area**

Describe the occipital lobe



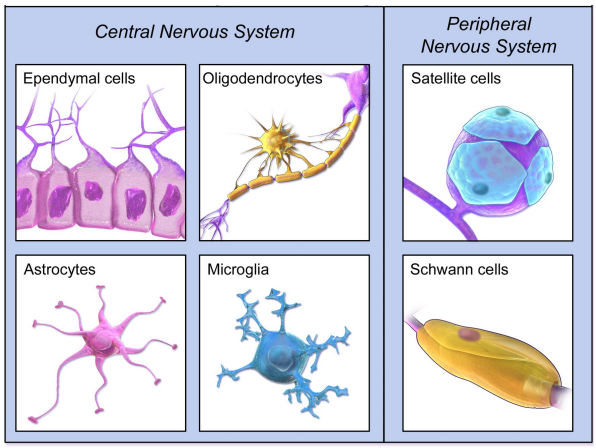
- The primary visual cortex of the occipital lobe is called what?
- Visual fields connect to the (ipsi/contra)lateral side of the visual cortex
- In the dark, photoreceptors are (on/off), and the flow of Na+ creates what's known as the _____.

Describe the occipital lobe

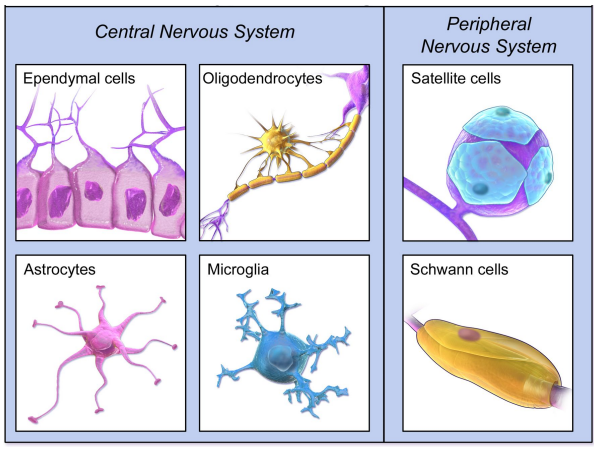


- The primary visual cortex of the occipital lobe is called what? **V1**
- Visual fields connect to the (ipsi/**contra**)lateral side of the visual cortex
- In the dark, photoreceptors are (**on**/off), and the flow of Na+ creates what's known as the **dark current**.

What are some roles of glial cells?



What are some roles of glial cells?



- **Myelination**
- **Providing nutrients to neurons**
- **Removing toxins**

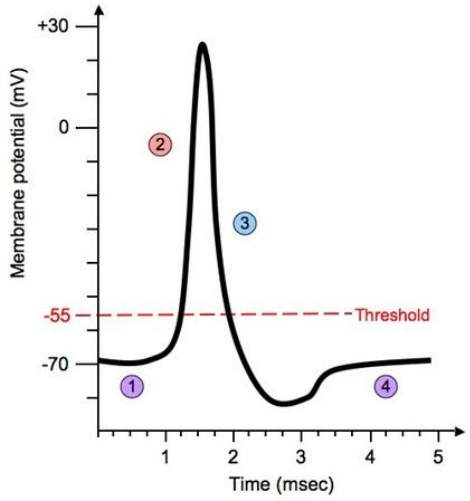
Describe signal propagation in neurons

- Neurons receive an incoming message from its (axon/dendrite).
- The nerve impulse is sent down the (axon/soma) of the neuron through a process called _____ conduction.
- In this process, the signal jumps in between the _____, the spaces between myelin sheaths along the neuron.
- In a disease called _____, myelin is degenerated, degrading the (ionic/electrical) signal over time. In addition, there are no (ion/electrical) gates under the myelin, preventing the cell from reverting to (ionic/electrical) conduction as well.

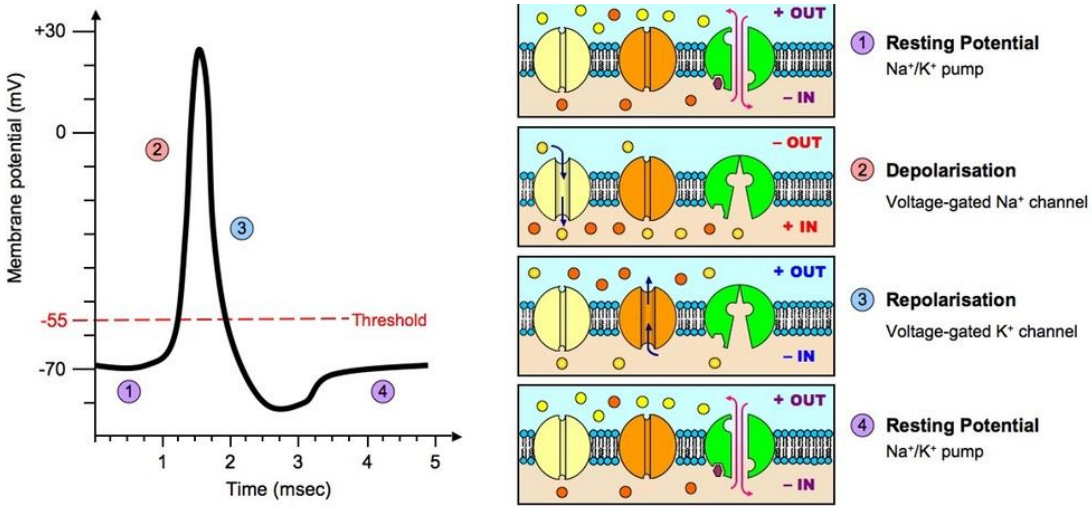
Describe signal propagation in neurons

- Neurons receive an incoming message from its (axon/**dendrite**).
- The nerve impulse is sent down the (**axon**/soma) of the neuron through a process called **saltatory** conduction.
- In this process, the signal jumps in between the **Nodes of Ranvier**, the spaces between myelin sheaths along the neuron.
- In a disease called **multiple sclerosis**, myelin is degenerated, degrading the (ionic/**electrical**) signal over time. In addition, there are no (**ion**/electrical) gates under the myelin, preventing the cell from reverting to (**ionic**/electrical) conduction as well.

Describe the steps of an action potential



Describe the steps of an action potential



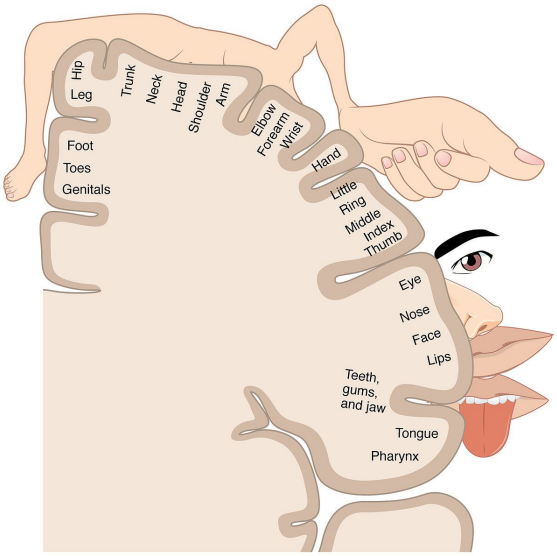
Describe how an NT affects a neuron

- What is the process in which Ca++ causes vesicles in the presynaptic neuron to release neurotransmitter (NT)?
- When the NT reaches the postsynaptic receptor site, does it enter the postsynaptic cell?
- If the NT is an (agonist/antagonist), it increases the reaction of the postsynaptic cell, which can lead to (IPSP/EPSP).
- What is the effect called when a second messenger activates metabolic process that opens an ion gate?
- This effect is (rapid and short-lived/slow and long-lived).

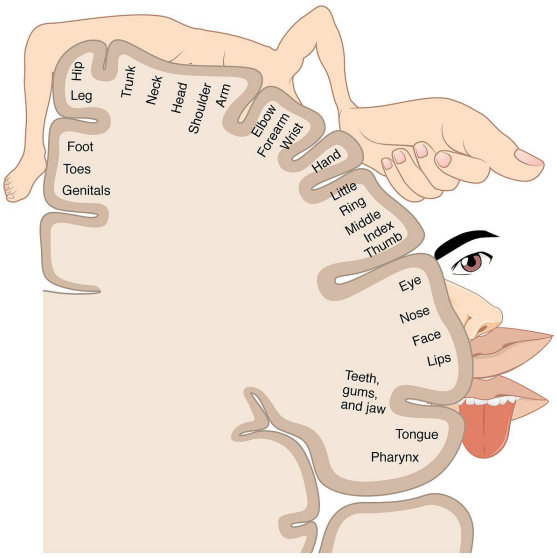
Describe how an NT affects a neuron

- What is the process in which Ca++ causes vesicles in the presynaptic neuron to release neurotransmitter (NT)? **exocytosis**
- When the NT reaches the postsynaptic receptor site, does it enter the postsynaptic cell? **No, it attaches to receptor site and then detaches**
- If the NT is an (**agonist**/antagonist), it increases the reaction of the postsynaptic cell, which can lead to (IPSP/**EPSP**).
- What is the effect called when a second messenger activates metabolic process that opens an ion gate? **metabotropic**
- This effect is (rapid and short-lived/**slow and long-lived**).

Why is the homunculus important?

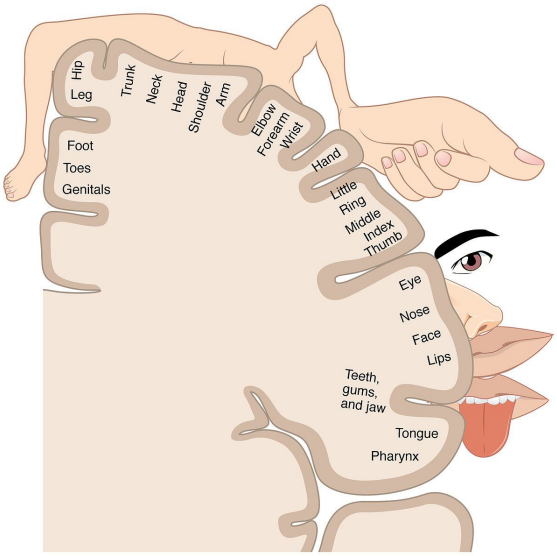


Why is the homunculus important?



- **Demonstrates how different parts of the body are represented in the cortex**
- What is type of mapping called?
- Does it exist for all senses?
- If an area is disproportionately represented on the cortex, what is this called?

Why is the homunculus important?



- **Demonstrates how different parts of the body are represented in the cortex**
- What is type of mapping called? **topographic**
- Does it exist for all senses? **Yes (retinotopic, tonotopic, somatosensory)**
- If an area is disproportionately represented on the cortex, what is this called? **Magnification factor**

Choose either the Dorsal or Ventral visual pathway for the following

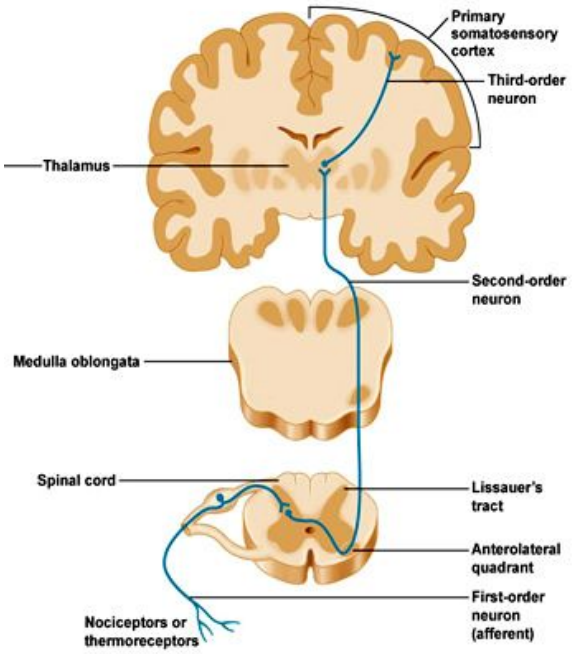
- Also known as the Parvocellular pathway
- Sensitive to motion direction
- Ends at the inferior temporal cortex, a region important for recognizing faces
- Also known as the “where/how” pathway
- Ends at the posterior parietal cortex
- Also known as the “who/what” pathway
- Detects depth through binocular disparity
- Sensitive to color

Choose either the Dorsal or Ventral visual pathway for the following

- Also known as the Parvocellular pathway **Ventral**
- Sensitive to motion direction **Dorsal**
- Ends at the inferior temporal cortex, a region important for recognizing faces **Ventral**
- Also known as the “where/how” pathway **Dorsal**
- Ends at the posterior parietal cortex **Dorsal**
- Also known as the “who/what” pathway **Ventral**
- Detects depth through binocular disparity **Dorsal**
- Sensitive to color **Ventral**

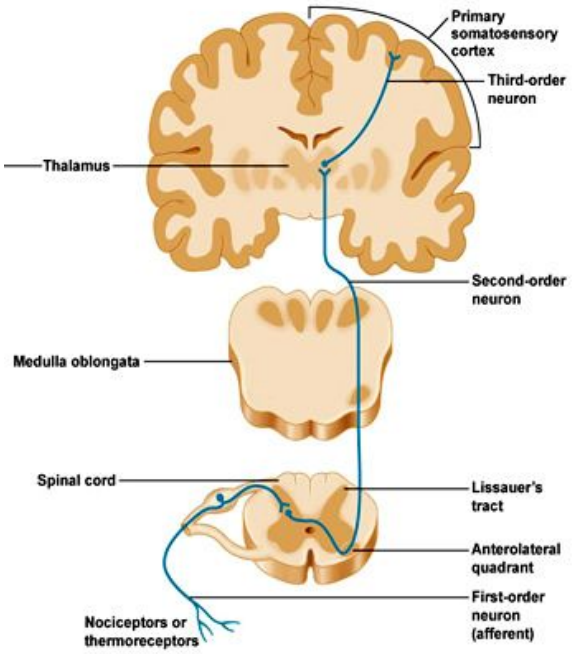
Somatosensory Pathways: the spinothalamic pathway

- Carries (free/encapsulated) nerve ending sensations (hot, cold, sex).
- Sensory fibers enter the spinal cord via the _____ and synapse.
- Fibers ascend and connect with (first/second) order neuron, which crosses to contralateral side and synapses with VPN (_____) of thalamus.
- Nerves are (small/large) and (unmyelinated/myelinated).



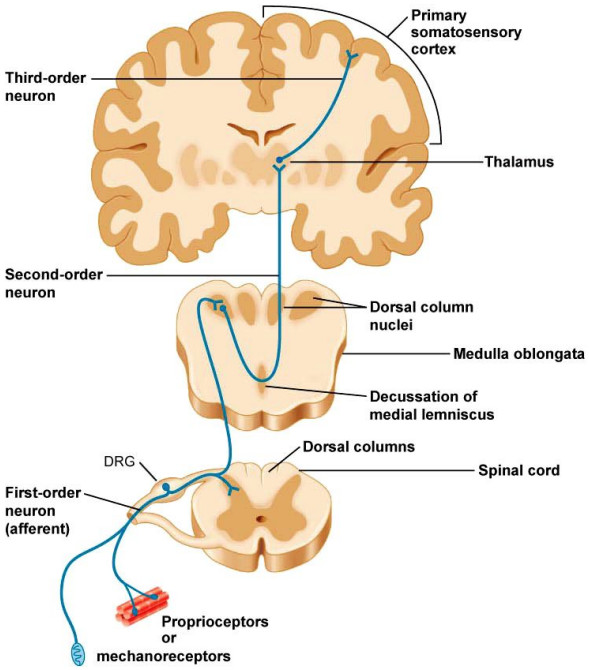
Somatosensory Pathways: the spinothalamic pathway

- Carries (**free**/encapsulated) nerve ending sensations (hot, cold, sex).
- Sensory fibers enter the spinal cord via the **dorsal root** and synapse.
- Fibers ascend and connect with (first/**second**) order neuron, which crosses to contralateral side and synapses with VPN (**Ventral Posterior Nucleus**) of thalamus.
- Nerves are (**small**/large) and (**unmyelinated**/myelinated).



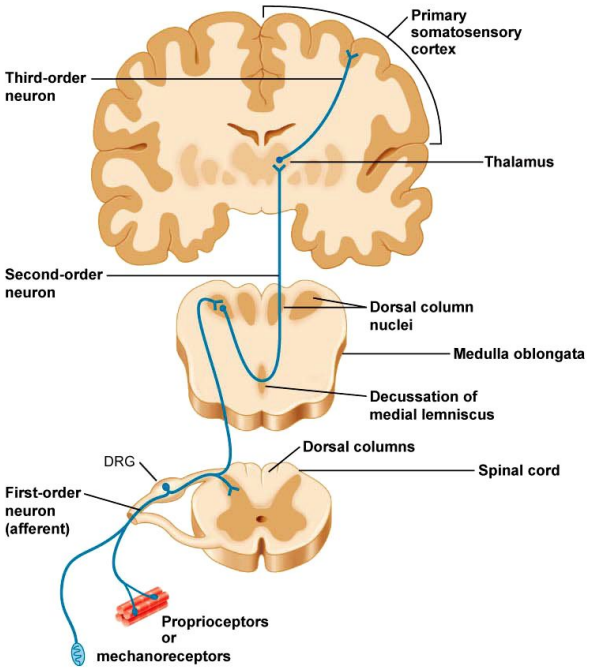
Somatosensory Pathways: the medial lemniscal pathway

- (Free/Encapsulated) nerve ending sensations enters through dorsal root of spinal cord where _____ axon synapses.
- Main fiber ascends on ipsilateral side to the _____.
- Second-order neuron will cross to contralateral side through the brainstem and synapse on VPN.
- Nerves are (small/large) and (unmyelinated/myelinated).



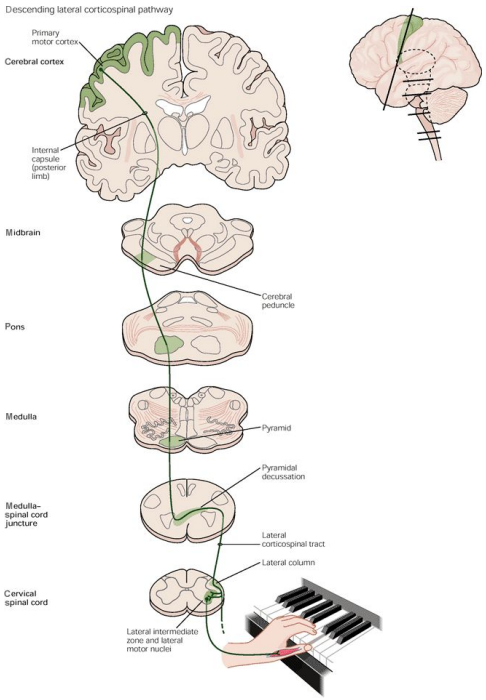
Somatosensory Pathways: the medial lemniscal pathway

- (Free/**Encapsulated**) nerve ending sensations enters through dorsal root of spinal cord where **collateral** axon synapses.
- Main fiber ascends on ipsilateral side to the **medulla**.
- Second-order neuron will cross to contralateral side through the brainstem and synapse on VPN.
- Nerves are (small/**large**) and (unmyelinated/**myelinated**).



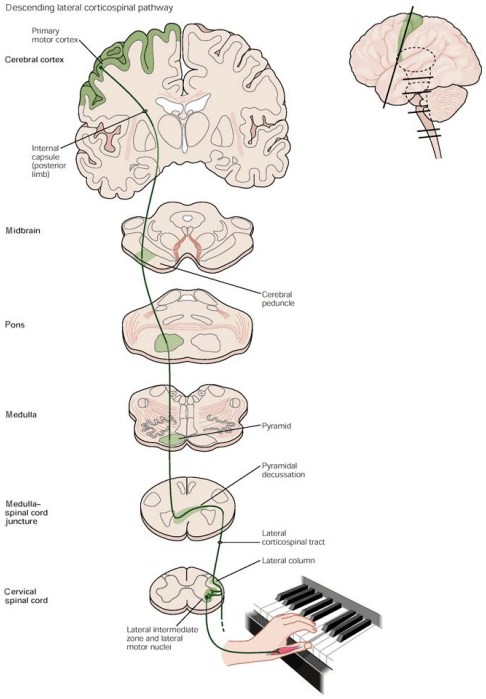
Motor Pathways: the corticospinal tract

- Controls (involuntary/voluntary) movement on contralateral side
- (Unmyelinated/myelinated) tract and designed for what?
- Crosses over in pons to synapse on _____ nerve to face.



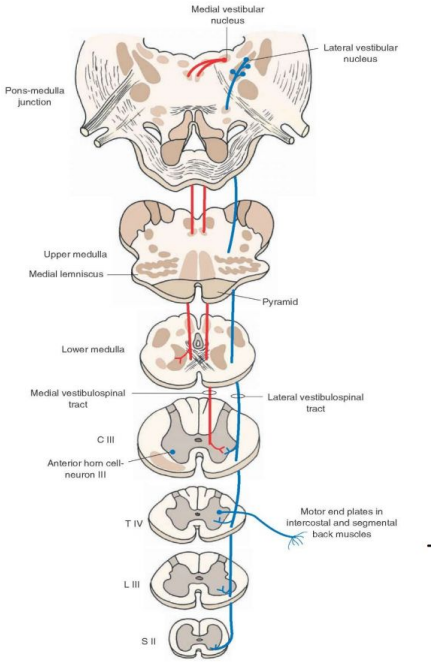
Motor Pathways: the corticospinal tract

- Controls (involuntary/**voluntary**) movement on contralateral side
- (Unmyelinated/**myelinated**) tract and designed for what? **Fine motor movements, distal muscles (i.e. hand movements in playing piano)**



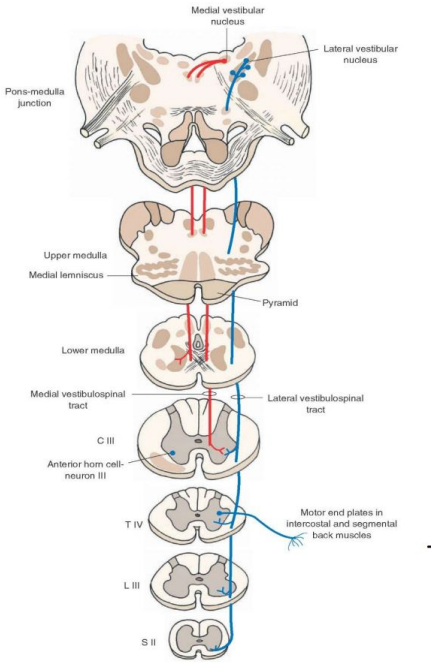
Motor Pathways: the ventromedial tract?

- Bilateral and (ipsi/contra)lateral
- What is an important note about the parts of the body and the movements the ventromedial tracts control?



Motor Pathways: the ventromedial tract?

- Bilateral and (**ipsi**/contra)lateral
- What is an important note about the parts of the body and the movements the ventromedial tracts control? **Primarily controls movements where one side cannot move without the other.**



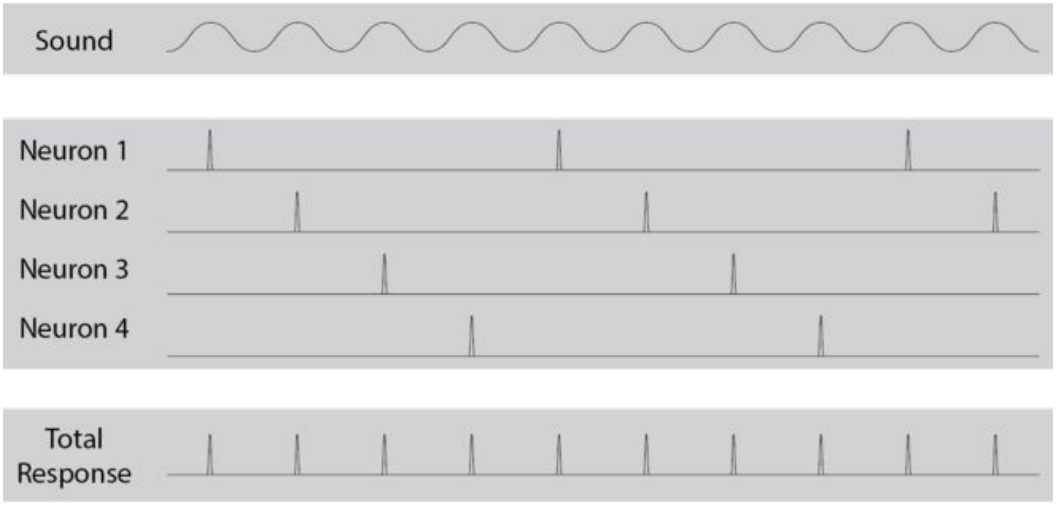
Describe across-fiber coding

- Across-fiber coding involves (a single/multiple) neuron(s) encoding patterns of activity.
- Does this patterning exist for vision?
- What about for audition?
- What about for somatosensory modalities?

Describe across-fiber coding

- Across-fiber coding involves (a single/**multiple**) neuron(s) encoding patterns of activity.
- Does this patterning exist for vision? **Yes**
- What about for audition? **Yes**
- What about for somatosensory modalities? **Yes**

Across-Fiber Coding



What do you know about these NTs?

- 5HT:
- Substance P:
- Dopamine:
- Glutamate:
- ACh:
- GABA:
- Endorphin:

What do you know about these NTs?

- 5HT: **low levels can lead to aggression, depression; are reuptaken by presynaptic cell; ends REM sleep**
- Substance P: **released in pain responses**
- Dopamine: **associated with reward; released by nucleus accumbens; low levels in basal ganglia implied in Parkinson's**
- Glutamate: **excitatory; involved in LTP**
- ACh: **released in REM sleep; released during muscle contraction; low levels implied in Alzheimer's; opponency with GABA**
- GABA: **inhibitory, released in deep sleep, opponency with ACh**
- Endorphin: **released by PAG to counteract pain**