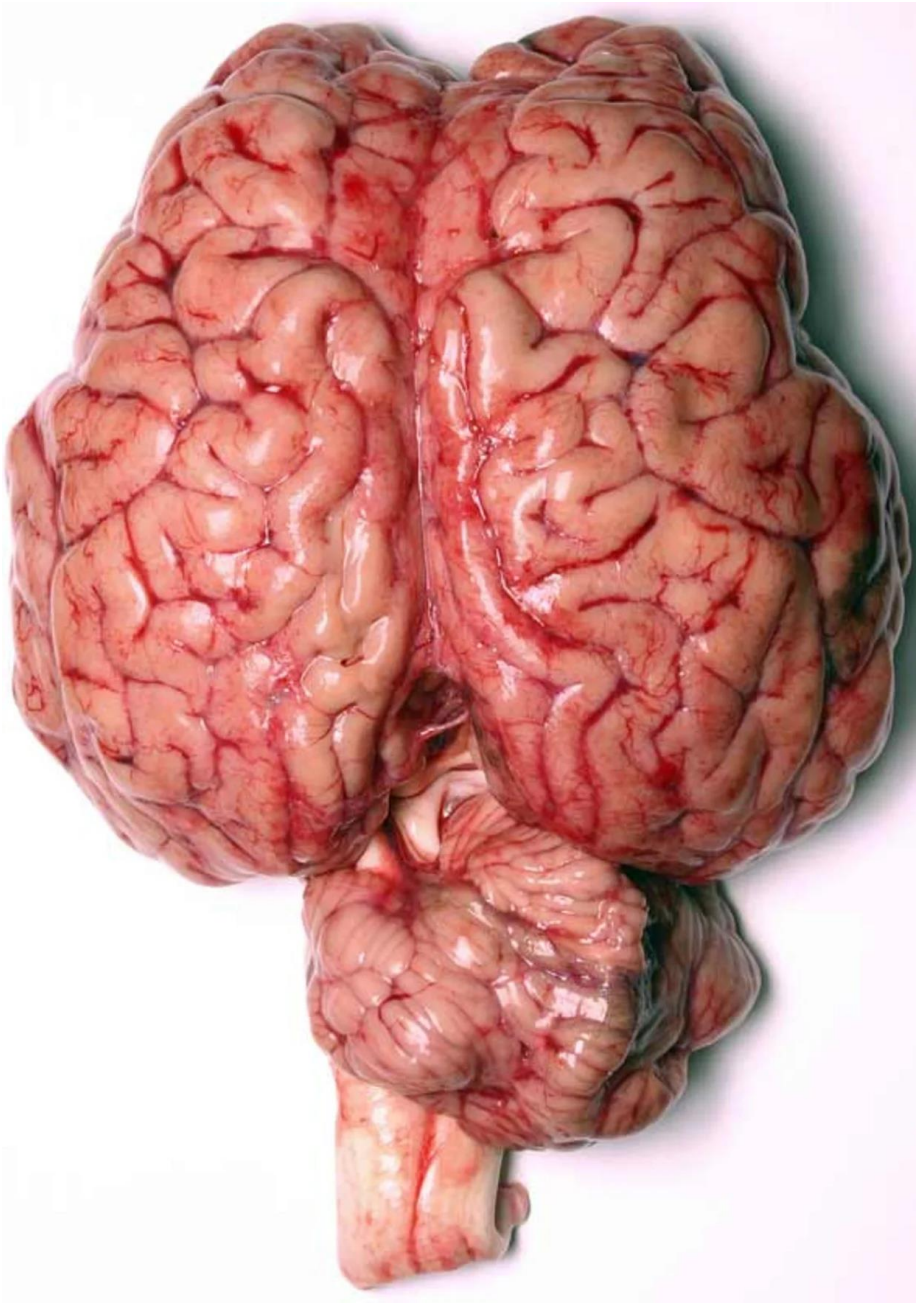

A summary of the Nervous system

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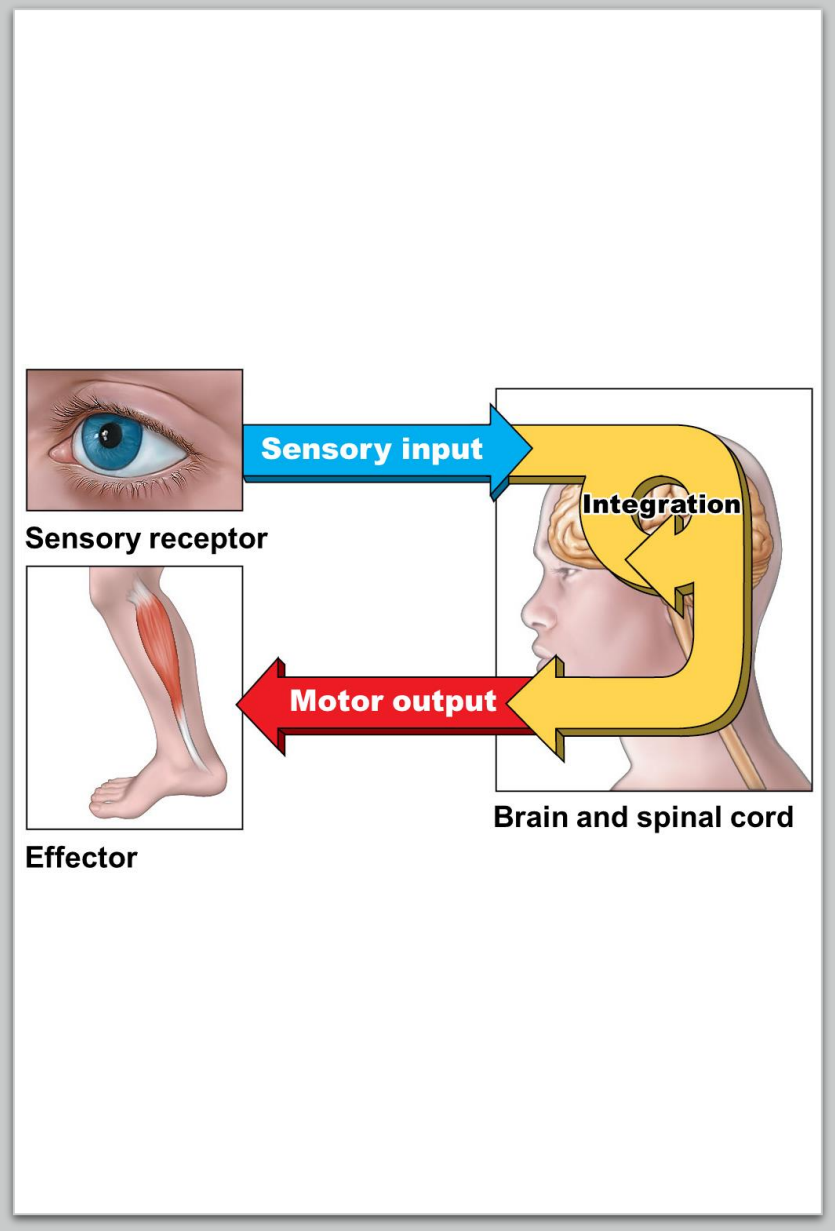
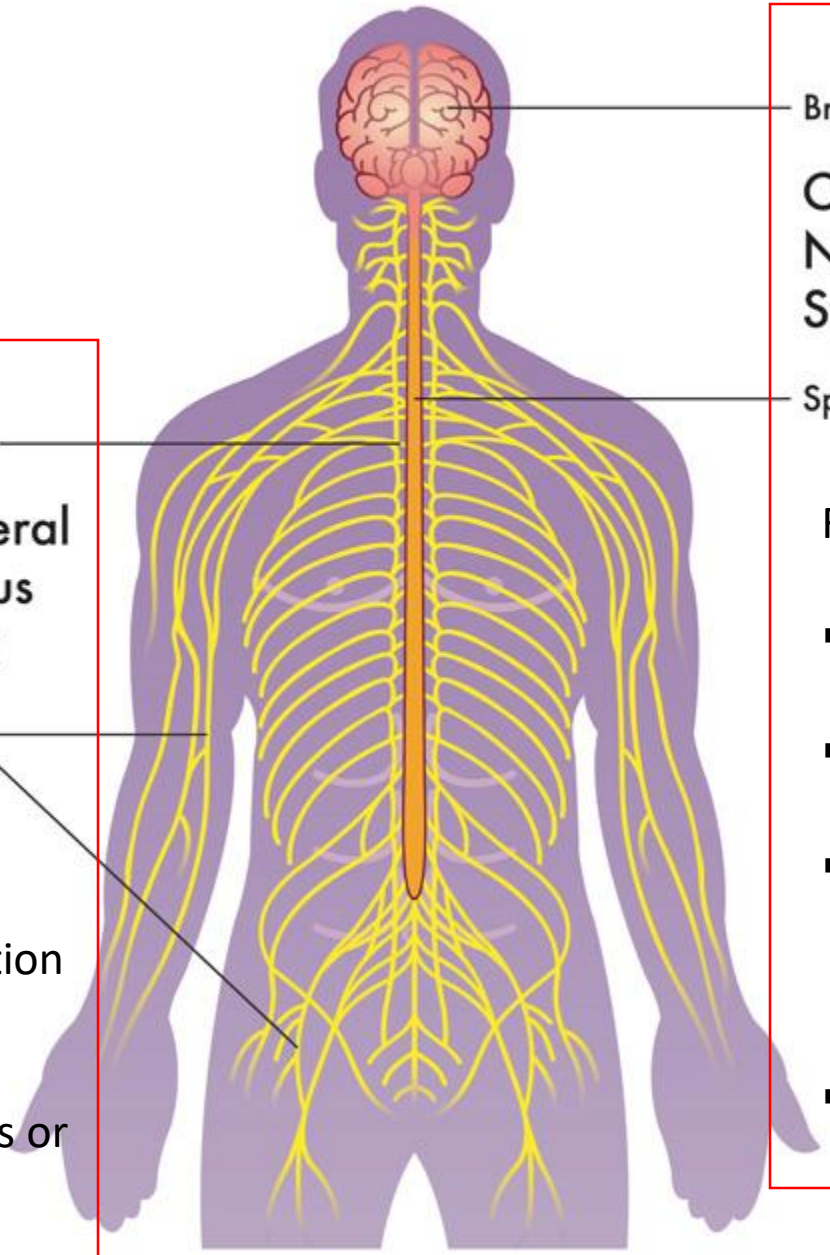
School of Anatomical Sciences

Functions of the Nervous System

1. Sensory input—gathering information
   - Sensory receptors monitor changes, called *stimuli*, occurring inside and outside the body
2. Integration
   - Nervous system processes and interprets sensory input and decides whether action is needed
3. Motor output
   - A response, or effect, activates muscles or glands



The Nervous System

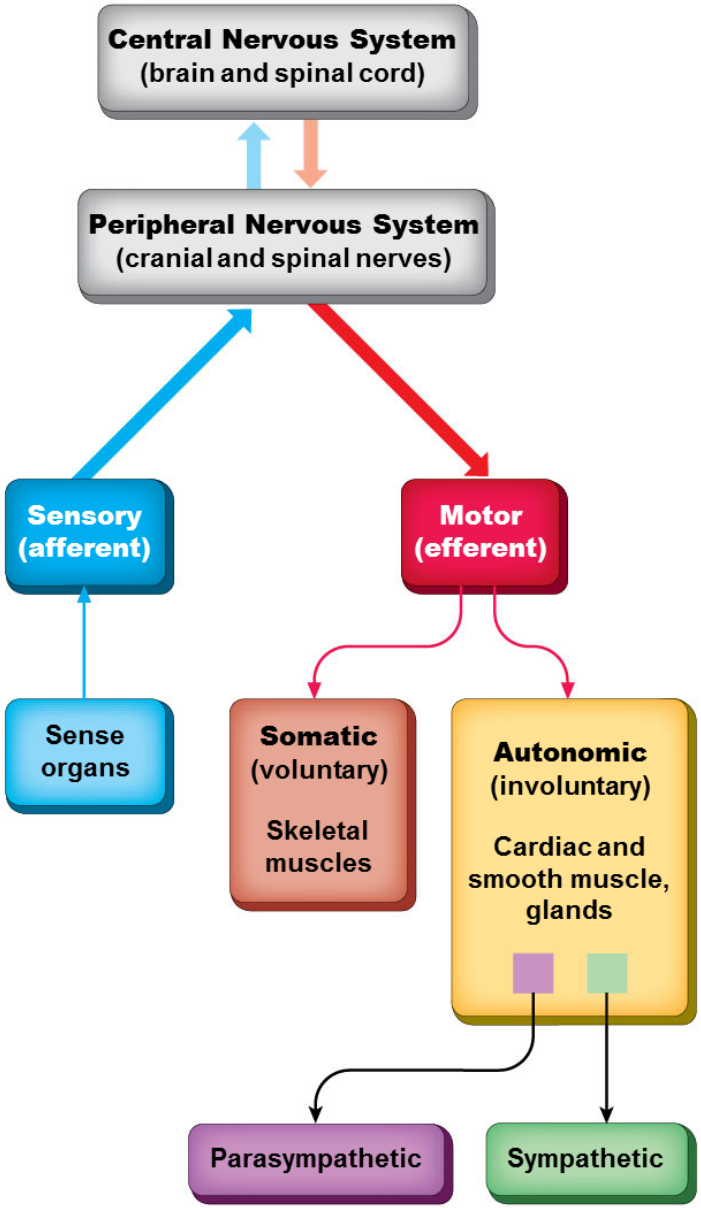


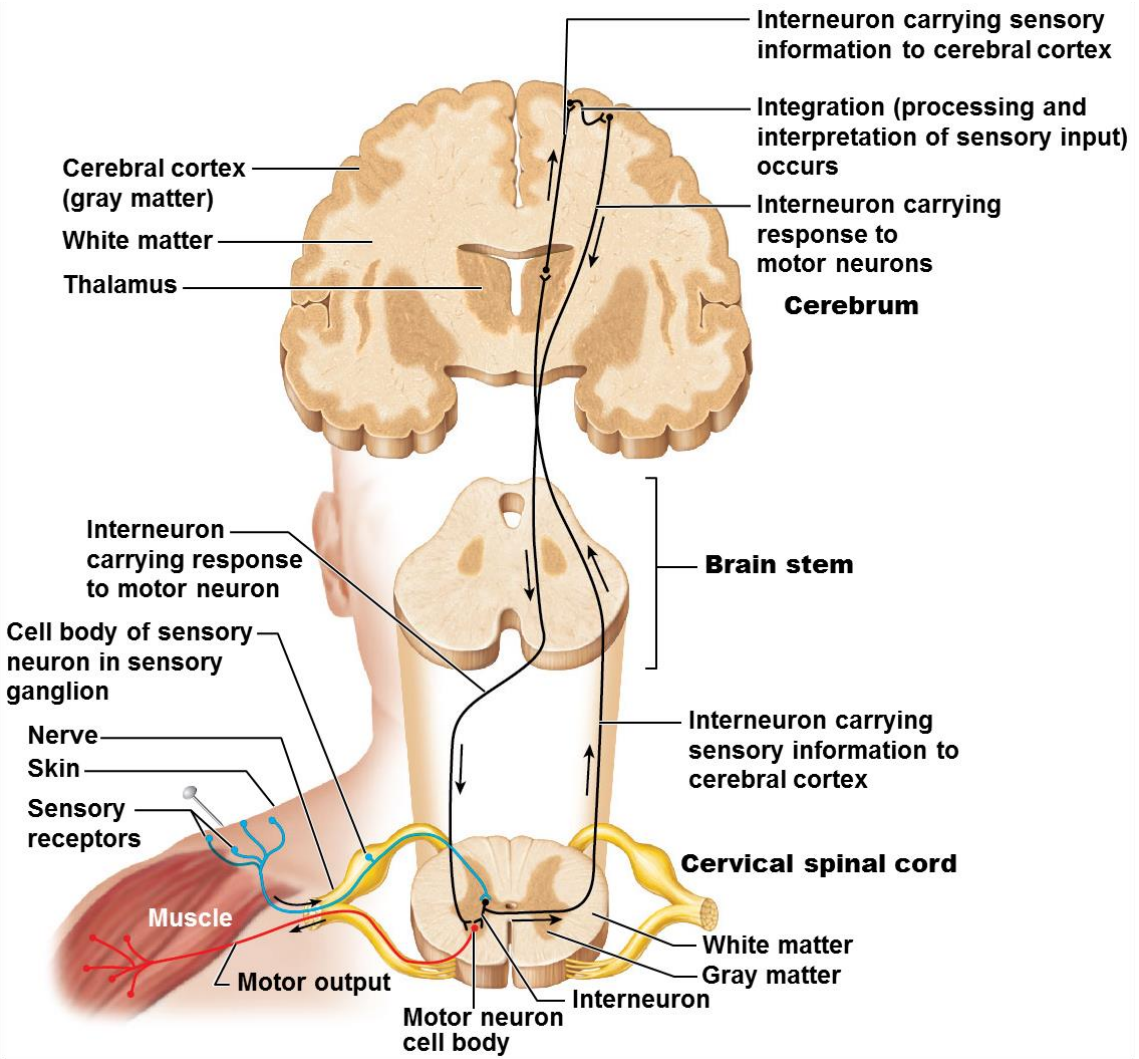
Functions:

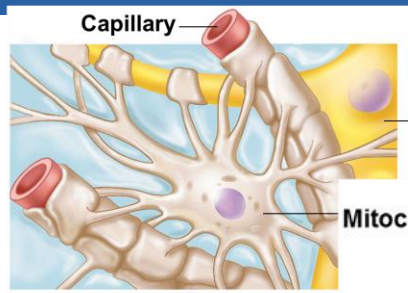
- Integration
- Command centre
- Interprets incoming sensory information
- Issues outgoing instructions

Functions:

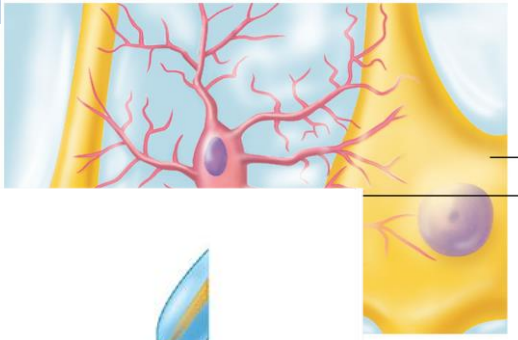
- Serves as communication lines among sensory organs, the brain and spinal cord, and glands or muscles



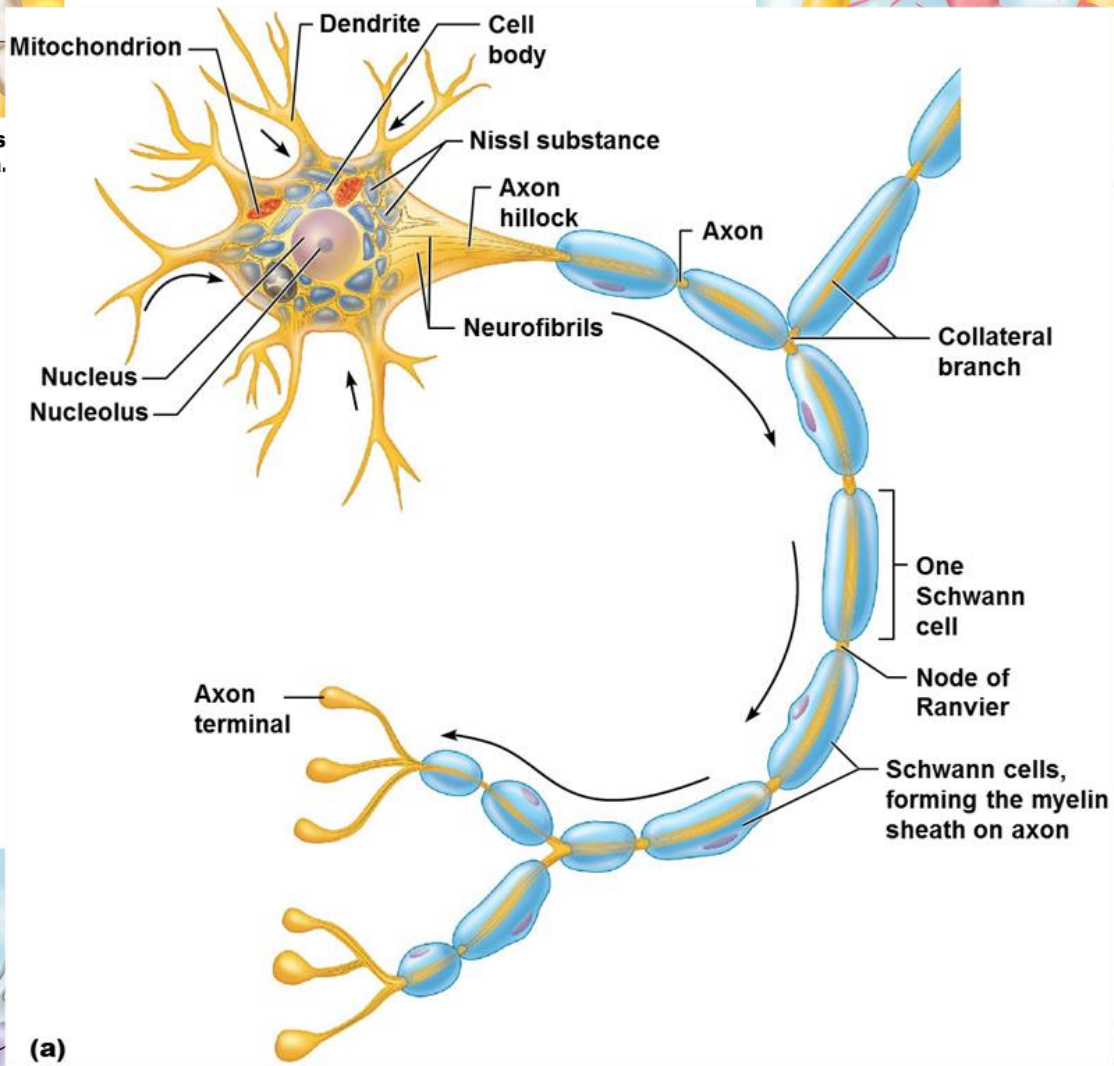




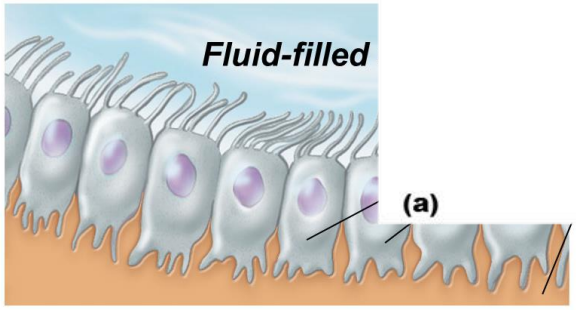
(a) Astrocytes are the mos
and versatile neuroglia.



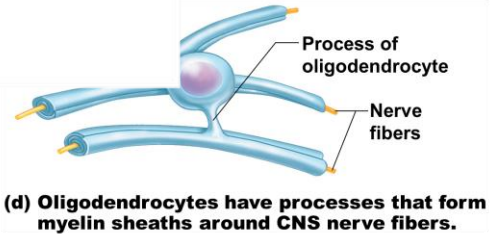
phagocytes that



spinal cord tissue



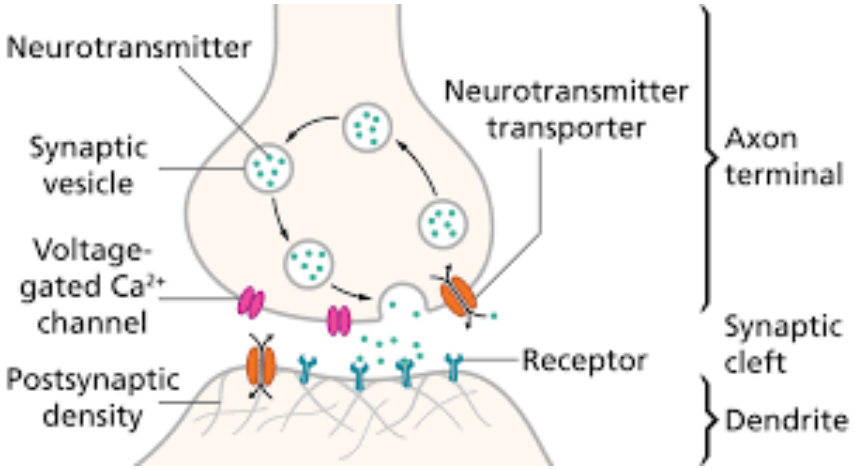
(c) Ependymal cells line cerebrospinal fluid–filled cavities.

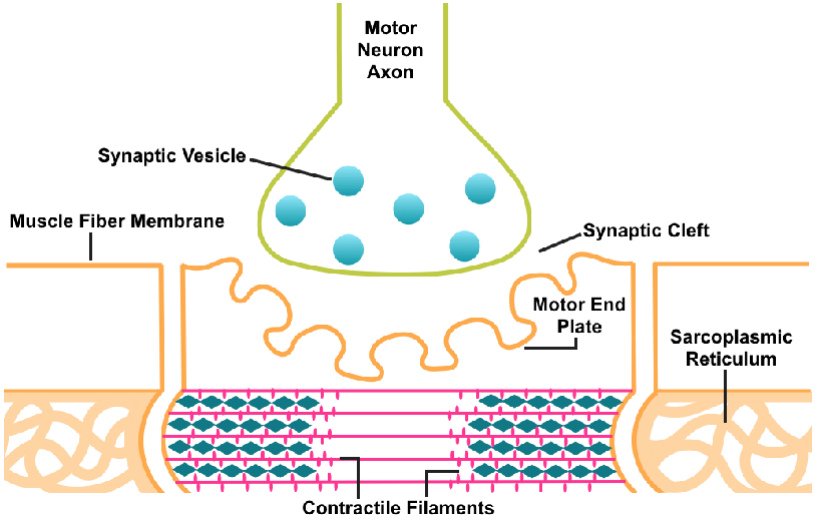


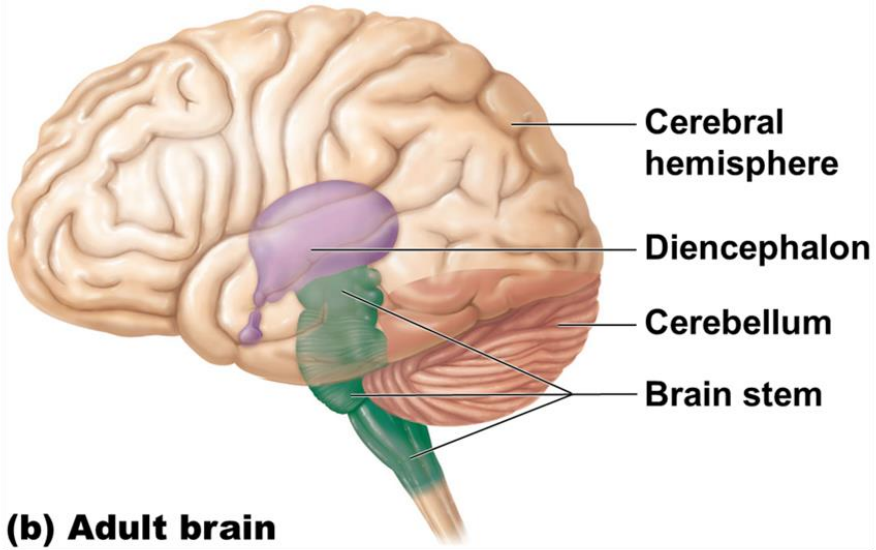
(d) Oligodendrocytes have processes that form myelin sheaths around CNS nerve fibers.

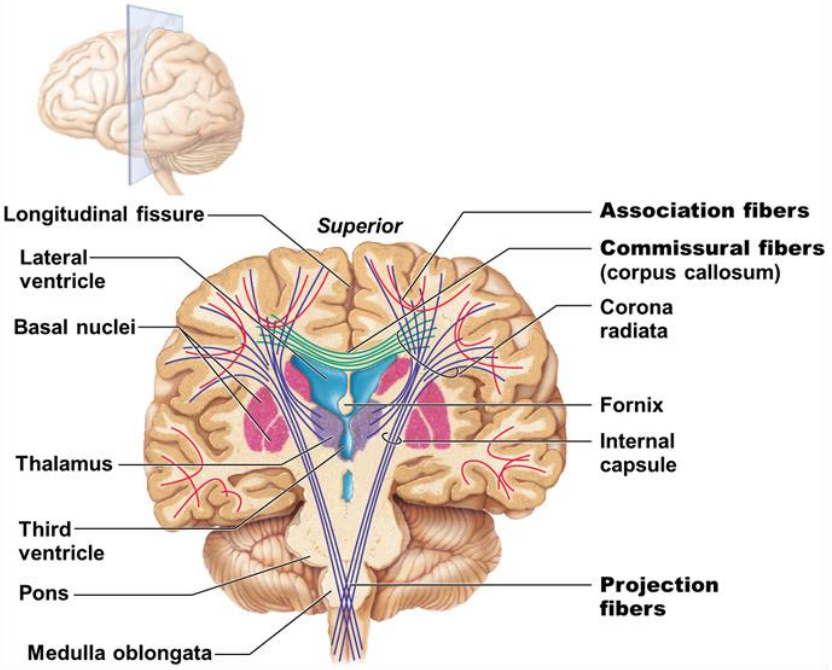
Synaptic cleft—gap between axon terminals and the next neuron

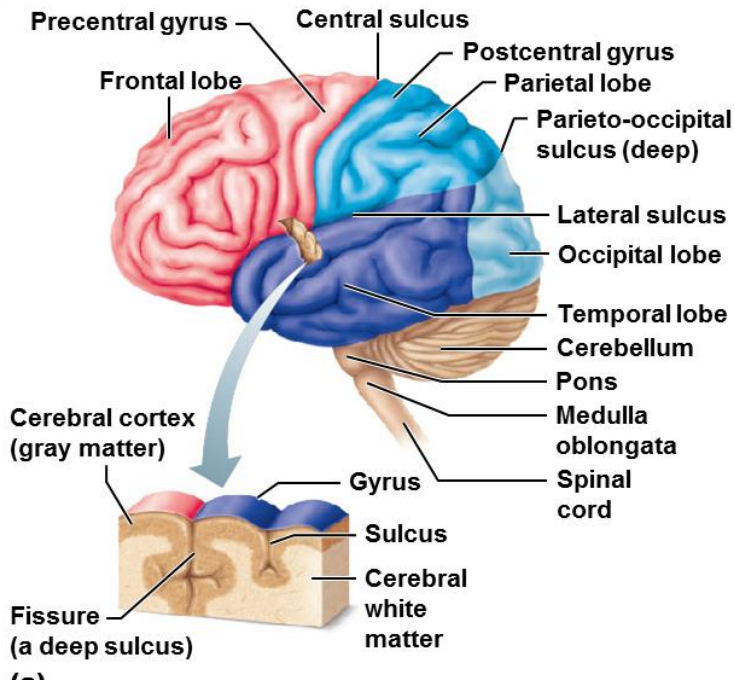
Synapse—functional junction between nerves where a nerve impulse is transmitted






Cerebral hemisphere
Diencephalon
Cerebellum
Brain stem
(b) Adult brain


Longitudinal fissure
Superior
Association fibers
Lateral ventricle
Commissural fibers (corpus callosum)
Basal nuclei
Corona radiata
Fornix
Internal capsule
Thalamus
Third ventricle
Pons
Projection fibers
Medulla oblongata

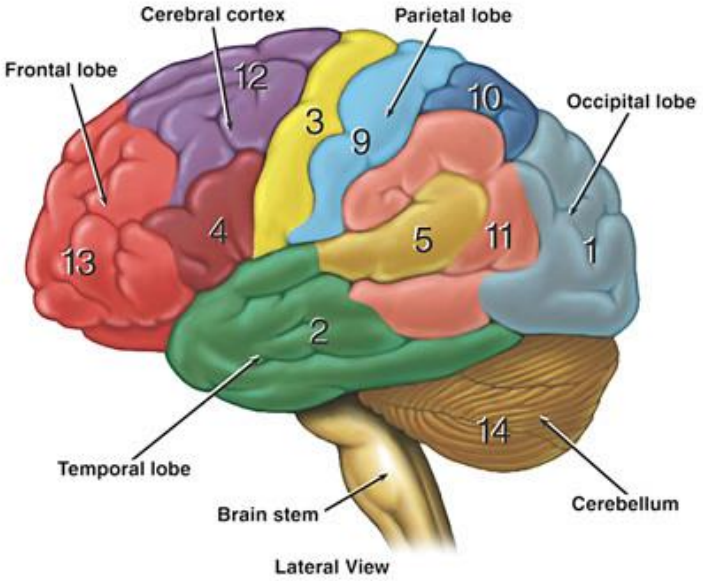

Precentral gyrus
Central sulcus
Postcentral gyrus
Frontal lobe
Parietal lobe
Parieto-occipital sulcus (deep)
Lateral sulcus
Occipital lobe
Temporal lobe
Cerebellum
Pons
Medulla oblongata
Spinal cord
Cerebral cortex (gray matter)
Gyrus
Sulcus
Cerebral white matter
Fissure (a deep sulcus)

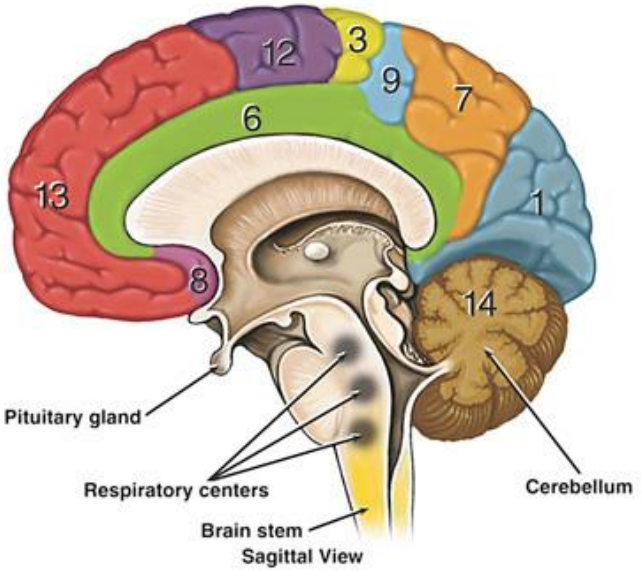
Functional Areas of the Cerebral Cortex

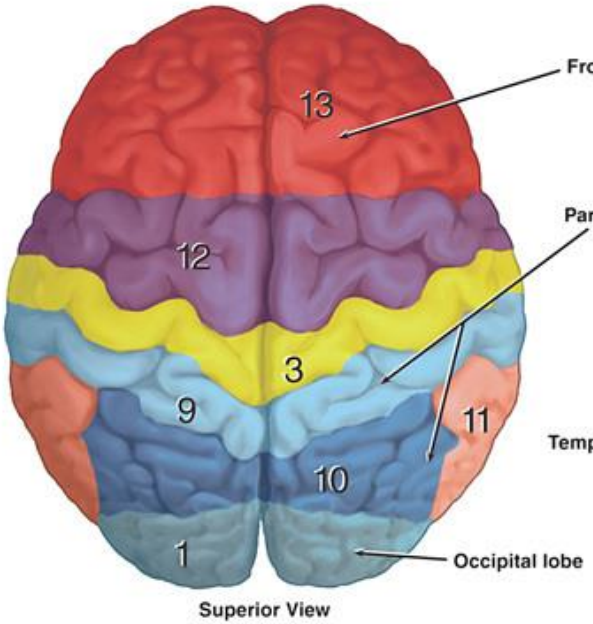
1. **Visual Area:**
   Sight
   Image recognition
   Image perception
2. **Association Area**
   Short-term memory
   Equilibrium
   Emotion
3. **Motor Function Area**
   Initiation of voluntary muscles
4. **Broca's Area**
   Muscles of speech
5. **Auditory Area**
   Hearing
6. **Emotional Area**
   Pain
   Hunger
   "Fight or flight" response
7. **Sensory Association Area**
8. **Olfactory Area**
   Smelling
9. **Sensory Area**
   Sensation from muscles and skin
10. **Somatosensory Association Area**
    Evaluation of weight, texture, temperature, etc. for object recognition
11. **Wernicke's Area**
    Written and spoken language comprehension
12. **Motor Function Area**
    Eye movement and orientation
13. **Higher Mental Functions**
    Concentration
    Planning
    Judgment
    Emotional expression
    Creativity
    Inhibition

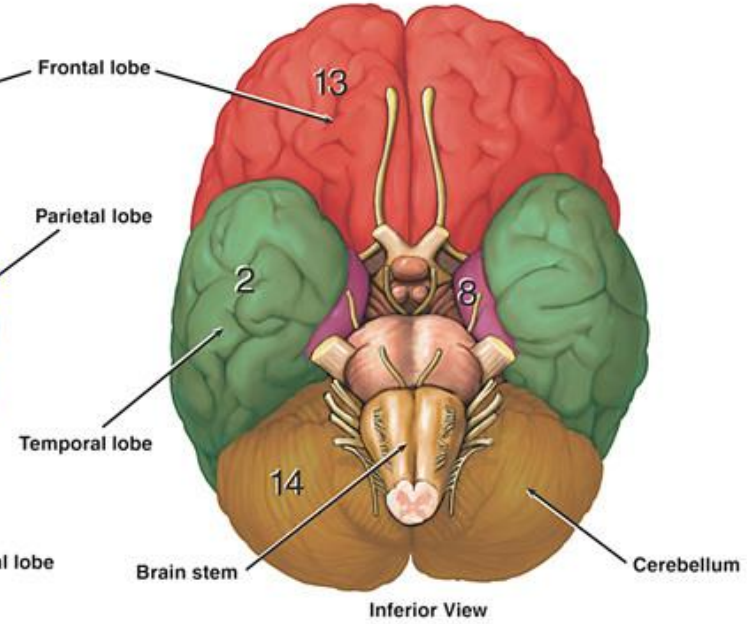
Functional Areas of the Cerebellum

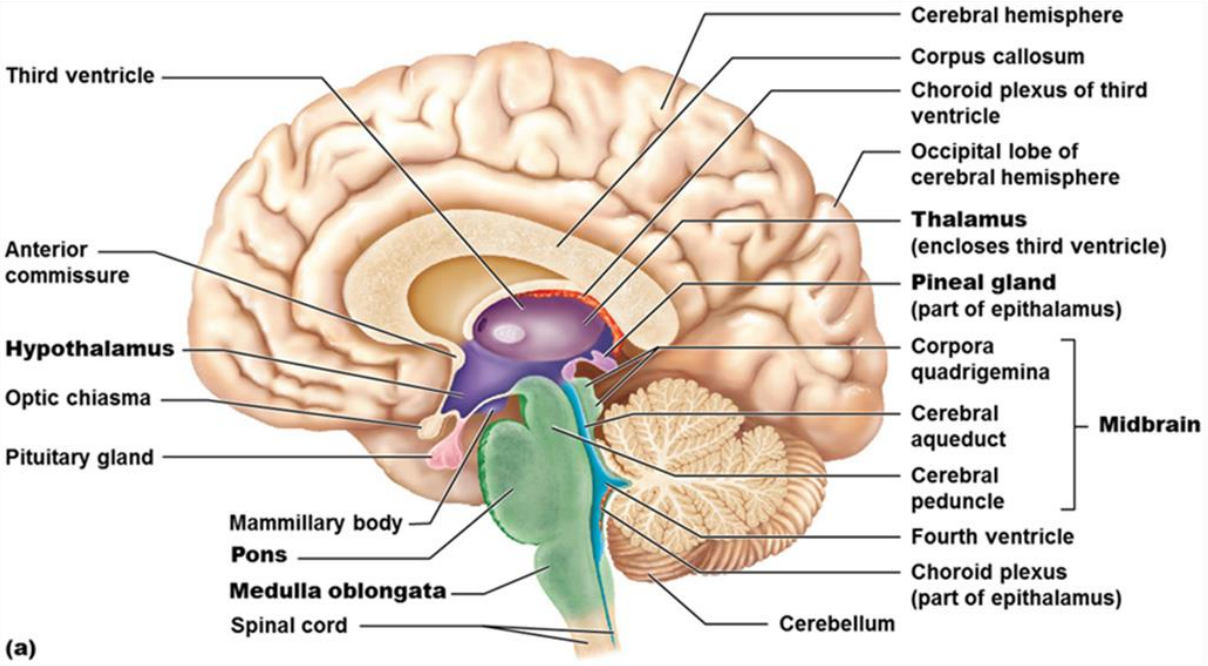
14. **Motor Functions**
    Coordination of movement
    Balance and equilibrium
    Posture

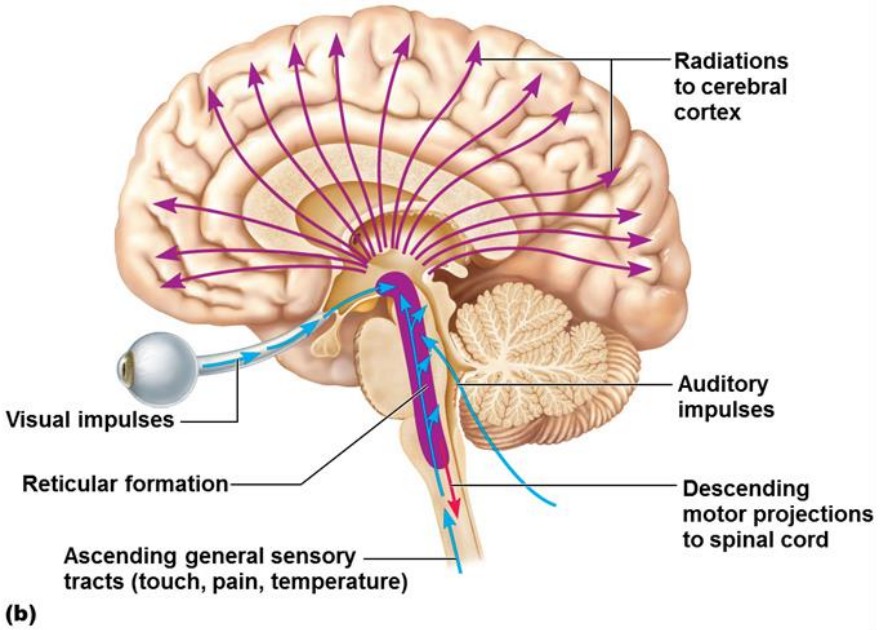












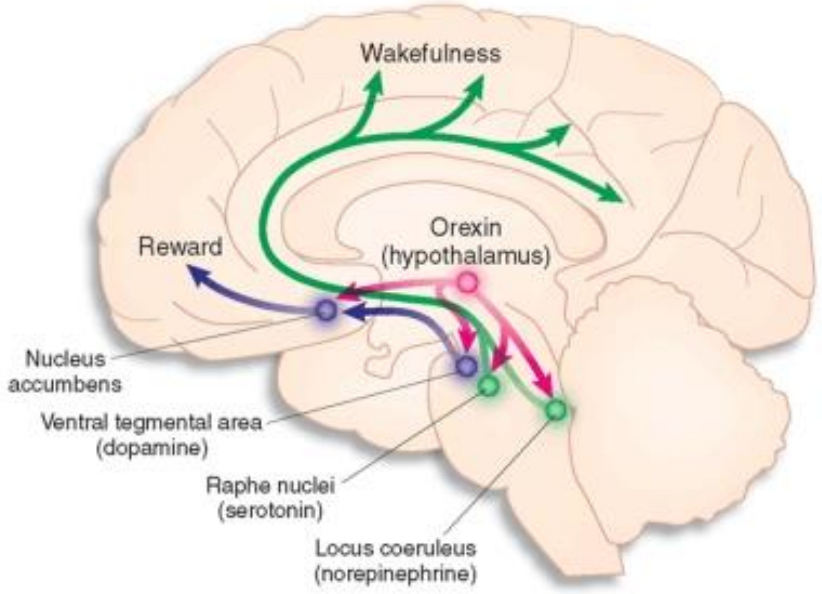
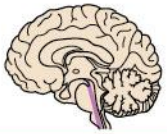
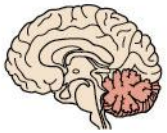


Table 7.1 Functions of Major Brain Regions

Region	Function
Cerebral hemispheres	
	**Cortex: Gray matter:** • Localizes and interprets sensory inputs • Controls voluntary and skilled skeletal muscle activity • Acts in intellectual and emotional processing **Basal nuclei:** • Subcortical motor centers help control skeletal muscle movements (see Figure 7.14)
Diencephalon	
	**Thalamus:** • Relays sensory impulses to cerebral cortex • Relays impulses between cerebral motor cortex and lower motor centers • Involved in memory **Hypothalamus:** • Chief integration center of autonomic (involuntary) nervous system • Regulates body temperature, food intake, water balance, and thirst • Regulates hormonal output of anterior pituitary gland and acts as an endocrine organ (producing ADH and oxytocin)
	**Limbic system—A functional system:** • Includes cerebral and diencephalon structures (e.g., hypothalamus and anterior thalamic nuclei) • Mediates emotional response; involved in memory processing

Table 7.1 Functions of Major Brain Regions (2 of 2)

Table 7.1 Functions of Major Brain Regions (*continued*)

Region	Function
Cerebral hemispheres	
Brain stem	
	**Midbrain:** • Contains visual and auditory reflex centers • Contains subcortical motor centers • Contains nuclei for cranial nerves III and IV; contains projection fibers (e.g., fibers of the pyramidal tracts) **Pons:** • Relays information from the cerebrum to the cerebellum • Cooperates with the medullary centers to control respiratory rate and depth • Contains nuclei of cranial nerves V–VII; contains projection fibers **Medulla oblongata:** • Relays ascending sensory pathway impulses from skin and proprioceptors • Contains nuclei controlling heart rate, blood vessel diameter, respiratory rate, vomiting, etc. • Relays sensory information to the cerebellum • Contains nuclei of cranial nerves VIII–XII; contains projection fibers • Site of crossover of pyramids
	**Reticular formation—A functional system:** • Maintains cerebral cortical alertness; filters out repetitive stimuli • Helps regulate skeletal and visceral muscle activity
Cerebellum	
	**Cerebellum:** • Processes information from cerebral motor cortex, proprioceptors, and visual and equilibrium pathways • Provides "instructions" to cerebral motor cortex and subcortical motor centers, resulting in smooth, coordinated skeletal muscle movements • Responsible for proper balance and posture

Thank you!

Nuclei and tracts