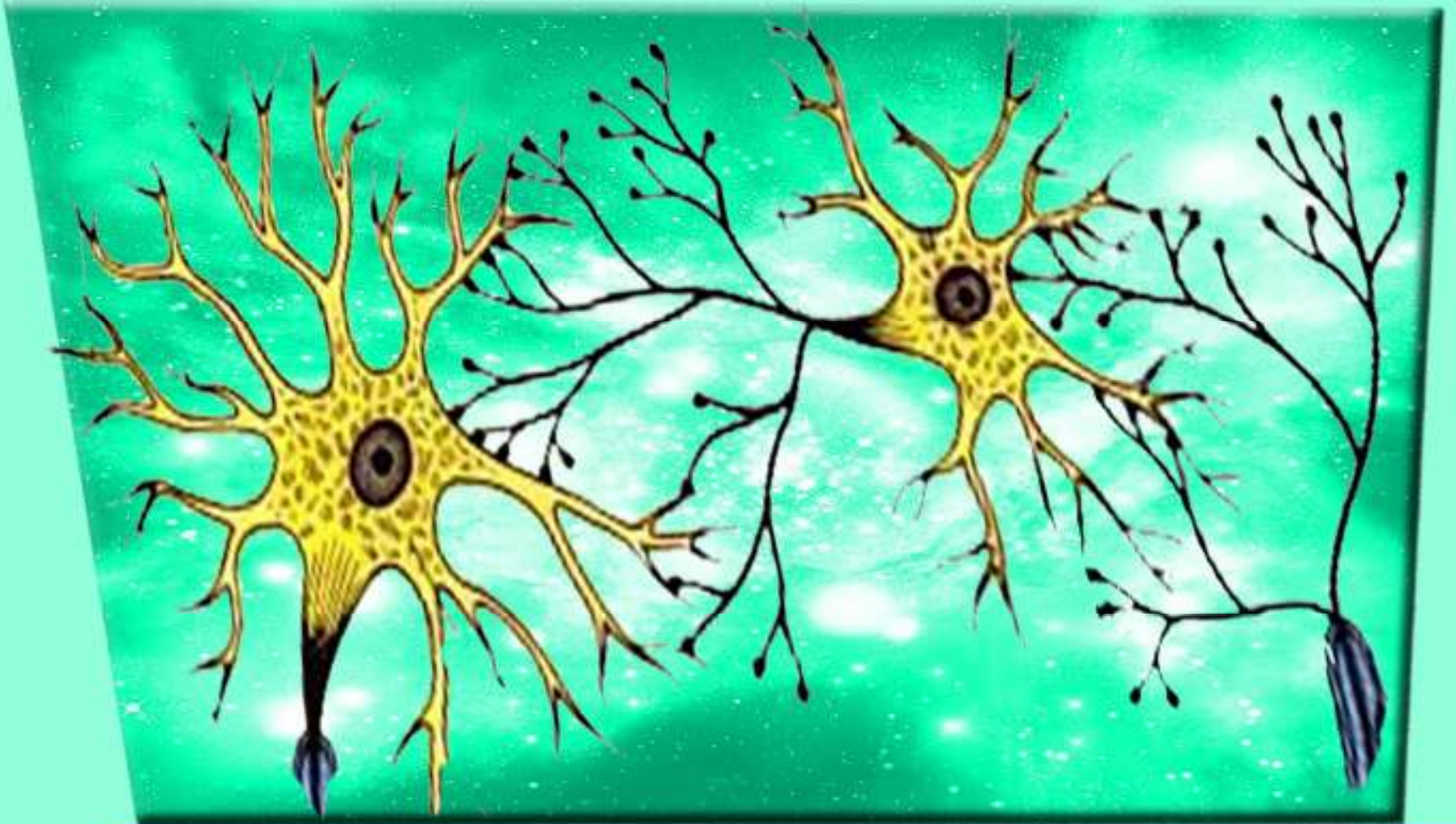


Introduction to Health Science



The Nervous System (Regulatory System)

The Basic Functions of the Nervous System

- **Sensation**

- The ability of sensory nerves to detect stimuli and send a message in the form of impulses to the CNS (central nervous system-brain and spinal cord)
- What are some stimuli that can be detected?
- Pressure, Temperature changes, Taste, Smell, Light



Integration

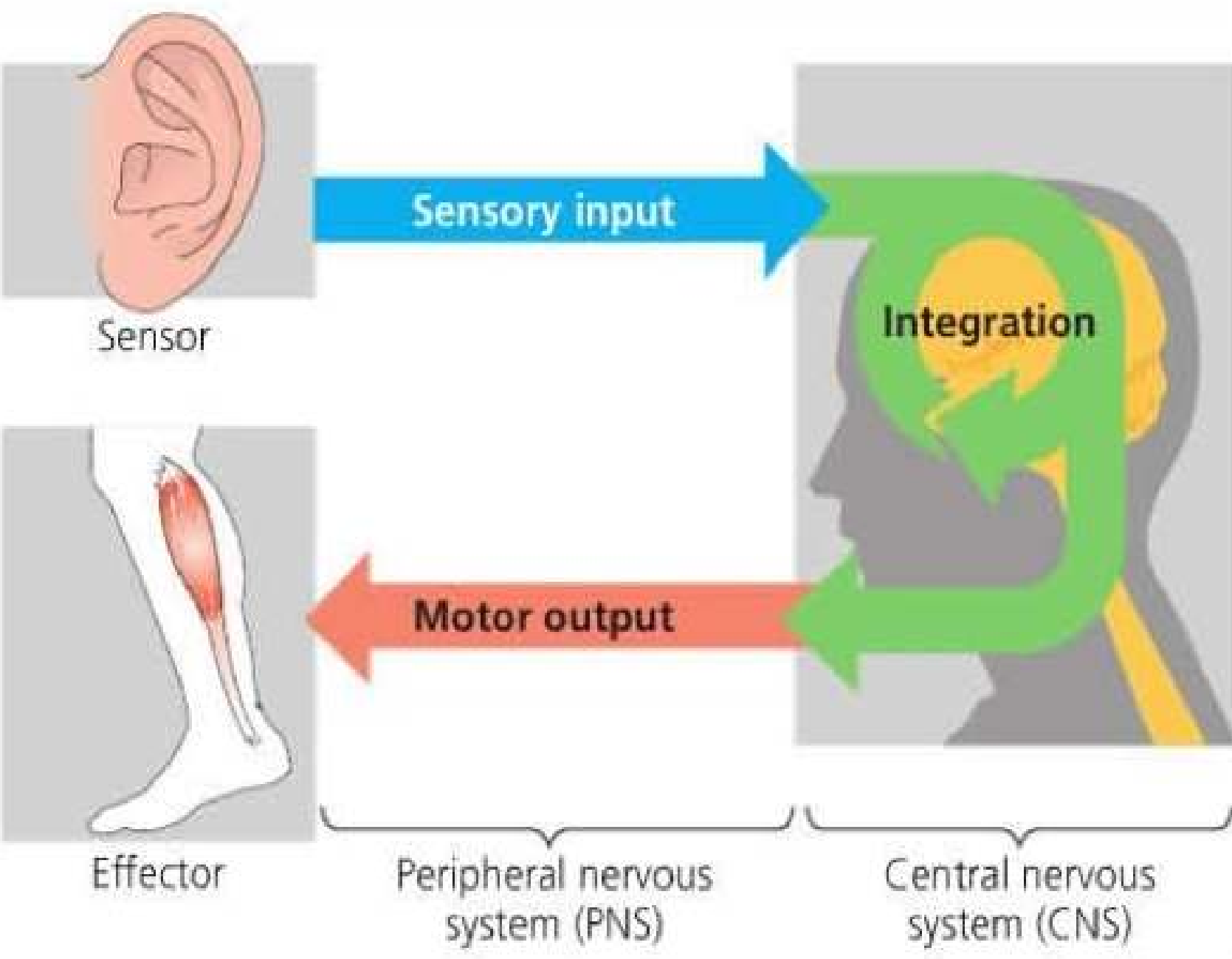
- **The CNS receives and interprets sensory stimuli from the body and determines an appropriate response to those stimuli.**



Movement



- **The ability of the CNS to send impulses through motor nerves to carry out the response**
- **What type of actions can occur?**
- **Muscle movement**
- **Secretion of hormones from glands**



Sensor

Sensory input

Integration

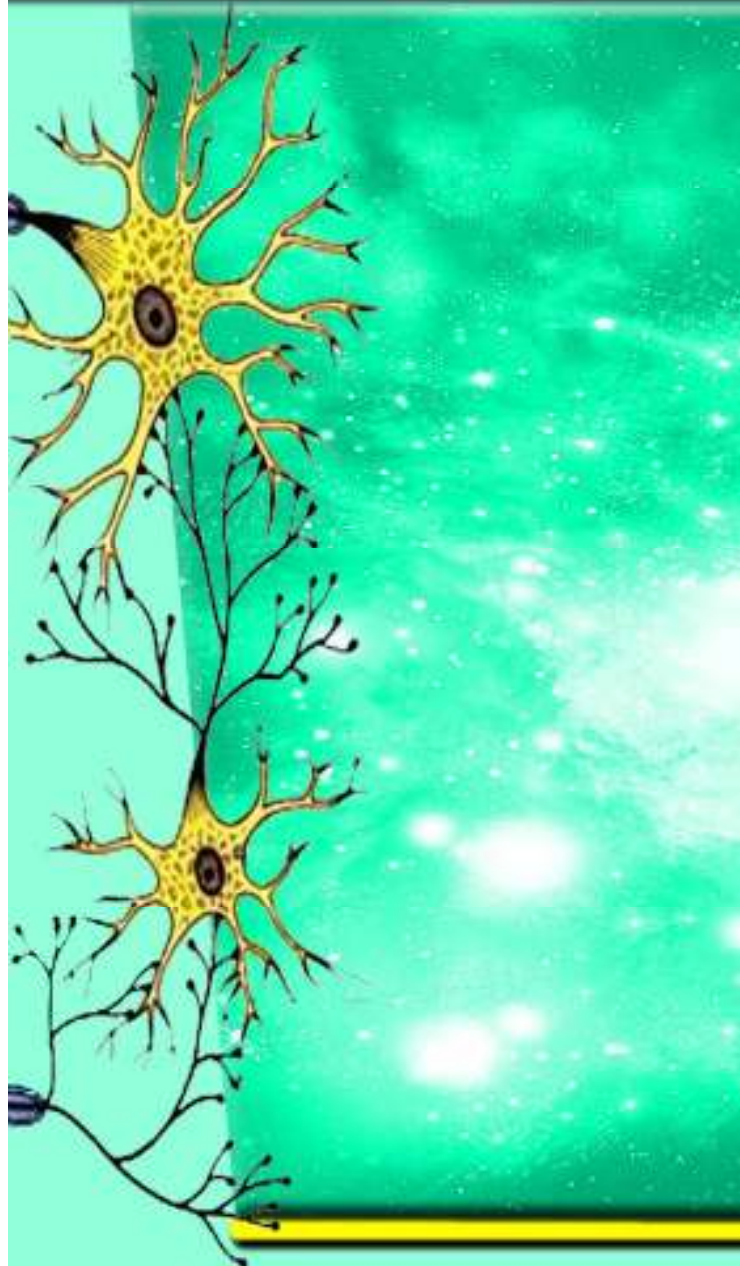
Motor output

Effector

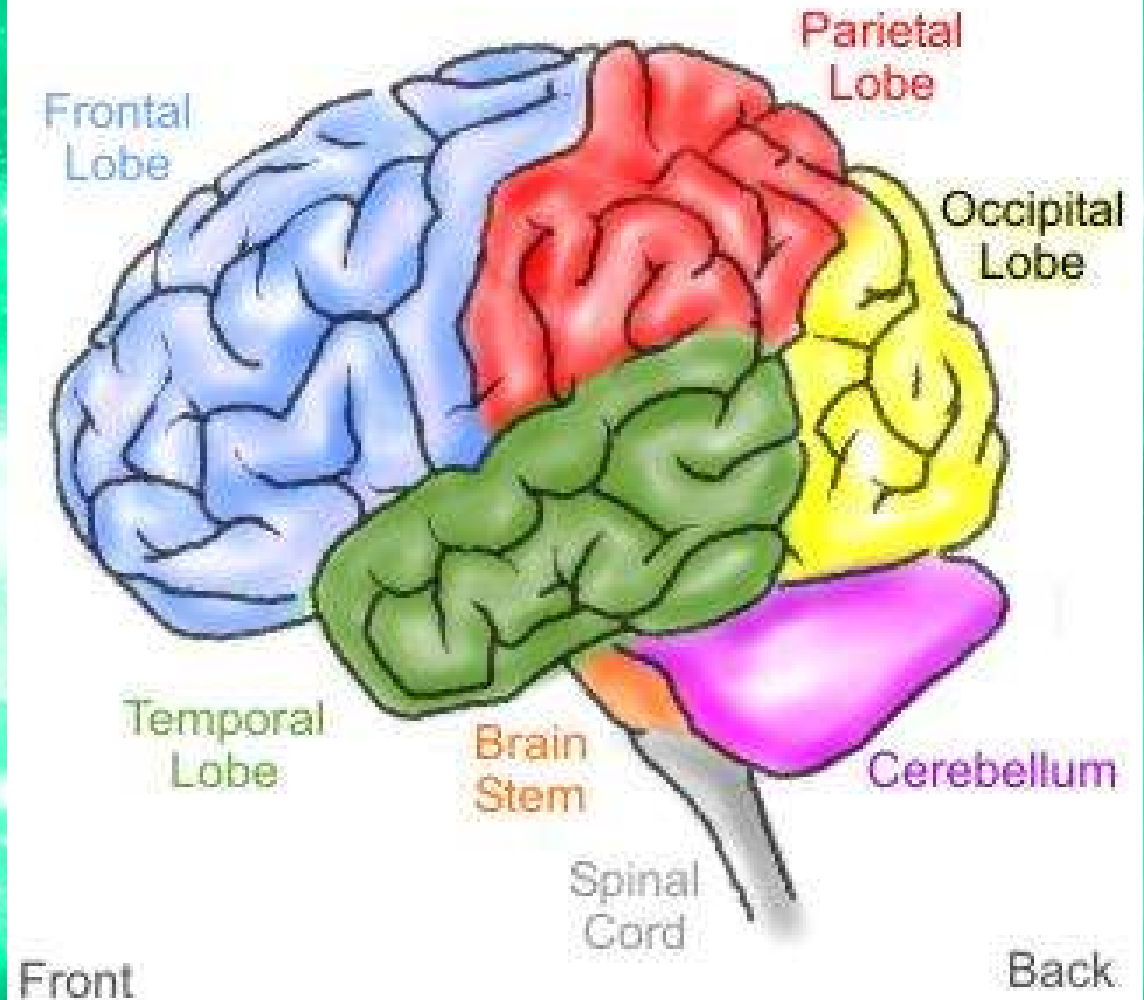
Peripheral nervous system (PNS)

Central nervous system (CNS)

The Basic Structures of the Nervous System



Regions of the Human Brain:



Nerves



- **Nerves (neurons) are the basic units of structure and function for the nervous system.**
- **Nerves are capable of sending electrical messages called impulses.**
- **There are two main types of nerves:**
 - **Sensory nerves**
 - **Motor nerves**

Types of Nerves

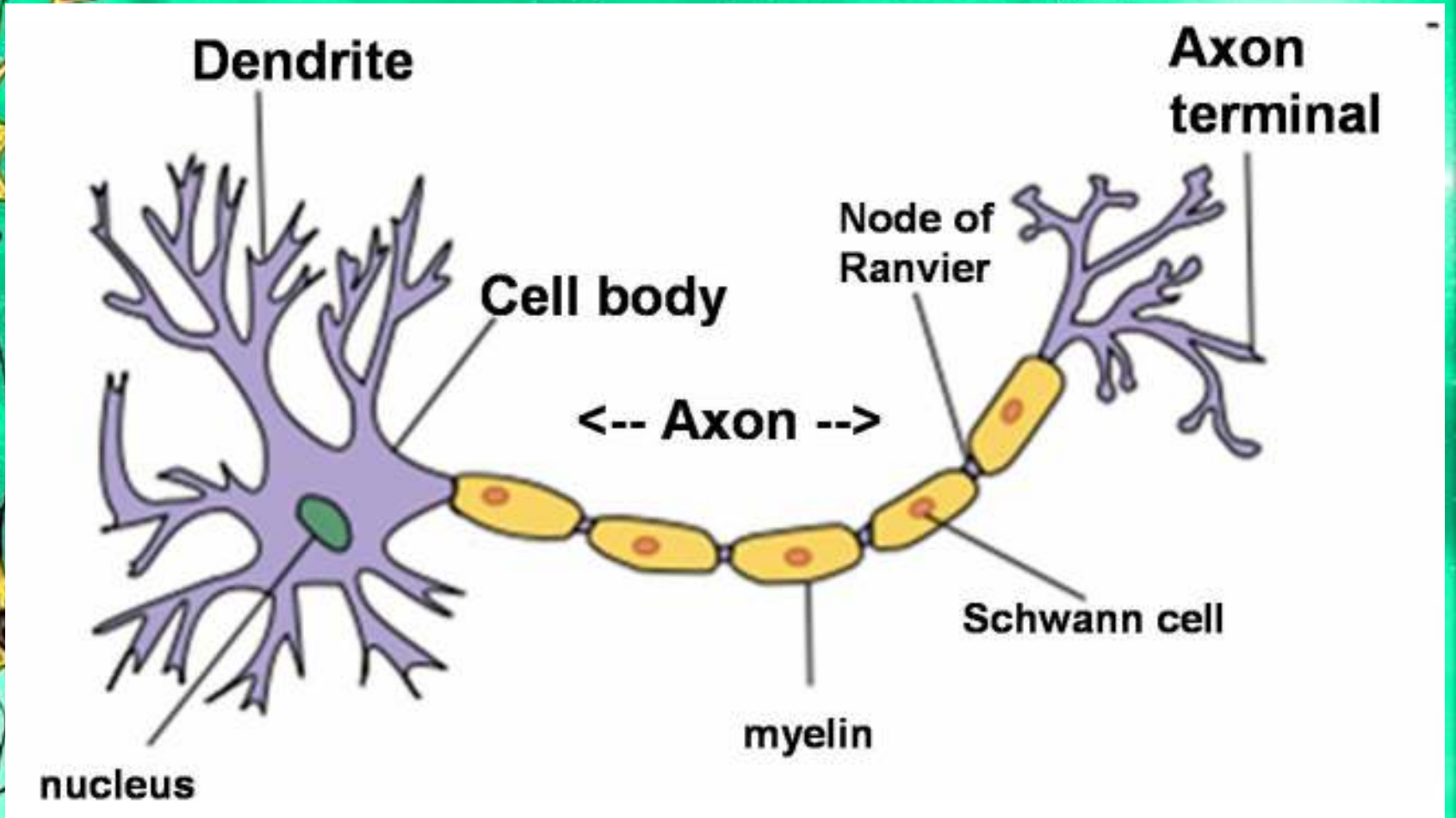


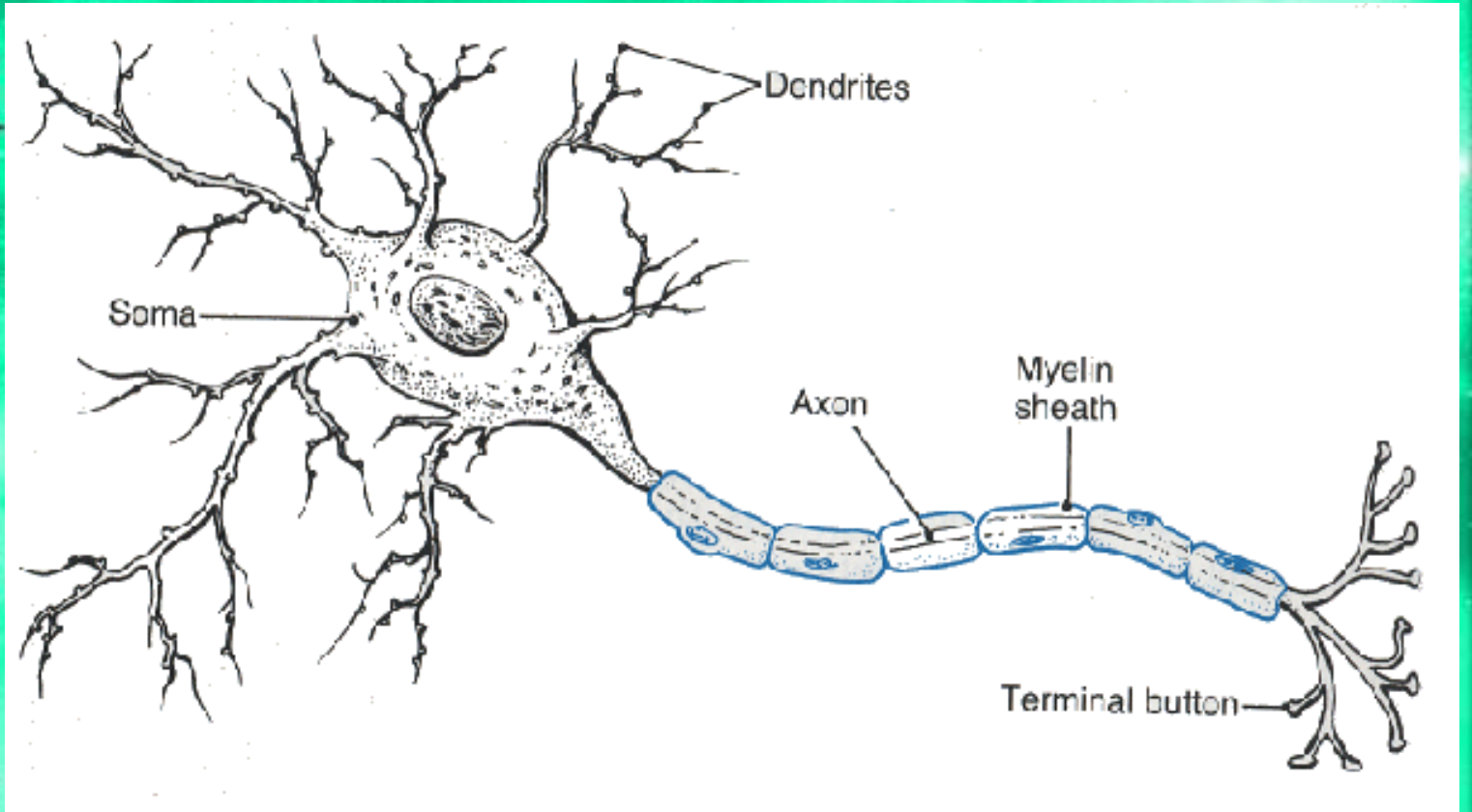
- **Sensory nerves detect changes and carry impulses to the brain and spinal cord from the sense organs.**
- **Motor nerves detect changes and carry impulses away from the brain and spinal cord to muscles.**

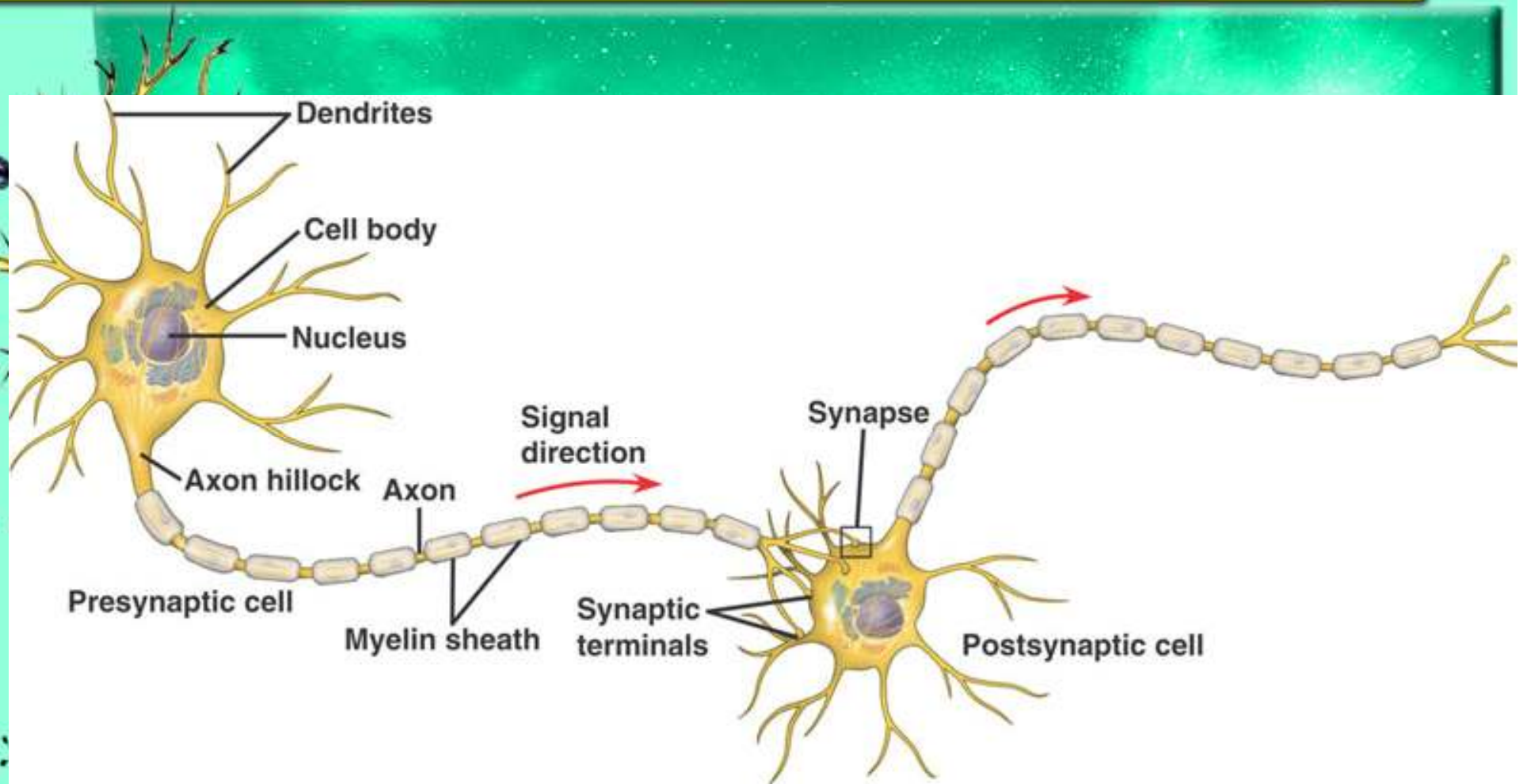
Nerve Structure



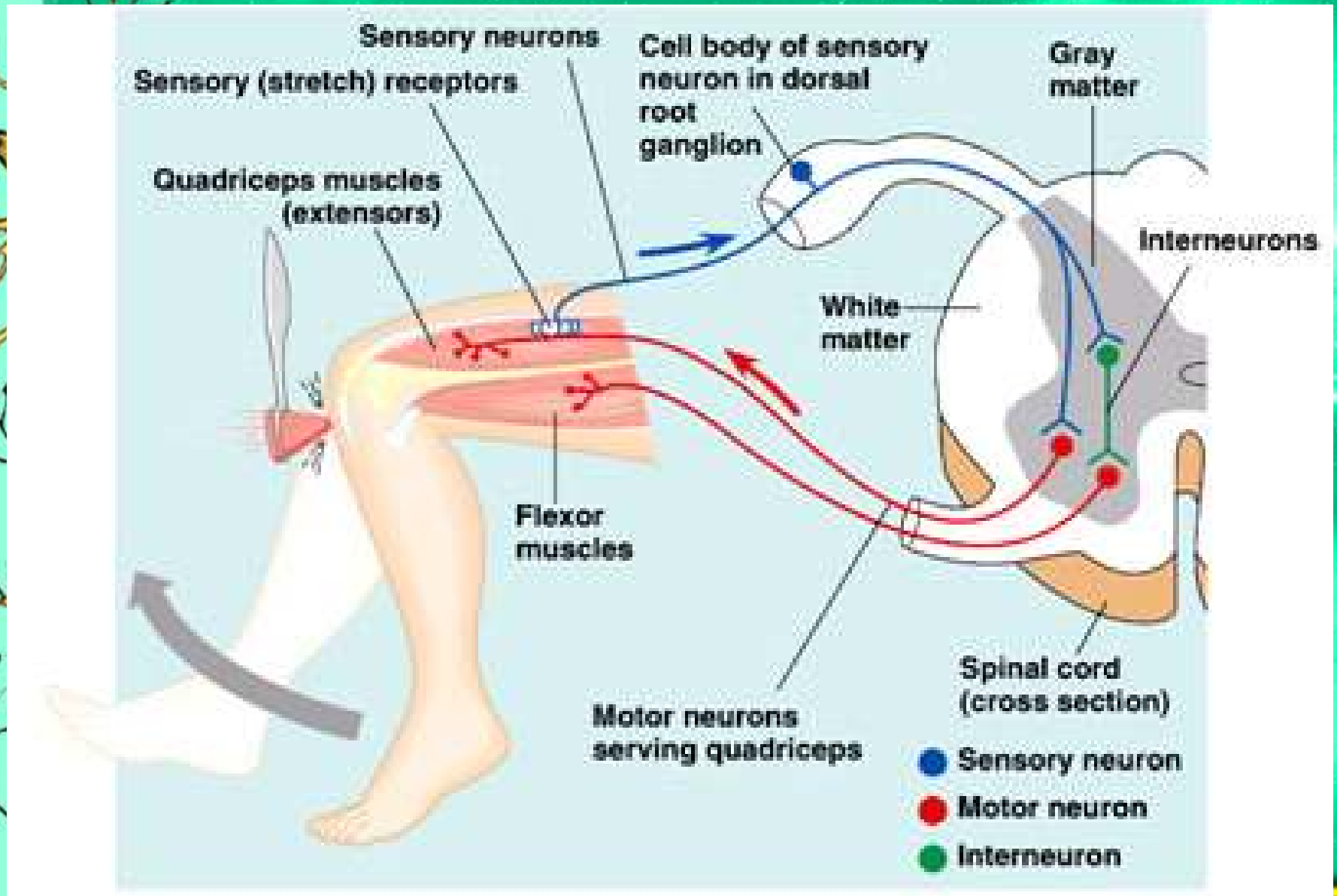
- **There are three basic parts of a neuron:**
 - **Dendrites**
 - Short, branchlike extensions which conduct electrical signals toward the cell body.
 - **Cell Body**
 - Contains large nucleus and other cellular organelles.
 - **Axon**
 - Extends from the cell body. Responsible for carrying nerve impulses to other neurons, muscles or glands.







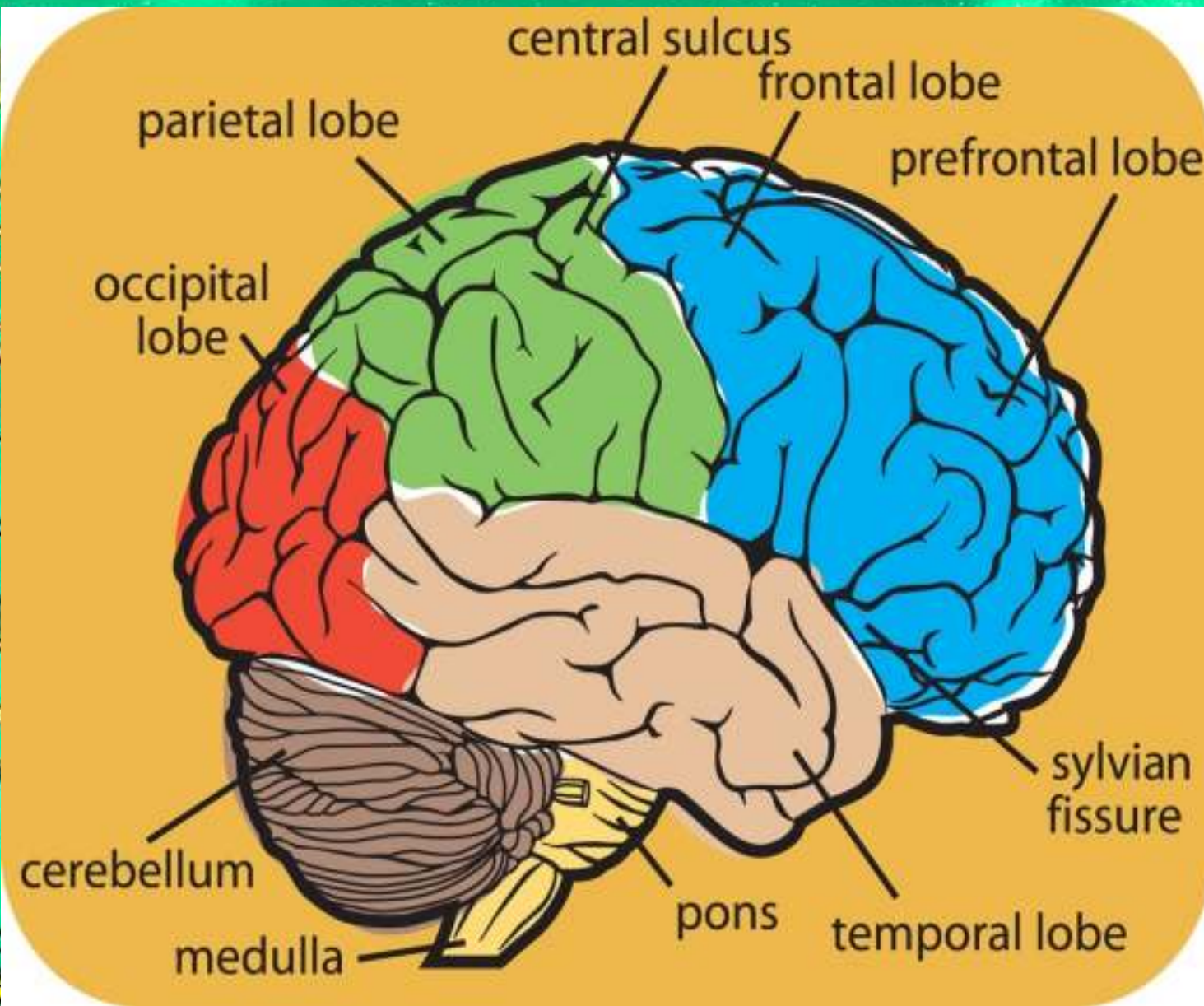
Reflexes

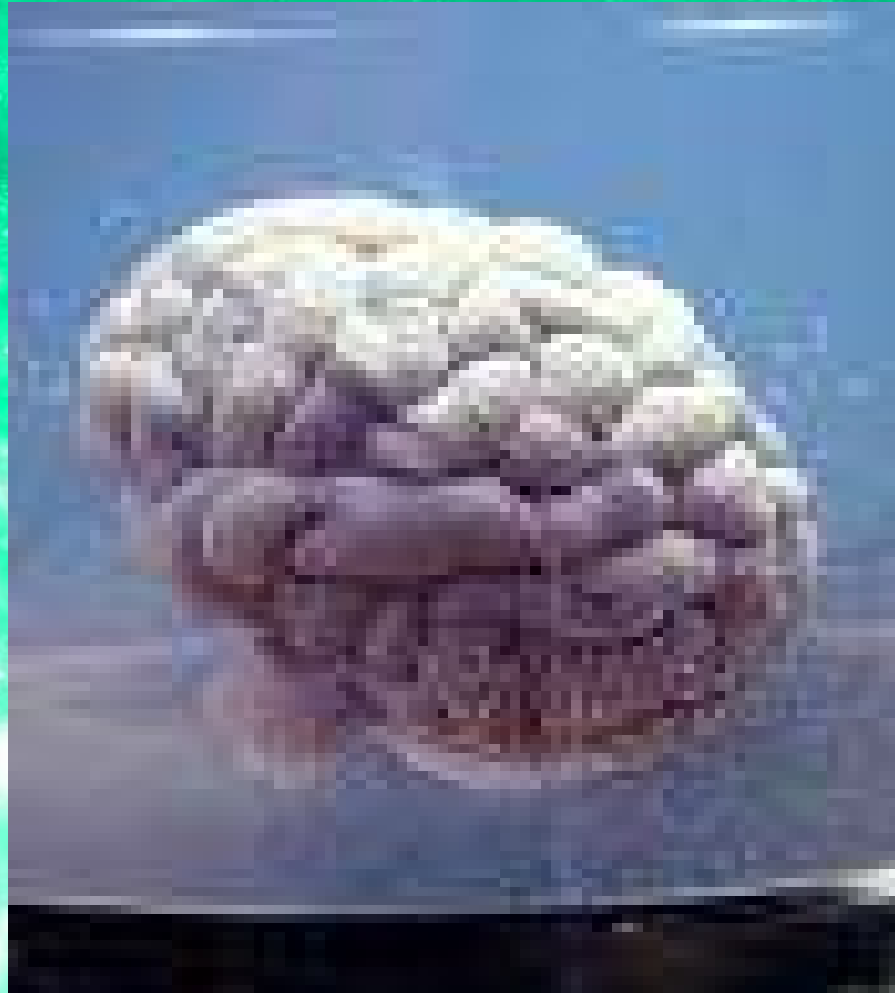


The Brain



- **Analyzes and processes information**
- **Relays messages to the rest of the body.**
 - **Primary control center of the body.**
- **Forms the CNS with the spinal cord**
- **The brain is composed of three main parts:**
 - **Cerebrum**
 - **Cerebellum**
 - **Brain Stem**





Brain Structures and Functions



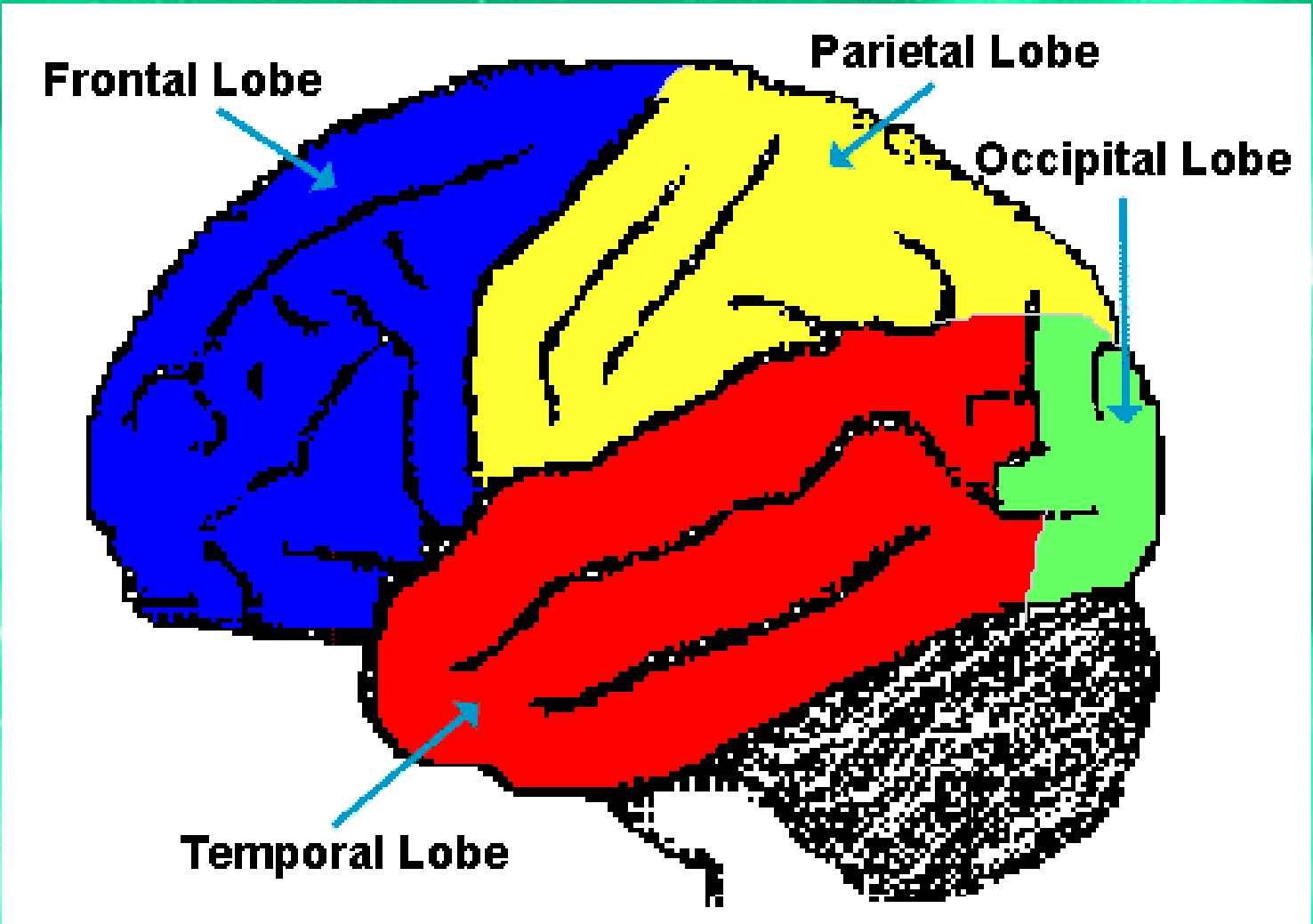
- **Cerebrum**
 - Largest part of the brain.
 - Has two distinct halves called hemispheres
 - Has many folds and grooves
 - Increases the number of nerve cells found in the brain
- **The cerebrum is divided into four lobes.**
 - Frontal Lobe
 - Parietal Lobe
 - Temporal Lobe
 - Occipital Lobe



- **Frontal Lobe**
 - Controls skeletal muscle movement
 - Interprets sense of smell
 - Responsible for your personality, and our ability to learn, think, problem solve and concentrate.
- **Parietal Lobe**
 - Interprets many of the senses including taste, touch, temperature, and pain.



- **Occipital Lobe**
 - **Interprets the sense of sight**
- **Temporal Lobe**
 - **Interprets the senses of balance and hearing.**
 - **Contains structures (such as the hippocampus) which store memory.**



Frontal Lobe

Parietal Lobe

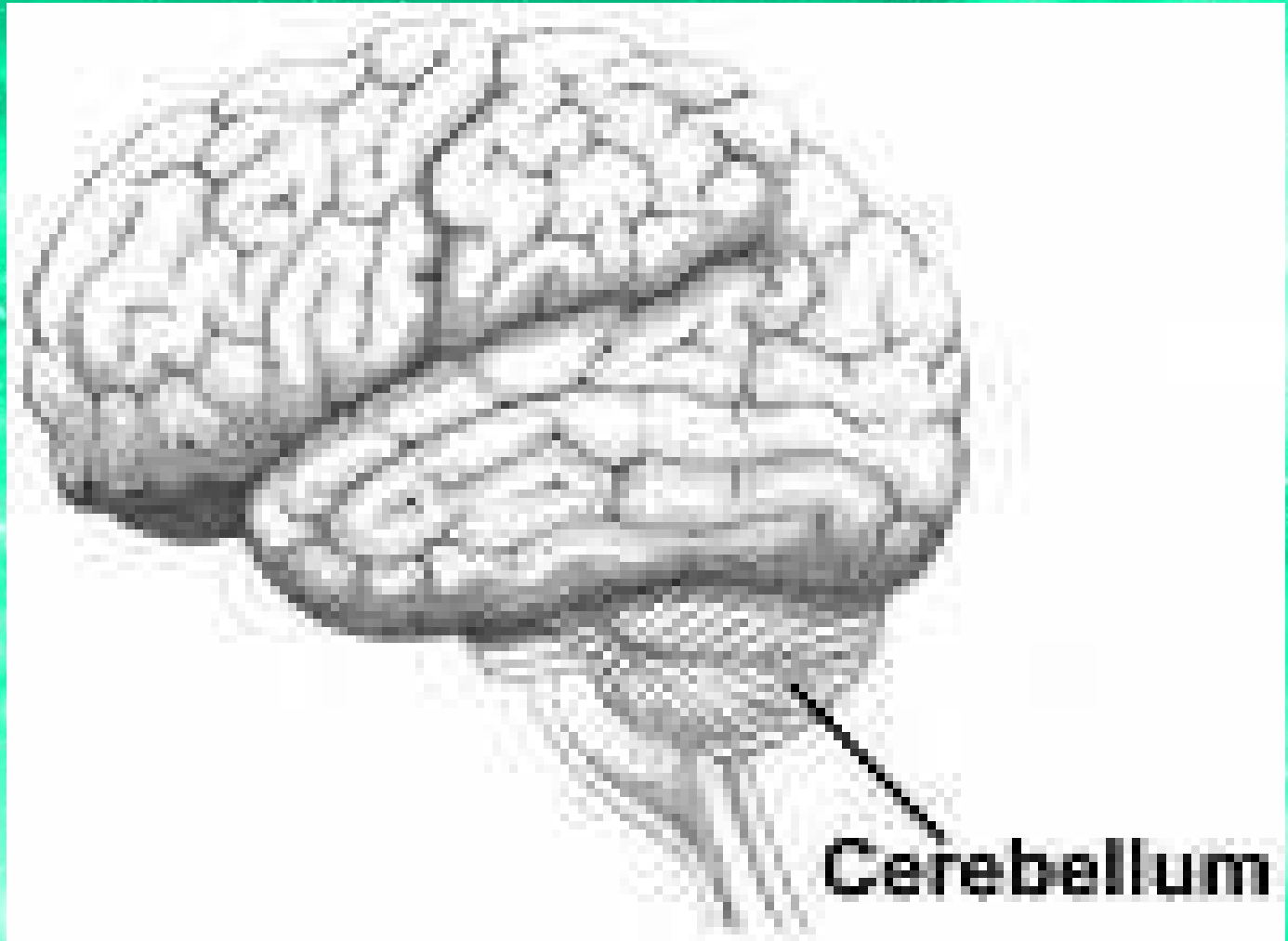
Occipital Lobe

Temporal Lobe

Cerebellum



- **Second largest part of the brain**
 - Means the “little cerebrum.”
- **Located at the back of the head below the cerebrum.**
- **Coordinates muscular movements**
- **Helps muscles move gracefully and efficiently.**
- **Helps with balance.**



Cerebellum



Brainstem

- **Located below the cerebellum**
- **Connects the spinal cord to the brain.**
- **Composed of two structures**
 - **Medulla oblongata**
 - **Pons**



Brainstem

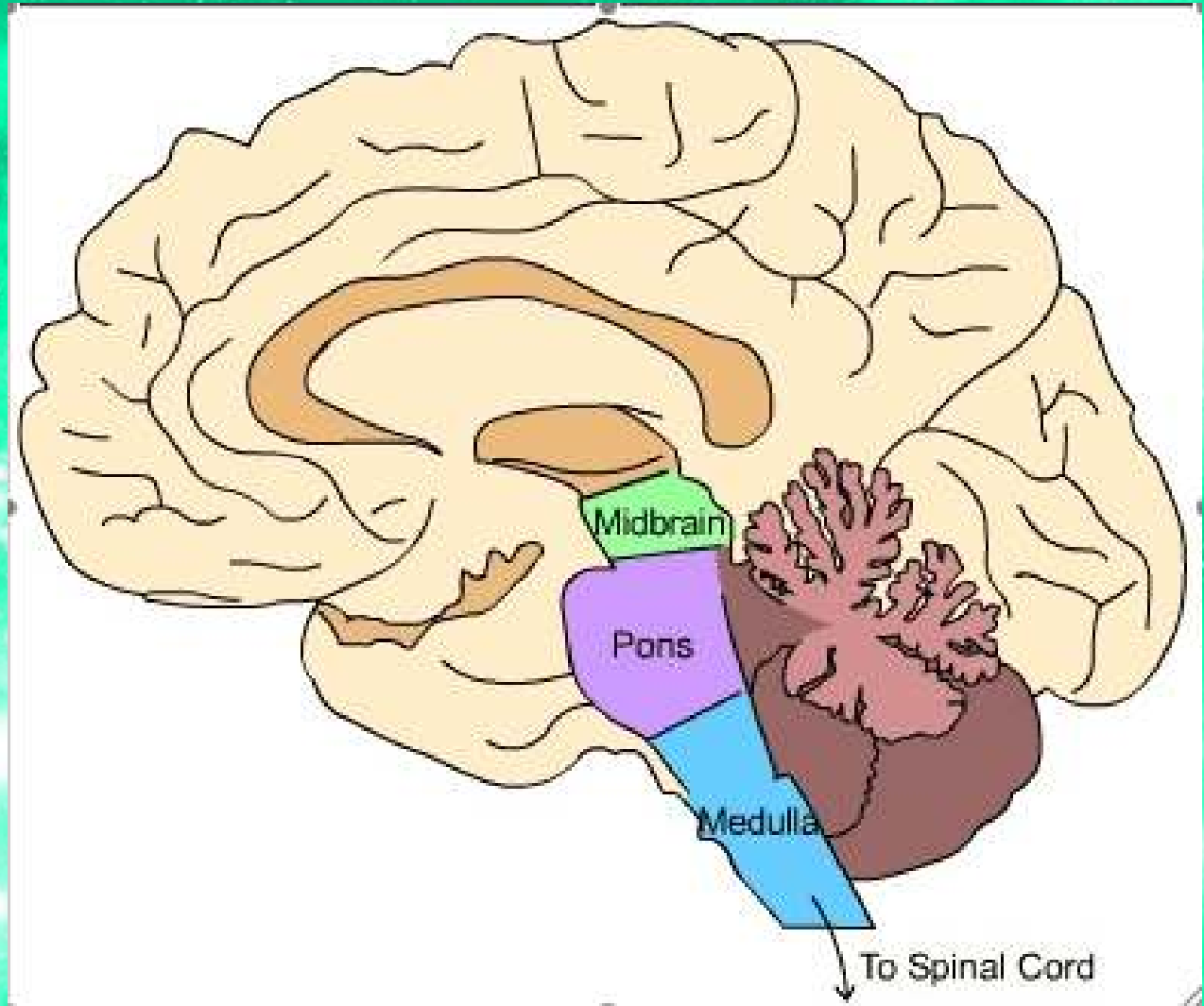
- **Medulla oblongata**
 - Continuous with the spinal cord
 - Regulates heart beat, blood pressure, breathing, swallowing, hiccupping, and vomiting.
 - Relays nerve impulses between the brain and the spinal cord.



Brainstem

- **Pons**
 - **Small bulge area above the medulla oblongata.**
 - **Regulates the rate and depth of breathing**

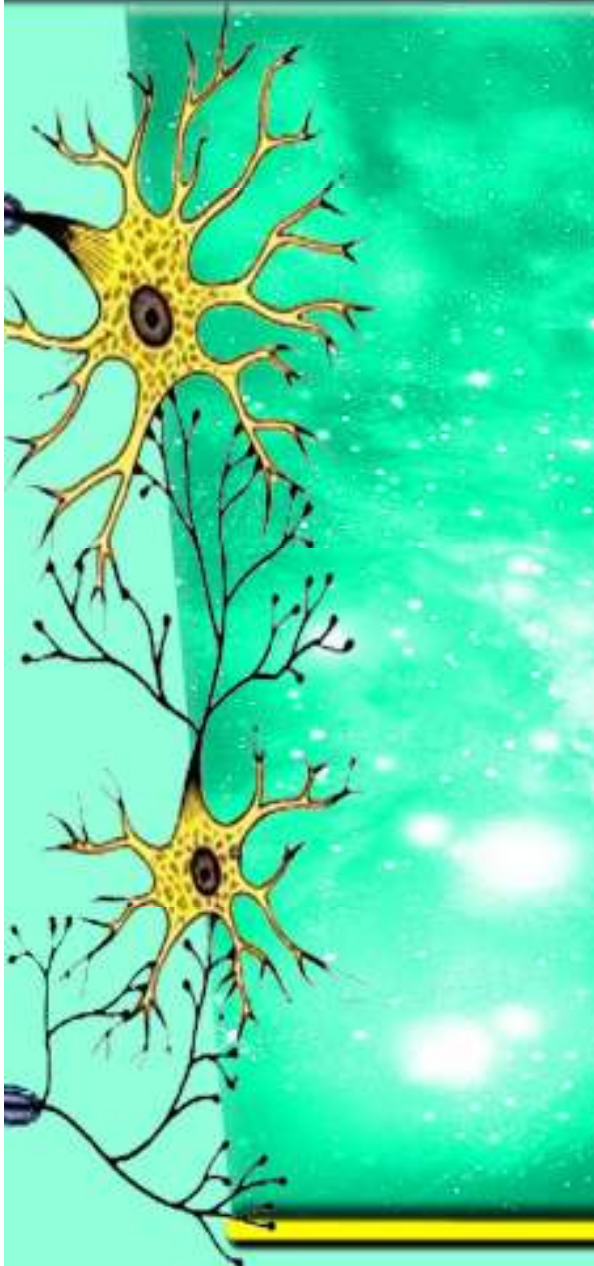




Spinal Cord

- **Part of the CNS**
- **Major communication link between the brain and the rest of the body.**
- **Process many reflexes**
 - **Unconscious, automatic responses to stimuli.**
- **There are 31 pairs of spinal nerves which branch from the spinal cord**
 - **Control breathing, arm movement, leg movement etc.**

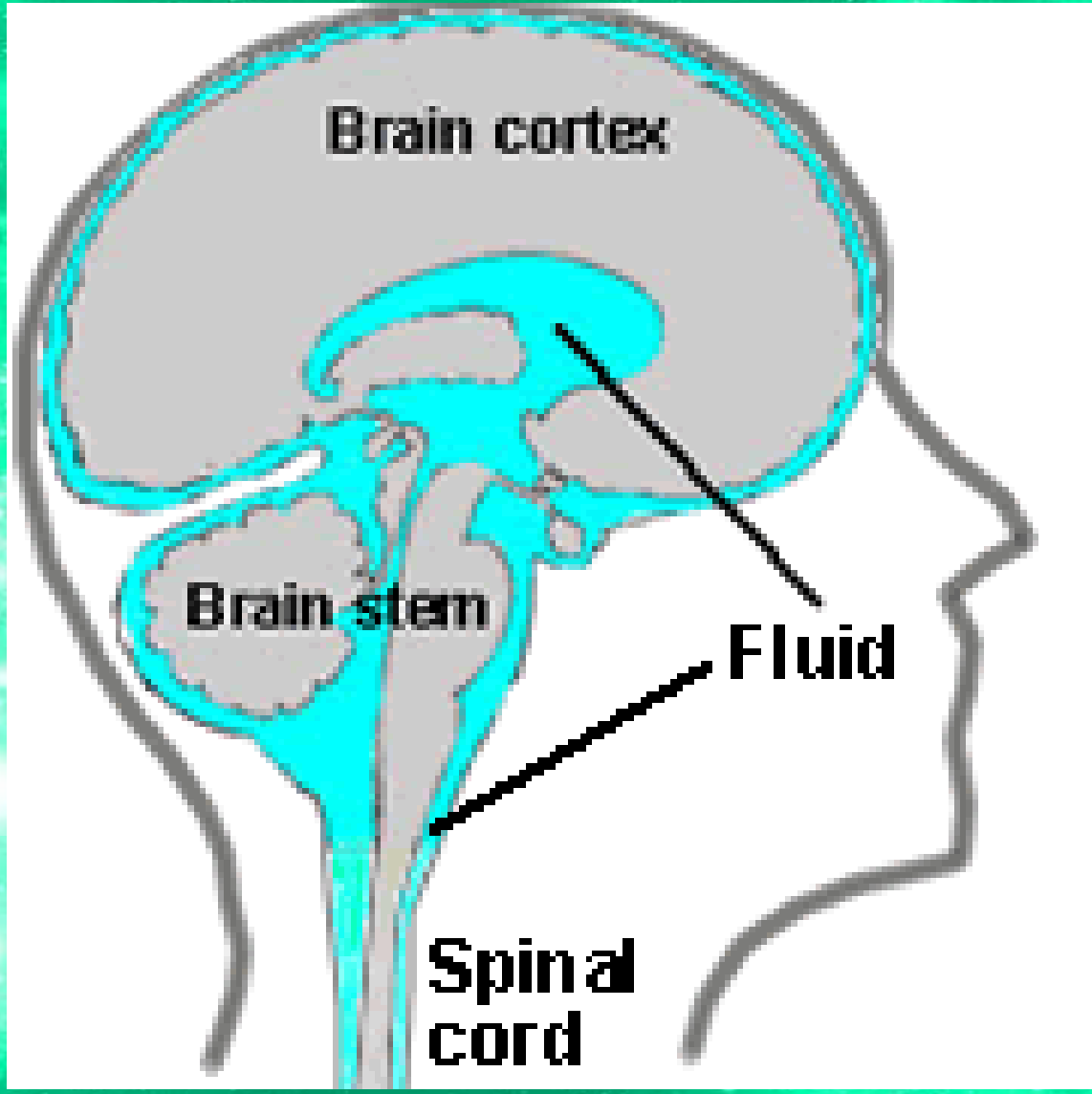




Cerebrospinal Fluid



- **CSF is a clear, watery fluid which bathes the brain and the spinal cord**
- **Protects it by acting as a shock absorber.**
- **CSF allows for the exchange of nutrients and waste products between the blood and the nervous tissue.**
- **CSF circulates between the two layers of the meninges, through the center of the spinal cord, and through large openings in the brain (ventricles).**



Meninges



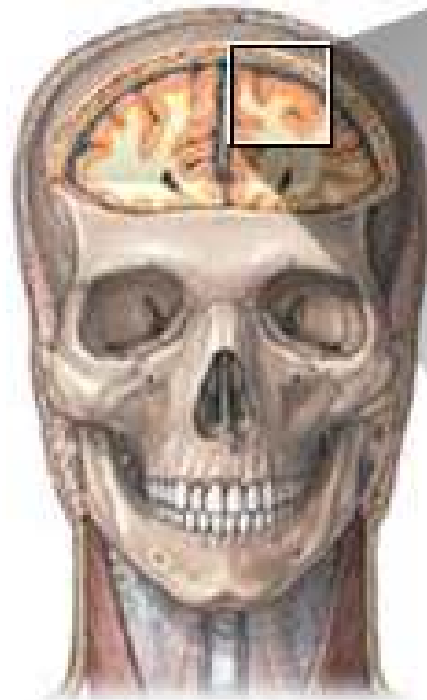
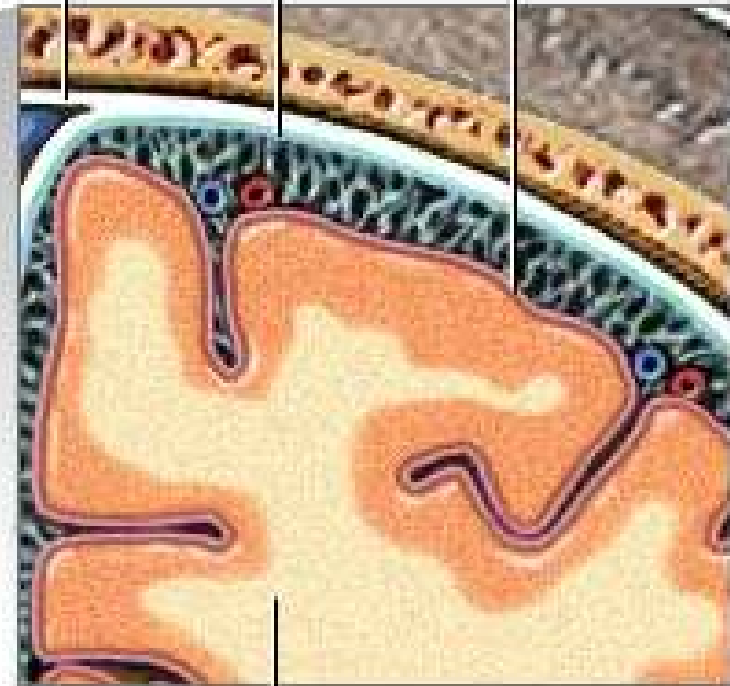
- **A set of three layers of connective tissue that enclose the brain and spinal cord.**
 - **Located under the skull and directly attached to the brain.**
- **Meninges help to provide a small amount of protection to the brain and spinal cord.**
- **Cerebrospinal fluid circulates between two layer of the meninges.**

The meninges are the membranes covering the brain and spinal cord

Dura mater (2 layers)

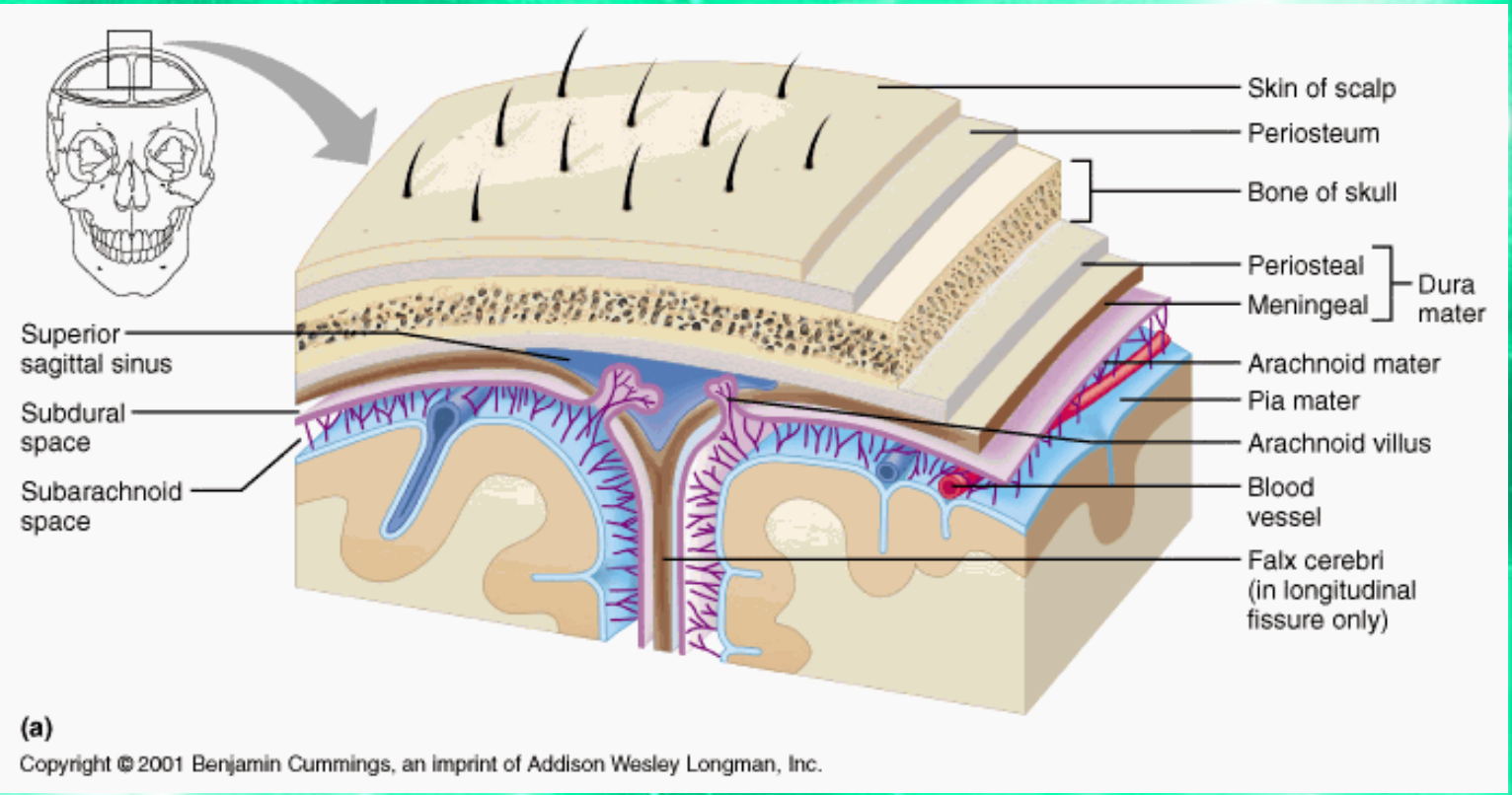
Arachnoid

Pia mater



Brain

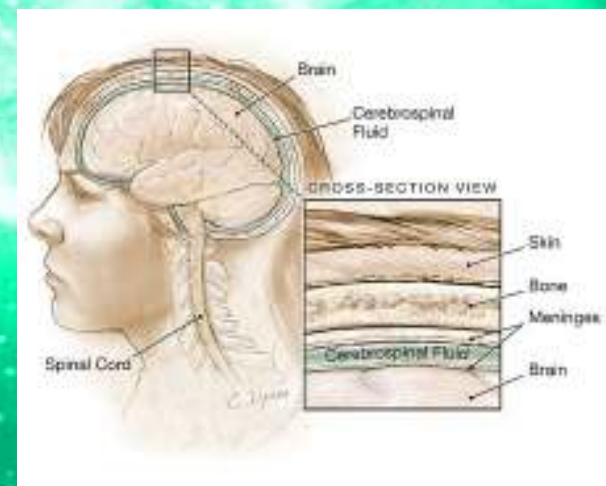




Describe Diseases Disorders of the Nervous System

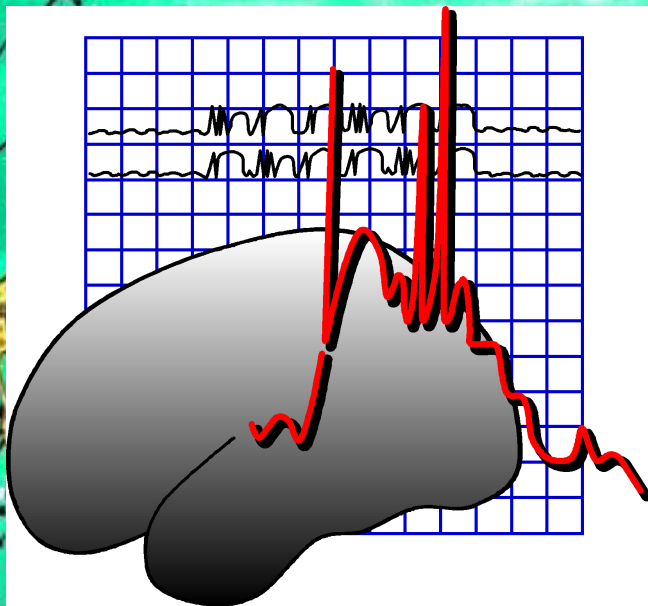
- **Meningitis**

- Meningitis is an infection that causes the inflammation of the brain and spinal cord coverings. Most common forms are bacterial or viral.
- Symptoms: fever, chills, headache, nausea, vomiting, stiff neck
- Treatment: Antibiotics for bacterial meningitis



Epilepsy

- **Epilepsy is a brain disorder involving repeated seizures of any kind. Seizures are episodes of disturbed brain function that cause changes in attention or behavior.**



- Symptoms:
 - Loss of consciousness
 - Staring spells
 - Violent convulsions.
- Treatment:
 - Varies depending on the cause.
 - May be controlled by medications.

Concussion

- **Post traumatic impairment of neural function caused by a direct blow to the head resulting in bruising of the brain.**
 - **Symptoms may include headache, loss of consciousness, ringing of the ears, nausea, irritability, confusion, disorientation, dizziness, amnesia or difficulty concentrating.**
 - **Treatment may include removal from play, rest avoiding re-injury, medications for pain, physical therapy and relaxation.**



Stroke

- **Stroke, also known as a CVA or cerebrovascular accident, occurs when there is an interruption of the blood supply to any part of the brain.**

- Symptoms appear suddenly and can include weakness or paralysis of an extremity, numbness, vision changes, slurred speech, difficulty swallowing and loss of memory
- It is important to get immediate care to reduce permanent complications. Physical therapy and/or occupational therapy may be needed.

