

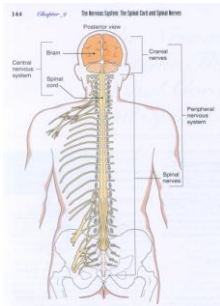
# Nervous System

## Chapter 9 Notes

### I. Functions of Nervous System

- A. Coordinating center for all body systems
- B. Detects and responds to stimuli
- C. Helps body adapt to conditions it encounters

#### A. Structural Divisions of Nervous System



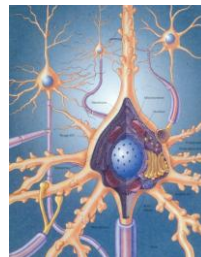
- **1. Central Nervous System (CNS)**  
composed of the brain and spinal cord
- **2. Peripheral Nervous System (PNS)**  
composed of spinal and cranial nerves

#### B. Functional Divisions- 2 types

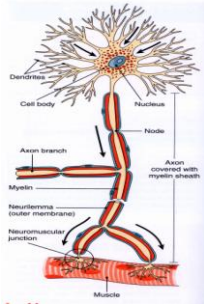
- **1. SOMATIC Nervous System (SNS)**  
– Voluntary;  
– controls all skeletal muscles
- **2. AUTONOMIC Nervous System (ANS)**  
– Involuntary;  
– Controls smooth and cardiac muscle, glands

## II. Neurons and their Functions

### A. Structure of a Neuron



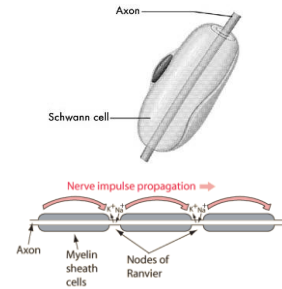
### Neuron Structure: Three basic parts



- 1. **Cell Body** - contains the nucleus and other organelles
- 2. **Dendrites** - short extensions that receive signals (impulses) from other neurons
- 3. **Axons** - long fibers that transmit impulses *away* from cell body to a muscle or other neuron

### The Myelin Sheath around the axon

- A. A fatty material that acts as insulation to protect the nerve fiber.
- B. The sheath is made up of Schwann cells, wrapped in layers (like pancakes) along the axon.
- C. The gaps (called **nodes**) between each Schwann cell causes the impulse to travel faster along the axon.

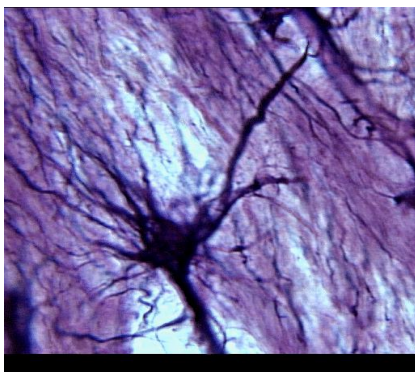


## III. Neuroglia

- A. Special connective tissue cells
- B. protect and support neurons
- C. can reproduce, unlike neurons
- D. help repair neurons
- E. regulate fluid around neurons
- F. remove pathogens and impurities

## B. Types of Neurons in the PNS

- 1. Sensory (Afferent) neurons carry impulses **TO** the CNS.
- 2. Motor (Efferent) neurons carry signal **FROM** the CNS to the muscles or glands.
- 3. Interneurons relay information **WITHIN** the CNS.

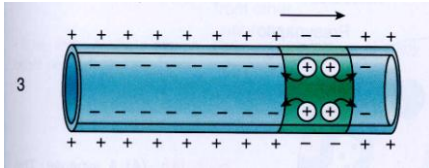


## E. Types of Neurons in the PNS

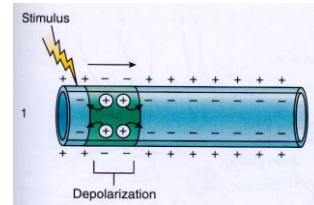
- Sensory (afferent) Neurons
  - Carry impulses to the spinal cord from sensory receptors
- Motor (efferent) Neurons
  - Carry impulses away from spinal cord to muscles or glands
- Interneurons –
  - only found in brain and spinal cord, they act as connectors between neurons

## F. How the Nerve Impulse Works

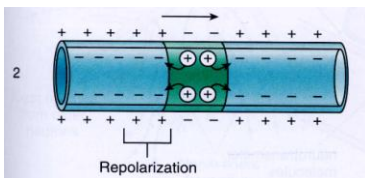
- 1. Resting state of a fiber is polarized; (note the positive & negative charges)



- 2. A stimulus causes the electric charge to change polarity, causing *depolarization* of the membrane.



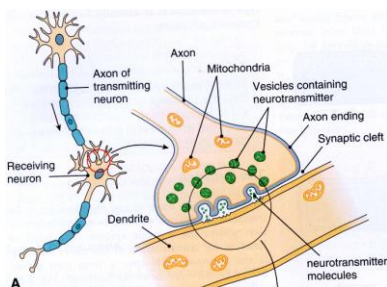
- 3. The depolarization moving along the membrane is called the *action potential*.
- 4. The membrane immediately *repolarizes*, ready for the next stimulus.



## B. The Synapse -The junction for transmitting the nerve impulse .

- 1. The nerve impulse travels to the end of the axon, causing vesicles to release a
- 2. neurotransmitter, which acts as a signal to the next (postsynaptic) cell
- 3. Receptors pick up the signal and respond
- 4. neurotransmitters are chemicals that carry the signals; 3 main ones include:
  - Epinephrine (adrenaline)
  - Norepinephrine (noradrenaline)
  - Acetylcholine

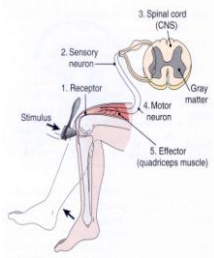
## Synapse Diagram



## G. The Reflex Arc

- A complete pathway through the nervous system from stimulus to response.

## Reflex Arc Diagram



- 1. *Receptor* receives stimulus
- 2. *Sensory neuron* takes impulse to spinal cord
- 3. A response is organized by *CNS*
- 4. *Motor neuron* carries impulse away to muscle
- 5. *Effector* is a muscle that contracts as a result

## Divisions of the Autonomic Nervous System

- **1. Sympathetic**
  - Fibers start in thoracic and lumbar region
  - Effects the body's response to stress, the 'fight-or-flight' response
- **2. Parasympathetic**
  - Fibers start in brain and sacrum
  - Reverses the stress response to provide balance in the body systems