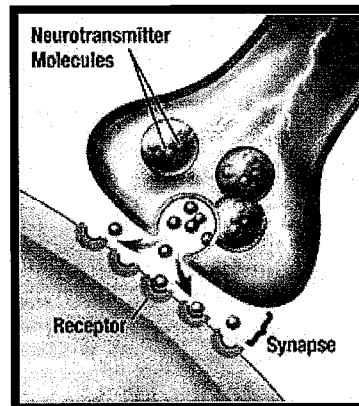
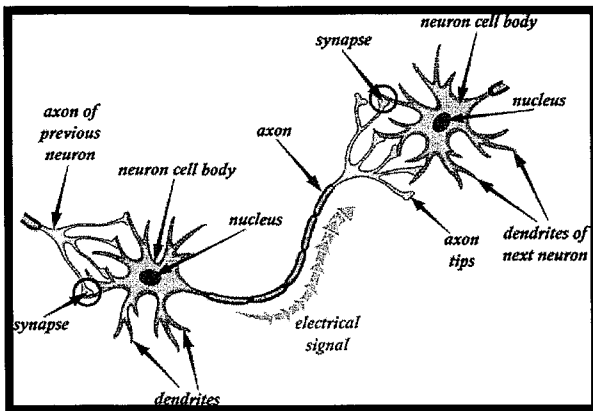


# HUMAN NERVOUS SYSTEM

## I. NEURONS

- a. **NEURONS** are the basic unit of structure and function of the nervous system.
- b. Structure:
- c. **Three types of neurons:**
  - ◆ **Sensory Neurons:** transmit impulses from receptors to spinal cord and brain  
--sense organs (ears, eyes, tongue, nose, and skin) are where sensory neurons are most concentrated
  - ◆ **Interneurons:** found in spinal cord and brain, relay nerve impulses between sensory and motor neurons
  - ◆ **Motor Neurons:** transmit nerve impulses from spinal cord to muscles or glands (**effectors**)
- d. **STIMULUS:** the sensory organs pick up a stimulus from the environment by **SENSORY RECEPTORS**. The stimulus is converted into an electrochemical **IMPULSE**.
- e. **IMPULSE** moves along a neuron in **ONE DIRECTION** from dendrites to cell body to axon to terminal branches to terminal button.
- f. **SYNAPSE:** space between two neurons. The Impulse is carried across the synapse by chemicals called **NEUROTRANSMITTERS**
- g. The impulse travels from sensory neurons to interneurons in the spinal cord to the brain interneurons, where the stimulus is interpreted and the **RESPONSE** is sent from interneurons of brain to spinal cord interneurons to motor neurons to **EFFECTORS** (muscles or glands)



## II. CENTRAL NERVOUS SYSTEM

### A. BRAIN:

- ◆ large mass of neurons located in the cranial cavity
- ◆ Brain has three major divisions

#### a. **Cerebrum:**

- largest part of the brain; center for **VOLUNTARY** activity
- specific areas for interpretation of sensory impulse, interpretation, initiation of motor activities, memory, thinking and reasoning

#### b. **Cerebellum:**

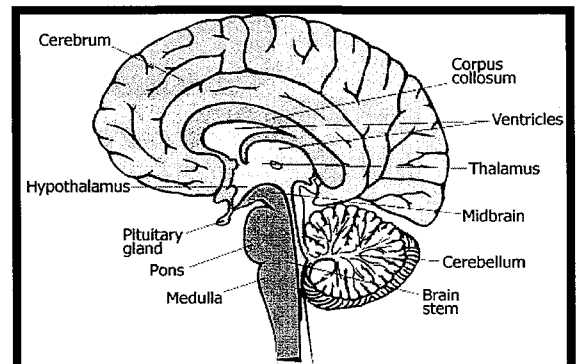
- located below and behind the cerebrum; coordinates motor activities and aids in maintaining balance

#### c. **Medulla:**

- located at the base of the brain; connects the brain and spinal cord
- controls **INVOLUNTARY** activities in the body such as **BREATHING, HEARTBEAT, BLOOD PRESSURE, & PERISTALSIS**

### B. SPINAL CORD

- ◆ the medulla of the brain is continuous with the spinal cord
- ◆ the spinal cord is contained inside and protected by the **VERTEBRAE** of the spinal column (the backbone)
- ◆ spinal cord coordinates activities between the brain and the other body structures



### III. Peripheral Nervous System

- ◆ includes all neurons outside the central nervous system
- ◆ these neurons (sensory and motor) neurons carry impulses between the central nervous system and the rest of the body.
- ◆ **Peripheral Nervous System is subdivided into:**
  - a. **Somatic Nervous System** (controls **VOLUNTARY MUSCLES** of the skeletal system)
  - b. **Autonomic Nervous System** (controls **INVOLUNTARY MUSCLES or SMOOTH muscle, CARDIAC muscle and GLANDS**)
    - controls heart rate, pulse rates, circulation, respiration, and peristalsis

### IV. HUMAN BEHAVIOR

#### A. *Voluntary behavior:*

- conscious, intentional behavior that involves the cerebrum of the brain
- such behaviors include, memory, association of ideas, imagination of possible outcomes, planning and the ability to choose a particular outcome or behavior.

#### B. *Involuntary Behavior*

- behavior that occurs automatically

##### 1. reflex arc:

- a set pathway from sensory receptors to sensory neurons to the interneurons in the spinal cord.
- the spinal cord responds automatically, sending an impulse to the motor neurons to react AND sends the sensory impulse to the brain for further interpretation.
- such reflexes are generally inborn and protective in nature, allowing the individual to have a rapid response to a potentially dangerous situation
- ex: when you touch a hot stove, your hand pulls away before your brain gets the impulse and causes you to react to the pain.

##### 2. Conditioned (learned) behavior

- automatic behavior that is learned
- **habits:** learned behavior, that through repetition, has become automatic.
- Example – writing your name on a paper when it is given to you even though the teacher is telling you **NOT** to write your name anywhere on the paper

### V. DISORDERS OF THE NERVOUS SYSTEM

1. **Cerebral Palsy:** congenital disease (happens in fetal development, not hereditary)
  - characterized by a disturbance in motor function
  - damage to the motor centers of the brain, usually the cerebellum
  - symptoms include poor coordination of muscles and difficulty in speech
2. **Stroke:** results from a cerebral hemorrhage or clot in a brain cerebral vessel
  - can result in some brain damage such as paralysis and loss of mental functions such as speech, & memory.
3. **Meningitis:** inflammation of the membranes surrounding the brain and spinal cord
  - symptoms include severe headache, fever, & chills.
  - stiffness and back pain usually follow
4. **Polio:** viral disease of the central nervous system which can result in paralysis.
  - preventable with immunization by the Salk injection vaccine or Sabin oral vaccine