

- c. Treatment: antibiotics, anticonvulsants, and medications for pain and cerebral edema

#### 7. Multiple sclerosis (MS)

- a. Chronic, progressive disabling condition resulting from degeneration of the myelin sheath in the central nervous system (CNS)
- b. Usually occurs between the ages of 20 and 40
- c. Cause is unknown
- d. Progresses at different rates and has periods of remission
  - (1) Early symptoms include visual disturbances, weakness, fatigue, poor coordination, and tingling and numbness
  - (2) Later tremor, spasticity of muscles, paralysis, speech impairment, emotional swings, and incontinence occur
- e. Treatment such as physical therapy, muscle relaxants, steroids, and psychological counseling is used to maintain functional ability as long as possible

#### 8. Neuralgia

- a. Nerve pain
- b. Caused by inflammation, pressure, toxins, and other diseases
- c. Treatment directed toward eliminating cause

#### 9. Paralysis

- a. Brain or spinal cord injury destroys neurons and results in loss of function and sensation below level of injury
- b. Hemiplegia: paralysis on one side of the body caused by a tumor, injury, or cerebrovascular accident (CVA)
- c. Paraplegia: paralysis in lower extremities or lower part of body caused by a spinal cord injury
- d. Quadriplegia: paralysis of the arms, legs, and body below the spinal cord injury
- e. No cure, but much research is directed toward repairing spinal cord damage
- f. Treatment: supportive, includes physical and occupational therapy

#### 10. Parkinson's disease

- a. Chronic progressive condition involving degeneration of brain cells, usually in persons over 50 years of age
- b. Symptoms
  - (1) Tremors, stiffness, and muscular rigidity
  - (2) Forward leaning position and a shuffling gait
  - (3) Difficulty in stopping while walking
  - (4) Loss of facial expression and drooling
  - (5) Mood swings with frequent depressions
  - (6) Behavioral changes
- c. Treatment but no cure
  - (1) Levodopa is used to relieve the symptoms

- (2) In selected cases, surgery to selectively destroy a small area of the brain to control the involuntary movements

- (3) Physical therapy to limit the muscular rigidity

#### 11. Shingles or herpes zoster

- a. Acute inflammation of nerve cells
- b. Caused by the herpes virus, which also causes chicken pox
- c. Characteristically occurs in the thoracic area on one side of body and follows path of the affected nerves
- d. Symptoms: fluid-filled vesicles, severe pain, redness, itching, fever, and abnormal skin sensations
- e. Treatment: directed at relieving pain and itching until the inflammation subsides, usually in 1 to 4 weeks

### **VI. APPLICATION**

- A. Show transparency #42 and ask students to name the parts of the neuron.
- B. Show transparency #43 (or use anatomic model) and ask students to name the parts of the brain and identify the main function(s) of each part.
- C. Ask the following questions (or create your own questions):
  - 1. List three functions of the spinal cord.
  - 2. What are meninges? Name the three layers.
  - 3. What are ventricles?
  - 4. What are the functions of cerebrospinal fluid?
  - 5. How does the sympathetic nervous system prepare the body to act in times of emergency?
  - 6. How does the parasympathetic nervous system counteract the action of the sympathetic nervous system?
  - 7. What is the difference between paraplegia, quadriplegia, and hemiplegia?
  - 8. What is meningitis? hydrocephalus? epilepsy? neuralgia?
- D. Students complete assignment sheet in workbook on Unit 6:6 Nervous System

### **VII. EVALUATION**

- A. Evaluate student response to application activities
- B. Grade assignment sheet on Unit 6:6 to determine student knowledge
- C. Grade answers on Unit 6:6 test to determine student knowledge

### **ALTERNATIVE METHODS OF PRESENTATION**

- 1. Bulletin board: Students create a bulletin board on the nervous system showing all parts of the system. Comparing the nervous system to a telephone switchboard and system, or to a computer system with output devices, is another approach.

## Spinal Cord

- b. Ends at the first or second lumbar vertebra
- c. Surrounded and protected by the vertebrae
- d. Responsible for many reflex actions
- e. Carries sensory (afferent) messages up to the brain
- f. Carries motor (efferent) messages from the brain to the nerves that go to muscles and glands

### 3. Meninges

- a. Three membranes
- b. Cover and protect the brain and spinal cord
- c. Dura mater: thick, tough outer layer
- d. Arachnoid membrane: middle delicate weblike layer
- e. Pia mater
  - (1) Innermost layer
  - (2) Closely attached to the brain and spinal cord
  - (3) Contains blood vessels that nourish the nerve tissue

### 4. Ventricles

- a. Four hollow spaces located in the brain
- b. Connect with each other and with the space under the arachnoid membrane, the subarachnoid space
- c. Filled with a fluid called cerebrospinal fluid
  - (1) Fluid circulates continually between the ventricles and through the subarachnoid space
  - (2) Serves as a shock absorber to protect the brain and spinal cord
  - (3) Carries nutrients to some parts of brain and spinal cord
  - (4) Helps remove metabolic products and wastes
  - (5) Produced by special structures called choroid plexuses in the ventricles of the brain
  - (6) After circulating, it is absorbed into the blood vessels of the dura mater and returned to bloodstream through special structures called arachnoid villi

## F. Peripheral nervous system

1. Made of all of the nerves
2. Consists of cranial nerves and spinal nerves
  - a. Cranial nerves
    - (1) 12 pairs and their branches
    - (2) Some are responsible for special senses such as sight, hearing, taste and smell
    - (3) Others receive general sensations such as touch, pressure, pain, and temperature, and send out impulses for involuntary and voluntary muscle control
  - b. Spinal nerves
    - (1) 31 pairs and their branches
    - (2) Carry messages to and from the spinal cord

- (3) Both sensory (afferent) and motor (efferent) nerves, or mixed nerves
- (4) Eight cervical, twelve thoracic, five lumbar, five sacral, and one pair of coccygeal spinal nerves
- (5) Each nerve goes directly to a particular part of the body or networks with other spinal nerves to form a plexus that supplies sensation to a larger segment of the body

### 3. Autonomic nervous system

- a. Important part of the peripheral nervous system
- b. Helps maintain a balance in the involuntary functions of the body, but allows the body to react in times of emergency
- c. Two divisions: sympathetic and parasympathetic
  - (1) Usually two systems work together
    - aa. Maintain balanced state or homeostasis in body
    - bb. Control involuntary body functions at proper rates
  - (2) Sympathetic nervous system
    - aa. Acts in times of emergency such as flight or fight
    - bb. Prepares the body to act
    - cc. Increases heart rate and respirations
    - dd. Raises blood pressure
    - ee. Slows activity in the digestive tract
  - (3) Parasympathetic nervous system
    - aa. Counteracts the actions of the sympathetic after the emergency
    - bb. Slows the heart rate and respirations
    - cc. Lowers blood pressure
    - dd. Increases activity in the digestive tract

## G. Diseases and abnormal conditions

### 1. Cerebral palsy

- a. Disturbance in voluntary muscle action
- b. Caused by brain damage
  - (1) Lack of oxygen to the brain and/or birth injuries
  - (2) Prenatal rubella (German measles) and infections
- c. Of the three forms, spastic, athetoid, and atactic, spastic is the most common
- d. Symptoms
  - (1) Exaggerated reflexes and seizures
  - (2) Tense muscles and development of contractures
  - (3) Speech impairment
  - (4) Spasms and tremors
  - (5) Mental retardation in some cases
- e. Treatment but no cure
  - (1) Physical, occupational, and speech therapy
  - (2) Muscle relaxants and anticonvulsive drugs