

- d. Etiology unknown
  - (1) May be autoimmune disease
  - (2) Antibodies attack the body's own tissues
- e. No cure, and treatment is supportive
- 4. Muscle spasms or cramps
  - a. Sudden, painful, involuntary contractions of muscles
  - b. Usually occur in legs or feet
  - c. May result from overexertion, low electrolyte levels, or poor circulation
  - d. Use gentle pressure and stretching of muscle to relieve spasm
- 5. Strain
  - a. Overstretching or injury to a muscle and/or tendons
  - b. Frequent sites include the back, arms, and legs
  - c. Prolonged or sudden muscle exertion is usually cause
  - d. Symptoms: myalgia or muscle pain, swelling, limited movement
  - e. Treatment
    - (1) Rest and elevation of extremity
    - (2) Muscle relaxants or pain medications
    - (3) Alternating heat and cold applications

#### VI. APPLICATION

- A. Use transparency #40 to allow students to identify the muscles
- B. Ask different students to demonstrate the following movements of muscles: adduction, abduction, flexion, extension, rotation
- C. Ask the following questions (or create your own questions):
  - 1. What is the difference between voluntary and involuntary muscles?
  - 2. What is the action of cardiac muscles? visceral or smooth muscles? skeletal muscles?
  - 3. How does a tendon differ from a fascia?
  - 4. What is the origin of a muscle? the insertion?
  - 5. What happens to muscle tone in a severe illness such as paralysis?
  - 6. What is a contracture?
  - 7. What is muscular dystrophy? strain? myasthenia gravis?
- D. Students complete assignment sheet in workbook on Unit 6:5 Muscular System

#### VII. EVALUATION

- A. Evaluate student response to application activities
- B. Grade assignment sheet on Units 6:5 to determine student knowledge
- C. Grade answers on Unit 6:5 test to determine student knowledge

#### ALTERNATIVE METHODS OF PRESENTATION

- 1. Exercise sessions: Use approved exercise programs and allow students to have exercise sessions to exercise and/or strengthen different skeletal muscles.

- 2. Sports evaluation: Assign small groups of students to different types of sports (football, tennis, golf, swimming, etc.). Students research sport and determine which body muscles are used the most in each sport.
- 3. Guest speaker: Invite a physical therapist to the class to discuss muscles, atrophy, contractures, exercise, and so forth.
- 4. Audiovisual: Show films, tapes, and/or slides on the muscular system.
- 5. Muscular System Activity: Students use the Muscular System Activity in the Class Activities section of this Resource Book to apply their knowledge of the actions of the main muscles of the body.

## UNIT 6:6 NERVOUS SYSTEM

### I. OBJECTIVES

- A. Identify the four main parts of a neuron
- B. Name the two main divisions of the nervous system
- C. Describe the function of each of the five main parts of the brain
- D. Explain three functions of the spinal cord
- E. Name the three meninges
- F. Describe the circulation and function of cerebrospinal fluid
- G. Contrast the actions of the sympathetic and parasympathetic nervous system
- H. Describe at least five diseases of the nervous system

### II. TEACHING AIDS

- A. Transparencies—#42: A neuron, #43: Brain and spinal cord, and overhead projector
- B. Model of the brain and spinal cord if available
- C. Chalk and chalkboard
- D. Nervous System Activity and Aphasia Activity (see Class Activities section of this Resource Book)

### III. REFERENCE: *Diversified Health Occupations*, 6th edition, Unit 6:6

### IV. PREPARATION

- A. There is a computer-like system in our body
- B. What is the computer of the body? (Wait for answer: the brain)
- C. What carries the computer messages? (Wait for answer: nerves)
- D. The brain and nerves are a part of the nervous system

### V. PRESENTATION

- A. Introduction
  - 1. Nervous system is a complex, highly organized system
  - 2. Coordinates all of the many activities of the body

# Nervous System

3. Allows the body to respond and adapt to changes that occur both inside and outside the body
- B. Neuron (Show transparency #42)
  1. Also called the nerve cell
  2. Basic structural unit of the nervous system
  3. Parts of neuron
    - a. Cell body
    - b. Nucleus inside the cell body
    - c. Nerve fibers
      - (1) Dendrites: carry impulses toward the cell body
      - (2) Axon: single nerve fiber that carries impulses away from the cell body
        - aa. Many axons are covered with a lipid (fat) covering called a myelin sheath
        - bb. Increases the rate of transmission of an impulse
        - cc. Insulates and maintains the axon
      - (3) Axon of a neuron lies close to the dendrites of many other neurons
        - aa. Space between them is known as a synapse
        - bb. Impulses coming from an axon "jump" the synapse to get to the dendrite of a neuron that will carry the impulse in the right direction
        - cc. Special chemicals called neurotransmitters located at end of each axon allow nerve impulses to pass from one neuron to another
        - dd. Impulses may follow many different routes
- C. Nerves
  1. Combination of many nerve fibers
  2. Located outside the brain and spinal cord
  3. Afferent or sensory nerves carry messages from all parts of the body to the brain and spinal cord
  4. Efferent or motor nerves carry messages from the brain and spinal cord to muscles and glands
  5. Associative or internuncial nerves carry both sensory and motor messages
- D. Divisions of the nervous system
  1. Two main divisions: central nervous system and peripheral nervous system
  2. Central nervous system consists of the brain and spinal cord
  3. Peripheral nervous system
    - a. Made of the nerves
    - b. Autonomic nervous system
      - (1) Separate division of the peripheral nervous system
      - (2) Controls involuntary body functions
- E. Central nervous system
  1. Brain (Show transparency #43)
    - a. Mass of nerve tissue
      - b. Protected by membranes and the cranium or skull
      - c. Cerebrum
        - (1) Largest and highest section of the brain
        - (2) Outer part is arranged in folds called convolutions and separated into lobes
          - aa. Lobes include the frontal, parietal, temporal, and occipital
          - bb. Named from the skull bones that surround them
        - (3) Responsible for reasoning, thought, memory, speech, sensation, sight, smell, hearing, and voluntary body movement
      - d. Cerebellum
        - (1) Section below the back of the cerebrum
        - (2) Responsible for coordination of muscles, balance and posture, and muscle tone
      - e. Diencephalon
        - (1) Located between the cerebrum and midbrain
        - (2) Contains two structures: thalamus and hypothalamus
          - aa. Thalamus acts as a relay center and directs sensory impulses to the cerebrum
          - bb. Hypothalamus regulates and controls the autonomic nervous system, temperature, appetite, water balance, sleep, and constriction and dilation of blood vessels; also involved with emotions such as anger, fear, pleasure, pain, and affection.
      - f. Midbrain
        - (1) Located below the cerebrum at the top of the brain stem
        - (2) Responsible for conducting impulses between brain parts and for certain eye reflexes
      - g. Pons
        - (1) Located below the midbrain in the brain stem
        - (2) Responsible for conducting messages to other parts of the brain and for certain reflex actions including chewing, tasting, production of saliva, and assisting with respiration
      - h. Medulla oblongata
        - (1) Lowest part of the brain stem
        - (2) Connects with the spinal cord
        - (3) Responsible for regulating the heart-beat, respiration, swallowing, coughing, and blood pressure
    2. Spinal cord
      - a. Continues down from the medulla oblongata

- (3) Casts or braces
  - (4) Orthopedic surgery for severe contractures
2. Cerebrovascular accident (CVA)
- a. Also called stroke or apoplexy
  - b. Blood flow to the brain is impaired resulting in a lack of oxygen and destruction of brain tissue
  - c. Causes
    - (1) Cerebral hemorrhage resulting from hypertension, an aneurysm, or a weak blood vessel
    - (2) Occlusion or blockage caused by atherosclerosis or a thrombus (blood clot)
  - d. Symptoms vary depending on area and amount of brain tissue damaged
    - (1) Loss of consciousness
    - (2) Weakness and vertigo (dizziness)
    - (3) Paralysis on one side of the body (hemiplegia)
    - (4) Dysphagia or difficulty swallowing
    - (5) Visual disturbances and mental confusion
    - (6) Aphasia (speech and language impairment)
    - (7) Incontinence
  - e. Immediate treatment
    - (1) Care during first three hours can help prevent brain damage
    - (2) Thrombolytic or "clot-bursting" drugs such as TPA or tissue plasminogen activator
    - (3) Angioplasty of cerebral arteries can also dissolve blood clot and restore blood flow to the brain
    - (4) Use CT scans to determine cause of CVA because TPA cannot be used if CVA is caused by a hemorrhage
    - (5) Neuroprotective agents (drugs that help prevent injury to neurons) used to prevent permanent brain damage
  - f. Treatment
    - (1) Depends on symptoms present
    - (2) Directed toward helping the person recover from or adapt to the symptoms present
    - (3) Physical, occupational, and speech therapy essential
3. Encephalitis
- a. Inflammation of the brain caused by a virus, bacteria, or chemical agent
  - b. Virus is frequently contacted from mosquito bite
  - c. Symptoms vary but may include fever, extreme weakness or lethargy, visual disturbances, headache, vomiting, stiff neck and back, disorientation, seizures, and coma
  - d. Treatment is supportive
    - (1) Antiviral drugs and antiseizure medications
- (2) Maintenance of fluid and electrolyte balance
  - (3) Monitoring of respiratory and kidney function
4. Epilepsy or seizure syndrome
- a. Brain disorder associated with abnormal electrical impulses in the neurons of the brain
  - b. Causes can include brain injury, birth trauma, tumors, toxins such as lead or carbon monoxide, or infections
  - c. Many cases are idiopathic (spontaneous or primary)
  - d. Absence or petit mal seizures
    - (1) Milder and characterized by a loss of consciousness lasting a few seconds
    - (2) Common in children and frequently disappear by late adolescence
  - e. Generalized tonic-clonic or grand mal seizures
    - (1) Most severe
    - (2) Loss of consciousness lasting several minutes
    - (3) Convulsions with violent shaking and thrashing movements
    - (4) Hypersalivation, which causes foaming at the mouth
    - (5) Loss of body functions
  - f. Treatment: anticonvulsant drugs are very effective
5. Hydrocephalus
- a. Excessive accumulation of cerebrospinal fluid in the ventricles and, in some cases, the subarachnoid space
  - b. Usually caused by a congenital defect, infection, or tumor that obstructs the flow of cerebrospinal fluid
  - c. Symptoms
    - (1) Abnormally enlarged head and prominent forehead with bulging eyes
    - (2) Irritability
    - (3) Distended scalp veins
    - (4) Retardation when pressure prevents proper development of the brain
  - d. Treatment: surgical implantation of a shunt (tube) between the ventricles and the veins, heart, or abdominal peritoneal cavity to drain the excess fluid
6. Meningitis
- a. Inflammation of the meninges of the brain and/or spinal cord caused by a bacteria, virus, fungus, or toxins such as lead and arsenic
  - b. Symptoms
    - (1) High fever
    - (2) Headache, back and neck pain, stiffness
    - (3) Nausea and vomiting
    - (4) Delirium and convulsions
    - (5) Coma and death if not treated