Nervous System
Ch. 25
Dr. Thorson
Lesson Objectives

Upon completion of this lesson, students should be able to:

1. Define and spell the terms to learn in this chapter.
2. List the functions of the nervous system.
3. Identify and discuss the structures that make up the central nervous system.
4. Explain how nerve impulses are transmitted.
Lesson Objectives

Upon completion of this lesson, students should be able to:

5. State the functions of the peripheral nervous system, the somatic nervous system, and the autonomic nervous system, and distinguish the differences between each.

6. Explain the delicate balance between the sympathetic and parasympathetic nervous system.
The Nervous System

• Acts to correlate both external and internal factors that affect our bodies by gathering, storing, deciphering both external and internal information

• Decides how to respond and react in an appropriate manner in order to satisfy certain need

• Of these needs, most important is need for survival
FIGURE 25-1 The nervous system
Structure and Function of the Nervous System

• Central Nervous System (CNS)
  • Brain
  • Spinal Cord

• Peripheral Nervous System (PNS)
  • Somatic nervous system (SNS)
  • Autonomic nervous system (ANS)
  • ANS further divided into sympathetic and parasympathetic nervous systems
FIGURE 25-2  Components of the nervous system.
Structure and Function of the Nervous System

- Nervous system three separate functions
  - Detects and interprets sensory information
  - Takes that information and makes decisions about how it is being received
  - Carries out a motor function based on the decisions made
FIGURE 25-3  Motor neuron showing the axon, dendrite, and myelin sheath.
Neurons

- Nervous system tissue is made up of:
  - Specialized nerve cells called neurons
  - Supporting tissue structures known as neuroglia
  - Neurons structural and functional in nature
  - Neuron cells enable the body to interact with its ever-changing internal and external environments
Neurons

• Motor Neurons
  • Control most of body's functions
  • Considered efferent nerves; transmit impulse away from neural cell body in CNS to stimulate a target muscle, organ, or gland
Neurons

• Motor Neurons
  • Have processes known as axon and dendrites
  • Several dendrites and only one axon
  • Axon covered with fatty insulating substance called myelin sheath
Neurons

• Motor Neurons
  • Axons may be several feet long and reach from cell body to area that is to be activated
  • Dendrites unsheathed, resemble tree branches, receive information for the neuron
  • Axon sends information away from the body of the cell
Neurons

• Sensory Neurons
  • Transmit sensory information through a peripheral process (projection)
  • Transmit impulses directly to CNS
  • Lack true dendrites, are sheathed, more closely resemble axons
Neurons

• Sensory Neurons
  • CNS activates motor neurons to respond to the sensory information
  • Referred to as afferent nerves; they carry impulses from sensory receptor to CNS
FIGURE 25-4 A sensory neuron.
Neurons

• Interneurons
  • Often referred to as associative neurons because they are located entirely within CNS
  • Work as liaison between sensory and motor neurons by mediating their impulses
Nerve Fibers, Nerves, and Tracts

• Nerve Fibers
  • Single elongated process, usually an axon or peripheral process from a sensory neuron
  • Found in PNS wrapped in sheaths
  • Nerve fibers of CNS do not contain Schwann cells; thus damage to CNS is permanent, whereas damage to a peripheral nerve can be reversed
Nerve Fibers, Nerves, and Tracts

• Myelinated Sheaths
  • Have both inner sheath of myelin (thick fatty substance) and outer sheath, or neurilemma, composed of Schwann cells
  • Schwann cells needed for process of regenerating a damaged nerve fiber
Nerve Fibers, Nerves, and Tracts

- Unmyelinated Sheaths
  - Wrapped only in neurilemma and lack myelin
Nerve Fibers, Nerves, and Tracts

• Nerves
  • Bundled unit of fibers found outside the CNS
  • Categorized as afferent (conducting impulses to the CNS) or efferent (conducting impulses to muscles, organs, and glands)
  • Some possess both afferent and efferent fibers (mixed nerves)
Nerve Fibers, Nerves, and Tracts

• Tracts
  • Group of nerve fibers within CNS
  • All nerve fibers housed within nerve tract must have same origin, function, and termination
  • Spinal cord contains sensory tracts that are afferent, which ascend to the brain, and efferent tracts that descend from the brain
Nerve Fibers, Nerves, and Tracts

• Tracts
  • Largest nerve tract is corpus callosum, which joins right and left hemispheres of the brain
Nerve Impulses and Synapses

- Stimulation begins to occur at receptor
- When receptor is stimulated, it reacts by initiating a chemical change or impulse
- Transmission of an impulse by a nerve fiber is based on "all or none" principle; either there is a response or there is not
Nerve Impulses and Synapses

• Receptor must receive sufficient stimulation to send impulse, or else the impulse is not transmitted to brain or target organ
Nerve Impulses and Synapses

• Each receptor has its own threshold at which it will react to a stimulus
• Each will only respond when its threshold is reached
• Impulse travels down axon of a nerve to knob-shaped structure (synaptic knob) at the end of the axon
• Impulse transmitted from neuron to neuron similar to a domino effect
FIGURE 25-5  A synapse
Central Nervous System

- Central nervous system (CNS) composed solely of brain and spinal cord
  - Receiptes impulses from entire body
  - Processes the information
  - Responds with appropriate actions
  - May be conscious or unconscious
Central Nervous System

- Both brain and spinal cord divided into gray matter and white matter
  - Gray matter
    - Unsheathed cell bodies and true dendrites
  - White matter
    - Myelinated nerve fibers
- In spinal cord, arrangement of gray and white matter in cross section is H-shaped
Central Nervous System

- Brain
  - Largest mass of nervous tissue in body
  - Male brain weighs about three pounds
  - Female brain weighs slightly less
  - Encompassed by three membranes (meninges)
    - Pia mater
    - Arachnoid mater
    - Dura mater
Central Nervous System

- Major divisions of the brain
  - Cerebrum
  - Diencephalon
  - Brainstem
  - Cerebellum
- Brainstem
  - Midbrain
  - Hindbrain (pons and medulla oblongata)
FIGURE 25-6  (A) Sagittal section of the brain; (B) lateral view of the brain.
Central Nervous System

- Cerebrum
  - Largest portion of mature brain
  - Both gray and white matter
  - Governs sensory and motor activity (sensory perception, emotions, consciousness, memory, voluntary movements) considered higher brain functions
Central Nervous System

- Cerebrum
  - Divided in half, forming two mirror-image portions called cerebral hemispheres
Central Nervous System

- Cerebrum
  - Corpus callosum connects the two halves
  - Surface marked by numerous ridges or convolutions called gyri
  - Surface known as cerebral cortex
  - Fissure: deep groove in brain
  - Sulcus: shallow groove in brain
Central Nervous System

- Cerebral Cortex
  - Houses 75 percent of neurons of entire nervous system
  - Composed of gray and white matter that lies directly below it
  - Responsible for interpreting sensory information and initiating body movements
  - Stores memories and creates emotions
Central Nervous System

• Cerebral Cortex
  • Frontal lobe
    • Deals with reasoning, personality and emotions, problem solving, planning, parts of speech, movement
  • Parietal lobe
    • Perceives stimuli related to touch, pain, temperature, pressure; recognizes and differentiates size, shape, color
Central Nervous System

- Cerebral Cortex
  - Temporal lobe
    - Perceives and recognizes auditory stimuli (hearing) and memory; interprets organizing and sequencing of items and events
  - Occipital lobe
    - Primarily concerned with the aspects of vision; perceives and recognizes printed words
Central Nervous System

- Diencephalon
  - Literally translated means "second portion of the brain"
  - Thalamus serves as relay center for all sensory impulses with exception of smell
Central Nervous System

• Diencephalon
  • Hypothalamus regulates autonomic nervous activity associated with behavior and emotional expression; regulates thirst and hunger, maintaining body temperature
Central Nervous System

• Brainstem
  • Resembles a stem
  • Contains midbrain, pons, medulla oblongata
  • Structures relay important information to the cerebrum including visual, auditory, and other sensory data
Central Nervous System

- Midbrain
  - Located just below cerebrum and above pons
  - Associated with visual reflexes and tracking movements of eyes
  - Lower two segments associated with sense of hearing
Central Nervous System

• Pons
  • Broad band of white matter anterior to cerebellum and between midbrain and medulla oblongata
  • Contains fiber tracts linking cerebellum and medulla to higher cortical areas
  • Plays vital role in voluntary and involuntary motor control
Central Nervous System

- Medulla Oblongata
  - Connects pons and rest of brain to spinal cord
  - Nerve centers vital to body's survival exert control over circulation of blood by regulating both heartbeat and arterial blood pressure
Central Nervous System

- Medulla Oblongata
  - Different areas responsible for involuntary bodily functions, including breathing, swallowing, coughing, sneezing, vomiting
Central Nervous System

• Cerebellum
  • Second largest portion of brain
  • Located in back of skull below cerebrum and behind pons and medulla oblongata
  • Surface has large cortex of gray cell bodies and white matter on its interior
Central Nervous System

- Cerebellum
  - Coordinates voluntary and involuntary patterns of movement
  - Adjusts muscles to automatically maintain posture
Central Nervous System

- Spinal Cord
  - Conducts sensory impulses from rest of body to brain and sends motor impulses from brain to rest of the body; occurs in white matter
  - Reflex center for nerve impulses that do not need to pass through the brain
Critical Thinking Question

1. What do you think is the purpose of cerebrospinal fluid?
Central Nervous System

- Cerebrospinal Fluid (CSF)
  - Colorless in appearance
  - Considered to be "blood" of nervous system
  - Moves from ventricles into connecting canal, and then through spinal canal and subarachnoid space that surround the brain
Central Nervous System

• Cerebrospinal Fluid (CSF)
  • Serves as cushion to protect brain and spinal cord, which float in the fluid
  • Nourishes brain and spinal cord with oxygen and glucose
Peripheral Nervous System

- One of two major divisions of nervous system
- Divided into somatic nervous system and autonomic nervous system
- Nerves of PNS connect CNS to sensory organs (such as eye and ear) and to other organs of body, muscles, blood vessels, and glands
Peripheral Nervous System

- Cranial and Spinal Nerves
  - Cranial nerves originate in the brain and are identified by Roman numerals
  - 12 pairs arranged symmetrically and named for function or area they serve
  - PNS contains 31 pairs of spinal nerves
  - Connected to spinal cord and named for region of vertebral column where they exist
FIGURE 25-7  The relationship of the 12 cranial nerves to specific regions of the brain.
Peripheral Nervous System

- Spinal Nerves
  - 8 pairs of cervical spinal nerves
  - 12 pairs of thoracic spinal nerves
  - 5 pairs of lumbar spinal nerves
  - 5 pairs of sacral spinal nerves
  - 1 pair of coccygeal spinal nerves
FIGURE 25-8 The 31 pairs of spinal nerves
Peripheral Nervous System

- Cranial Nerves
  - Olfactory
    - Provides sense of smell
  - Optic
    - Provides vision
  - Oculomotor
    - Conducts motor impulses to four of the six external muscles of the eye and to the muscle that raises the eyelid
Peripheral Nervous System

- Cranial Nerves
  - Trochlear
    - Conducts motor impulses to control the superior oblique muscle of the eyeball
  - Trigeminal
    - Provides sensory input from face, nose, mouth, forehead, top of head; motor fibers to muscles of the jaw (chewing)
Peripheral Nervous System

- Cranial Nerves
  - Abducens
    - Conducts motor impulses to lateral rectus muscle of the eyeball
  - Facial
    - Controls muscles of face and scalp; lacrimal glands of eye and submandibular and sublingual salivary glands; input from tongue for sense of taste
Peripheral Nervous System

- Cranial Nerves
  - Vestibulocochlear (Acoustic)
    - Provides input for hearing and equilibrium
  - Glossopharyngeal
    - Provides general sense of taste; regulates swallowing; controls secretion of saliva
Peripheral Nervous System

- Cranial Nerves
  - Vagus
    - Controls muscles of pharynx, larynx, thoracic, abdominal organs; swallowing, voice production, slowing of heartbeat, acceleration of peristalsis
  - Accessory
    - Controls trapezius and sternocleidomastoid muscles, permitting movement of the head and shoulders
Peripheral Nervous System

• Cranial Nerves
  • Hypoglossal
    • Controls the tongue; tongue movements
Peripheral Nervous System

- Somatic Nervous System
  - Made up of nerves that connect to skeletal muscles, sensory organs, and skin
  - Referred to as "voluntary" nervous system because it connects to muscles and other structures under voluntary control of the body
Peripheral Nervous System

• Somatic Nervous System
  • Responsible for processing sensory information received from eyes, ears, nose, and touch
Peripheral Nervous System

• Autonomic Nervous System
  • Controls involuntary bodily functions such as sweating, secretion of glands, arterial blood pressure, smooth muscle tissue, and heart
  • Divided into sympathetic and parasympathetic nervous systems
  • These two systems counteract each other's activity to keep body in state of homeostasis
Peripheral Nervous System

- Sympathetic Division
  - Branches from 12 thoracic and first 3 lumbar spinal nerves form first part of sympathetic division of the ANS
  - Cell bodies of these nerve fibers located in gray matter of spinal cord
  - Axons of these nerve cells branch out from spinal nerves and enter immediately into masses of nerve cell bodies called sympathetic ganglia
Peripheral Nervous System

• Sympathetic Division
  • Spinal nerves that synapse with sympathetic ganglia tend to produce widespread innervation when activated
  • This occurrence thought to prepare body for fight or flight
  • During fight or flight, a person experiences increased alertness in conjunction with increase in metabolic rate and other bodily functions
Peripheral Nervous System

• Sympathetic Division
  • At this point, SNS stimulates adrenal gland to release epinephrine (adrenaline) the hormone that causes the familiar adrenaline rush
Peripheral Nervous System

• Parasympathetic Division
  • Long fibers that branch from cranial nerves III, VII, IX, and X in conjunction with long fibers of sacral nerves II, II, and IV, form first stage of parasympathetic division
Peripheral Nervous System

- Parasympathetic Division
  - Cranial nerve fibers extend via vagus nerve to ganglia serving thoracic, abdominal, pelvic viscera
  - Fibers of sacral spinal nerves form pelvic nerve, which branches to synapse with small ganglia near or within organs to be innervated
Peripheral Nervous System

• Parasympathetic Division
  • Cell bodies of these ganglia serve lower colon, rectum, bladder, reproductive organs
  • Parasympathetic division has quieting effect
Peripheral Nervous System

- Parasympathetic Division
  - Works to conserve energy and innervate digestive system, nicknamed "rest and digest"
  - Cause decrease in metabolism and bodily functions
Common Disorders Associated with the Nervous System

• Alzheimer's Disease
  • Progressive, degenerative disease that attacks the brain and its cognitive function
  • Family history associated with development, along with activity and age
Common Disorders Associated with the Nervous System

• Alzheimer's Disease
  • Usually, symptoms do not begin to appear until after age 65
  • Currently, 10 percent of Americans 65 and older have Alzheimer's disease
Common Disorders Associated with the Nervous System

• Alzheimer's Disease
  • Mild forgetfulness of recent events marks first symptoms
  • Ability to think and rationalize diminishes
  • Thought processes interrupted
Common Disorders Associated with the Nervous System

• Alzheimer's Disease
  • Speech may become difficult to understand
  • Reading and writing skills deteriorate
  • Behavioral patterns change during later stages
Common Disorders Associated with the Nervous System

- Alzheimer's Disease
  - Patients may become agitated, depressed, aggressive or violent
  - Eventually, patients are unable to speak, eat, or care for themselves
Common Disorders Associated with the Nervous System

- Alzheimer's Disease
  - Medications to slow in progression in early stages
  - Medication must continue throughout patient's life to avoid regression
  - Recent medical studies suggest that older adults who maintain active lifestyles and engage in mentally stimulating activities may be less prone to develop Alzheimer's disease
Common Disorders Associated with the Nervous System

- Amyotrophic Lateral Sclerosis (ALS)
  - Unknown etiology
  - Heredity and environmental factors considered to be associated
  - Breaks down the motor neurons
  - Disease also known as Lou Gehrig's disease
Common Disorders Associated with the Nervous System

- Amyotrophic Lateral Sclerosis (ALS)
  - Loss of control of voluntary muscle movement including arms, legs, and trunk
  - Involuntary muscle movement associated with contraction of heart and smooth muscle of internal organs are not generally affected
Common Disorders Associated with the Nervous System

• Amyotrophic Lateral Sclerosis (ALS)
  • Various forms of ALS associated with loss of intellectual function (dementia) or sensory symptoms
Common Disorders Associated with the Nervous System

- Amyotrophic Lateral Sclerosis (ALS)
  - No known cure
  - Certain medications as well as speech, physical, and respiratory therapy can help to manage symptoms and improve or maintain the quality of life
Common Disorders Associated with the Nervous System

• Bell's Palsy
  • Weakness or paralysis of muscles that control expression on one side of face
  • Generally not a serious condition
  • Caused by damage to a facial nerve, one of which runs beneath each ear to muscles on the same side of the face
Common Disorders Associated with the Nervous System

• Bell's Palsy
  • Named after Dr. Charles Bell who first documented the disorder in 1882
  • Also known as facial palsy
Common Disorders Associated with the Nervous System

• Bell's Palsy
  • Unilateral paralysis of the face
  • Facial drooping and lack of expression on afflicted side
  • Headaches and excessive drooling or tearing
Common Disorders Associated with the Nervous System

- Bell's Palsy
  - Corticosteroids at onset ensures good recovery
  - Most often, Bell's palsy will resolve on its own within weeks or months of onset
Common Disorders Associated with the Nervous System

- **Disk Disorders**
  - Occurs when intervertebral disks between spinal vertebrae deteriorate, creating pain and shortening of stature
  - Severe pain around or near location of problematic disk
  - Neck, back, and leg pain and immobility
  - Leg and other muscle weakness
  - Incontinence
Common Disorders Associated with the Nervous System

- Disk Disorders
  - Bed rest
  - Heat or cold
  - Muscle relaxers
  - Analgesics
  - Physical therapy for ruptured or slipped disks
  - Massage therapy, acupuncture, biofeedback
Common Disorders Associated with the Nervous System

- Encephalitis
  - Infection of brain often caused by a virus
  - Primarily affects infants and elderly
- Signs and Symptoms
  - Headache
  - Sudden fever
  - Vomiting
Common Disorders Associated with the Nervous System

• Signs and Symptoms
  • Sensitivity to light
  • Stiff neck and back
  • Confusion
  • Drowsiness
  • Clumsiness
  • Irritability
Common Disorders Associated with the Nervous System

- Encephalitis
  - Emergency care required if patient exhibits
    - Loss of consciousness
    - Decreased responsiveness
    - Seizures
    - Muscle weakness
    - Impaired judgment
Common Disorders Associated with the Nervous System

• Encephalitis
  • Generally hospitalized
  • Antibiotics
  • Antiviral medications
  • Anticonvulsants
  • Steroids to decrease inflammation
  • Sedatives to control irritability and agitation
Common Disorders Associated with the Nervous System

• Epilepsy and Seizures
  • Seizures
    • Disorders associated with misfiring or interference of electrical impulses within the brain
    • Occurs when abnormal and often intense bursts of electrical activity produced within the brain
    • Affect 0.5 percent of population
Common Disorders Associated with the Nervous System

- Epilepsy and Seizures
  - Epilepsy
    - Disorder characterized by recurring seizures
    - Cause often unknown
    - Often result of another condition: head injury, stroke, brain infection, brain tumor
Common Disorders Associated with the Nervous System

- Epilepsy and Seizures
  - Seizures temporarily interfere with muscle control, movement, speech, vision, awareness of one's surroundings
  - Some individuals only have one seizure in a lifetime, whereas others may have repeated episodes
Common Disorders Associated with the Nervous System

- Epilepsy and Seizures
  - Medication reduces occurrence and severity of seizures
  - In almost all patients with recurrent seizures or epilepsy, medication taken for life
Common Disorders Associated with the Nervous System

- Epilepsy and Seizures
  - In very severe cases, surgery may be required
  - Minimizing exposure to or circumstances surrounding triggers helpful
Critical Thinking Question

1. When is it important to seek professional help for a headache?
Common Disorders Associated with the Nervous System

• Headaches
  • Clinical features include number of attacks per month, length of time per attack, pain characteristics, and accompanying symptoms such as:
    • Migraine
    • Tension
    • Cluster
    • Post-traumatic
Common Disorders Associated with the Nervous System

• Headaches
  • Migraine
    • Tend to be more common among women and thought that female hormones responsible for this higher frequency
Common Disorders Associated with the Nervous System

• Headaches
  • Tension
    • Referred to as muscle-contraction headache, stress headache, ordinary headache, psychomyogenic headache, and idiopathic headache; may be episodic or chronic in nature
Common Disorders Associated with the Nervous System

• Headaches
  • Cluster
    • More common in men than women; those who drink excessively and smoke are at highest risk of developing
  • Post-traumatic
    • Often occur after head or neck injury has healed
Common Disorders Associated with the Nervous System

• Meningitis
  • Infection of meninges that surround and protect the brain and spinal cord
  • Caused by virus or bacterium
Common Disorders Associated with the Nervous System

• Meningitis
  • Bacterial meningitis, if left untreated, has high death rate
    • Neck stiffness
    • Headache
    • Vomiting
    • High fever
    • Chills
Common Disorders Associated with the Nervous System

- Meningitis
  - Immediate medical treatment necessary
  - Antibiotics
  - Antiinflammatory medications
  - Analgesics
  - Anticonvulsants
  - Isolation may be required to prevent its spread
Common Disorders Associated with the Nervous System

- Multiple Sclerosis (MS)
  - Chronic, debilitating autoimmune disease affecting brain and spinal cord
  - No known cure
Common Disorders Associated with the Nervous System

• Multiple Sclerosis (MS)
  • Body attacks its own myelin that surrounds the nerves of the brain and spinal cord (CNS)
  • As the myelin is damaged, scarlike tissue begins to develop and becomes very thick and dense (sclerosis)
Common Disorders Associated with the Nervous System

• Multiple Sclerosis (MS)
  • Area of sclerotic tissue (lesion)
  • Lesions can form and develop throughout the CNS
  • Sclerotic tissue impedes transmission of nerve impulses, resulting in difficulty with movement, vision, or sensation
Common Disorders Associated with the Nervous System

• Multiple Sclerosis (MS)
  • Double vision
  • Dizziness
  • Paralysis
  • Loss of balance
  • Depression and emotional changes
  • Problems with speech and vision
Common Disorders Associated with the Nervous System

• Multiple Sclerosis (MS)
  • Pins-and-needles sensations
  • Bladder incontinence
  • Numbness
  • Muscle stiffness
  • Uncontrollable tremors
Common Disorders Associated with the Nervous System

• Multiple Sclerosis (MS)
  • Treatment depends on type and severity of disease
  • Drug therapy used to minimize effects of symptoms and improve quality of life
FIGURE 25-9 Multisystem effects of multiple sclerosis

**Neurologic**
- Emotional lability (euphoria or depression)
- Forgetfulness
- Apathy
- Scanning speech
- Impaired judgment
- Irritability

**Potential Complications**
- Convulsive seizures
- Dementia

**Sensory**
- Visual
  - Blurred vision
  - Diplopia
  - Nyctalopia
  - Visual field defects (blind spots)
  - Eye pain
- Auditory
  - Vertigo
  - Noise
- Tactile (especially hands or legs)
  - numbness
  - Paresthesias (tingling, burning sensation)
- Diminished sense of temperature
- Pain with pressures
- Loss of proprioception

**Potential Complication**
- Visual
  - Blindness

**Respiratory**
- Diminished cough reflex
- Recurrent infections

**Urinary**
- Hesitancy
- Frequency
- Retention
- Reflex bladder emptying

**Gastrointestinal**
- Oral/Esophageal
  - Difficulty chewing
  - Dysphagia
- Upper/lower GI
  - Decreased or absent sphincter control
  - Bowel incontinence
  - Constipation

**Musculoskeletal**
- Fatigue
- Limb weakness
- Ataxic movements (shaky, irregular, uncoordinated)
- Intention tremors
- Spasticity
- Muscular atrophy
- Dragging of feet and foot drop
- Dysarthria with slurred speech

**Reproductive**
- Impotence (male)
- Loss of genital sensation
Common Disorders Associated with the Nervous System

• Neuralgia
  • General term for nerve pain
  • Causes vary and include chemical irritation, trauma (including surgery), inflammation, and infections
  • Signs and symptoms include
    • Pain, usually brief but may be severe
    • Shooting pain along course of affected nerve
Common Disorders Associated with the Nervous System

• Neuralgia
  • Treatment varies depending on cause, location, severity of pain and other factors
  • Rest, stretching, and heat
  • Aspirin, acetaminophen, or ibuprofen
Common Disorders Associated with the Nervous System

• Neuralgia
  • Narcotic pain killers, nerve blocks, anesthetic agents administered via local injection
  • Surgical procedures to decrease sensitivity
Common Disorders Associated with the Nervous System

• Parkinson's Disease
  • Progressive disorder
  • Caused by degeneration of nerve cells in parts of the brain that control movement
  • Shortage of the neurotransmitter dopamine, causing movement impairments that characterize the disease
  • No known cure
Common Disorders Associated with the Nervous System

• Parkinson's Disease
  • Tremor of a limb (especially at rest)
  • Localized to one side and one limb; usually seen in the hand
  • Slow movement (bradykinesia)
  • Inability to move (akinesia)
Common Disorders Associated with the Nervous System

• Parkinson's Disease
  • Rigid limbs, shuffling gait, stooped posture
  • Reduced facial expression (the "mask")
  • Soft voice
Common Disorders Associated with the Nervous System

- Parkinson's Disease
  - Depression
  - Personality change
  - Dementia
  - Sleep disturbances
  - Speech impairment
  - Sexual difficulties
  - Worsens over time
Common Disorders Associated with the Nervous System

- Parkinson's Disease
  - Medication levodopa
  - Levodopa must eventually be discontinued due to side effects
  - Surgical intervention helps minimize involuntary motions
Common Disorders Associated with the Nervous System

• Sciatica
  • Pain that runs along sciatic nerve
  • Often caused by inflammation due to a pinched root of the sciatic nerve
  • Typically occurs on one side
Common Disorders Associated with the Nervous System

- Sciatica
  - Sharp pain from lower back, down the back of the thigh
  - Pain may be worse during periods of activity, as well as at night
  - Increased pain when weather changes
  - Numbness and tingling sensations
Common Disorders Associated with the Nervous System

• Sciatica
  • Analgesics
  • Antiinflammatories
  • Steroids
  • Cold or heat therapy
  • Rest and restrict activities
  • Gentle stretching
  • In extreme cases, surgical intervention may be necessary
Common Disorders Associated with the Nervous System

- Spinal Cord Injuries
  - Damage, lesions, or a break in spinal cord can result in paralysis
- Quadriplegia
  - Paralysis from the shoulders down
- Paraplegia
  - Paralysis from the waist down
- Hemiplegia
  - Occurs when paralysis affects one side
Common Disorders Associated with the Nervous System

• Spinal Cord Injuries
  • Treatment aimed at reducing complications
  • Physical therapy may be helpful in hemiplegic patients with complications due to stroke
Common Disorders Associated with the Nervous System

- Spinal Cord Injuries
  - Complications associated with paralysis:
    - Pressure sores (decubitus)
    - Thrombosis
    - Muscle atrophy
    - Pneumonia
Common Disorders Associated with the Nervous System

• Strokes
  • Also known as cerebrovascular accident (CVA)
  • Third leading cause of death in the U.S.
  • Death occurs to brain tissue when blood supply to brain is decreased by a clot or a hemorrhage
Common Disorders Associated with the Nervous System

• Strokes
  • Brain cells can die when oxygen supply is interrupted for more than a few minutes
  • Speed is important in diagnosis and treatment
Common Disorders Associated with the Nervous System

- Strokes
  - Symptoms often sudden and require emergency intervention
  - Numbness or weakness on one side of body
  - Confusion or trouble speaking
Common Disorders Associated with the Nervous System

- Strokes
  - Vision disturbances in one or both eyes
  - Dizziness
  - Loss of balance or coordination
  - Severe headache with no known cause
Common Disorders Associated with the Nervous System

- Stroke
  - Emergency intervention vital
  - Stabilize condition by either dissolving blood clots or stopping hemorrhage
  - Surgery may be necessary
Common Disorders Associated with the Nervous System

- Stroke
  - Medications to control swelling of the brain and control blood pressure
  - Medications and treatments given after incident to reduce the chance of recurrence
Common Disorders Associated with the Nervous System

- Transient Ischemic Attacks (TIAs)
  - Frequently precursors of strokes
  - "Ministrokes" that can last anywhere from a few seconds to hours
Common Disorders Associated with the Nervous System

- Transient Ischemic Attacks (TIAs)
  - Signs and symptoms
    - Temporary sudden weakness
    - Numbness
    - Change of consciousness
  - Symptoms depend on the portion of the brain affected
Common Disorders Associated with the Nervous System

- Transient Ischemic Attacks (TIAs)
  - Patients must seek medical attention
  - TIAs a sign a true stroke may soon occur
  - Preventive measures must be taken
  - Anticoagulants and aspirin therapy
Common Disorders Associated with the Nervous System

• Transient Ischemic Attacks (TIAs)
  • Cease smoking
  • Stop overeating
  • Maintain a healthy weight
  • Decrease alcohol consumption
  • Lower blood pressure
  • Control diabetes
Common Disorders Associated with the Nervous System

• Trauma
  • Epidural and subdural hematomas develop when the head receives a blow
  • Subdural hematomas cause pressure in the brain that must be relieved with shunting
Common Disorders Associated with the Nervous System

- Trauma
  - Trauma to the brain can also cause:
    - Concussion
      - Injury caused by sharp jarring or a blow to the head
    - Contusion
      - Bruising of the brain
    - Depressed skull fractures can cause brain injury
Common Disorders Associated with the Nervous System

- Trauma
  - Symptoms vary depending on type of injury
    - Loss of consciousness
    - Headache
    - Confusion
Common Disorders Associated with the Nervous System

- Trauma
  - Symptoms vary depending on type of injury
    - Dizziness
    - Blurred vision
    - Ringing in the ears
    - Behavioral, mood, and sleep pattern changes
Common Disorders Associated with the Nervous System

• Trauma
  • Treatment varies depending on type of injury
  • Rehabilitation exercise
  • Medications to suppress seizures, such as benzodiazepines and barbiturates