

# CHAPTER 12

## NERVOUS SYSTEM

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### MEDIA LIBRARY

#### Student DVD-ROM

- Twelve different interactive learning games
- Flash card generator
- Audio Glossary
- Professional Profile video—Electroneurodiagnostics
- Body Rhythms
- Terminology Translator

#### Companion Website

- Multiple Choice, True/False, and Fill-in-the-Blank practice questions
- Labeling exercises
- Case study
- Additional Professional Profile information

- *New York Times* link for research into specific pathologies
- Web Destination activities
- Audio Glossary
- Link to VangoNotes
- Link to drug updates

#### IRDVD

- Animations
  - 3D interactive animation of brain anatomy
  - Multiple sclerosis
- Drag-and-drop labeling activity
  - Central Nervous System

- Videos
  - Epilepsy
  - Tonic-clonic seizure
  - Absence seizure
  - Parkinson's disease
  - Electrodiagnostic technician
- Digital library of all figures from text chapter, labeled and unlabeled
- Test bank with 200 objective questions per chapter plus two short answer questions
- 20 classroom response questions
- PowerPoint presentation for classroom or online utilization

## OBJECTIVE 1

Identify and define the combining forms and suffixes introduced in this chapter.

Text page: 388; PowerPoint slides: 6–9

### LECTURE NOTES

#### Combining Forms

cephal/o	head
cerebell/o	cerebellum
cerebr/o	cerebrum
encephal/o	brain
gli/o	glue
medull/o	medulla oblongata
mening/o	meninges
meningi/o	meninges
myel/o	spinal cord
neur/o	nerve
phas/o	speech
poli/o	gray matter
pont/o	pons
radicul/o	nerve root
thalam/o	thalamus
thec/o	sheath (meninges)
ventricul/o	brain ventricle

#### Suffixes

-algnesia	pain, sensitivity
-esthesia	feeling, sensation
-paresis	weakness
-phasia	speech
-plegia	paralysis
-taxia	muscle coordination

### TEACHING STRATEGIES

- Encourage/remind students to add new word parts to their flash cards.

#### Medical Terminology Bee

- Create PowerPoint flash cards of new combining forms and suffixes presented in this chapter; have all students stand and then define word part; if student is correct, he or she remains standing; if student is wrong, he or she sits down; continue until only one student is standing.

### LEARNING ACTIVITIES

#### Worksheet 12A

- New Combining Form and Suffix Handout

#### Worksheet 12B

- Medical Term Analysis

#### Quiz 12A

- May be used as a worksheet

#### Text

- Practice Exercises

#### Student DVD-ROM

- Learning games
- Make flash cards

#### CW

- Practice questions

### ASSESSMENTS

**Quiz 12A**—New Word Parts Quiz

**Test Bank**—Fill-in-the-Blank questions

## OBJECTIVE 2

Correctly spell and pronounce medical terms and major anatomical structures relating to the nervous system.

### LECTURE NOTES

Pronunciation for medical terms in this chapter can be found:

- In parentheses following key terms
- In the Audio Glossary on Student DVD-ROM
- In the Audio Glossary at Companion Website

### TEACHING STRATEGIES

Emphasize to students:

- Importance of correctly spelling terms.
- How sounding out terms can assist in learning how to spell the terms.

Say each new term in class and have students repeat it.

#### Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension of spelling strategies.

### LEARNING ACTIVITIES

#### Worksheet 12B

- Medical Term Analysis

#### Terminology Checklist

- Can be used to practice pronunciation using the Audio Glossary as reference

#### Text

- Practice Exercises

#### Flash cards

- Look at the definition and write out/pronounce terms

#### Student DVD-ROM

- Audio Glossary
- Spelling Challenge game
- Crossword and Word Search puzzles

### ASSESSMENTS

#### Quiz 12B—Spelling Quiz

Suggested terms:

1. neurotransmitter
2. synapse
3. neuroglial
4. meninges
5. diencephalon
6. arachnoid
7. parasympathetic
8. anesthesiology
9. radiculopathy
10. hydrocephalus
11. paresthesia
12. syncope
13. unconscious
14. Alzheimer's
15. cerebrovascular
16. amyotrophic
17. myelomeningocele
18. myasthenia
19. echoencephalography
20. endarterectomy

**Test Bank**—questions

## OBJECTIVE 3

Locate and describe the major organs of the nervous system and their functions.

Text pages: 390–395; PowerPoint slides: 10; 22–50

### LECTURE NOTES

- Responsible for coordinating all activity of body; first receives information from both external and internal **sensory receptors**; then uses information to adjust activity of **muscles** and **glands** to match needs of body
- Nervous system subdivided into **central nervous system (CNS)** and **peripheral nervous system (PNS)**
- Central nervous system consists of **brain** and **spinal cord**; sensory information comes into central nervous system, where it is processed; motor messages then exit central nervous system carrying commands to muscles and glands
- **Nerves** of peripheral nervous system are **cranial nerves** and **spinal nerves**; sensory nerves carry information to central nervous system and motor nerves carry commands away from central nervous system
- All portions of nervous system are composed of nervous tissue

### Brain

- One of largest organs in body
- Coordinates most body activities; center for thought, memory, judgment, and emotion
- Each part of brain is responsible for controlling different body functions, such as temperature regulation, blood pressure, and breathing
- Four sections to brain: **cerebrum**, **cerebellum**, **diencephalon**, and **brain stem** (see ■ Figure 12.3)
- **Cerebrum**—largest section of brain; located in upper portion of brain and is area that processes thoughts, judgment, memory, problem solving, and language; outer layer of cerebrum is **cerebral cortex**, composed of folds of gray matter; elevated portions of cerebrum, or convolutions, are called **gyri** and are separated by fissures, or valleys, called **sulci**; is subdivided into left and right halves called **cerebral hemispheres**; each hemisphere has four lobes; see ■ Figure 12.4:
  1. **Frontal lobe:** most anterior portion of cerebrum; controls motor function, personality, and speech
  2. **Parietal lobe:** most superior portion of cerebrum; receives and interprets nerve impulses from sensory receptors and interprets language
  3. **Occipital lobe:** most posterior portion of cerebrum; controls vision
  4. **Temporal lobe:** left and right lateral portion of cerebrum; controls hearing and smell
- **Diencephalon**—located below cerebrum, contains two of most critical areas of the brain, **thalamus** and **hypothalamus**; thalamus is composed of gray matter and acts as center for relaying impulses from eyes, ears, and skin to cerebrum; pain perception is controlled by thalamus; hypothalamus located just below thalamus controls body temperature, appetite, sleep, sexual desire, and emotions; hypothalamus is responsible for controlling autonomic nervous system, cardiovascular system, digestive system, and release of hormones from pituitary gland

### TEACHING STRATEGIES

#### Visual Aids

- Use full-size anatomical charts and models to illustrate different organs of nervous system, especially brain.

#### IRDVD

- See PowerPoint presentation on the Instructor's Resource DVD for a drag-and-drop central nervous system anatomy activity; display on screen and have students discuss and place labels during class.
- See PowerPoint presentation on the Instructor's Resource DVD for a 3D animation of the brain.

#### Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

### LEARNING ACTIVITIES

#### Worksheet 12C

- Chapter Review

#### Text

- Labeling exercises 12.A & 12.B2
- Practice Exercises

#### Student DVD-ROM

- Labeling exercises
- Learning games

#### CW

- Labeling exercise
- Practice questions

#### Quiz 12D

- May be used as worksheet

### ASSESSMENTS

**Quiz 12D**—Labeling Diagrams

**Test Bank**—questions

- **Cerebellum**—second largest portion of brain; located beneath posterior part of cerebrum; aids in coordinating voluntary body movements and maintaining balance and equilibrium; cerebellum refines muscular movement that is initiated in cerebrum
- **Brain stem**—area has three components: **midbrain**, **pons**, and **medulla oblongata**; midbrain acts as pathway for impulses to be conducted between brain and spinal cord; pons—term meaning bridge—connects cerebellum to rest of brain; medulla oblongata is most inferior positioned portion of brain; connects brain to spinal cord; area contains centers that control respiration, heart rate, temperature, and blood pressure; also site where nerve tracts cross from one side of brain to control functions and movement on other side of body; with few exceptions, left side of brain controls right side of body and vice versa
- **Ventricles**—brain has four interconnected cavities; one in each cerebral hemisphere, one in thalamus, and one in front of cerebellum; contain **cerebrospinal fluid** (CSF), watery, clear fluid provides protection from shock or sudden motion to brain and spinal cord

## Spinal Cord

- Function is to provide pathway for impulses traveling to and from brain
- Column of nervous tissue; extends from medulla oblongata of brain down to level of second lumbar vertebra within vertebral column
- 33 vertebrae of backbone line up to form continuous canal for spinal cord called **spinal cavity** or **vertebral canal**
- See ■ Figure 12.5
- Also protected by cerebrospinal fluid; flows down center of spinal cord within **central canal**; inner core of spinal cord consists of cell bodies and dendrites of peripheral nerves and therefore is gray matter; outer portion of spinal cord is myelinated white matter; white matter is either **ascending tracts** carrying sensory information up to brain or **descending tracts** carrying motor commands down from brain to peripheral nerve

## Meninges

- Three layers of connective tissue membranes; surround brain and spinal cord
- See ■ Figure 12.6
- From external to internal, meninges are:
  1. **Dura mater**: meaning *tough mother*; forms tough, fibrous sac around central nervous system
  2. **Subdural space**: actual space between dura mater and arachnoid layers
  3. **Arachnoid layer**: meaning *spider-like*; thin, delicate layer attached to pia mater by web-like filaments
  4. **Subarachnoid space**: space between arachnoid layer and pia mater; contains cerebrospinal fluid that cushions brain from outside
  5. **Pia mater**: meaning *soft mother*; innermost membrane layer and is applied directly to surface of brain and spinal cord

## OBJECTIVE 4

Describe the components of a neuron.

Text page: 390; PowerPoint slides: 11–19

### LECTURE NOTES

- Consists of two basic types of cells: **neurons** and **neuroglial cells**
- Neurons—individual nerve cells; capable of conducting electrical impulses in response to stimulus
- Neurons have three basic parts: **dendrites**, **nerve cell body**, and **axon** (see ■ Figure 12.1A)
- Dendrites—highly branched projections that receive impulses
- Nerve cell body—contains nucleus and many of other organelles of cell (see ■ Figure 12.1B)
- Axon—neuron has only single axon; projection from nerve cell body that conducts electrical impulse toward destination
- **Synapse**—point at which axon of one neuron meets dendrite of next neuron; electrical impulses cannot pass directly across gap between two neurons, called **synaptic cleft**; require help of chemical messenger, called **neurotransmitter**
- Neuroglial cells—found in nervous tissue; each has different support function for neurons; for example, some neuroglial cells produce **myelin**, fatty substance that acts as insulation for many axons so that they conduct electrical impulses faster; neuroglial cells *do not* conduct electrical impulses.

### TEACHING STRATEGIES

#### Visual Aids

- Use full-size anatomical charts and models to illustrate the structure of a nerve.

#### Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

### LEARNING ACTIVITIES

#### Worksheet 12C

- Chapter Review

#### Text

- Labeling exercise 12.B1
- Practice Exercises

#### Student DVD-ROM

- Labeling exercise
- Learning games

#### CW

- Labeling exercise
- Practice questions

#### Quiz 12C

- May be used as worksheet

### ASSESSMENTS

Quiz 12C—Labeling Diagram

Test Bank—questions

## OBJECTIVE 5

Distinguish between the central nervous system, peripheral nervous system, and autonomic nervous system.

Text pages: 390–398; PowerPoint slides: 20–21; 51–62

### LECTURE NOTES

#### Central Nervous System

- Brain and spinal cord
- Receives impulses from all over body, processes this information, then responds with an action
- Consists of both **gray** and **white matter**
- Gray matter—comprised of unsheathed or uncovered cell bodies and dendrites
- White matter—**myelinated** nerve fibers (see ■ Figure 12.2); myelin sheath makes nervous tissue appear white

### TEACHING STRATEGIES

#### Visual Aids

- Use full-size anatomical charts and models to illustrate the organization of different parts of the nervous system.

#### Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

- **Tracts**—bundles of nerve fibers interconnecting different parts of central nervous system
- Central nervous system is encased and protected by **meninges**

## Peripheral Nervous System (PNS)

- 12 pairs of cranial nerves and 31 pairs of spinal nerves
- **Nerve**—bundle of axon fibers located outside central nervous system that carries messages between central nervous system and various parts of body
- Whether nerve is cranial or spinal is determined by where nerve originates; cranial nerves arise from brain, mainly at medulla oblongata; spinal nerves split off from spinal cord, and one pair (left and right) exits between each pair of vertebrae
- **Nerve root**—point where either type of nerve is attached to central nervous system
- Names of most nerves reflect either organ nerve serves or portion of body the nerve is traveling through
- Entire list of cranial nerves is found in Table 12.1; ■ Figure 12.7 illustrates some major spinal nerves in human body
- Most nerves carry information to and from central nervous system, individual neurons carry information in only one direction; **afferent neurons**, also called **sensory neurons**, carry sensory information from sensory receptor to central nervous system; **efferent neurons**, also called **motor neurons**, carry activity instructions from central nervous system to muscles or glands out in body (see ■ Figure 12.8)
- **Ganglion**—nerve cell bodies of neurons forming nerve are grouped together in knot-like mass; located outside central nervous system
- Nerves of peripheral nervous system are subdivided into two divisions, **autonomic nervous system (ANS)** and **somatic nerves**, each serving a different area of body

## Autonomic Nervous System

- Involved with control of involuntary or unconscious bodily functions
- May increase or decrease activity of smooth muscle found in viscera and blood vessels, cardiac muscle, and glands
- Divided into two branches: **sympathetic branch** and **parasympathetic branch**
- Sympathetic nerves control “fight-or-flight” reaction during times of stress and crisis; increase heart rate, dilate airways, increase blood pressure, inhibit digestion, and stimulate production of adrenaline during crisis
- Parasympathetic nerves serve as counterbalance for sympathetic nerves, “rest-and-digest” reaction; cause heart rate to slow down, lower blood pressure, and stimulate digestion.

## Somatic Nerves

- Serve skin and skeletal muscles
- Mainly involved with conscious and voluntary activities of body
- Large variety of sensory receptors found in dermis layer of skin use somatic nerves to send their information, such as touch, temperature, pressure, and pain, to brain
- Also carry motor commands to skeletal muscles

## LEARNING ACTIVITIES

### Worksheet 12C

- Chapter Review

### Text

- Labeling exercise 12.B1
- Practice Exercises

### Student DVD-ROM

- Learning games

### CW

- Practice questions

## ASSESSMENTS

**Quiz 12G**—Chapter Review

**Test Bank**—questions

## OBJECTIVE 6

Build and define nervous system medical terms from word parts.

Text pages: 398–399; PowerPoint slides: 63–68

### LECTURE NOTES

#### Combining

Form	Medical Term	Definition
cephal/o	cephalalgia	head pain (headache)
cerebell/o	cerebellar	pertaining to cerebellum
	cerebellitis	cerebellum inflammation
cerebr/o	cerebral	pertaining to cerebrum
	cerebrospinal	pertaining to cerebrum and spine
encephal/o	electroencephalogram (EEG)	record of brain's electricity
	encephalitis	brain inflammation
meningi/o	meningioma	meninges tumor
mening/o	meningeal	pertaining to meninges
	meningitis	meninges inflammation
myel/o	myelogram	record of spinal cord
	myelitis	spinal cord inflammation
neur/o	neural	pertaining to nerves
	neuralgia	nerve pain
	neurectomy	removal of nerve
	neurologist	specialist in nerves
	neuroma	nerve tumor
	neuropathy	nerve disease
	neuroplasty	surgical repair of nerves
	polyneuritis	inflammation of many nerves
	neurorrhaphy	suture of nerve
pont/o	pontine	pertaining to pons
radicul/o	radiculitis	nerve root inflammation
	radiculopathy	nerve root disease
thalam/o	thalamic	pertaining to thalamus
thec/o	intrathecal	pertaining to within meninges

#### Suffix

Suffix	Medical Term	Definition
-algia	analgesia	absence of pain or sensation
-esthesia	anesthesia	lack of sensations
	hyperesthesia	excessive sensations
-paresis	monoparesis	weakness of one
-phasia	aphasia	lack of speech
	dysphasia	difficult speech
-plegia	monoplegia	paralysis of one
	quadriplegia	paralysis of four
-taxia	ataxia	lack of muscle coordination

### TEACHING STRATEGIES

- Reinforce how many nervous system terms can be constructed from word parts.
- Read aloud chapter terms that are made up of word parts; have students identify parts and define terms, either aloud or individually on paper.
- Write sentences on the board using common words; have students substitute correct medical terms.

#### Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

### LEARNING ACTIVITIES

#### Worksheet 12A

- New Word Parts handout

#### Worksheet 12B

- Med Term Analysis

#### Worksheet 12C

- Chapter Review

#### Quiz 12E

- May be used as worksheet

#### Text

- Practice Exercises
- Terminology Checklist

#### Student DVD-ROM

- Learning games
- Flash cards

#### CW

- Practice questions

### ASSESSMENTS

Quiz 12E—Word Building Quiz

Quiz 12G—Chapter Review

Test Bank—questions

## OBJECTIVE 7

Identify and define nervous system vocabulary terms.

Text pages: 399–400; PowerPoint slides: 69–72

### LECTURE NOTES

Term	Definition
anesthesiology	branch of medicine specializing in anesthesia, including for surgical procedures, resuscitation measures, and management of acute and chronic pain; physician is <i>anesthesiologist</i>
aura	sensations, such as seeing colors or smelling unusual odor, occurring prior to epileptic seizure or migraine headache
coma	profound unconsciousness or stupor resulting from illness or injury
conscious	condition of being awake and aware of surroundings
convulsion	severe involuntary muscle contractions and relaxations; variety of causes, such as epilepsy, fever, and toxic conditions
delirium	abnormal mental state characterized by confusion, disorientation, and agitation
dementia	progressive impairment of intellectual function that interferes with performing activities of daily living; patients have little awareness of their condition; found in disorders such as Alzheimer's
focal seizure	localized seizure often affecting one limb
hemiparesis	weakness or loss of motion on one side of body
hemiplegia	paralysis on only one side of body
neurology	branch of medicine concerned with diagnosis and treatment of diseases and conditions of nervous system; physician is <i>neurologist</i>
neurosurgery	branch of medicine concerned with treating conditions and diseases of nervous systems by surgical means; physician is <i>neurosurgeon</i>
palsy	temporary or permanent loss of ability to control movement
paralysis	temporary or permanent loss of function or voluntary movement
paraplegia	paralysis of lower portion of body and both legs
paresthesia	abnormal sensation such as burning or tingling
seizure	sudden, uncontrollable onset of symptoms; such as epileptic seizure
syncope	fainting
tremor	involuntary repetitive alternating movement of part of body
unconscious	condition or state of being unaware of surroundings, with inability to respond to stimuli

### TEACHING STRATEGIES

- Write sentences on the board using common words; have students substitute correct medical terms.

#### Jeopardy Game

- Have students create questions for terms in this section for a Jeopardy game to be played in class—may be combined with Pathology, Diagnostic, and Therapeutic terms.

#### Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

### LEARNING ACTIVITIES

#### Worksheet 12C

- Chapter Review

#### Text

- Practice Exercises
- Terminology Checklist
- Medical Record Analysis
- Chart Note Transcription

#### Student DVD-ROM

- Learning games
- Flash cards

#### CW

- Practice questions
- Case Study

### ASSESSMENTS

**Quiz 12G**—Chapter Review

**Test Bank**—questions

## OBJECTIVE 8

Identify and define selected nervous system pathology terms.

Text pages: 400–405; PowerPoint slides: 73–94

### LECTURE NOTES

Term	Definition
<b>Brain</b> absence seizure	type of epileptic seizure; lasts only few seconds to half minute; characterized by loss of awareness and absence of activity; also called <i>petit mal seizure</i>
Alzheimer's disease	chronic, organic mental disorder consisting of dementia; more prevalent in adults between ages 40 and 60; involves progressive disorientation, apathy, speech and gait disturbances, and loss of memory
astrocytoma	tumor of brain or spinal cord composed of astrocytes, one type of neuroglial cell
brain tumor	intracranial mass, either benign or malignant; benign tumor of brain can still be fatal since it grows and causes pressure on normal brain tissue
cerebral aneurysm	localized abnormal dilatation of blood vessel, usually artery; result of congenital defect or weakness in wall of vessel; ruptured aneurysm is common cause of hemorrhagic cerebrovascular accident
cerebral contusion	bruising of brain from blow or impact; symptoms last longer than 24 hours; include unconsciousness, dizziness, vomiting, unequal pupil size, and shock
cerebral palsy (CP)	nonprogressive brain damage resulting from defect, trauma, or oxygen deprivation at time of birth
cerebrovascular accident (CVA)	development of infarct due to loss in blood supply to area of brain; blood flow interrupted by ruptured blood vessel (hemorrhage), floating clot (embolus), stationary clot (thrombosis), or compression; extent of damage depends on size and location of infarct; often includes dysphasia and hemiplegia; commonly called <i>stroke</i>
concussion	injury to brain resulting from brain being shaken inside skull from blow or impact; can result in unconsciousness, dizziness, vomiting, unequal pupil size, and shock; symptoms last 24 hours or less
epilepsy	recurrent disorder of brain in which seizures and loss of consciousness occur as result of uncontrolled electrical activity of neurons in brain

### TEACHING STRATEGIES

- Select two students to do 5-minute presentations of their Internet research in class.
- Write sentences on the board using common words; have students substitute correct medical terms.

#### Jeopardy Game

- Have students create questions for terms in this section for a Jeopardy game to be played in class—may be combined with Vocabulary, Diagnostic, and Therapeutic terms.

#### IRDVD

- See PowerPoint presentation on the Instructor's Resource DVD for videos on:
  - Epilepsy
  - Tonic-clonic seizure
  - Absence seizure
  - Parkinson's disease
- See PowerPoint presentation on the Instructor's Resource DVD for an animation on the topic of multiple sclerosis.

#### Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

### LEARNING ACTIVITIES

#### Internet Research

- Have students select a specific pathology and use Internet resources to research its symptoms, diagnosis, and treatments.

#### Worksheet 12C

- Chapter Review

#### Text

- Practice Exercises
- Terminology Checklist
- Medical Record Analysis
- Chart Note Transcription

#### Student DVD-ROM

- Learning games
- Flash cards

#### CW

- Practice questions
- Case Study

hydrocephalus	accumulation of cerebrospinal fluid within ventricles of brain; causing head to be enlarged; treated by creating artificial shunt for fluid to leave brain; if untreated may lead to seizures and mental retardation
migraine	specific type of headache characterized by severe head pain, sensitivity to light, dizziness, and nausea
Parkinson's disease	chronic disorder of nervous system with fine tremors, muscular weakness, rigidity, and shuffling gait
Reye syndrome	combination of symptoms; includes acute encephalopathy and damage to various organs, especially liver; occurs in children under age 15 who have had viral infection and is associated with taking aspirin; for this reason, it's not recommended for children to use aspirin
tonic-clonic seizure	type of severe epileptic seizure characterized by loss of consciousness and convulsions; seizure alternates between strong continuous muscle spasms (tonic) and rhythmic muscle contraction and relaxation (clonic); also called <i>grand mal seizure</i>
transient ischemic attack (TIA)	temporary interference with blood supply to brain, causing neurological symptoms such as dizziness, numbness, and hemiparesis; may eventually lead to full-blown stroke (cerebrovascular accident)

### Spinal Cord

amyotrophic lateral sclerosis (ALS)	disease with muscular weakness and atrophy due to degeneration of motor neurons of spinal cord; also called <i>Lou Gehrig's disease</i> , after New York Yankees' baseball player who died from disease
meningocele	congenital condition in which meninges protrude through opening in vertebral column; see <i>spina bifida</i>
myelomeningocele	congenital condition in which meninges and spinal cord protrude through opening in vertebral column; see <i>spina bifida</i>
poliomyelitis	viral inflammation of gray matter of spinal cord; results in varying degrees of paralysis, may be mild and reversible or may be severe and permanent; disease almost eliminated due to discovery of vaccine in 1950s
spina bifida	congenital defect in walls of spinal canal in which laminae of vertebra do not meet or close; may result in meningocele or myelomeningocele—meninges or spinal cord being pushed through opening
spinal cord injury (SCI)	damage to spinal cord as result of trauma; spinal cord may be bruised or completely severed

- Web Destination activities on Alzheimer's disease and cerebrovascular accidents
- *New York Times* link for research into specific pathologies

### ASSESSMENTS

**Quiz 12G**—Chapter Review

**Test Bank**—questions

## Nerves

Bell's palsy	one-sided facial paralysis due to inflammation of facial nerve, probably viral in nature; patient cannot control salivation, tearing of eyes, or expression, but most will eventually recover
Guillain-Barré syndrome	disease of nervous system in which nerves lose myelin covering; may be caused by autoimmune reaction; characterized by loss of sensation and/or muscle control starting in legs; symptoms move toward trunk and may paralyze diaphragm
multiple sclerosis (MS)	inflammatory disease of central nervous system extreme weakness and numbness due to loss of myelin insulation from nerves
myasthenia gravis	disease with severe muscular weakness and fatigue due to insufficient neurotransmitter at synapse
shingles	eruption of painful blisters on body along nerve path; thought to be caused by <i>Herpes zoster</i> virus infection of nerve root

## Meninges

epidural hematoma	mass of blood in space outside dura mater of brain and spinal cord
subdural hematoma	mass of blood forming beneath dura mater; meninges are torn by trauma; may exert fatal pressure on brain if hematoma is not drained by surgery

## OBJECTIVE 9

Identify and define selected nervous system diagnostic procedures.

Text pages: 405–406; PowerPoint slides: 95–100

## LECTURE NOTES

### Term

### Definition

#### Clinical Laboratory Tests

cerebrospinal fluid analysis	laboratory examination of clear, watery, colorless fluid from within brain and spinal cord; infections and abnormal presence of blood can be detected in this test
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#### Diagnostic Imaging

brain scan	image of brain taken after injection of radioactive isotopes into circulation
cerebral angiography	X-ray of blood vessels of brain after injection of radiopaque dye
echoencephalography	recording of ultrasonic echoes of brain; useful in determining abnormal patterns of shifting in brain

## TEACHING STRATEGIES

- Review an actual laboratory CT scan, MRIs, or PET scans of brain.
- Write sentences on the board using common words; have students substitute correct medical terms.

### IRDVD

- See PowerPoint presentation on the Instructor's Resource DVD for video on the topic of electroneurodiagnostic technicians

### Jeopardy Game

- Have students create questions for terms in this section for a Jeopardy game to be played in class—may be combined with Vocabulary, Pathology, and Therapeutic terms.

### Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

myelography	injection of radiopaque dye into spinal canal; X-ray is taken to examine normal and abnormal outlines made by dye
positron emission tomography (PET)	use of positive radionuclides to reconstruct brain sections; measurement taken of oxygen and glucose uptake, cerebral blood flow, and blood volume; amount of glucose brain uses indicates how metabolically active tissue is

### Additional Diagnostic Tests

Babinski's reflex	reflex test to determine lesions and abnormalities in nervous system; reflex is present if great toe extends instead of flexes when lateral sole of foot is stroked; normal response to this stimulation is flexion of toe
electroencephalography (EEG)	recording electrical activity of brain by placing electrodes at various positions on scalp; used in sleep studies to determine if there is normal pattern of activity during sleep
lumbar puncture (LP)	puncture with needle into lumbar area to withdraw fluid for examination and for injection of anesthesia; also called <i>spinal puncture</i> or <i>spinal tap</i>
nerve conduction velocity	test measures how fast impulse travels along nerve; can pinpoint area of nerve damage

### Guest speaker

- Invite an electroneurodiagnostic technician to class to discuss training and different types of tests he or she conducts.

## LEARNING ACTIVITIES

### Worksheet 12C

- Chapter Review

### Text

- Practice Exercises
- Terminology Checklist
- Medical Record Analysis
- Chart Note Transcription

### Student DVD-ROM

- Learning games
- Flash cards

### CW

- Practice questions
- Case Study
- *New York Times* link for research into specific diagnostic procedures

## ASSESSMENTS

**Quiz 12G**—Chapter Review

**Test Bank**—questions

## OBJECTIVE 10

Identify and define selected nervous system therapeutic procedures.

Text page: 407; PowerPoint slides: 101–102

## LECTURE NOTES

Term	Definition
<b>Medical Procedures</b>	
nerve block	injection of regional anesthetic to stop passage of sensory or pain impulses along nerve path
<b>Surgical Procedures</b>	
carotid endarterectomy	surgical procedure for removing obstruction within carotid artery, major artery in neck that carries oxygenated blood to brain; developed to prevent strokes, but is useful only in severe stenosis with transient ischemic attack
cerebrospinal fluid shunts	surgical procedure in which bypass is created to drain cerebrospinal fluid; used to treat hydrocephalus by draining excess cerebrospinal fluid from brain and diverting it to abdominal cavity

## TEACHING STRATEGIES

- Write sentences on the board using common words; have students substitute correct medical terms.

### Jeopardy Game

- Have students create questions for terms in this section for a Jeopardy game to be played in class—may be combined with Vocabulary, Pathology, and Diagnostic terms.

### Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

## LEARNING ACTIVITIES

### Worksheet 12C

- Chapter Review

laminectomy	removal of portion of vertebra in order to relieve pressure on spinal nerve
tractotomy	surgical interruption of nerve tract in spinal cord; treats intractable pain or muscle spasms

### Text

- Practice Exercises
- Terminology Checklist
- Medical Record Analysis
- Chart Note Transcription

### Student DVD-ROM

- Learning games
- Flash cards

### CW

- Practice questions
- Case Study
- *New York Times* link for research into specific treatment procedures

## ASSESSMENTS

**Quiz 12G**—Chapter Review

**Test Bank**—questions

## OBJECTIVE 11

Identify and define selected medications relating to the nervous system.

Text page: 407; PowerPoint slides: 103–104

### LECTURE NOTES

#### Classification Action

		Generic and Brand Names
analgesic	non-narcotic medication; treats minor to moderate pain; includes aspirin, acetaminophen, and ibuprofen	aspirin, Bayer, Ecotrin; acetaminophen, Tylenol; ibuprofen, Aleve
anesthetic	produces loss of sensation or loss of consciousness	lidocaine, Xylocaine; pentobarbital, Nembutal; propofol, Diprivan; procaine, Novocain
anticonvulsant	reduces excitability of neurons and therefore prevents uncontrolled neuron activity associated with seizures	carbamazepine, Tegretol; phenobarbital, Nembutal
dopaminergic drugs	treat Parkinson's disease by either replacing dopamine that is lacking or increasing strength of dopamine present	levodopa; L-dopa, Laro-dopa; levodopa/carbidopa, Sinemet
hypnotic	promotes sleep	secobarbital, Seconal; temazepam, Restoril
narcotic analgesic	treats severe pain; has potential to be habit forming if taken for prolonged time; also called <i>opiates</i>	morphine, MS Contin; oxycodone, Oxy-Contin; meperidine, Demerol
sedative	relaxing or calming effect	amobarbital, Amytal; butobarbital, Butisol

### TEACHING STRATEGIES

#### Pop Questions

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

### LEARNING ACTIVITIES

- Have students use a PDR and/or the Internet to look up additional information regarding these medications, such as dosage, side effects, and contraindications.

#### Worksheet 12C

- Chapter Review

### Text

- Practice Exercises
- Terminology Checklist

### Student DVD-ROM

- Learning games
- Flash cards

### CW

- Practice questions

## ASSESSMENTS

**Quiz 12G**—Chapter Review

**Test Bank**—questions

## OBJECTIVE 12

Define selected abbreviations associated with the nervous system.

Text page: 408; PowerPoint slides: 105–106

### LECTURE NOTES

ALS	amyotrophic lateral sclerosis
ANS	autonomic nervous system
CNS	central nervous system
CP	cerebral palsy
CSF	cerebrospinal fluid
CVA	cerebrovascular accident
CVD	cerebrovascular disease
EEG	electroencephalogram, electroencephalography
HA	headache
ICP	intracranial pressure
LP	lumbar puncture
MS	multiple sclerosis
PET	positron emission tomography
PNS	peripheral nervous system
SCI	spinal cord injury
TIA	transient ischemic attack

### TEACHING STRATEGIES

- Emphasize the importance of learning abbreviations and their full meanings; point out how some abbreviations, such as ANS, EEG, PET, and CNS are typically used rather than full terms.
- Encourage students to add abbreviations to their flash cards.
- Write sentences on the board using common words; have students substitute correct abbreviations.

#### **Memory Game**

- Have students assist in creating a memory game to play in class.

#### **Pop Questions**

- Use Clicker questions as either a pretest or posttest quiz to gauge student comprehension during lecture.

### LEARNING ACTIVITIES

#### **Worksheet 12C**

- Chapter Review

#### **Quiz 12F**

- May be used as a worksheet

#### **Text**

- Practice Exercises

#### **Student DVD-ROM**

- Learning games
- Flash cards

#### **CW**

- Practice questions

### ASSESSMENTS

**Quiz 12F**—Abbreviations Quiz

**Quiz 12G**—Chapter Review

**Test Bank**—questions



# Worksheet 12A

## New Combining Form and Suffix Handout

Directions: For each combining form below, write out its meaning and then locate a new term from the chapter that uses the combining form or suffix.

Combining Forms	Meaning	Chapter Term	Meaning
1. cephal/o	_____	_____	_____
2. cerebell/o	_____	_____	_____
3. cerebr/o	_____	_____	_____
4. encephal/o	_____	_____	_____
5. gli/o	_____	_____	_____
6. medull/o	_____	_____	_____
7. mening/o	_____	_____	_____
8. meningi/o	_____	_____	_____
9. myel/o	_____	_____	_____
10. neur/o	_____	_____	_____
11. phas/o	_____	_____	_____
12. poli/o	_____	_____	_____
13. pont/o	_____	_____	_____
14. radicul/o	_____	_____	_____
15. thalam/o	_____	_____	_____
16. thec/o	_____	_____	_____
17. ventricul/o	_____	_____	_____
<b>Suffixes</b>			
18. -algnesia	_____	_____	_____
19. -esthesia	_____	_____	_____
20. -paresis	_____	_____	_____
21. -phasia	_____	_____	_____
22. -plegia	_____	_____	_____
23. -taxia	_____	_____	_____



# Worksheet 12B

## Medical Term Analysis

Directions: Below are terms built from word parts used in this chapter that are not analyzed in the Word Building Table. Many are built from word parts you have learned in previous chapters. Analyze each term presented below and list and define the word parts used to build each term.

Medical Term	Word Part Analysis
1. cranial	_____ _____
2. neuroglial	_____ _____
3. somatic	_____ _____
4. anesthesiology	_____ _____
5. hemiparesis	_____ _____
6. hemiplegia	_____ _____
7. neurology	_____ _____
8. amyotrophic	_____ _____
9. meningocele	_____ _____
10. myelomeningocele	_____ _____
11. poliomyelitis	_____ _____

*(Continued)*

12. myasthenia

---

---

13. angiography

---

---

14. electroencephalography

---

---

15. analgesic

---

---

# Worksheet 12C

## Chapter Review

### Anatomy and Physiology

1. The central nervous system consists of the \_\_\_\_\_ and \_\_\_\_\_.
2. \_\_\_\_\_ are highly branched structures found on neurons that received impulses.
3. \_\_\_\_\_ is a fatty substance that acts as insulation for many axons.
4. List the meninges in order from outer layer to inner layer: \_\_\_\_\_.
5. The \_\_\_\_\_ lobe of the cerebrum controls vision.
6. The elevated portions of the cerebral convolutions are called \_\_\_\_\_ and they are separated by fissures called \_\_\_\_\_.
7. The midbrain, pons, and medulla oblongata make up the \_\_\_\_\_.
8. Pain perception is controlled by the \_\_\_\_\_.
9. The point at which a nerve is attached to the central nervous system is called the \_\_\_\_\_.
10. The \_\_\_\_\_ branch of the ANS is the “fight-or-flight” branch and the \_\_\_\_\_ branch of the ANS is the “rest-and-digest” branch.

### Word Building

Directions: Build a term that means:

1. brain inflammation \_\_\_\_\_
2. head pain \_\_\_\_\_
3. pertaining to the cerebrum and spine \_\_\_\_\_
4. meninges tumor \_\_\_\_\_
5. surgical repair of nerve \_\_\_\_\_
6. absence of pain \_\_\_\_\_
7. difficult speech \_\_\_\_\_
8. paralysis of four \_\_\_\_\_
9. lack of muscle coordination \_\_\_\_\_
10. removal of a nerve \_\_\_\_\_

(Continued)

## Matching

- |       |                        |  |
|-------|------------------------|--|
| _____ | 1. absence seizure     | a. uncontrolled electrical activity of the brain |
| _____ | 2. aura                | b. confusion, disorientation, agitation          |
| _____ | 3. coma                | c. procedure removes pressure on spinal nerve    |
| _____ | 4. delirium            | d. repetitive, alternating movements             |
| _____ | 5. focal seizure       | e. controls seizures                             |
| _____ | 6. dementia            | f. unaware of surroundings                       |
| _____ | 7. paresthesia         | g. insufficient neurotransmitter                 |
| _____ | 8. syncope             | h. petit mal                                     |
| _____ | 9. tremor              | i. associated with children taking aspirin       |
| _____ | 10. unconscious        | j. bruising of the brain                         |
| _____ | 11. astrocytoma        | k. a stroke                                      |
| _____ | 12. cerebral aneurysm  | l. profound unconsciousness                      |
| _____ | 13. cerebral contusion | m. progressive spinal cord degeneration          |
| _____ | 14. CVA                | n. fainting                                      |
| _____ | 15. Reye syndrome      | o. impaired intellectual functioning             |
| _____ | 16. epilepsy           | p. nerves lose myelin sheath                     |
| _____ | 17. ALS                | q. brain image made using radioactive isotopes   |
| _____ | 18. spina bifida       | r. unusual sensation before a seizure            |
| _____ | 19. MS                 | s. spinal tap                                    |
| _____ | 20. myasthenia gravis  | t. burning or tingling sensations                |
| _____ | 21. brain scan         | u. promotes sleep                                |
| _____ | 22. lumbar puncture    | v. may cause a hemorrhagic stroke                |
| _____ | 23. laminectomy        | w. affects only one limb                         |
| _____ | 24. anticonvulsant     | x. congenital defect                             |
| _____ | 25. hypnotic           | y. tumor of a neuroglial cell                    |

## Quiz 12A

### New Word Parts Quiz

Directions: Define the combining form or suffix in the spaces provided.

1. cephal/o \_\_\_\_\_
2. cerebell/o \_\_\_\_\_
3. cerebr/o \_\_\_\_\_
4. encephal/o \_\_\_\_\_
5. gli/o \_\_\_\_\_
6. mening/o \_\_\_\_\_
7. myel/o \_\_\_\_\_
8. neur/o \_\_\_\_\_
9. phas/o \_\_\_\_\_
10. poli/o \_\_\_\_\_
11. pont/o \_\_\_\_\_
12. radicul/o \_\_\_\_\_
13. thalam/o \_\_\_\_\_
14. ventricul/o \_\_\_\_\_
15. medull/o \_\_\_\_\_
16. -esthesia \_\_\_\_\_
17. -paresis \_\_\_\_\_
18. -plegia \_\_\_\_\_
19. -taxia \_\_\_\_\_
20. -algnesia \_\_\_\_\_



# Quiz 12B

## Spelling Quiz

Directions: Write each term as your instructor pronounces it.

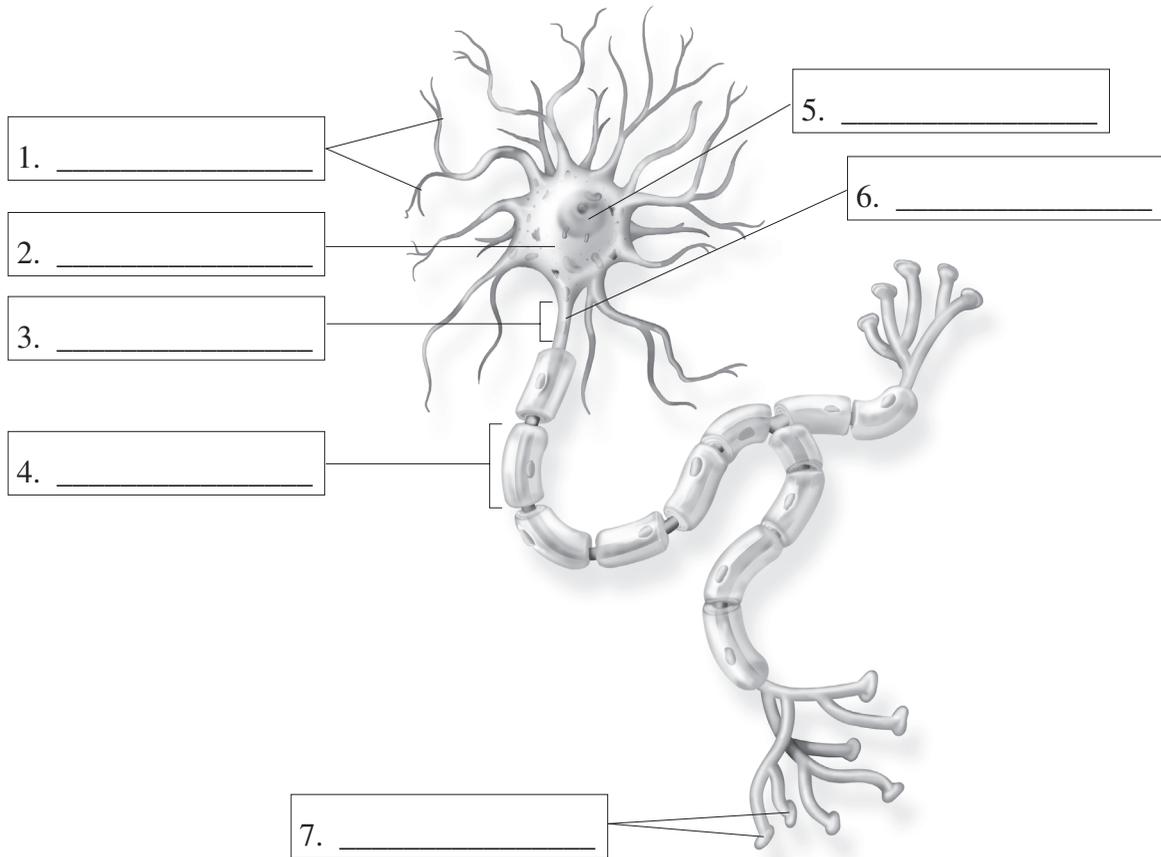
1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_
11. \_\_\_\_\_
12. \_\_\_\_\_
13. \_\_\_\_\_
14. \_\_\_\_\_
15. \_\_\_\_\_
16. \_\_\_\_\_
17. \_\_\_\_\_
18. \_\_\_\_\_
19. \_\_\_\_\_
20. \_\_\_\_\_



# Quiz 12C

## Labeling Diagram

Directions: Label the components of a neuron.

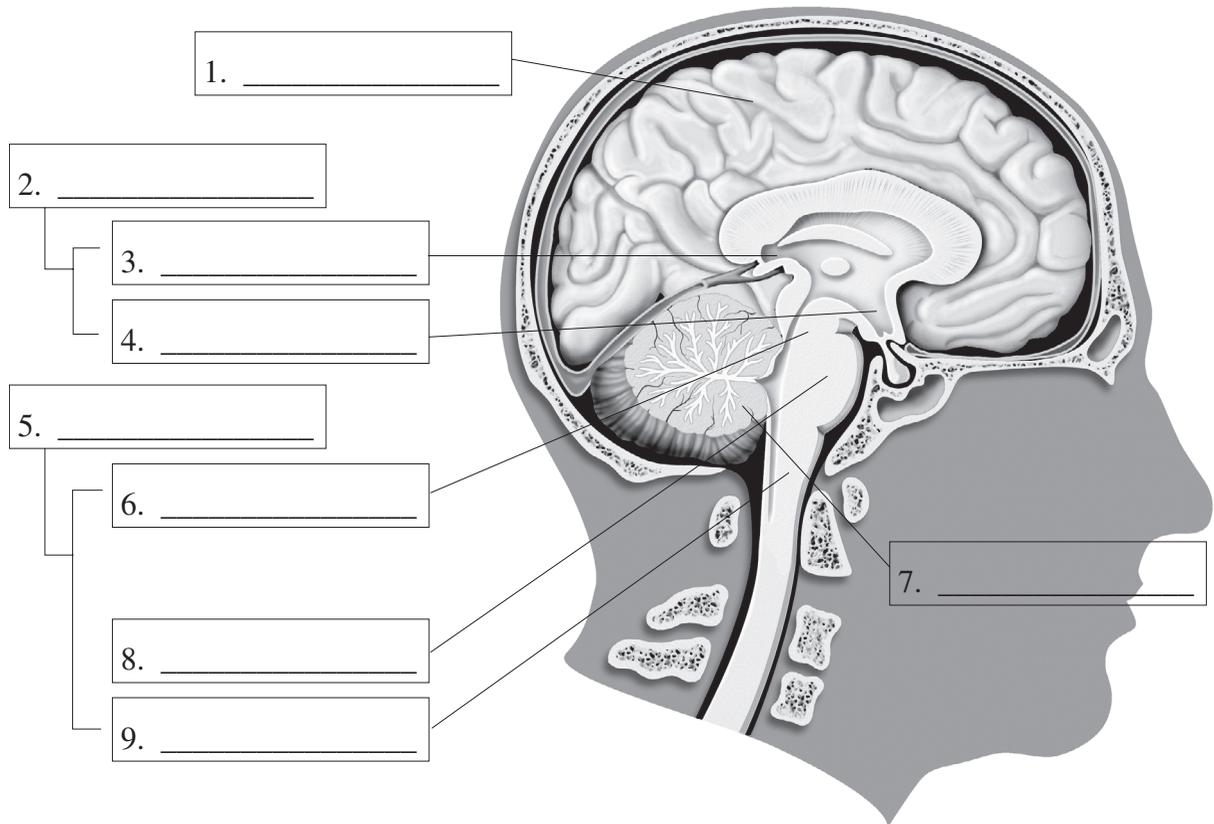




## Quiz 12D

### Labeling Diagram

Directions: Label the parts of the brain.





## Quiz 12E

### Word Building Quiz

Directions: Build a single medical term for each phrase below.

1. head pain \_\_\_\_\_
2. pertaining to the cerebellum \_\_\_\_\_
3. pertaining to the cerebrum \_\_\_\_\_
4. record of brain's electricity \_\_\_\_\_
5. pertaining to meninges \_\_\_\_\_
6. pertaining to nerve \_\_\_\_\_
7. inflammation of many nerves \_\_\_\_\_
8. pertaining to the pons \_\_\_\_\_
9. nerve root disease \_\_\_\_\_
10. pertaining to the thalamus \_\_\_\_\_
11. pertaining to within the meninges \_\_\_\_\_
12. excessive sensations \_\_\_\_\_
13. weakness of one \_\_\_\_\_
14. lack of speech \_\_\_\_\_
15. lack of muscle coordination \_\_\_\_\_
16. nerve tumor \_\_\_\_\_
17. pertaining to cerebrum and spine \_\_\_\_\_
18. half weakness \_\_\_\_\_
19. pertaining to nerve glue \_\_\_\_\_
20. surgical repair of a nerve \_\_\_\_\_



## Quiz 12F

### Abbreviation Quiz

Directions: Write the medical term for which each abbreviation stands.

1. ALS \_\_\_\_\_
2. ANS \_\_\_\_\_
3. CNS \_\_\_\_\_
4. CP \_\_\_\_\_
5. CSF \_\_\_\_\_
6. CVA \_\_\_\_\_
7. CVD \_\_\_\_\_
8. EEG \_\_\_\_\_
9. HA \_\_\_\_\_
10. ICP \_\_\_\_\_
11. LP \_\_\_\_\_
12. MS \_\_\_\_\_
13. PET \_\_\_\_\_
14. PNS \_\_\_\_\_
15. SCI \_\_\_\_\_
16. TIA \_\_\_\_\_



## Quiz 12G

### Chapter Review

#### PART I: Multiple Choice

Directions: Circle the correct answer.

- The innermost layer of the meninges is the
  - arachnoid layer.
  - dura mater.
  - pia mater.
  - pons.
- Afferent neurons
  - carry impulses to the brain and spinal cord.
  - carry impulses away from the brain and spinal cord.
  - carry impulses to the brain but away from the spinal cord.
  - carry impulses to the spinal cord but away from the brain.
- The condition in which there is degeneration of the motor neurons of the spinal cord (Lou Gehrig's disease) is known as
  - myasthenia gravis.
  - multiple sclerosis.
  - amyotrophic lateral sclerosis.
  - Reye syndrome.
- One-sided facial paralysis with an unknown cause is known as
  - Reye syndrome.
  - Lou Gehrig's disease.
  - Parkinson's disease.
  - Bell's palsy.
- A profound state of unconsciousness resulting from an illness of injury is
  - concussion.
  - sleep disorder.
  - coma.
  - seizure.
- The diagnostic term that means the process of X-ray filming the blood vessels of the brain is
  - cerebral angiogram.
  - ventriculogram.
  - myelography.
  - cerebral angiography.
- The form of epilepsy in which there is a loss of awareness without muscle convulsions is
  - absence seizure.
  - palsy seizure.
  - focal seizure.
  - tonic-clonic seizure.
- The medical term for fainting is
  - palsy.
  - syncope.
  - dementia.
  - delirium.
- The condition characterized by nonprogressive paralysis from a defect or trauma at birth is
  - autism.
  - epilepsy.
  - cerebral palsy.
  - dementia.
- The term for a disease affecting children and adolescents, typically following a viral infection, is
  - Babinski's syndrome.
  - cerebral palsy.
  - multiple sclerosis.
  - Reye syndrome.

(Continued)

## PART II: Matching

Directions: Match the term with its definition.

- |                                    |  |
|------------------------------------|--|
| _____ 1. cerebrospinal fluid shunt | a. can pinpoint nerve damage                     |
| _____ 2. nerve block               | b. progressive dementia                          |
| _____ 3. nerve conduction velocity | c. conducts electrical impulse on nerve          |
| _____ 4. subdural hematoma         | d. injection of regional anesthetic to stop pain |
| _____ 5. shingles                  | e. awake and aware of surroundings               |
| _____ 6. Alzheimer's disease       | f. coordinates voluntary body movements          |
| _____ 7. conscious                 | g. painful blisters along nerve path             |
| _____ 8. axon                      | h. blood accumulating in meninges                |
| _____ 9. cerebellum                | i. treats severe pain                            |
| _____ 10. narcotic analgesic       | j. treats hydrocephalus                          |

## PART III: Abbreviations

Directions: Write the full meaning of the following abbreviations.

1. ANS \_\_\_\_\_
2. CP \_\_\_\_\_
3. SCI \_\_\_\_\_
4. CVA \_\_\_\_\_
5. MS \_\_\_\_\_

# Chapter 12 Answer Keys

## Worksheet 12A Answer Key

### Combining Forms

1. head
2. cerebellum
3. cerebrum
4. brain
5. glue
6. medulla oblongata
7. meninges
8. meninges
9. spinal cord
10. nerve
11. speech
12. gray matter
13. pons
14. nerve root
15. thalamus
16. sheath (meninges)
17. ventricle

### Suffixes

18. pain, sensitivity
19. feeling, sensation
20. weakness
21. speech
22. paralysis
23. muscle coordination

## Worksheet 12B Answer Key

1. crani/o = skull; -al = pertaining to
2. neur/o = nerve; gli/o = glue; -al = pertaining to
3. somat/o = body; -ic = pertaining to
4. an- = lack of; esthesi/o = sensation; -logy = study of
5. hemi- = half; -paresis = weakness
6. hemi- = half; -plegia = paralysis
7. neur/o = nerve; -logy = study of
8. a- = lack of; my/o = muscle; -trophic = development
9. mening/o = meninges; -cele = protrusion
10. myel/o = spinal cord; mening/o = meninges; -cele = protrusion
11. poli/o = gray matter; myel/o = spinal cord; -itis = inflammation
12. my/o = muscle; -asthenia = weakness
13. angi/o = vessel; -graphy = process of recording
14. electr/o = electricity; encephal/o = brain; -graphy = process of recording
15. an- = lack of; -algesic = pain

## Worksheet 12C Answer Key

### Anatomy and Physiology

1. brain; spinal cord
2. dendrites
3. myelin
4. dura mater, arachnoid layer, pia mater
5. occipital
6. gyri; sulci
7. brain stem
8. thalamus
9. nerve root
10. sympathetic; parasympathetic

### Word Building

1. encephalitis
2. cephalalgia
3. cerebrospinal
4. meningioma
5. neuroplasty
6. analgesia
7. dysphasia
8. quadriplegia
9. ataxia
10. neurectomy

### Matching

- |       |       |
|-------|-------|
| 1. h  | 14. k |
| 2. r  | 15. i |
| 3. l  | 16. a |
| 4. b  | 17. m |
| 5. w  | 18. x |
| 6. o  | 19. p |
| 7. t  | 20. g |
| 8. n  | 21. q |
| 9. d  | 22. s |
| 10. f | 23. c |
| 11. y | 24. e |
| 12. v | 25. u |
| 13. j |       |

### Quiz 12A Answer Key

- |                 |                         |
|-----------------|-------------------------|
| 1. head         | 11. pons                |
| 2. cerebellum   | 12. nerve root          |
| 3. cerebrum     | 13. thalamus            |
| 4. brain        | 14. ventricle           |
| 5. glue         | 15. medulla oblongata   |
| 6. meninges     | 16. feeling, sensation  |
| 7. spinal cord  | 17. weakness            |
| 8. nerve        | 18. paralysis           |
| 9. speech       | 19. muscle coordination |
| 10. gray matter | 20. pain, sensitivity   |

### Quiz 12B Answer Key

- |                     |                         |
|---------------------|-------------------------|
| 1. neurotransmitter | 11. paresthesia         |
| 2. synapse          | 12. syncope             |
| 3. neuroglial       | 13. unconscious         |
| 4. meninges         | 14. Alzheimer's         |
| 5. diencephalon     | 15. cerebrovascular     |
| 6. arachnoid        | 16. amyotrophic         |
| 7. parasympathetic  | 17. myelomeningocele    |
| 8. anesthesiology   | 18. myasthenia          |
| 9. radiculopathy    | 19. echoencephalography |
| 10. hydrocephalus   | 20. endarterectomy      |

### Quiz 12C Answer Key

- |                        |                        |
|------------------------|------------------------|
| 1. dendrites           | 5. nucleus             |
| 2. nerve cell body     | 6. axon                |
| 3. unmyelinated region | 7. terminal end fibers |
| 4. myelinated axon     |                        |

### Quiz 12D Answer Key

1. cerebrum
2. diencephalon
3. thalamus
4. hypothalamus
5. brain stem
6. midbrain
7. cerebellum
8. pons
9. medulla oblongata

### Quiz 12E Answer Key

1. cephalgia
2. cerebellar
3. cerebral
4. electroencephalogram
5. meningeal
6. neural
7. polyneuritis
8. pontine
9. radiculopathy
10. thalamic
11. intrathecal
12. hyperesthesia
13. monoparesis
14. aphasia
15. ataxia
16. neuroma
17. cerebrospinal
18. hemiplegia
19. neuroglial
20. neuroplasty

### Quiz 12F Answer Key

1. amyotrophic lateral sclerosis
2. autonomic nervous system
3. central nervous system
4. cerebral palsy
5. cerebrospinal fluid
6. cerebrovascular accident
7. cerebrovascular disease
8. electroencephalogram or electroencephalography
9. headache
10. intracranial pressure
11. lumbar puncture
12. multiple sclerosis
13. positron emission tomography
14. peripheral nervous system
15. spinal cord injury
16. transient ischemic attack

### Quiz 12G Answer Key

#### Multiple Choice

1. C
2. A
3. C
4. D
5. C
6. D
7. A
8. B
9. C
10. D

#### Matching

1. j
2. d
3. a
4. h
5. g
6. b
7. e
8. c
9. f
10. i

### Abbreviations

1. autonomic nervous system
2. cerebral palsy
3. spinal cord injury
4. cerebrovascular accident
5. multiple sclerosis