Chapter 15

Nervous System
Function of the Nervous System

- The nervous system and the endocrine system cooperate in regulating and controlling the activities of the other body systems.
- The nervous system may be divided into two parts:
  - **central nervous system (CNS):** made up of the brain and spinal cord.
  - **peripheral nervous system (PNS):** made up of cranial and spinal nerves.
Principle Divisions of Nervous System

- Central Nervous System
  - Brain
  - Spinal Cord

- Peripheral Nervous System (nerves)
  - Afferent System
    - Sensory (into)
  - Efferent System
    - Somatic
    - Motor
    - Autonomic
      - Sympathetic
      - Parasympathetic
Nervous System
Central Nervous System

**Brain**: major portion of the central nervous system

- **cerebrum**: largest portion of the brain, divided into right and left hemispheres; controls the skeletal muscles, interprets general senses (temp, pain, and touch), and contains centers for sight and hearing. Intellect, memory, and emotional reactions also take place in the cerebrum.
Central Nervous System (cont’d)

Brain (cont’d)

- **ventricles**: spaces within the cerebrum that contain a fluid called *cerebrospinal fluid* (CSF), which flows through the subarachnoid space around the brain and spinal cord.

- **cerebral spinal fluid (CSF)**: clear, colorless fluid to cushion the brain and spinal column from shock; transports nutrients, and clears metabolic waste.
Central Nervous System (cont’d)

Brain (cont’d)

- **cerebellum**: often called the *hindbrain* located under the posterior portion of the cerebrum. Its function is to assist in the coordination of skeletal muscles and to maintain balance.

- **brainstem**: stemlike portion of the brain; connects with the spinal cord.
Central Nervous System (cont’d)

Brain (cont’d)

- **pons**: literally means “bridge.” It connects the cerebrum with the cerebellum and brainstem.
- **medulla oblongata**: located between pons and spinal cord; contains centers that control respiration, heart rate, and the muscles in the blood vessel walls, which assist in determining blood pressure.
Overview of system
Midsagittal section
Cell Types in CNS

- Glial cells (Neuroglia)
  - Astrocytes
  - Oligodendrocytes
  - Microglial cells
- Neurons
Neurons
Cell Parts

One Axon

Multiple dendrites
Central Nervous System (cont’d)

- **Spinal cord**
  - Passes through the vertebral canal extending from the medulla oblongata to the level of the 2nd lumbar vertebra; conducts nerve impulses to and from the brain and initiates reflex action to sensory information without input from the brain
Brain and Spinal Cord
Central Nervous System (cont’d)

**Spinal cord**

- **meninges**: 3 layers of membrane that cover the brain and spinal cord
  - **dura mater**: tough outer layer
  - **arachnoid**: delicate middle layer; the arachnoid membrane is loosely attached to the pia mater by weblike fibers, which allow for the subarachnoid space
  - **pia mater**: thin inner layer
Combining Forms for the Nervous System

- cerebell/o
- cerebr/o
- dur/o
- encephal/o
- gangli/o, ganglion/o
- mening/i, mening/o
- myel/o
- neur/o
- radic/o, radicul/o, rhiz/o
Midsagittal section
Head Injuries
Subdural hematoma
Peripheral Nervous System

- **nerve**: cordlike structure that carries impulses from one part of the body to another
  
  12 pair of cranial nerves
  31 pair of spinal nerves

- **ganglion**: group of nerve cells located outside the central nervous system
Cranial Nerves
Combining Forms Commonly Used with the Nervous System

- esthesi/o
- ment/o, phren/o, psych/o
- mon/o
- phas/o
- poli/o
- quadr/i
Prefix and Suffixes

- **Prefix**
  - tetra-

- **Suffixes**
  - -iatrist
  - -iatry
  - -ictal
  - -paresis
Helpful Information

- The combining form *myel/o* is defined as *spinal cord* in Chapter 15, although it also means *bone marrow* as presented in Chapter 14.

- The suffix “-paresis” means *slight paralysis* while the suffix “-plegia” means *paralysis*. 
Disease and Disorder Terms
Built from Word Parts

- cerebellitis
- cerebral thrombosis
- duritis
- encephalitis
- encephalomalacia
- gangliitis
- meningitis
- meningomyelocele
Top, spina bifida.

Bottom, (meninges / cv / (spinal cord) / cv / (protrusion)).
neurasthenia
neuritis
neuroarthropathy
neuroblast
neuroma
poliomyelitis
polyneuritis
rhizomeningomyelitis
Alzheimer’s disease (AD)
amyotrophic lateral sclerosis (ALS)
(Lou Gehrig’s disease)
Bell’s palsy
cerebral aneurysm
cerebral palsy (CP)
cerebrovascular accident (CVA) (stroke)
epilepsy
Bell’s Palsy
Cerebrovascular Accident
Disease and Disorder Terms Not Built from Word Parts (cont’d)

- multiple sclerosis (MS)
- neurosis
- Parkinson’s disease (PD)
- psychosis
- sciatica
- shingles
- transient ischemic attack (TIA)
Shingles
Surgical Terms Built from Word Parts

- ganglionectionomy
- neurectomy
- neurolysis
- neuroplasty
- neurorrhaphy
- neurotomy
- radicotomy, rhizotomy
(nerve root) / cv / (incision)
Diagnostic Terms Built from Word Parts

- Diagnostic imaging
  - cerebral angiograph
  - CT myelography

- Neurodiagnostic procedures
  - echoencephalography (EchoEG)
  - electroencephalogram (EEG)
  - electroencephalography
Diagnostic Terms Not Built from Word Parts

- **Diagnostic imaging**
  - computed tomography of the brain (CT scan)
  - magnetic resonance imaging of the brain (MRI scan)
  - positron emission tomography of the brain (PET scan)

- **Neurodiagnostic procedures**
  - evoked potential studies (EP studies)
CT Scanner
Computerized Tomography
Positron Emission Tomography
Other

lumbar puncture (LP)
Complementary Terms Built from Word Parts

- anesthesia
- aphasia
- cephalalgia
- craniocerebral
- dysphasia
- hemiparesis
- hemiplegia
- interictal
- intracerebral
- monoparesis
- neuroid
- neurologist
- panplegia
- preictal
- psychogenic
- tetraplegia
Complementary Terms
Not Built from Word Parts

cognitive
coma
concussion
conscious
convulsion
dementia
gait

incoherent
paraplegia
seizure
shunt
syncope
unconsciousness
1, (half) / (paralysis).
2, Paraplegia.
3, (four) / cv / (paralysis) OR (four / (paralysis).
Common Psychiatric Disorders

- anorexia nervosa
- anxiety disorder
- attention deficit hyperactivity disorder (ADHD)
- bipolar disorder
- bulimia nervosa
- obsessive-compulsive disorder (OCD)
- panic attack
- phobia
- posttraumatic stress disorder
- schizophrenia
Abbreviations

- AD
- ADHD
- ALS
- CP
- CSF
- CVA
- EchoEG
- EEG
- EP studies
- LP
- MRI scan
- OCD
- PD
- PET scan
- PTSD
- TIA
Humunculus

Motor cortex
Fingers
Thumb
Brow
Eye
Face
Lips
Jaw
Tongue
Throat

Arm
Wrist
Elbow
Hand
Shoulder
Hip
Knee

Midline

Left side of brain represents right side of body

Toes
Nerve

Axons

Connective tissue

Axons

Blood vessel
Nerve (cross section)
Spinal Cord Showing Layers of Meninges

Mosby items and derived items © 2005 by Mosby, Inc.
CT (spinal cord) / cv / (process of recording)
Lumbar Puncture with Needle in Place