The Nervous System: Spinal Cord and Spinal Nerves

Chapter 14

Spinal Cord & Spinal Nerves

- **Spinal cord**
  - Truly the pathway between body and mind
  - Conducts impulses to and from the brain
  - Carries out **spinal reflexes**

- **Spinal nerves**
  - 31 pairs
  - All are **mixed nerves**

Structure of the Spinal Cord

- Extends from the foramen magnum to the first or second lumbar vertebra.
- Ends in the conus medullaris
- **Filum terminale**
  - Extends from conus medullaris to sacral vertebrae
- **Cauda equina**
  - = filum terminale + dorsal & ventral roots from spinal nerves that extend below conus medullaris

Coverings of the Spinal Cord

- 3 layers called meninges
- **Dura mater**
  - Outer layer
- **Arachnoid**
  - Middle layer
- **Pia mater**
  - Adheres tightly to the surface of the spinal cord

Meninges of the Spinal Cord

Human Anatomy, 3rd edition
Prentice Hall, © 2001
Sectional Anatomy of the Spinal Cord

- Inner part consists of gray matter
  - Unmyelinated cell bodies, neuroglia, & dendrites
  - Organized into "horns"
- Outer part consists of white matter
  - Tracts (columns) of myelinated fibers
  - Ascending tracts are sensory
  - Descending tracts are motor

Example of Ascending Nerve Tracts

Spinal Nerves

- Connect to the spinal cord via a dorsal and a ventral root
- Dorsal root is sensory
  - Contains a dorsal root ganglion
- Ventral root is motor

Spinal Nerves

- The roots unite into the spinal nerve
- Spinal nerves exit through intervertebral foramen
- Split into branches, or rami.
  - Dorsal ramus
  - Ventral ramus
  - Regions of skin supplied by a spinal nerve = dermatomes
    ("skin slices")

Dermatomes

Nerve Plexuses

- Plexus = "braid"
- Nerves supplying the limbs form plexuses when they leave the spinal cord
  - Cervical plexus
  - Brachial plexus
  - Lumbosacral plexus
    - Lumbar plexus
    - Sacral plexus
Cervical Plexus
- Formed by spinal nerves C1 – C5
  - Nerves innervate the neck and shoulder region
  - Phrenic nerve to the diaphragm

Brachial Plexus
- Formed by spinal nerves C5 – C8 and T1
  - Nerves innervate the arm and shoulder
    - Radial nerve
    - Ulnar nerve
    - Median nerve

Lumbar Plexus
- Formed by spinal nerves T12 and L1 – L4
  - Innervates the medial and anterior portions of the thigh and lower abdominal regions
  - Lateral femoral cutaneous nerve

Sacral Plexus
- Formed by spinal nerves L4 and L5, and S1 and S2
  - Innervates the posterior portion of the hip, thigh, and leg, and the genital region
    - Sciatic nerve
Sacral Plexus

Spinal Reflexes

- **Reflexes** are automatic responses to stimuli
- **Spinal reflexes** result from the stimulation of a spinal reflex arc.

Basic Elements of a Reflex Arc

Spinal Cord Injuries

- Can affect sensory perception; motor paralysis
- Location affects severity of the injury
- **Spinal compression** results from squeezing the spinal cord within the vertebral canal
- **Spinal transection** is the severing of the spinal cord

Spinal Cord Injuries

- **Quadriplegia**
- **Paraplegia**

http://www.apparelyzed.com/paralysis.html