



The Human Body in Health and Illness

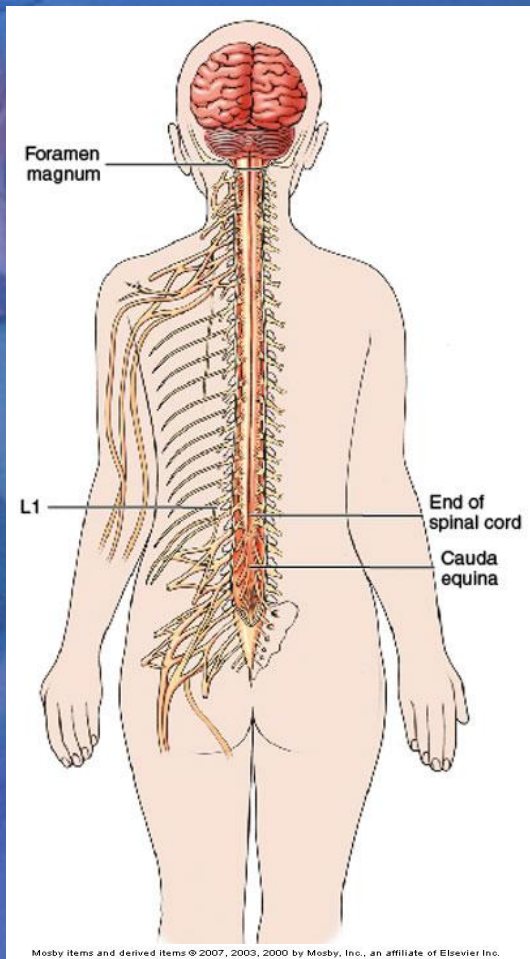
Barbara Herlihy

Chapter 11: Nervous System: Spinal Cord and Peripheral Nerves

Lesson 11.1 Objectives

- Describe the anatomy of the spinal cord and list its three functions.
- List four components of the reflex arc.

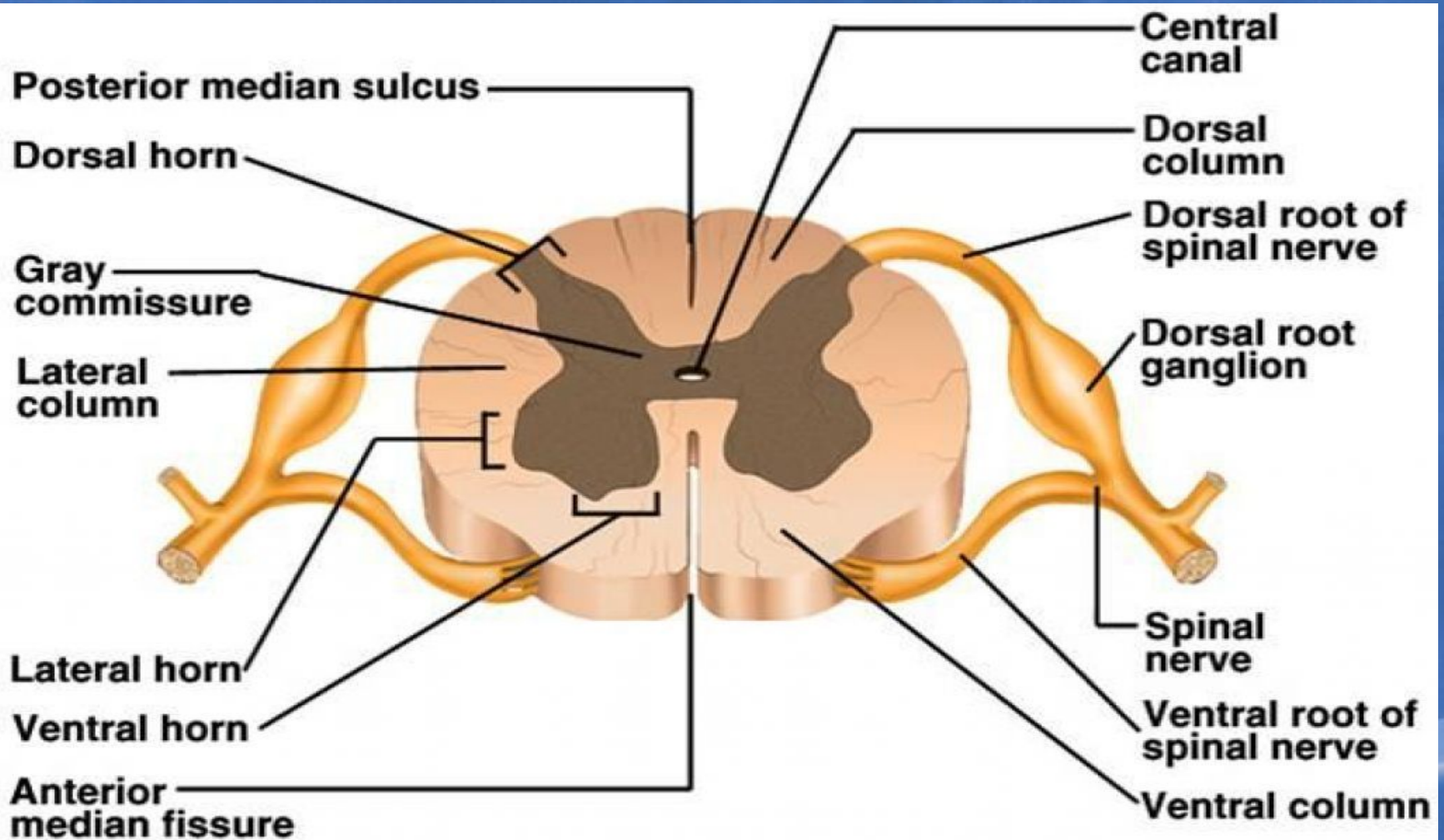
Spinal Cord Structure



- Spinal cord: continuation of the brain stem
- Structure:
 - Tubelike structure located in the spinal cavity
 - 17 inches long
 - Diameter similar to the thickness of the thumb

Spinal Cord Structure (cont'd.)

- Gray matter: cell bodies and interneurons located in the center of the spinal cord and shaped like a butterfly
- Two projections: dorsal horn and ventral horn
- Central canal: opening extending the entire length of the spinal cord



Spinal Cord Structure (cont'd.)

- White matter: myelinated axons grouped together into nerve tracts
 - Sensory tracts: ascending tracts
 - Motor tracts: descending tracts

Major Spinal Cord Tracts

Tracts

Functions

Ascending

Spinothalamic	Temperature; pressure; pain; light touch
Dorsal column	Proprioception; deep pressure; vibration
Spinocerebellar	Proprioception

Major Spinal Cord Tracts (cont'd.)

Tracts

Functions

Descending

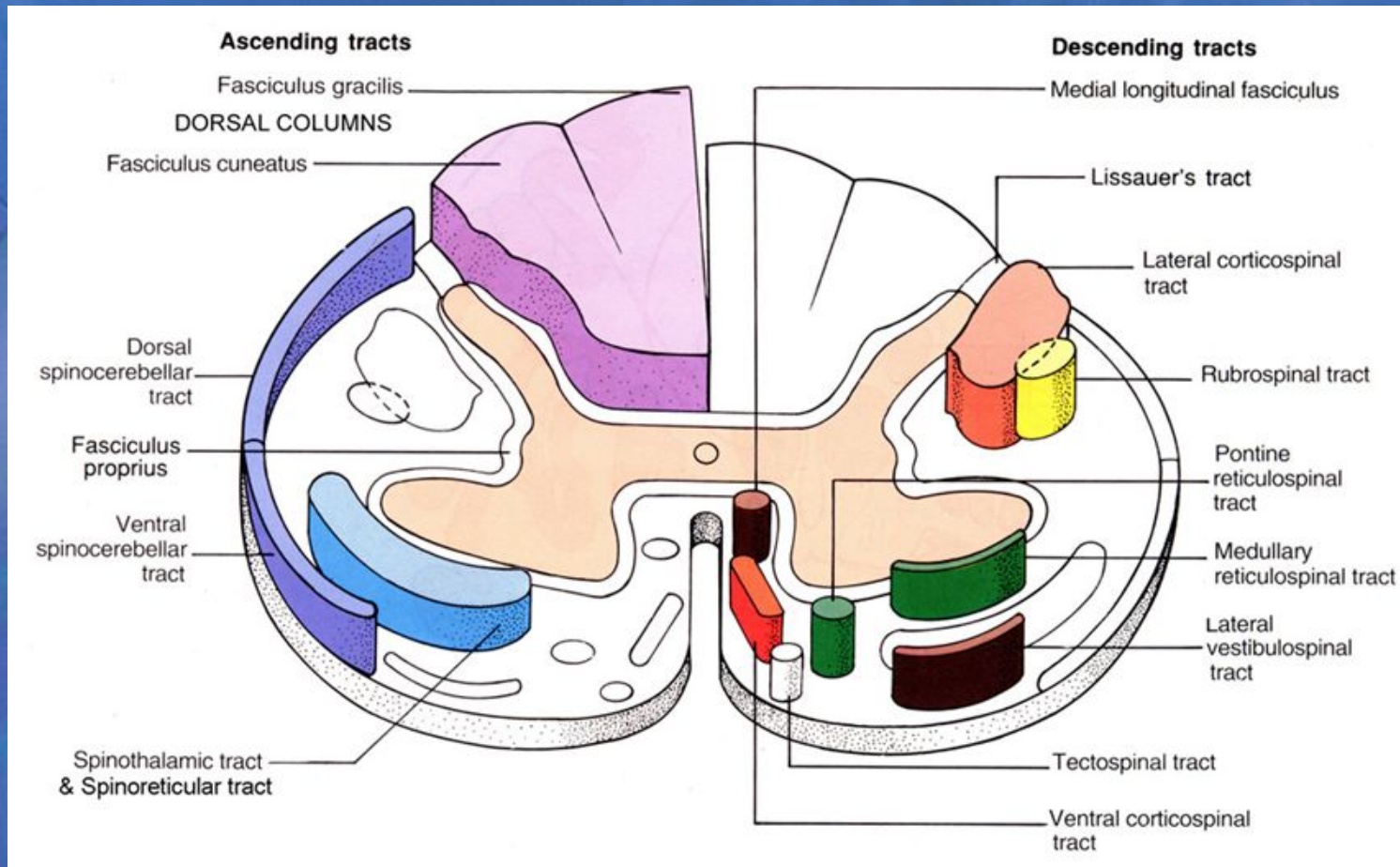
Pyramidal

Skeletal muscle tone; voluntary muscle movement

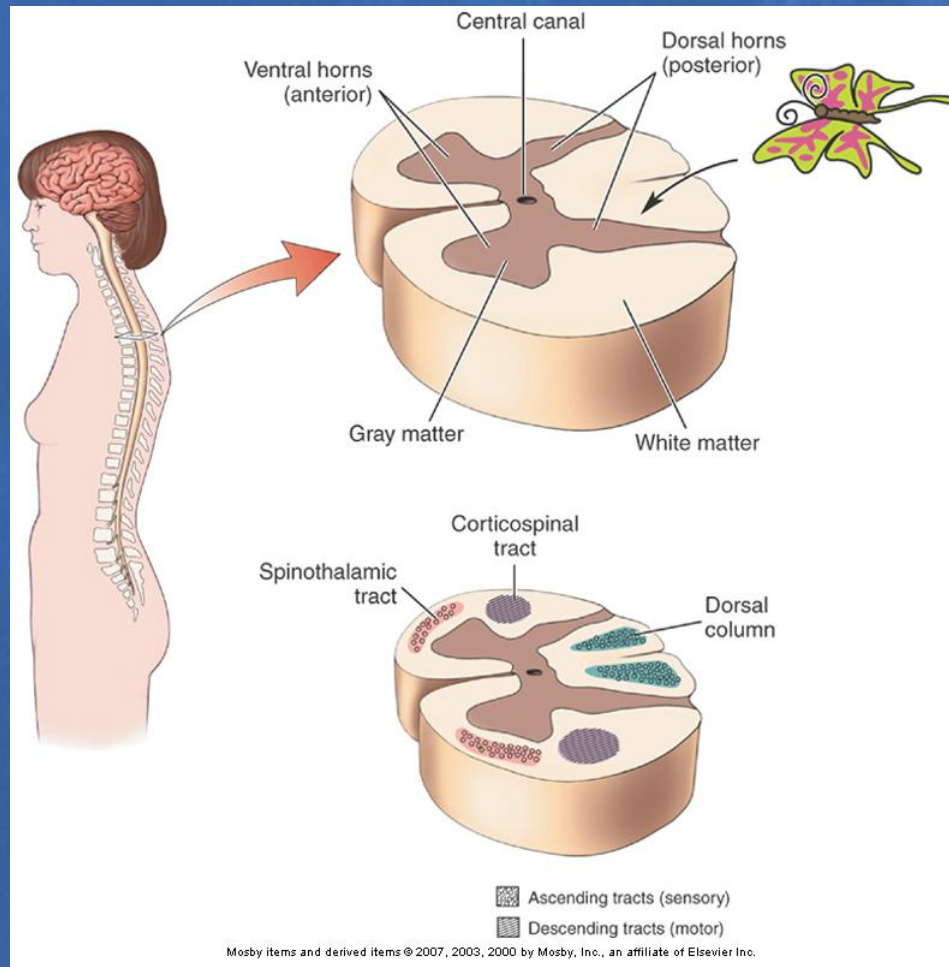
Extrapyramidal

Skeletal muscle activity (balance and posture)

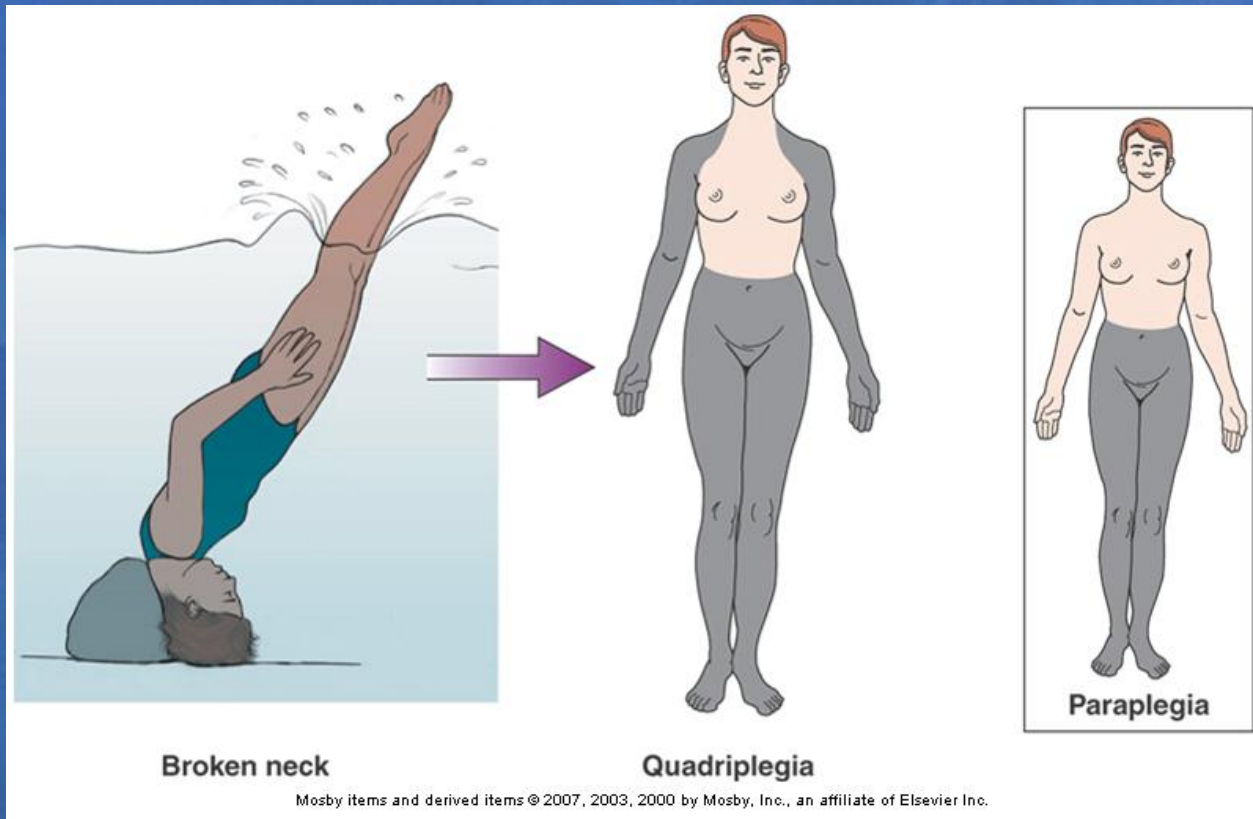
Ascending and Descending Tracts



Spinal Cord Structure

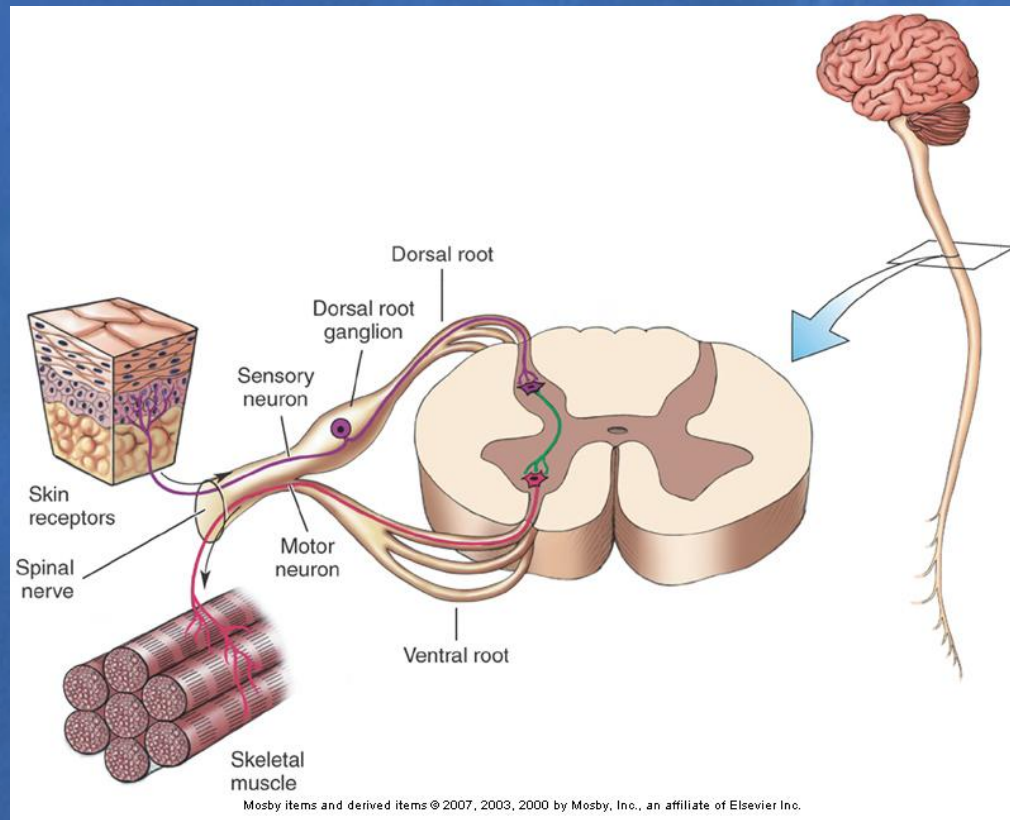


Spinal Cord Structure (cont'd.)



Spinal cord injuries.

Spinal Cord Structure (cont'd.)



Attachment of the spinal nerves to the spinal cord.

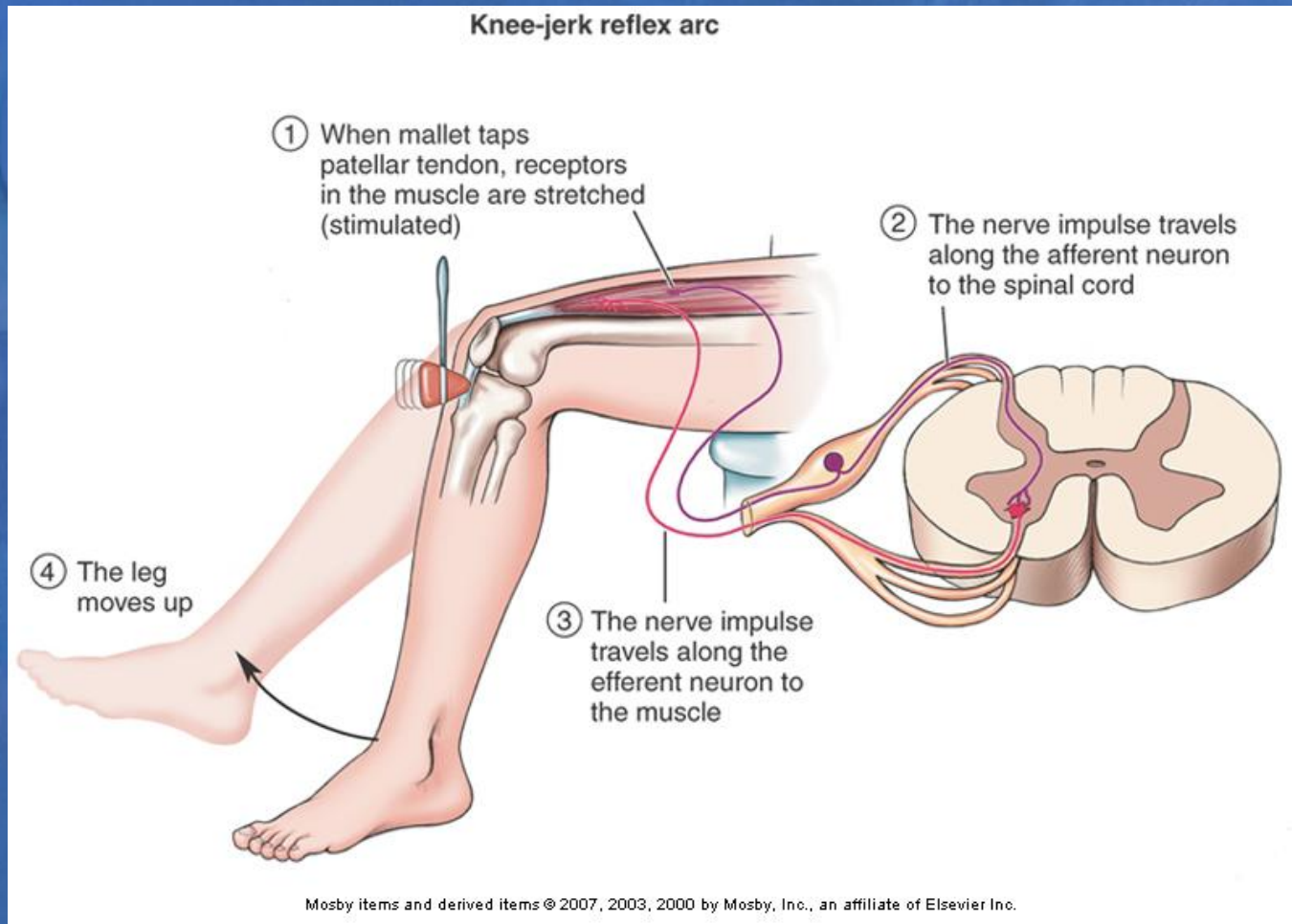
Spinal Cord Function

- Three major functions:
 - Sensory pathway
 - Provides pathways for sensory information from periphery to the brain
 - Motor pathway
 - Pathway to send motor information from the brain to the periphery
 - Reflex center
 - Acts as a major reflex centre

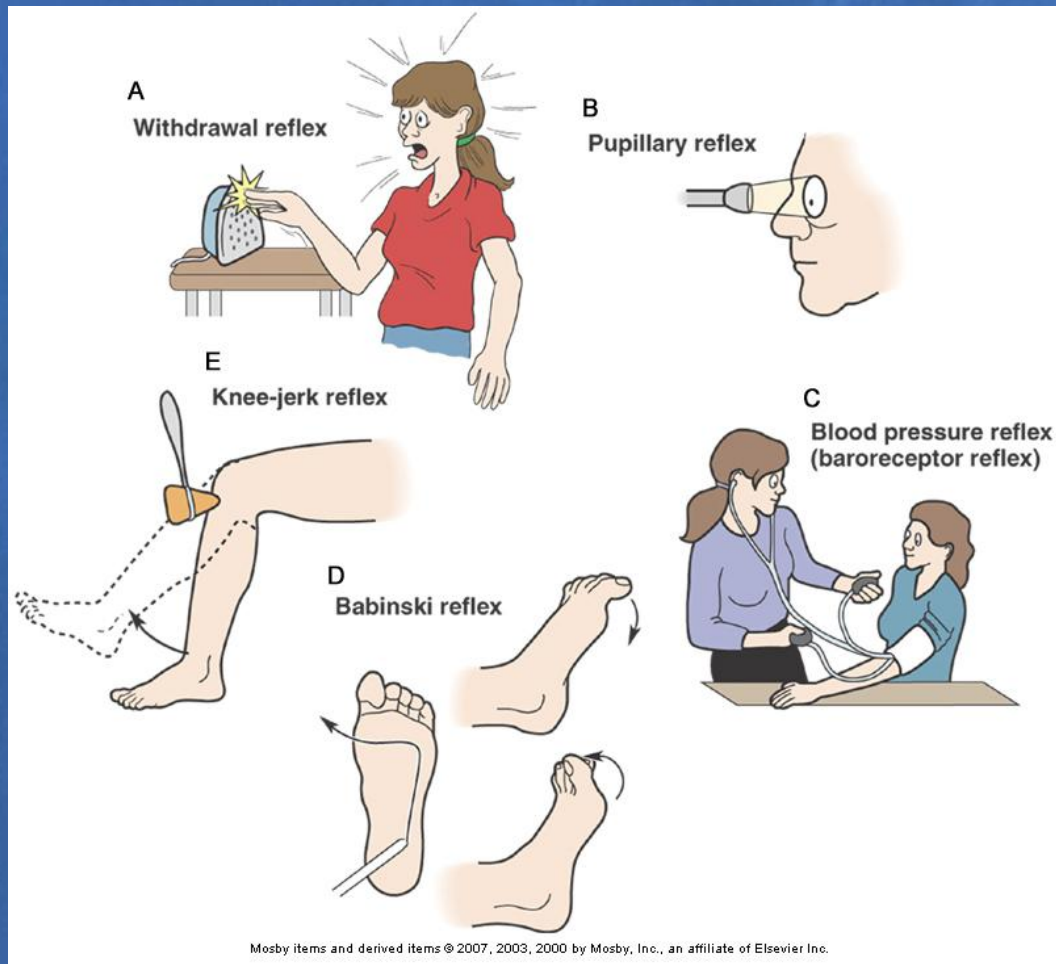
Spinal Cord Function (cont'd.)

- Reflex: involuntary response to a stimulus
- Reflex arc: nerve pathway involved in a reflex
 - Receptor
 - Afferent neuron
 - Efferent neuron
 - Effector organ

Spinal Cord Function (cont'd.)



Spinal Cord Function (cont'd.)



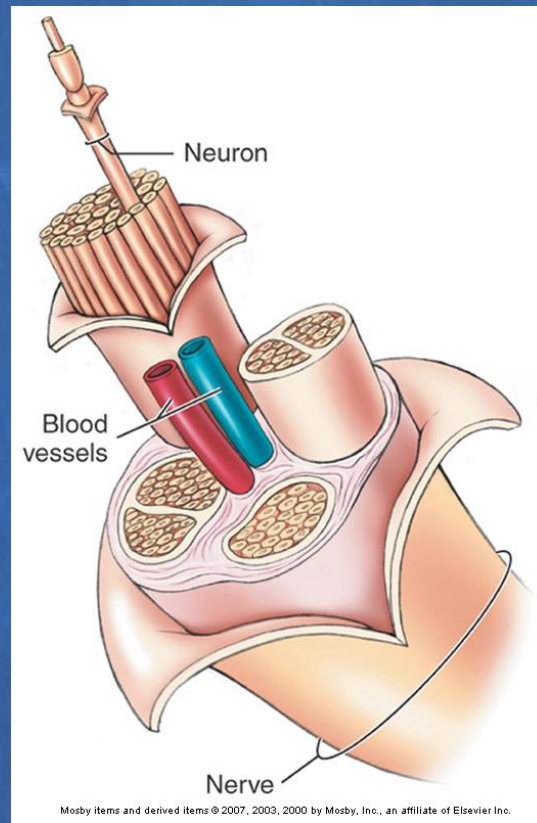
Lesson 11.2 Objectives

- List and describe the functions of the 12 pairs of cranial nerves.
- Identify the classification of spinal nerves.
- List the functions of the three major plexuses.

Nerves

- Neuron is a single nerve cell
- A nerve is made of many neurons bundled together, with blood vessels and wrapped in connective tissue
- 3 types of nerves
 - Sensory
 - Motor
 - Mixed

Peripheral Nervous System



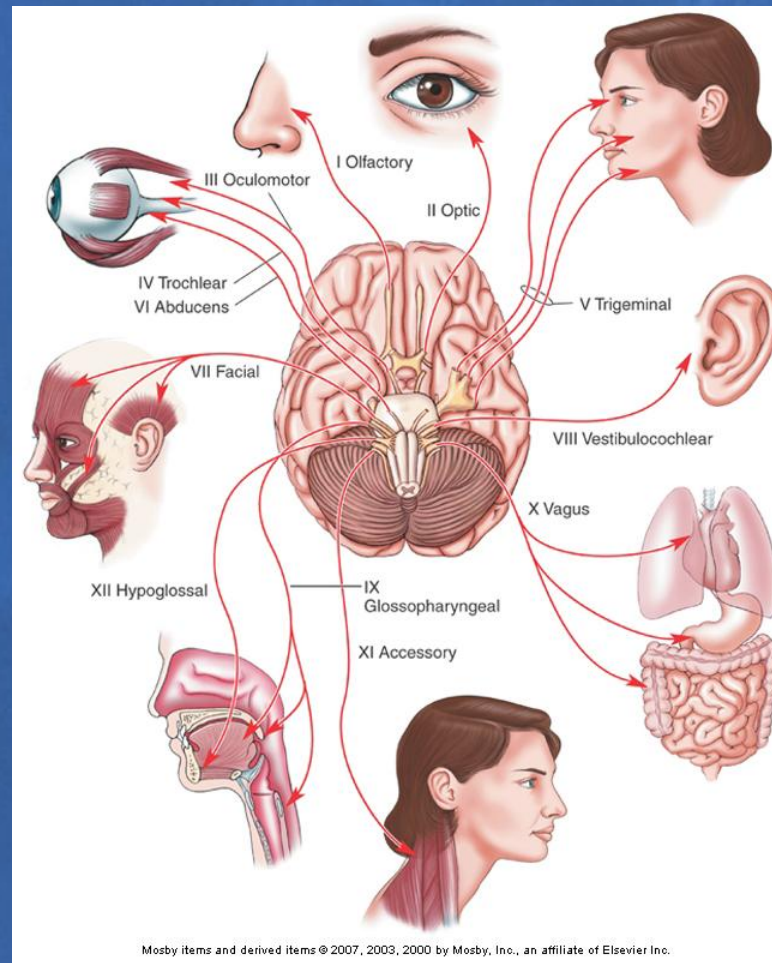
Difference between a neuron and nerve.

Peripheral Nervous System (cont'd.)

- Classifications of peripheral nervous system:
 - Structural classification: based on origin of the fiber
 - Cranial nerves
 - Spinal nerves
 - Functional classification: based on where nerves go and what they do
 - Somatic afferent nerves
 - Somatic efferent nerves
 - Autonomic nervous system (ANS)

Peripheral Nervous System (cont'd.)

Cranial nerves



Peripheral Nervous System (cont'd.)

- Functions of cranial nerves:
 - Sensory information for the special senses: smell, taste, vision, hearing, and balance
 - Sensory information for the general senses: touch, pressure, pain, temperature, and vibration
 - Motor information that results in contraction of skeletal muscles
 - Motor information that results in the secretion of glands and the contraction of cardiac and smooth muscle

Peripheral Nervous System (cont'd.)

- CN I
 - Olfactory nerve
 - Sensory
 - Sense of smell
- CN II
 - Optic nerve
 - Sensory
 - Sense of sight

Peripheral Nervous System (cont'd.)

- CN III
 - Oculomotor
 - Motor nerve
 - Movement of eyeball, raising of eyelid; change in pupil size
- CN IV
 - Trochlear
 - Motor nerve
 - Movement of eyeball

Peripheral Nervous System (cont'd.)

- CN V
 - Trigeminal
 - Mixed nerve
 - Chewing of food; sensations in face, scalp, cornea, and teeth
- CN VI
 - Abducens
 - Mixed nerve (mostly motor)
 - Movement of eyeball

Peripheral Nervous System (cont'd.)

- CN VII
 - Facial
 - Mixed nerve
 - Facial expressions; secretion of saliva and tears; taste; blinking
- CN VIII
 - Vestibulocochlear
 - Sensory
 - Sense of hearing and balance

Peripheral Nervous System (cont'd.)

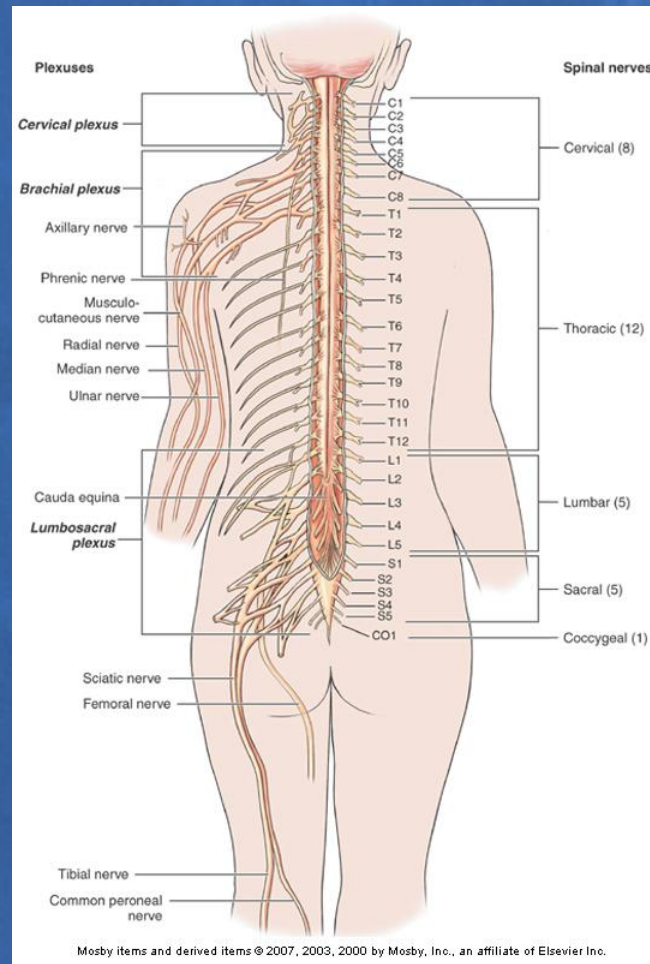
- CN IX
 - Glossopharyngeal
 - Mixed nerve
 - Swallowing, secretion of saliva; taste; sensory for reflex regulation of blood pressure; gag reflex
- CN X
 - Vagus
 - Mixed nerve
 - Visceral muscle movement and sensations; sensory for reflex regulation of blood pressure

Peripheral Nervous System (cont'd.)

- CN XI
 - Accessory
 - Mixed nerve (mostly motor)
 - Swallowing; head and shoulder movement; speaking
- CN XII
 - Hypoglossal
 - Mixed nerve (mostly motor)
 - Speech and swallowing

Peripheral Nervous System (cont'd.)

Spinal nerves



Peripheral Nervous System (cont'd.)

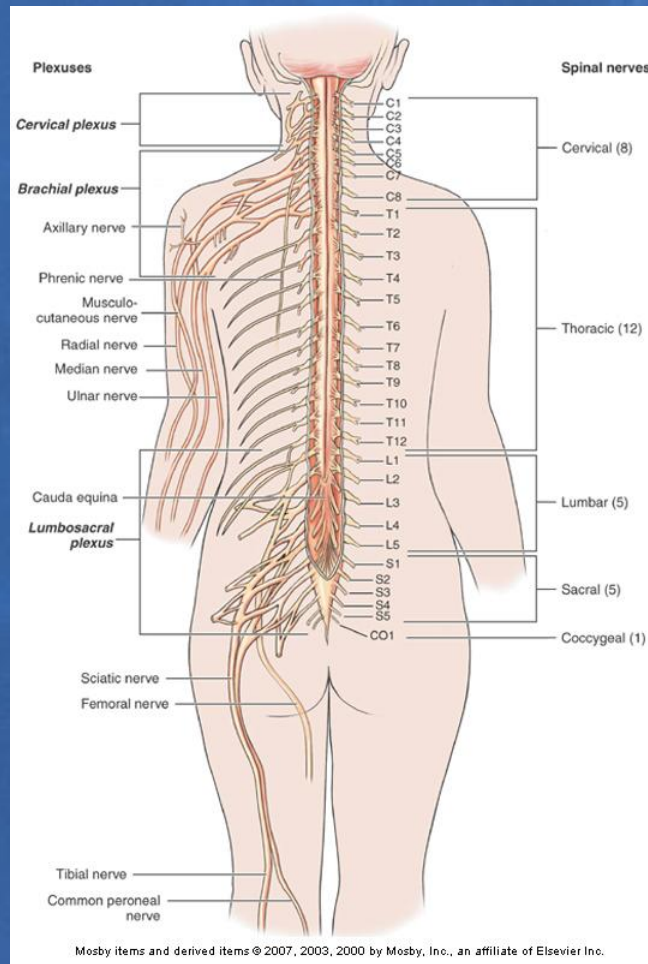
- Spinal nerves:
 - Cervical nerves: 8 pairs
 - Thoracic nerves: 12 pairs
 - Lumbar nerves: 5 pairs
 - Sacral nerves: 5 pairs
 - Coccygeal nerves: 1 pair

Peripheral Nervous System (cont'd.)

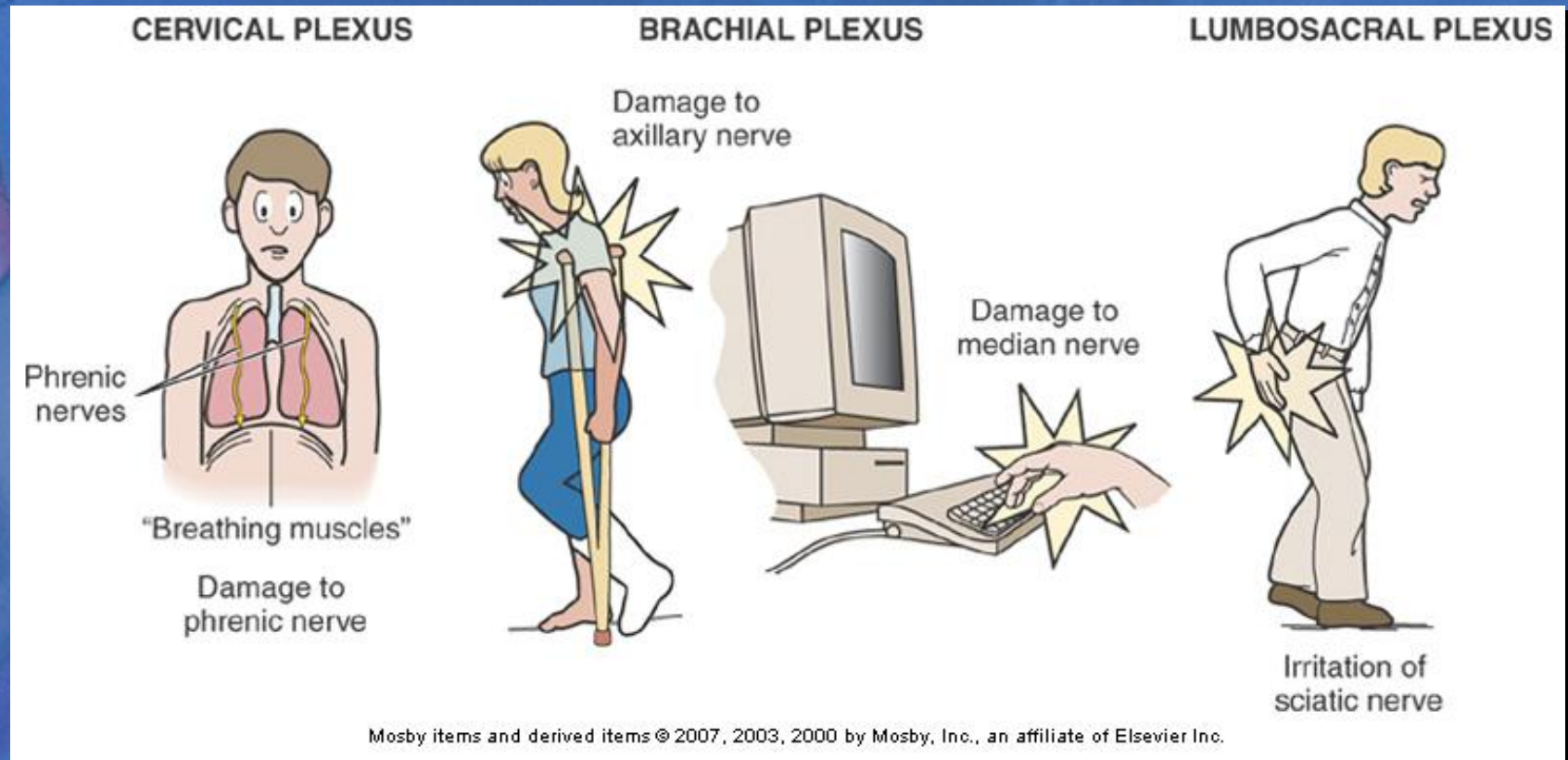
- Spinal nerve plexuses:
 - Cervical plexus (C1 to C4)
 - Brachial plexus (C5 to C8, T1)
 - Lumbosacral plexus (T12, L1 to L5, S1 to S4)

Peripheral Nervous System (cont'd.)

Spinal nerve plexuses

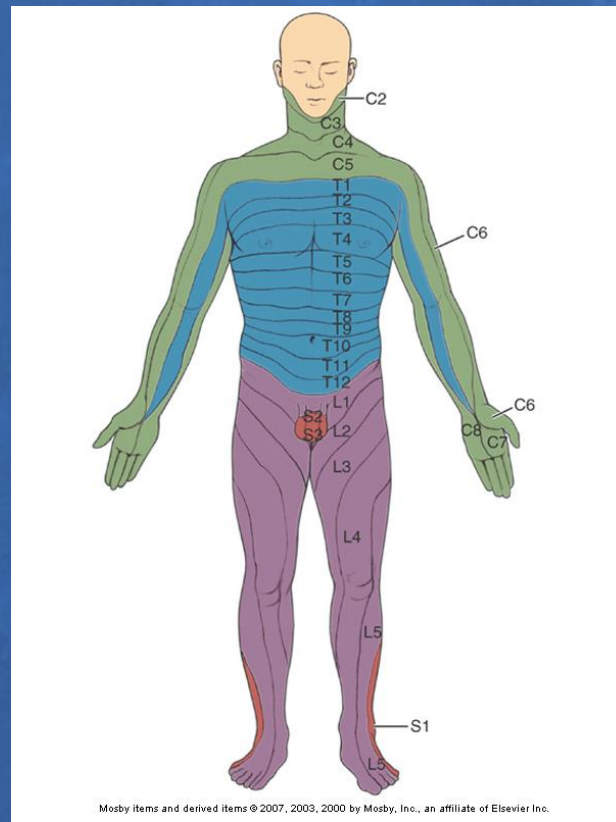


Peripheral Nervous System (cont'd.)



Examples of nerve damage.

Peripheral Nervous System (cont'd.)



Dermatome.