The Nervous System

Spinal Nerves

- There is a pair of spinal nerves at the level of each vertebrae for a total of 31 pairs
- Spinal nerves are formed by the combination of the ventral and dorsal roots of the spinal cord
- Spinal nerves are named for the region from which they arise

Spinal Nerves

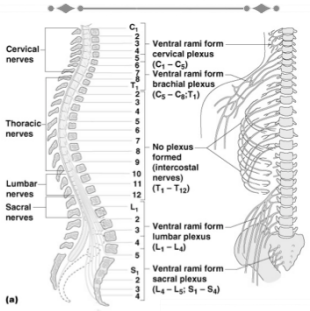

Figure 7.22a

Anatomy of Spinal Nerves

- Spinal nerves divide soon after leaving the spinal cord
  - Dorsal rami – serve the skin and muscles of the posterior trunk
  - Ventral rami – forms a complex of networks (plexus) for the anterior

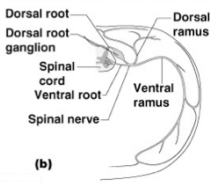

Figure 7.22b

Examples of Nerve Distribution

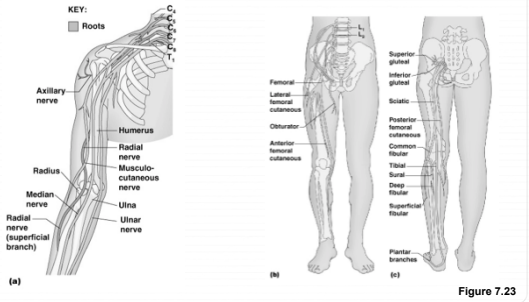

Figure 7.23

Autonomic Nervous System

- The involuntary branch of the nervous system
- Consists of only motor nerves
- Divided into two divisions
  - Sympathetic division
  - Parasympathetic division

Differences Between Somatic and Autonomic Nervous Systems

- Nerves
  - Somatic – one motor neuron
  - Autonomic – preganglionic and postganglionic nerves
- Effector organs
  - Somatic – skeletal muscle
  - Autonomic – smooth muscle, cardiac muscle, and glands

Differences Between Somatic and Autonomic Nervous Systems

- Nerurotransmitters
  - Somatic – always use acetylcholine
  - Autominic – use acetylcholine, epinephrine, or norepinephrine

Comparison of Somatic and Autonomic Nervous Systems

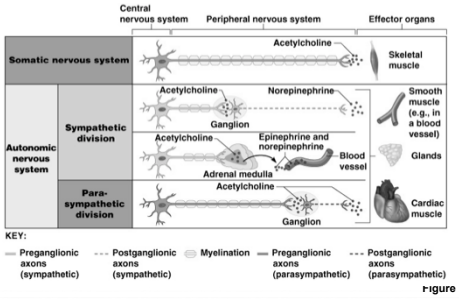

Figure 7.24

Anatomy of the Sympathetic Division

- Originates from T_1 through L_2
- Ganglia are at the sympathetic trunk (near the spinal cord)
- Short pre-ganglionic neuron and long postganglionic neuron transmit impulse from CNS to the effector
- Norepinephrine and epinephrine are neurotransmitters to the effector organs

Sympathetic Pathways

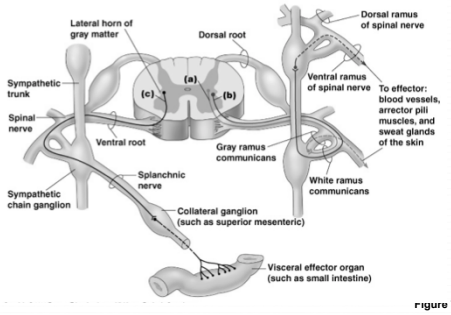

Figure 7.26

Anatomy of the Parasympathetic Division

- Originates from the brain stem and S_1 through S_4
- Terminal ganglia are at the effector organs
- Always uses acetylcholine as a neurotransmitter

Anatomy of the Autonomic Nervous System

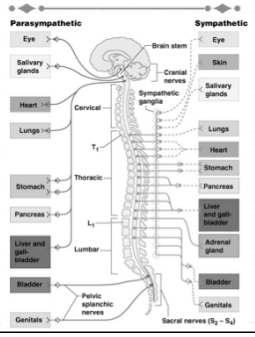

Figure 7.25

Autonomic Functioning

- Sympathetic – "fight-or-flight"
  - Response to unusual stimulus
  - Takes over to increase activities
  - Remember as the "E" division = exercise, excitement, emergency, and embarrassment

Autonomic Functioning

- Parasympathetic – housekeeping activites
  - Conserves energy
  - Maintains daily necessary body functions
  - Remember as the "D" division - digestion, defecation, and diuresis

Development Aspects of the Nervous System

- The nervous system is formed during the first month of embryonic development
- Any maternal infection can have extremely harmful effects
- The hypothalamus is one of the last areas of the brain to develop

Development Aspects of the Nervous System

- No more neurons are formed after birth, but growth and maturation continues for several years
- The brain reaches maximum weight as a young adult