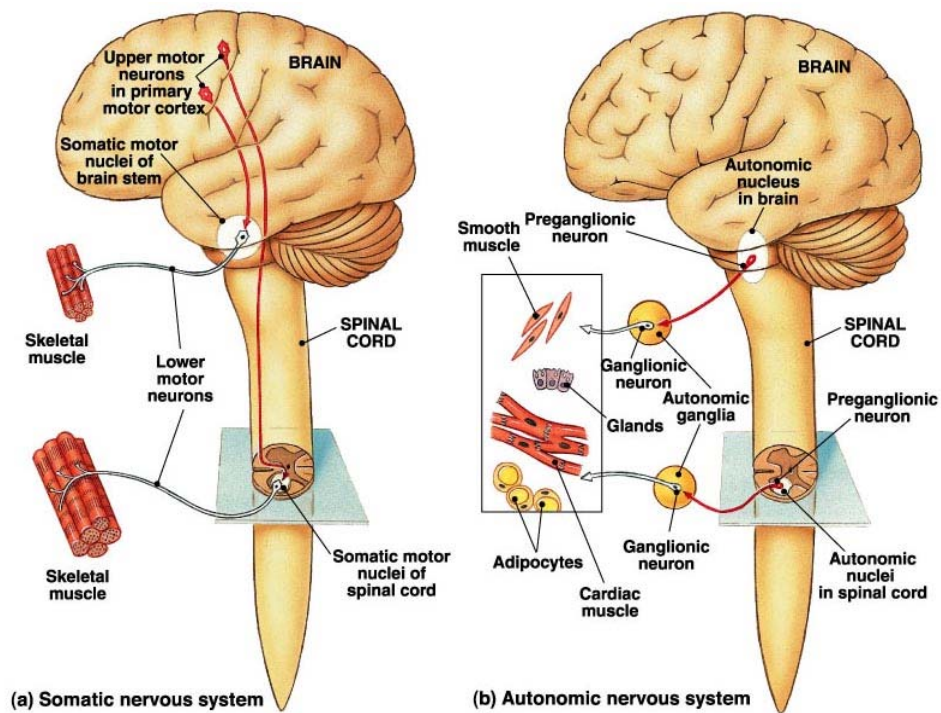


CHAPTER 16: THE AUTONOMIC NERVOUS SYSTEM

Read: Chapter 16, pages 517-534. Read only the topics covered in lecture. We will not cover this chapter in detail. Complete the homework at the end.

I. Overview

A. Position and Organization in the Nervous System

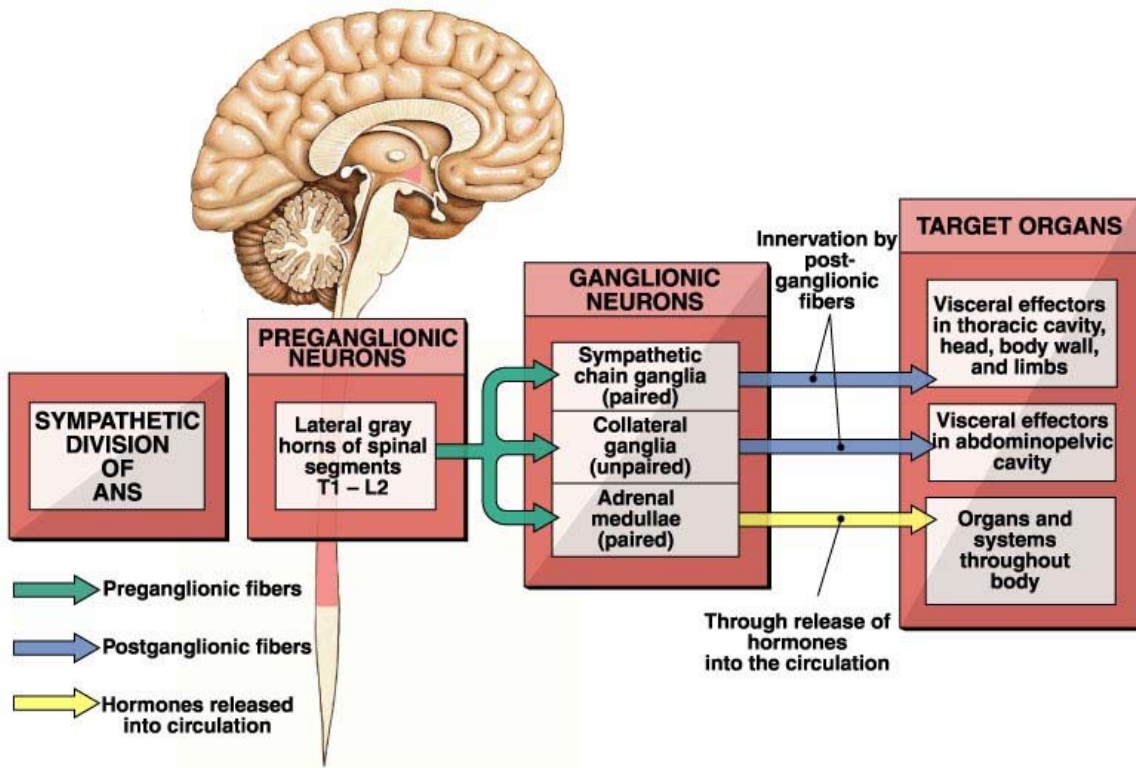


B. General Features

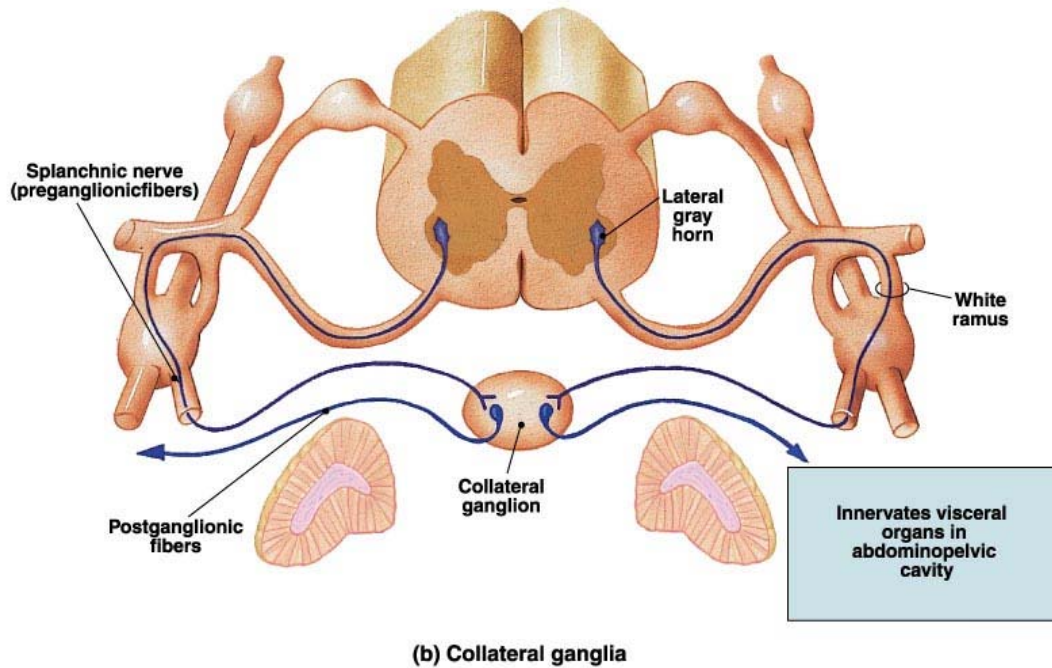
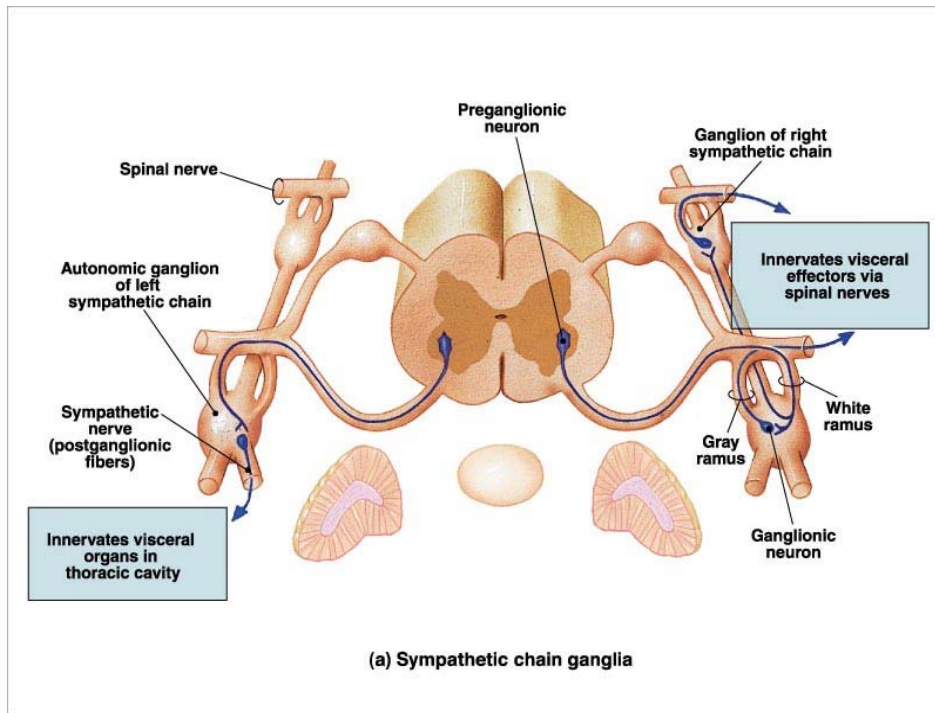
C. Two Major Branches

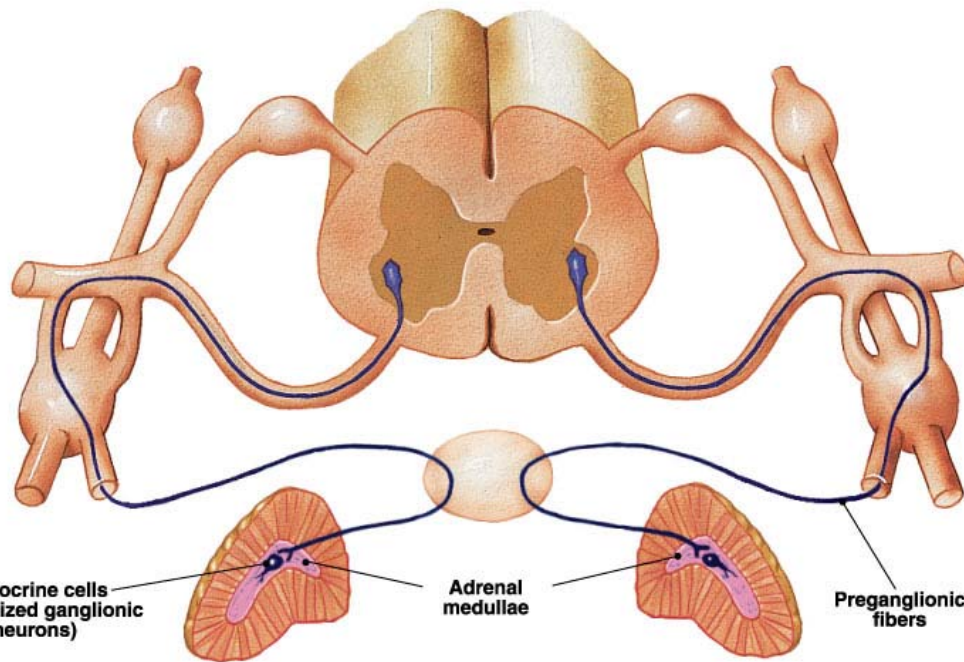
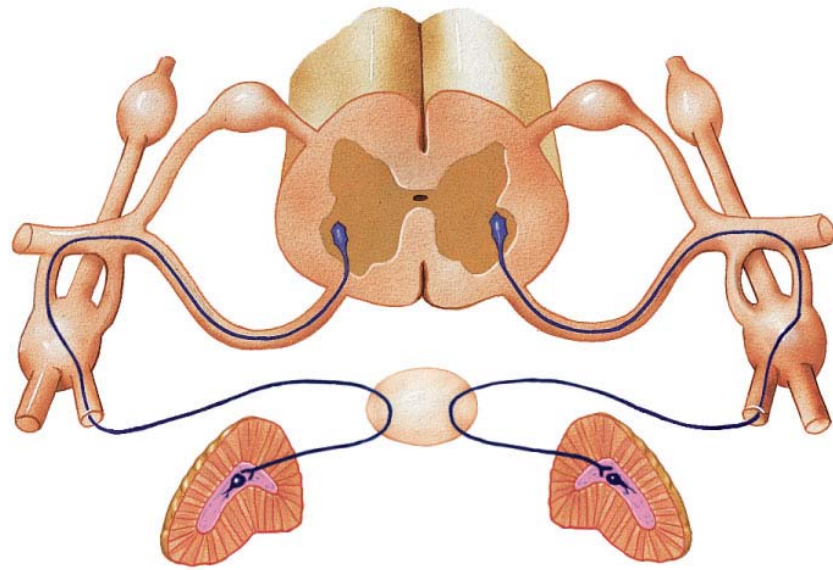
II. Sympathetic Division

A. Location of Cell Bodies of Preganglionic Neurons



B. Preganglionic Fibers - Four Routes Taken by Preganglionic Fibers

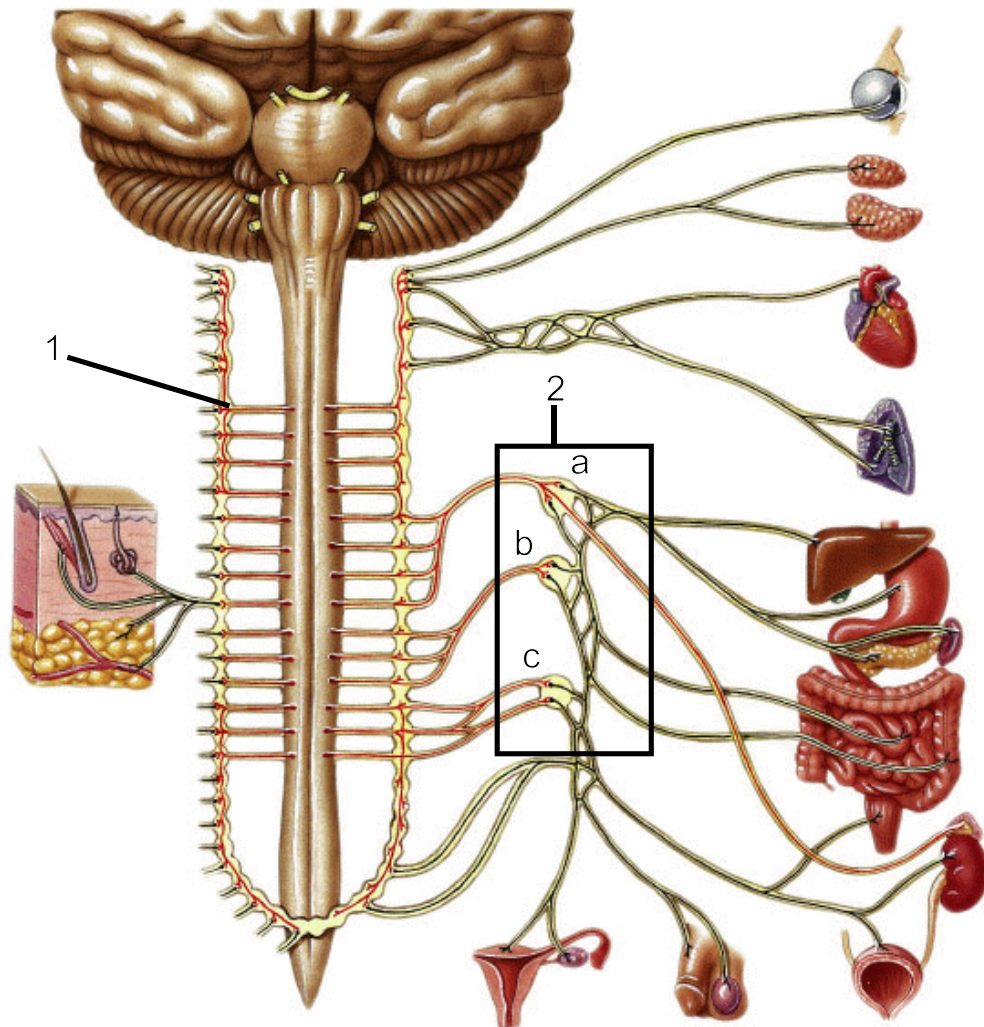




(c) The adrenal medullae

C. Two Types of Ganglia

- 1) Sympathetic Chain Ganglia
- 2) Collateral Ganglia
 - a) celiac
 - b) superior mesenteric
 - c) inferior mesenteric

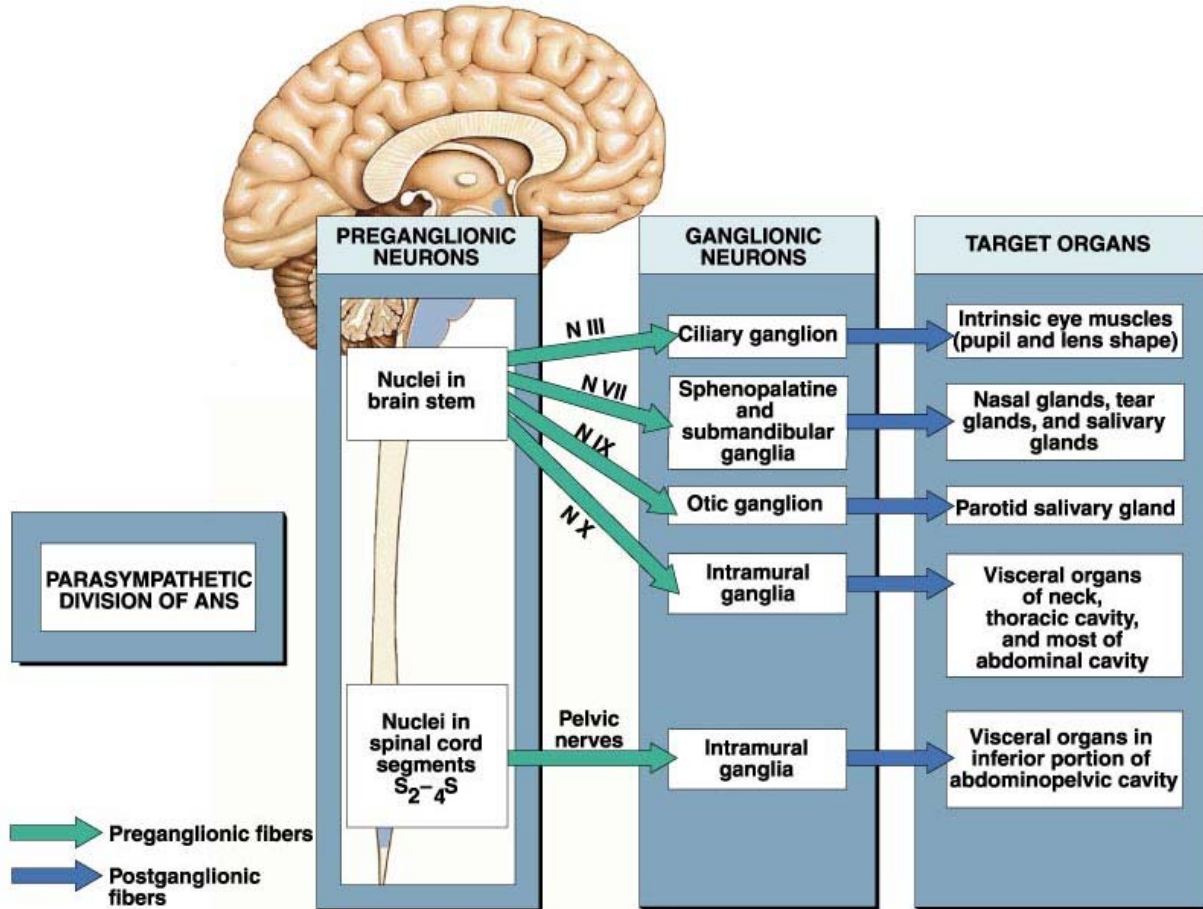


D. Postganglionic Fibers

E. Effectors

III. Parasympathetic Division

A. Location of Cell Bodies of Preganglionic Neurons



B. Preganglionic Fibers

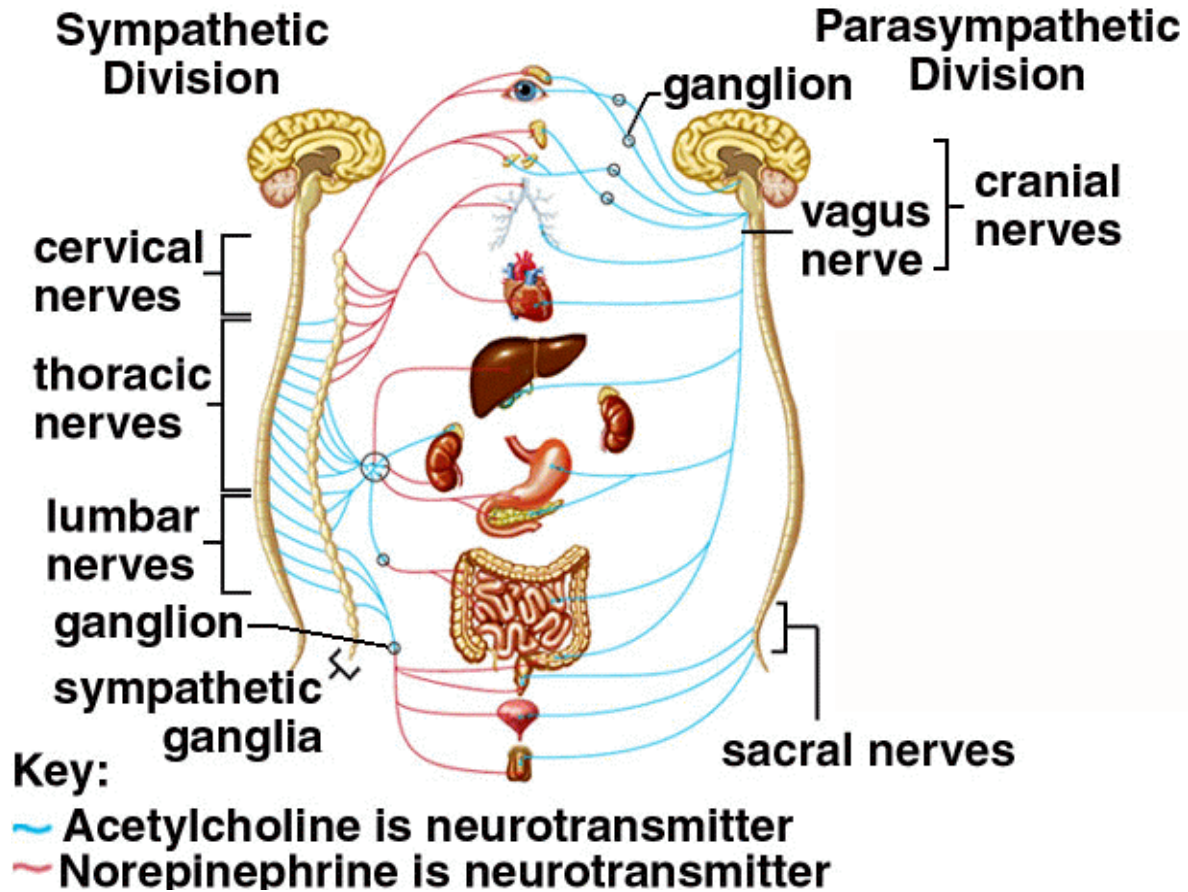
C. Ganglia

D. Postganglionic Fibers

E. Effectors

F. Autonomic Nervous System

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.



V. Autonomic Nervous System Receptors

Sympathetic pathways:



Parasympathetic pathways:



Receptor	Location	Response(s)
Adrenergic Group		
α_1		
α_2		
β_1		
β_2		
Cholinergic Group		
Nicotinic		
Muscarinic		

VI. Functions of the Autonomic Nervous System

Effector	Sympathetic	Parasympathetic
Heart		
Smooth Muscle		
Lungs: bronchioles		
Skin: arrector pili		
Pupil: muscles of iris		
Blood vessels		
Skin		
Skeletal muscle		

Viscera		
Urinary bladder		
Digestive system		
Glands		
Sweat glands		
Digestive glands		
Adrenal glands		

ASSIGNMENT: COMPLETE OUT OF CLASS - compare the structure of the sympathetic and parasympathetic divisions of the autonomic nervous system by completing the table below.

	Sympathetic	Parasympathetic
Preganglionic neurons		
a) location of cell bodies and dendrites		
b) location of axons		
Ganglia		
a) Type		
b) proximity to CNS		
Postganglionic neurons		
a) location of cell bodies and dendrites		
b) location of axons		
Distribution (limited distribution or widely distributed)		
Neurotransmitters		
a) synapse between preganglionic neuron & postganglionic neuron		
b) synapse between postganglionic neuron & effector		
Neurotransmitter Receptors		
a) postganglionic neurons		
b) viscera		

ASSIGNMENTS

Lecture Guide

- 1) What are the principal components of the autonomic nervous system? What is its general function? What is it called involuntary? What are the two major subdivisions?
- 2) Distinguish between the preganglionic and postganglionic neurons in the two divisions of the ANS.
- 3) What is an autonomic ganglion? What happens in a ganglion? Describe the location and function of the three types of autonomic ganglia?
- 4) How are the structures of the parasympathetic and sympathetic nervous systems similar? Different?
- 5) Explain how the term “dual innervation” applies to the autonomic nervous system.
- 6) Compare the actions of the parasympathetic and sympathetic nervous systems. How do they compare? Do all tissues receive both parasympathetic and sympathetic nerves?
- 7) Define: cholinergic neuron, adrenergic neuron. Which neurons in the autonomic nervous system are cholinergic? Which neurons are adrenergic?
- 8) What is meant by the antagonistic effects of the two divisions of the autonomic nervous system? Give some examples.
- 9) What effect would activation of the sympathetic nervous system have on the following: pupil diameter, hair follicles, adrenal gland, stomach motility, heart rate, passageways of the lungs, sweat production, digestive enzyme secretion. What would the effects of parasympathetic stimulation have on each of these?

Textbook Chapter 16 (page 547-548)

Level 1 Reviewing Facts and Terms: 1-3, 5, 11-14

Level 2 Reviewing Concepts: 19, 23, 24

Level 3 Critical Thinking and Clinical Applications: 29

Appendix 1 at the back of the text contains the answers to the above text questions.

Study Guide (pages 292-308)

(L1) Multiple Choice: 1-9, 11-13, 15, 17, 19-21, 23

Completion: 2-4, 6-9

Drawing/Illustration: Figures 16.1, 16.2

- (L2) Concept Map I, II
 - Multiple Choice: 2, 5, 8, 10
 - Completion: 2, 9
 - Short Essay: 1, 2, 11
- (L3) Critical Thinking: 1, 5

Answers to Study Guide questions are located in the back of the Study Guide

ILLUSTRATION CREDITS

This lecture guide is for use in Anatomy & Physiology I (50.173) during the Spring 2006 semester. Materials have been used with permission from the following sources for classroom purposes only.

Martini, F. *Fundamentals of Anatomy & Physiology 6th Ed.* 2001. Prentice-Hall, Upper Saddle River, NJ

Life Art Clip Art

Till, Margaret, Department of Biological and Allied Health Sciences, Bloomsburg University of Pennsylvania

Mader, S. *Human Biology 7th Ed.* McGraw-Hill Publishing, New York.