Chapter 11: The Cardiovascular System

I. The Heart

Objectives:
- Describe the location of the heart in the body, and identify its major anatomical areas on an appropriate model or diagram.
- Trace the pathway of blood through the heart.
- Compare the pulmonary and systemic circuits.
- Explain the operation of the heart valves.
- Name the functional blood supply of the heart.
- Name the elements of the intrinsic conduction system of the heart, and describe the pathway of impulses through this system.
- Define systole, diastole, stroke volume, and cardiac cycle.
- Define heart sounds and murmur.
- Explain what information can be gained from an electrocardiogram.
- Describe the effect of each of the following on heart rate: stimulation by the vagus nerve, exercise, epinephrine, and various ions.

A. Anatomy of the heart

1. Location and size

2. Coverings and wall
   a) Pericardium

   b) Myocardium and endocardium

3. Chambers and associated great vessels
   a) Atria vs. ventricles

   b) Pulmonary vs. systemic circuit

   (1) Pulmonary circulation & vessels
(2) Systemic circulation & vessels

4. Valves
   a) Atrioventricular (AV) valves
   b) Semilunar valves

5. Cardiac circulation

B. Physiology of the heart

1. Intrinsic conduction system of the heart
   a) Function
   b) Anatomy
   c) Pathology

2. Cardiac cycle and heart sounds
   a) Systole vs. diastole
   b) Mid-to-late diastole
c) Ventricular systole

d) Early diastole

3. Heart sounds

4. Cardiac output
   a) Description

   b) Regulation of stroke volume

   c) Factors modifying basic heart rate

      (1) Neural (ANS) controls

      (2) Physical factors

II. Blood Vessels

Objectives:
- Compare and contrast the structure and function of arteries, veins and capillaries.
- Identify the body’s major arteries and veins, and name the body region supplied by each.
- Discuss the unique features of special circulations of the body: arterial circulation of the brain, hepatic portal circulation, and fetal circulation.
- Define blood pressure and pulse, and name several pulse points.
- List factors affecting and/or determining blood pressure.
- Define hypertension and atherosclerosis, and describe possible health consequences of these conditions.
- Describe the exchanges that occur across capillary walls.

A. Types of blood vessels
B. Microscopic anatomy of blood vessels

1. Tunics

2. Structural differences between arteries, veins and capillaries
   
   a) Tunica media thickness
   
   b) Factors influencing venous return
   
   c) Capillaries
   
   d) Capillary beds

C. Gross anatomy of blood vessels

1. Major arteries of the systemic circulation
   
   a) Aorta
   
   b) Arterial branches of the ascending aorta
   
   c) Arterial branches of the aortic arch
      
      (1) Brachiocephalic trunk
      
      (2) Left common carotid artery
      
      (3) Left subclavian artery
d) Arterial branches of the thoracic aorta

e) Arterial branches of the abdominal aorta

(1) Celiac trunk

(2) Superior mesenteric artery

(3) Renal arteries

(4) Gonadal arteries

(5) Lumbar arteries

(6) Inferior mesenteric artery

(7) Common iliac arteries

2. Major veins of the systemic circulation

a) Superior and inferior vena cavae

b) Veins draining into the superior vena cava

(1) Radial and ulnar veins

(2) Cephalic vein

(3) Basilic vein
(4) Subclavian vein

(5) Vertebral vein

(6) Internal jugular vein

(7) Brachiocephalic veins

(8) Azygous vein

c) Veins draining into the inferior vena cava

(1) Anterior and posterior tibial and fibular veins

(2) Great saphenous veins

(3) Common iliac veins

(4) Right gonadal vein

(5) Renal veins

(6) Hepatic portal vein

(7) Hepatic veins

3. Special circulations

a) Arterial supply of the brain and the Circle of Willis
b) Hepatic portal circulation

c) Fetal circulation

D. Physiology of circulation

1. Arterial pulse

2. Blood pressure
   a) Description
   
   b) Blood pressure gradient
   
   c) Measuring blood pressure
   
   d) Effects of various factors on blood pressure
      
      (1) Peripheral resistance and cardiac output
      
      (2) Neural factors (ANS)
      
      (3) Renal factors: the kidneys
      
      (4) Temperature
III. Developmental Aspects of the Cardiovascular System

**Objectives:**
- Briefly describe the development of the cardiovascular system.
- Name the fetal vascular modifications, or “fetal shunts,” and describe their function.
- Explain how regular exercise and a diet low in fats and cholesterol may help maintain cardiovascular health.

**A. Prenatal development**

**B. Normal adult functioning**

**C. Effect of diet and age**