



The Human Body in Health and Illness

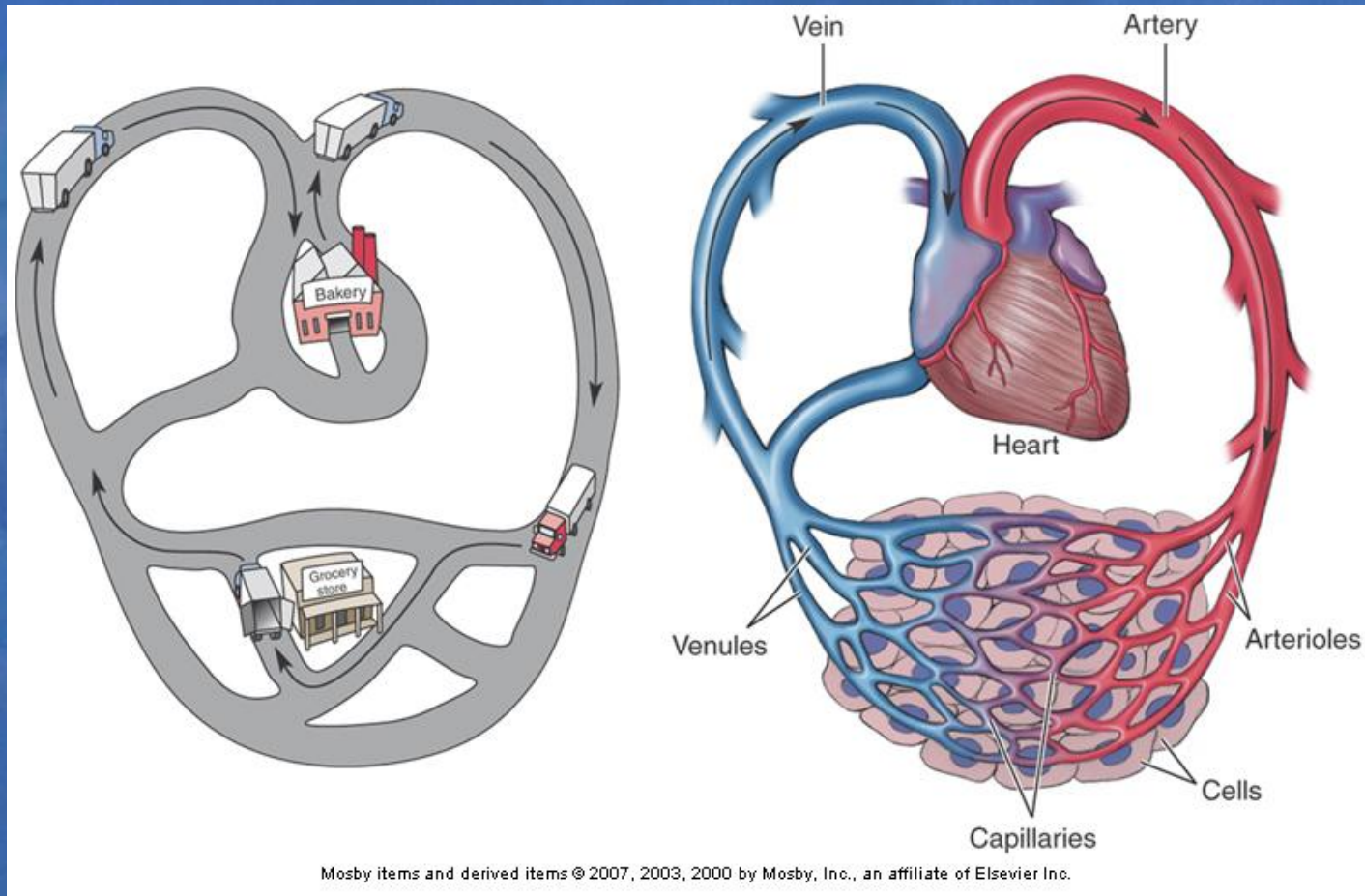
Barbara Herlihy

Chapter 18: Anatomy of the Blood Vessels

Lesson 18.1 Objectives

- Describe the pulmonary and systemic circulations.
- Describe the structure and function of arteries, capillaries, and veins.
- List the three layers of tissue found in arteries and veins.
- Explain the functions of conductance, resistance, exchange, and capacitance vessels.

Circles, Circuits, and Circulation



Circles, Circuits, and Circulation

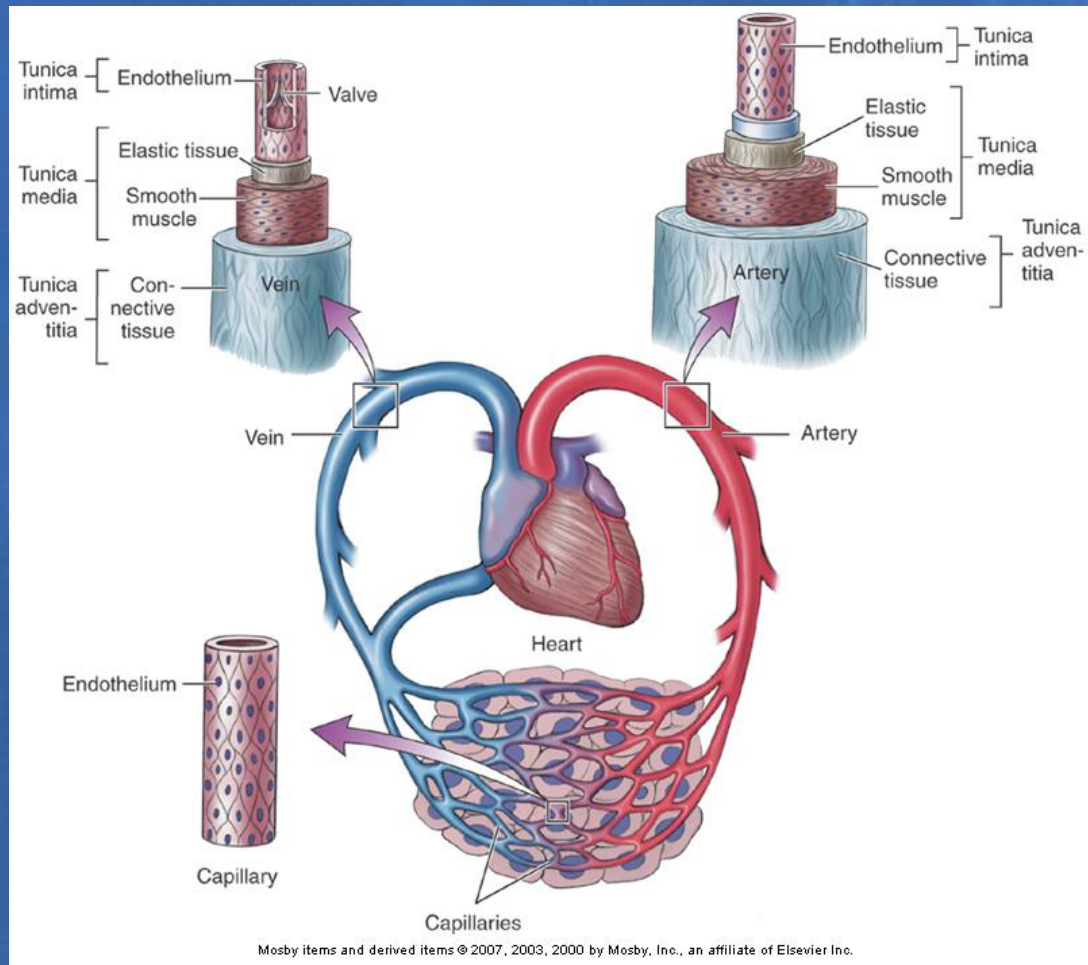
(cont'd.)

- Pulmonary circulation: carries blood from the right ventricle of the heart to the lungs and back to the left atrium of the heart
- Systemic circulation: provides the blood supply to the rest of the body

Types of Blood Vessels

- Arteries –
 - Smallest are called Arterioles
- Capillaries
- Veins
 - Smallest are called Venules

Types of Blood Vessels (cont'd.)



Types of Blood Vessels (cont'd.)

- Arteries
 - Structure: thick wall with three layers
 - Function: carry blood from the heart to the arterioles
 - Arterioles: thinner walls, contract and relax due to muscle changes

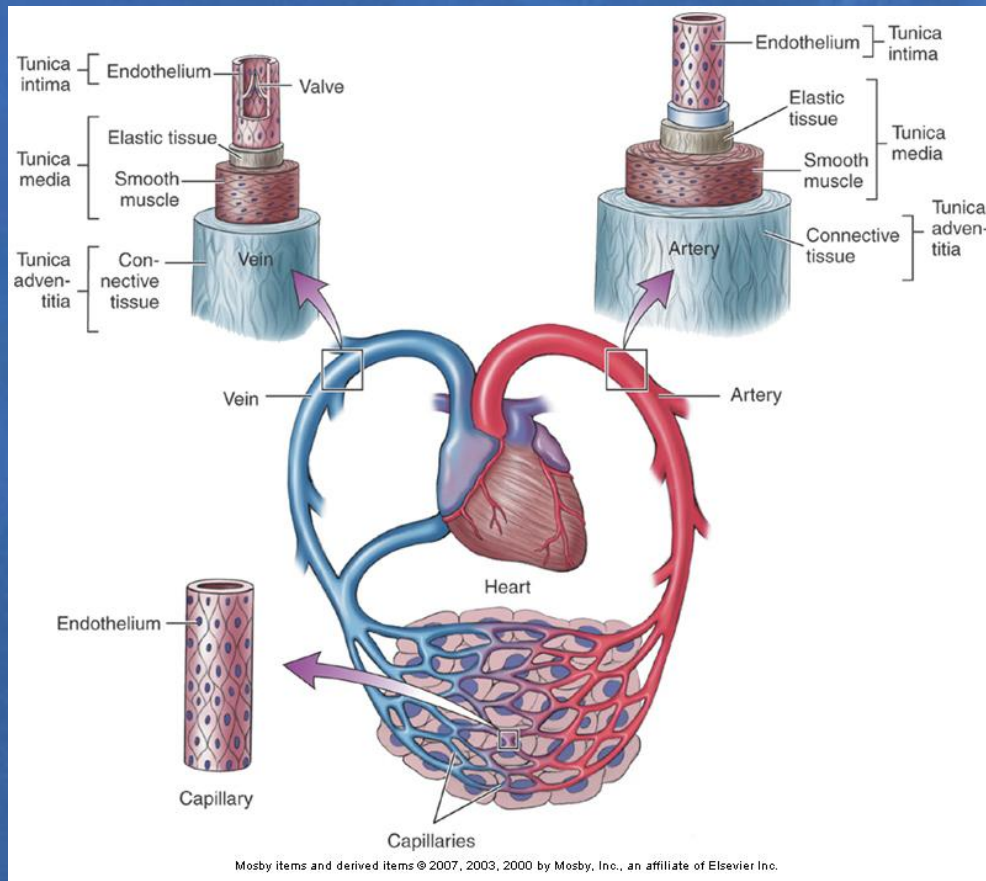
Types of Blood Vessels (cont'd.)

- Capillaries:
 - Smallest & most numerous, close to every cell of the body
 - Structure: layer of endothelium
 - Function: exchange vessels, connect arterioles to venules

Types of Blood Vessels (cont'd.)

- Veins
 - Structure: three layers, but thinner and less elastic than arteries; contain valves
 - Function: collect and return blood from the tissues to the heart
 - Venules: thin walls, hold and store blood

Blood Vessel Walls



Blood Vessel Walls (cont'd.)

- Layers:
 - Tunica intima: innermost layer; endothelium
 - Tunica media: middle layer; elastic tissue and smooth muscle
 - Tunica adventitia: outer layer; connective tissue

Blood Vessels: What They Do

- Arteries
 - Conductance vessels: large arteries conduct blood from heart to arterioles
- Arterioles
 - Resistance vessels: arterioles resist the flow of blood by constricting, or offer less resistance by dilating

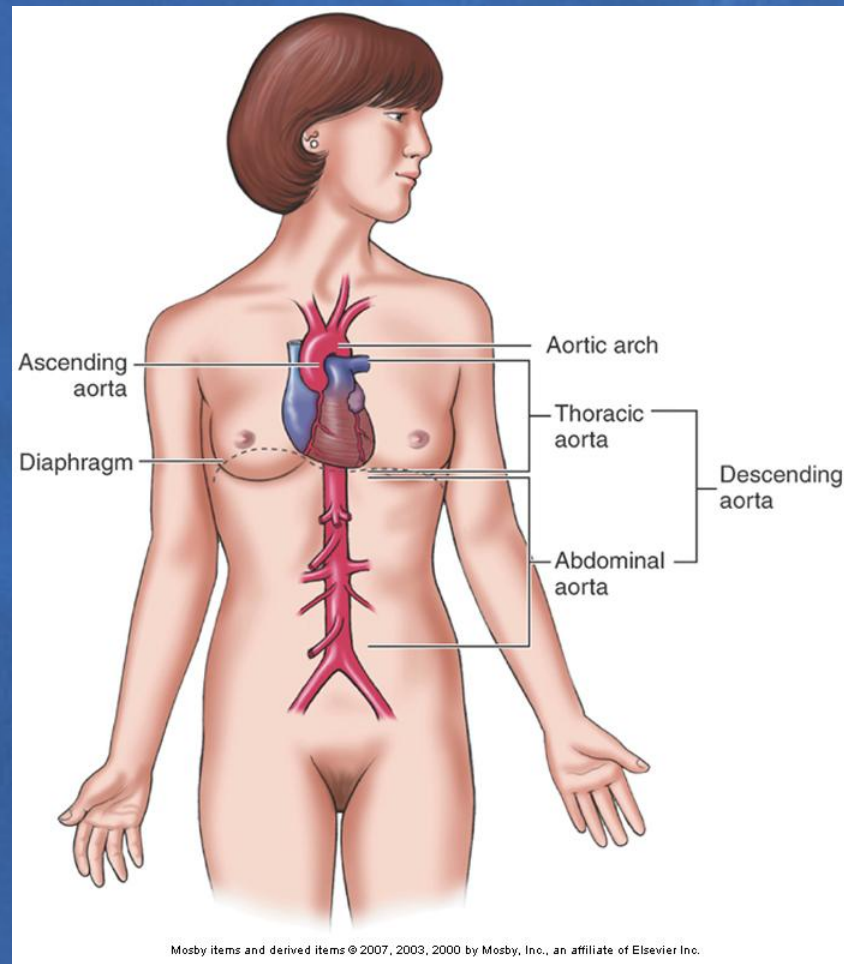
Blood Vessels: What They Do (cont'd.)

- Capillaries
 - Exchange vessels: capillaries allow exchange of nutrients and waste
- Veins and venules
 - Capacitance vessels: collect and return blood, blood storage

Lesson 18.2 Objectives

- List those major arteries of the systemic circulation that are branches of the ascending aorta, aortic arch, and descending aorta.
- List the major veins of the systematic circulation.
- Describe the following special circulations: blood supply to the head and brain, hepatic circulation, and fetal circulation.

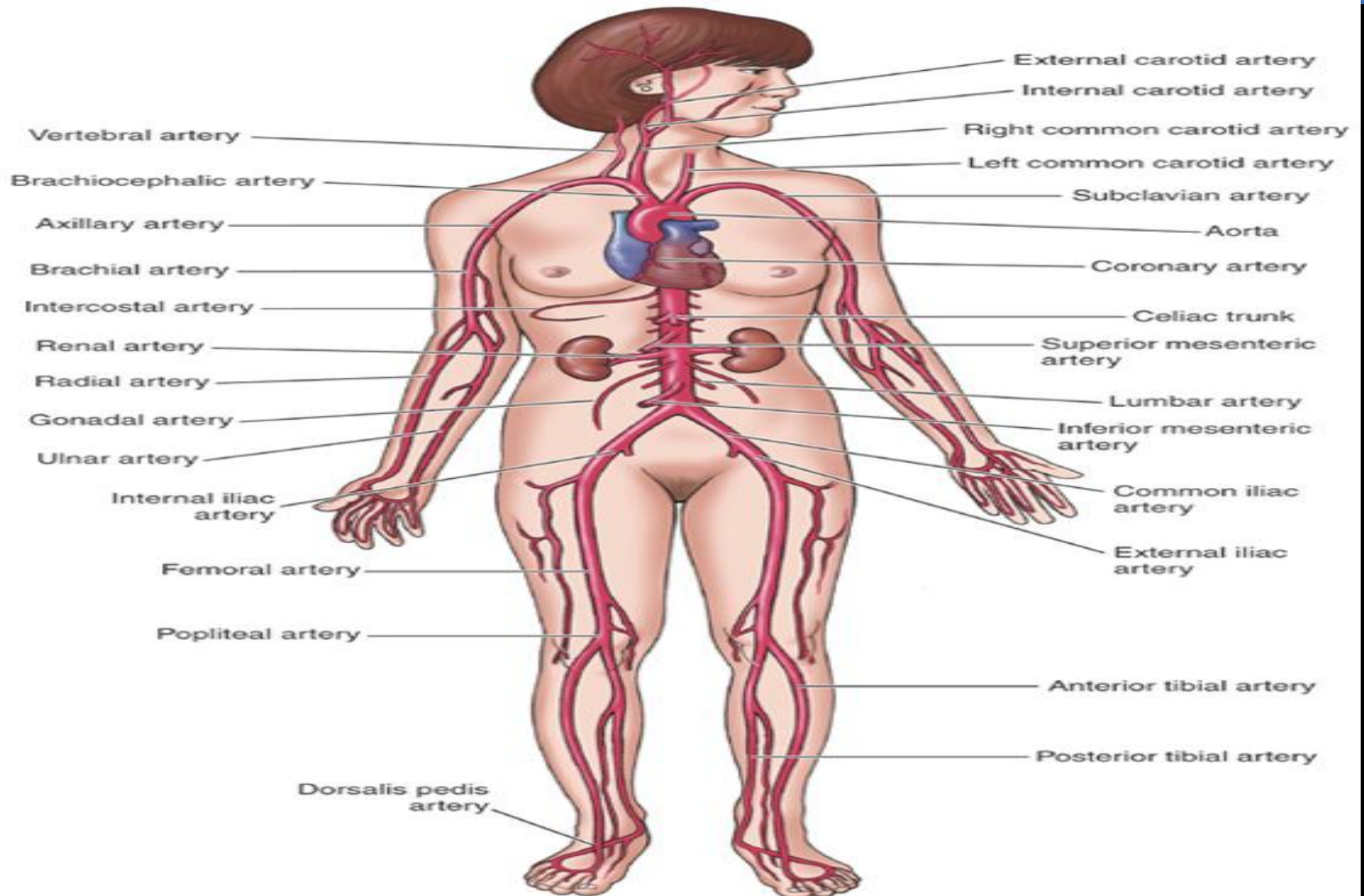
Major Arteries of the Systemic Circulation



Major Arteries of the Systemic Circulation (cont'd.)

- Aorta: the mother of all arteries
 - Location: originates in the left ventricle of the heart, curves and descends through the thorax and abdomen, then splits into two common iliac arteries
 - Branches:
 - Ascending aorta
 - Aortic arch
 - Descending aorta (thoracic aorta)
 - Descending aorta (abdominal aorta)

Major Arteries of the Systemic Circulation (cont'd.)



Major Arteries of the Systemic Circulation (cont'd.)

- Branches of the ascending aorta:
 - Right coronary artery
 - Left coronary artery

Major Arteries of the Systemic Circulation (cont'd.)

- Branches of the aortic arch:
 - Brachiocephalic artery
 - Left common carotid artery
 - Left subclavian artery
 - Right subclavian artery

Major Arteries of the Systemic Circulation (cont'd.)

- Branches of the descending aorta (thoracic aorta):
 - Intercostal arteries
 - Other small arteries supply the organs in the thorax

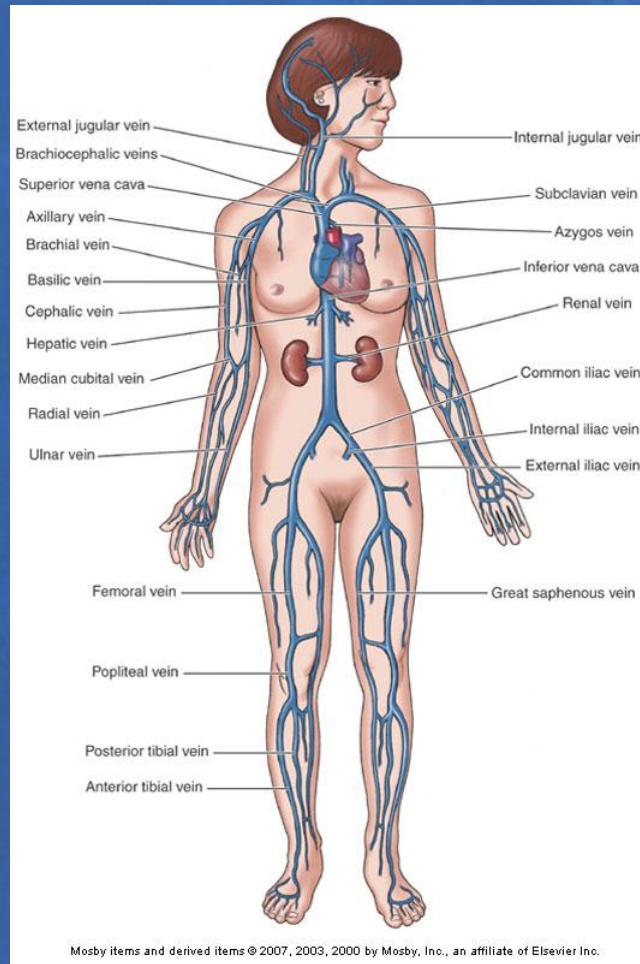
Major Arteries of the Systemic Circulation (cont'd.)

- Branches of the descending aorta (abdominal aorta):
 - Celiac trunk: gastric artery, splenic artery, and hepatic artery
 - Mesenteric arteries: superior mesenteric artery and inferior mesenteric artery
 - Renal arteries, gonadal arteries, and lumbar arteries
 - Right and left common iliac arteries
 - Major arteries of the thigh, leg, and foot

Major Veins of the Systemic Circulation

- Vena cava: the main vein
 - Superior vena cava (SVC)
 - Inferior vena cava (IVC)

Major Veins of the Systemic Circulation (cont'd.)



Major Veins of the Systemic Circulation (cont'd.)

- Superior vena cava: receives blood from the head, shoulder, and upper extremities
- Veins that drain into the SVC:
 - Cephalic vein
 - Basilic vein
 - Medial cubital vein
 - Subclavian veins
 - Jugular veins
 - Brachiocephalic veins
 - Azygos vein

Major Veins of the Systemic Circulation (cont'd.)

- Inferior vena cava: receives blood from all regions of the body below the diaphragm
- Veins that drain into the IVC:
 - Tibial veins
 - Peroneal veins
 - Popliteal veins
 - Femoral veins
 - Iliac veins
 - Great saphenous veins
 - Renal veins
 - Hepatic veins

Special Circulations

- Blood supply to the head and brain
- Blood supply to the liver
- Fetal circulation

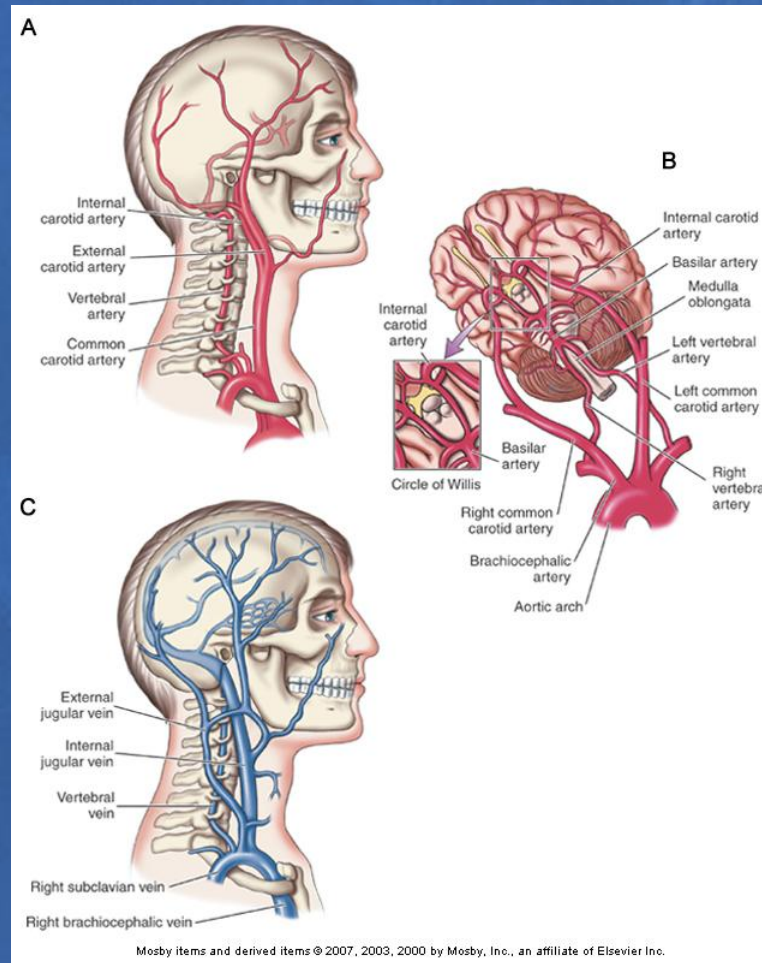
Special Circulations (cont'd.)

- Head and brain blood supply:
 - Carotid arteries:
 - Right and left common carotid arteries
 - External and internal carotid arteries
 - Vertebral arteries:
 - Right and left vertebral arteries
 - Basilar artery
- Circle of Willis: circle of arteries composed of branches from the internal carotid arteries and the basilar artery

Special Circulations (cont'd.)

- Venous drainage of the head and brain:
 - External jugular veins: drain blood from the posterior head and neck region
 - Internal jugular veins: drain blood from the anterior head, face, and neck

Special Circulations (cont'd.)



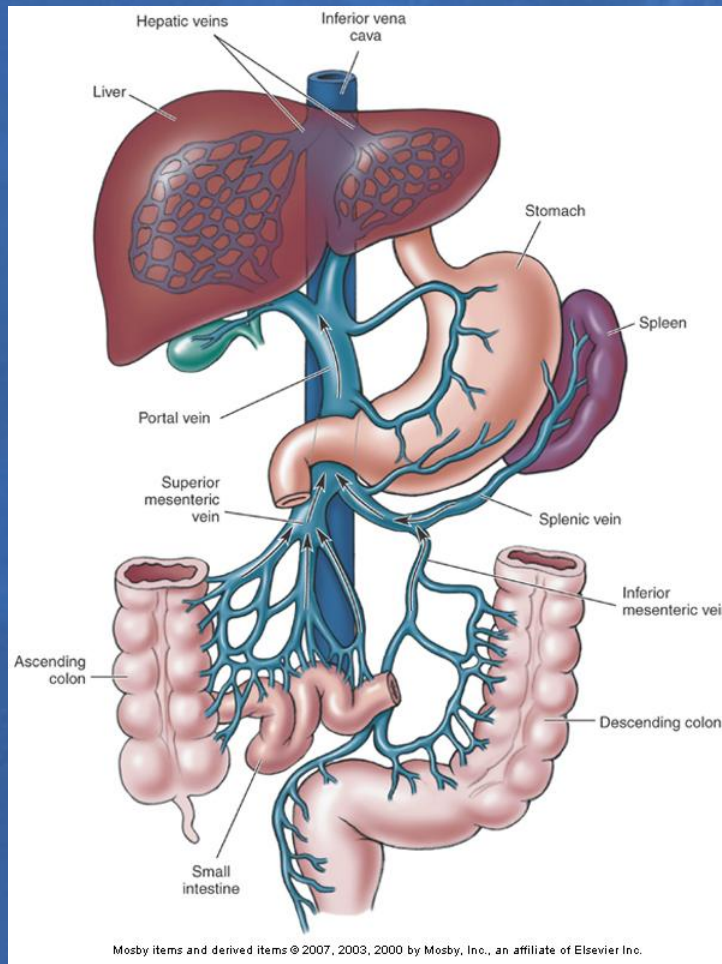
Special Circulations (cont'd.)

- Blood supply to the liver:
 - Portal vein: carries blood rich in digestive end products from the organs of digestion to the liver
 - Hepatic veins: drain blood from the liver and deliver it to the IVC
 - Hepatic artery: carries oxygen-rich blood to the liver

Special Circulations (cont'd.)

- Splanchnic circulation: blood flow to the stomach, spleen, pancreas, intestines, and liver; very adjustable

Special Circulations (cont'd.)



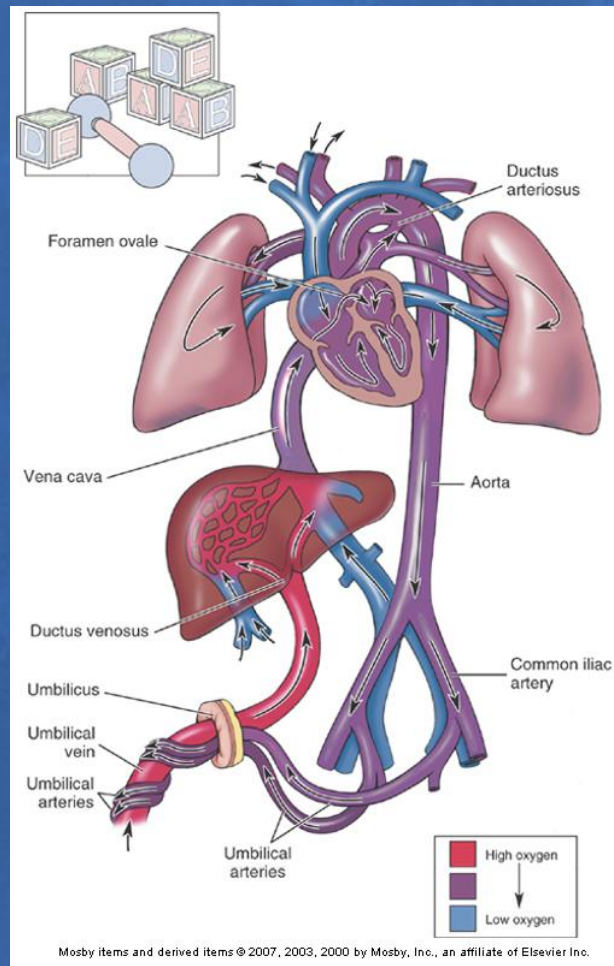
Special Circulations (cont'd.)

- Fetal circulation modifications:
 - Umbilical blood vessels:
 - Umbilical vein: carries blood rich in oxygen and nutrients from the placenta to the fetus
 - Umbilical arteries: carry carbon dioxide and other waste from the fetus to the placenta

Special Circulations (cont'd.)

- Fetal circulation modifications (cont'd.):
 - Ductus venosus: vessel that connects the umbilical vein with the IVC in the fetus
 - Foramen ovale: opening in the interatrial septum of the heart
 - Ductus arteriosus: short tube that connects the pulmonary artery with the aorta

Special Circulations (cont'd.)



Pulse

- Pulse: pressure wave caused by the alternating expansion and recoil of the arteries with each beat of the heart
- Helps determine:
 - Heart rate
 - Rhythm
 - Strength
 - Arterial circulatory health

Pulse (cont'd.)

