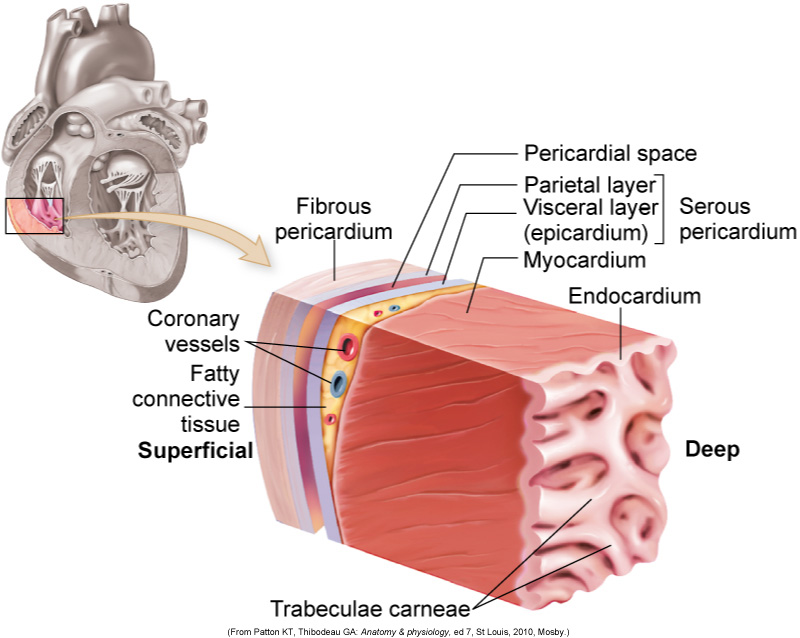
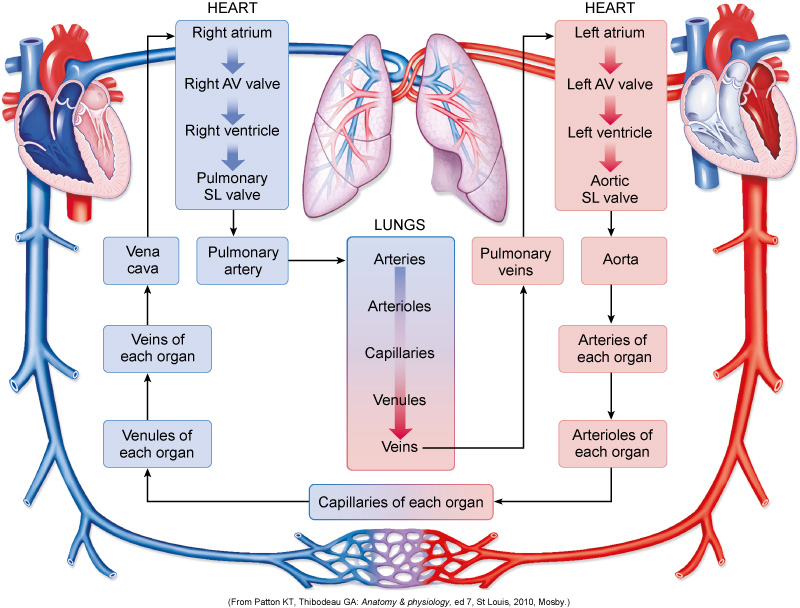
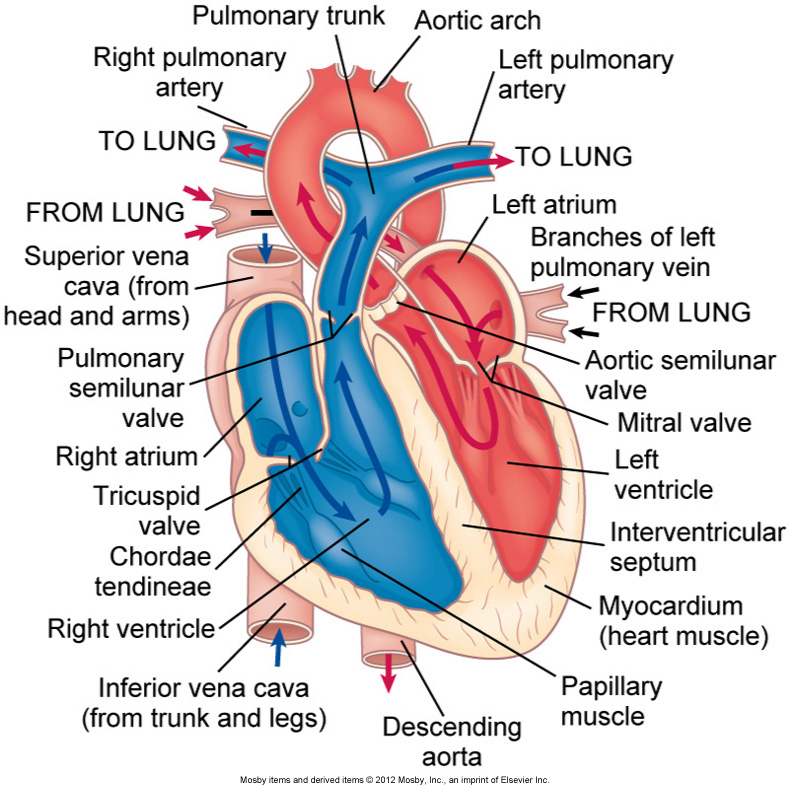
**Cardiovascular Structure and Function**

**Pathology 2 - Dr. Gary Mumaugh**

**Circulatory System - Heart**

* Right heart
  + Pulmonary circulation - Pumps blood through the lungs
* Left heart
  + Systemic circulation - Pumps blood through the body
* Mediastinum
* Heart wall
  + Pericardium
    - Parietal and visceral
    - Pericardial cavity and fluid
  + Myocardium
  + Endocardium

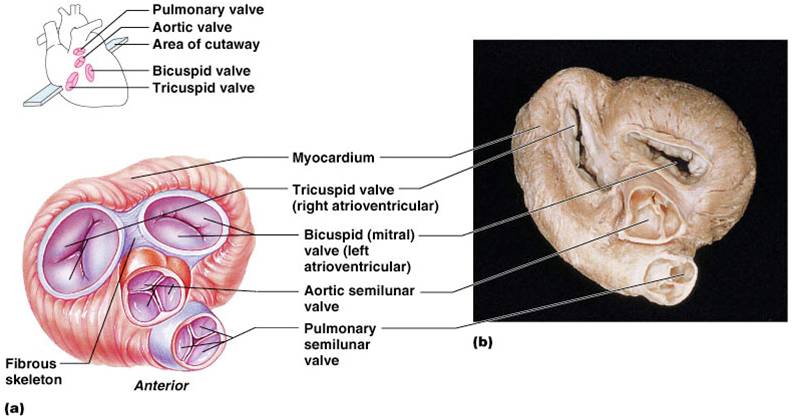


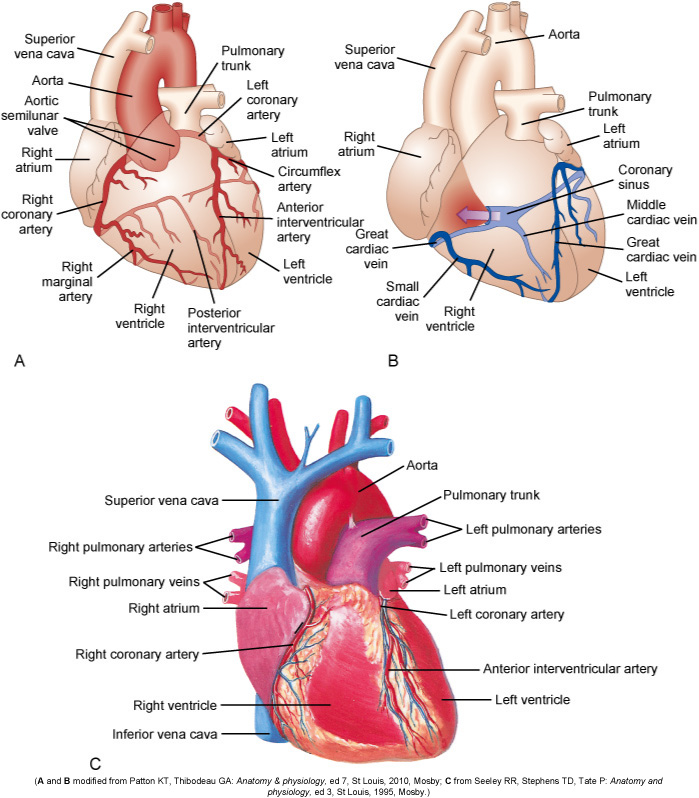


**The Valves of the Heart**

* Atrioventricular valves:
  + Tricuspid valve
  + Mitral valve
* Semilunar valves:
  + Pulmonic semilunar valve
  + Aortic semilunar valve

**The Great Vessels**

* Superior and inferior venae cavae
* Pulmonary artery (trunk)
  + Right and left pulmonary arteries
* Pulmonary veins
* Aorta

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**The Coronary Vessels**

* Right coronary artery
  + Right marginal branch
  + Posterior descending branch
* Left coronary artery
  + Left anterior descending artery
  + Circumflex artery
* The Coronary Vessels
* Coronary capillaries
* Coronary veins:
  + Coronary sinus
  + Great cardiac vein
  + Posterior vein of the left ventricle
* Coronary lymphatic vessels

**Structures That Control Heart Action**

* Cardiac action potentials
* Conduction system
  + Sinoatrial node (SA)
  + Atrioventricular node (AV)
  + Bundle of His (AV bundle)
  + Right and left bundle branches
  + Purkinje fibers

**Structures That Control Heart Action**

* Propagation of cardiac action potentials
  + Resting membrane potential
  + Depolarization
  + Repolarization
  + Hyperpolarization
  + Refractory period
* Electrocardiogram
* Automaticity
* Rhythmicity

**Structures That Control Heart Action**

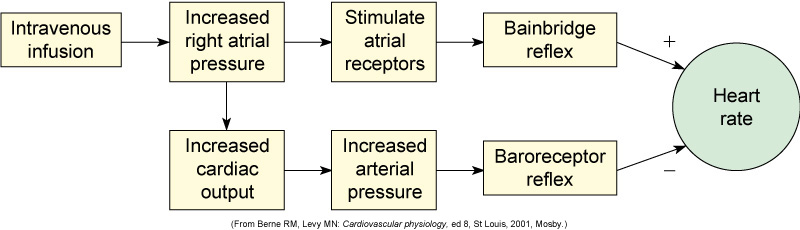
* Cardiac innervation
  + Sympathetic nerves
  + Parasympathetic nerves
* Adrenergic receptor function
  + Beta-adrenergic receptors
  + Norepinephrine or epinephrine

**Cardiac Performance**

* Cardiac output
  + Preload
    - Left ventricular end-diastolic volume
    - Laplace law
    - Frank-Starling law of the heart
  + Afterload
    - Load muscle must move after it starts to contract
    - Determined by system vascular resistance in aorta, arteries, and arterioles

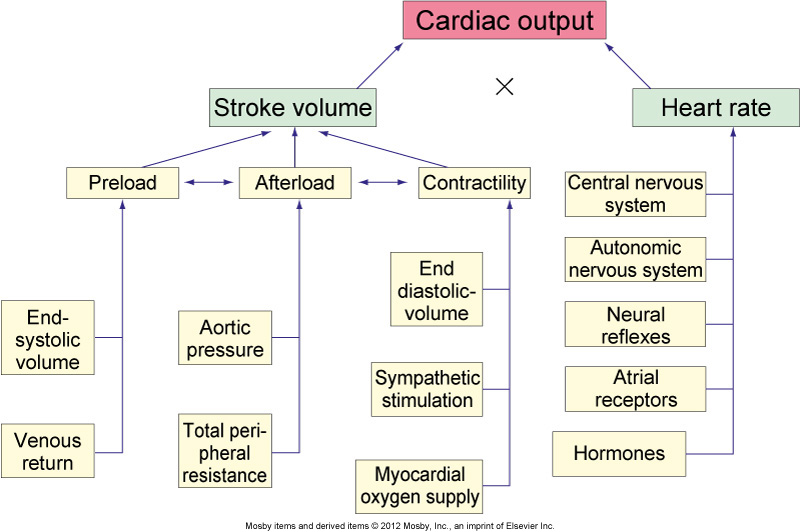
**Heart rate**

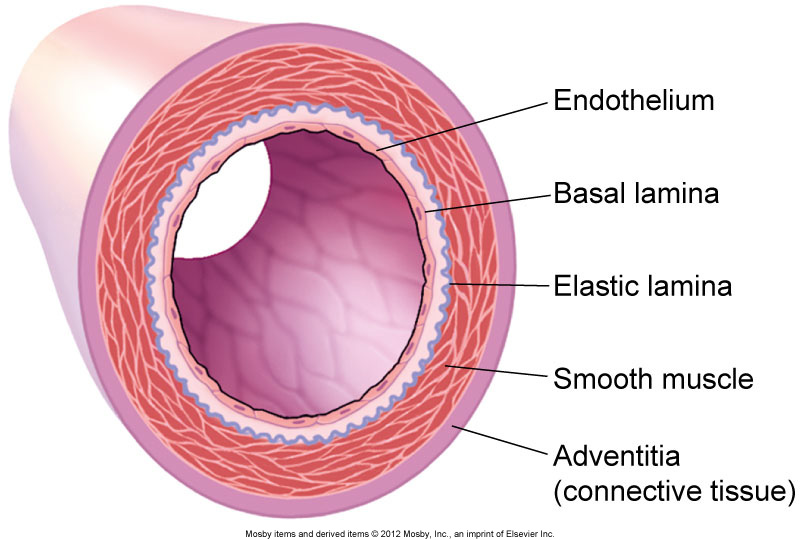
* Cardiovascular control center
  + Cardioexcitatory and cardioinhibitory centers
* Neural reflexes
  + Bainbridge and baroreceptor reflexes
* Atrial receptors
* Hormones and biochemicals



**Cardiac Performance**

* Myocardial contractility
  + Stroke volume
  + Inotropic agents
  + Oxygen and carbon dioxide levels
* Cardiac output
  + Volume of blood flowing through either the systemic or pulmonary circuit in liters per minute
* Ejection fraction





**Systemic Circulation**

* Arteries
* Arterioles
* Capillaries
* Venules
* Veins

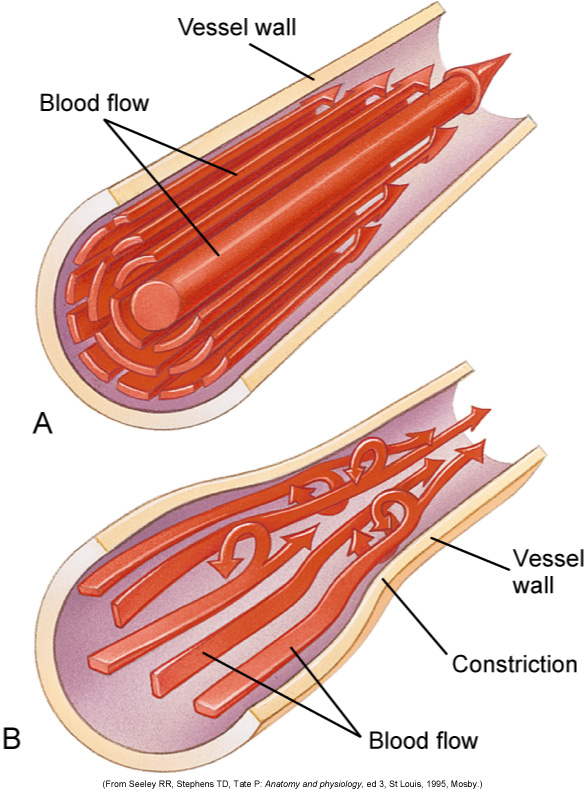
**Structure of Blood Vessels**

* Lumen
* Tunica intima
* Tunica media
* Tunica externa (adventitia)

**Factors Affecting Blood Flow**

* Pressure
  + Force exerted on a liquid per unit area
* Resistance
  + Opposition to force
  + Diameter and length of the blood vessels contribute to resistance
* Poiseuille law
* Factors Affecting Blood Flow
* Neural control of total peripheral resistance
  + Change in diameter of the vessels
  + Baroreceptors
  + Arterial chemoreceptors
* Velocity
* Laminar vs. turbulent flow
* Vascular compliance

**Laminar vs. Turbulent Flow**



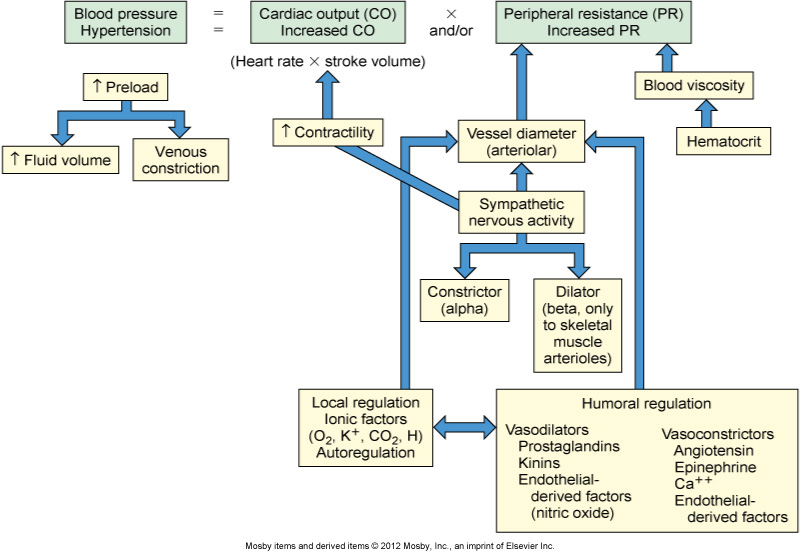
**Regulation of Blood Pressure**

* Arterial pressure
  + Mean arterial pressure (MAP)
  + Effects of cardiac output
  + Effects of total peripheral resistance
  + Effect of hyperemia
  + Effects of hormones
    - Epinephrine and norepinephrine
    - Antidiuretic hormone, renin-angiotensin system, and natriuretic peptides

**Regulation of Blood Pressure**

* Adrenomedullin
* Insulin
* Venous pressure

**Regulation of Coronary Circulation**

* Coronary perfusion pressure
* Autoregulation
* Autonomic regulation

**Lymphatic System**

* Special vascular system that picks up excess fluid and returns it to the bloodstream
* Lymphatic fluid
* Lymphatic veins and venules
* Right lymphatic duct
* Thoracic duct
* Afferent and efferent lymphatic vessels

