
















10.1 The Pulmonary-Circulatory System

LESSON Vocabulary

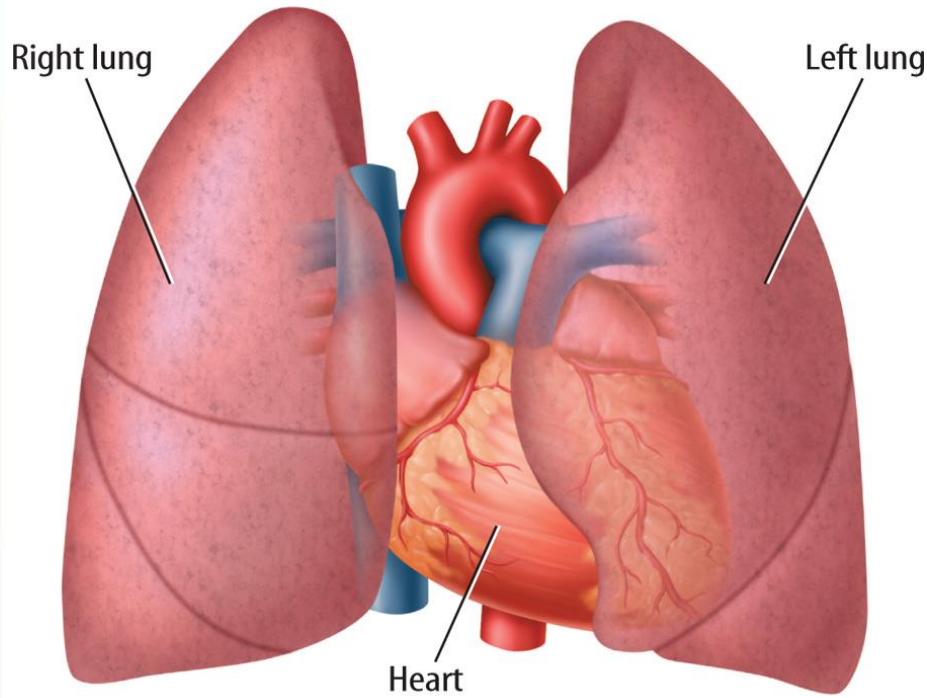
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|--|---|
|  pulmonary system |  ventricle |
|  breathing |  artery |
|  lungs |  capillary |
|  pneumonia |  vein |
|  suffocation |  heart attack |
|  asthma |  stroke |
|  circulatory system |  heart |
|  atrium | |



The Pulmonary System



- Our **pulmonary system** contains tissues and organs specialized for:

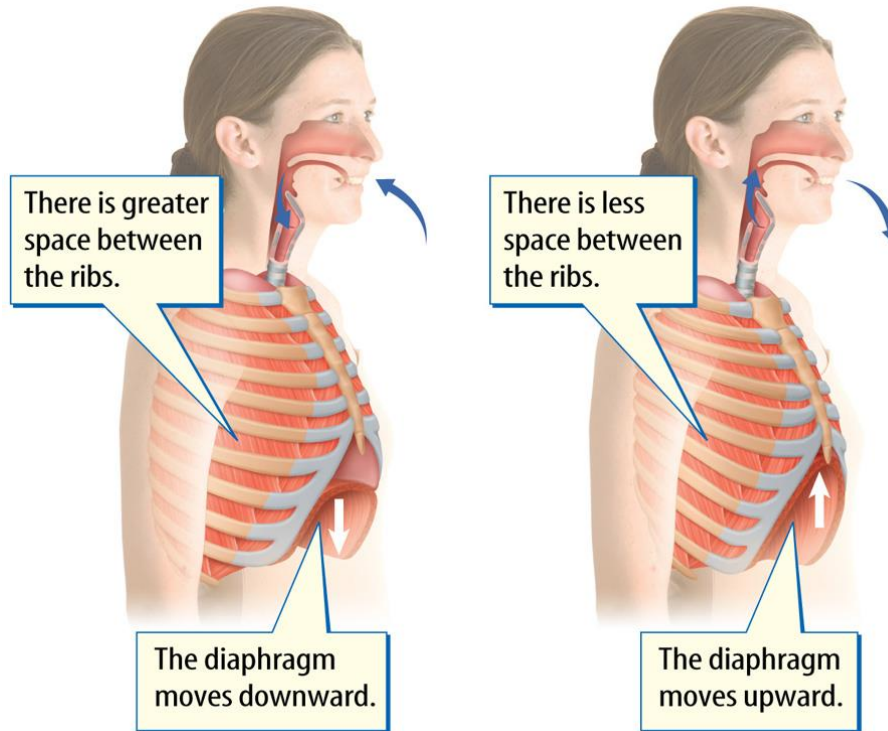


- Taking in oxygen and removing carbon dioxide from our bodies
- Exchanging oxygen and carbon dioxide



Breathing

- **Breathing** is the process of air entering and exiting our lungs.



Breathing (cont.)

- The trachea forks into two branches called bronchi.



- The bronchi are connected to the **lungs**—the organs of the pulmonary system.



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Breathing (cont.)

- The bronchi divide into bronchioles, which are further divided many times into alveoli.
- Oxygen and carbon dioxide are exchanged in the alveoli.
- The air that now is high in carbon dioxide is exhaled and flows out in the reverse path.



Problems in the Pulmonary System

- We cannot live without air.
- Cells combine food and oxygen to produce energy.
- Problems in the pulmonary system prevent oxygen from reaching the lungs.



Pneumonia

- Caused by contact with mucus from an infected person or the introduction of bacteria or viruses from the mouth and throat into the lungs
- One of the leading causes of death in the U.S.



Suffocation

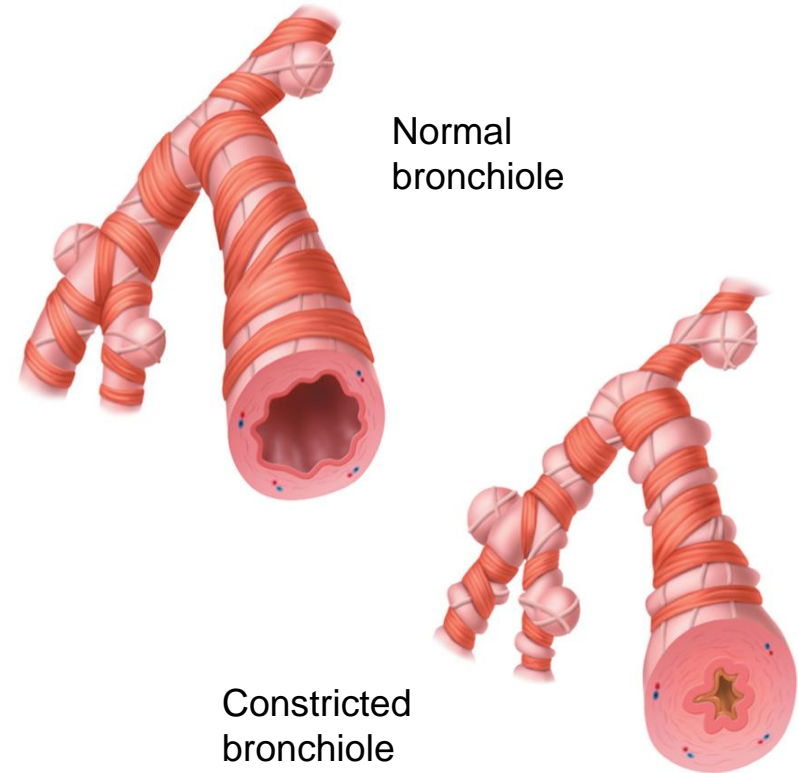


- **Suffocation** occurs when the lungs and body do not receive enough oxygen.
- Causes of:
 - Choking
 - Children with blankets or plastic bags covering their faces
 - Gases such as carbon monoxide



Asthma

- A disease of the airways to the lungs
- Most common long-term disease in children
- Triggers include air pollution, smog, and ozone



The Circulatory System

- Oxygen, food, other nutrients, and waste products are transported to and from cells by blood.



- The **circulatory system** contains the heart and blood vessels, and transports blood throughout the body.

Brain
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[Circulatory
System](#)

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Blood

- Blood is a tissue that contains many different substances, including cells.
- Blood is 55% plasma.
 - Plasma is 90% water.
 - The remaining 10% is ions, proteins, and other substances.

Interactive
Table

[Components in Whole Blood](#)



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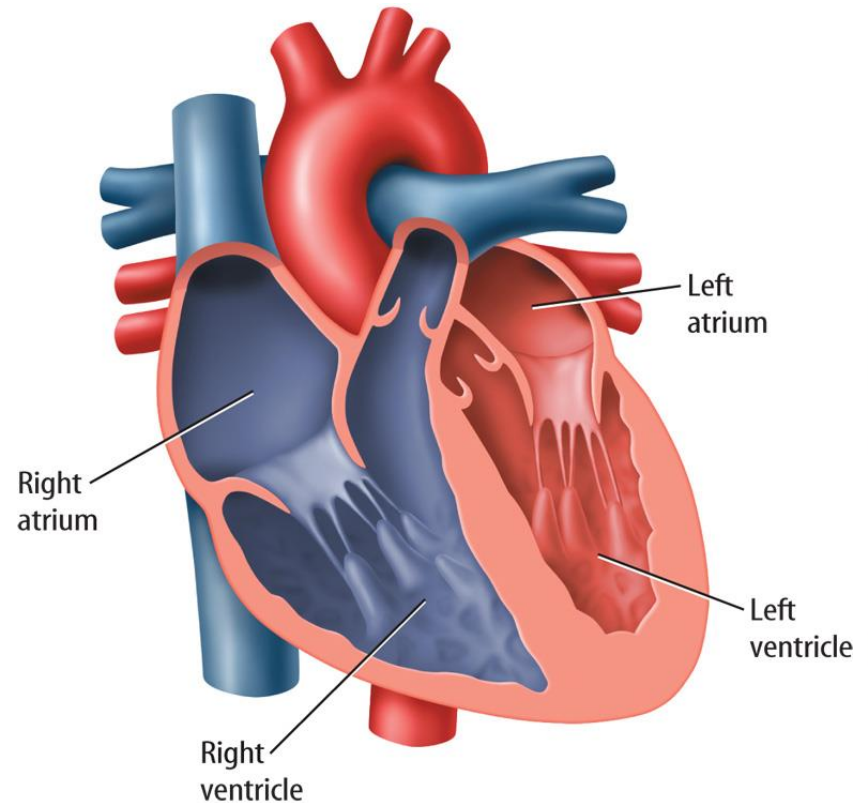
Heart

- The **heart** is the organ of the circulatory system that pumps blood.
- The atria (singular, **atrium**) are the two upper chambers of the heart that receive blood.
- The **ventricles** are the two lower chambers that pump blood out of the heart.



Heart (cont.)

- Deoxygenated blood travels from the right atrium to the right ventricle, the lungs, the left atrium, the left ventricle, and to the body.



Blood Vessels

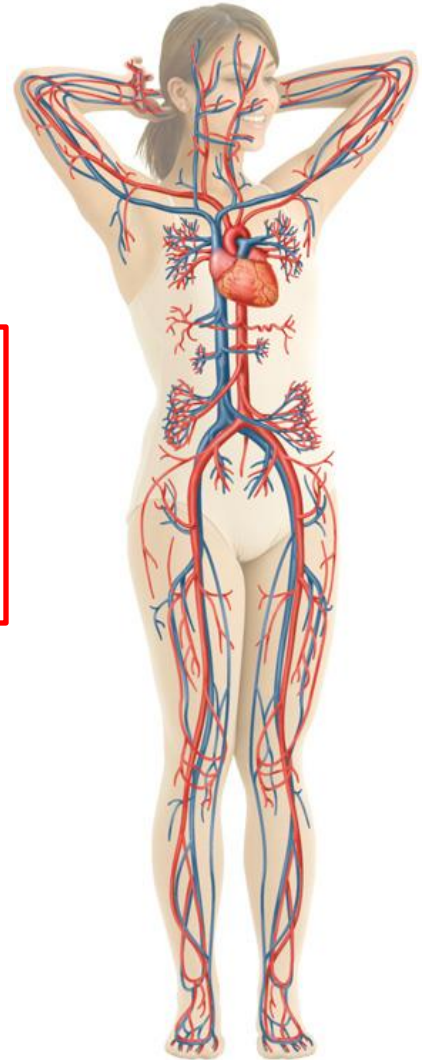
- Blood travels to and from the heart in vessels.



- **Arteries** are vessels that carry blood away from the heart to organs of the body.



- Arteries branch into smaller vessels called **capillaries**, which deliver oxygen and nutrients to the organs.

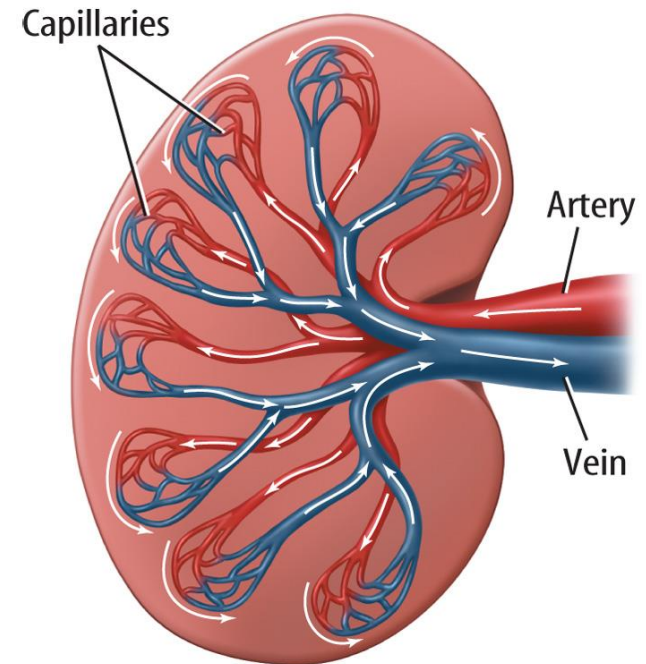


Blood Vessels (cont.)

- The capillaries transport carbon dioxide and wastes, then join with larger vessels that carry the blood on its return path.



- These vessels connect to larger vessels called **veins** that carry blood to the heart.



Blood Vessels (cont.)

- All blood vessels have the same structure.
 - Inner lining: thin, flat layer of cells where the blood and the vessel wall meet
 - Next layer: connective tissue followed by a layer of smooth muscle
 - Final layer: connective tissue that contains nerves and supplies the larger vessels with nutrients



Problems in Circulatory System

- Circulatory system problems prevent oxygen from reaching cells and can lead to health problems and death.
- Cardiovascular disease are the diseases of the heart and blood vessels.
- Cardiovascular disease causes more than half the deaths in the U.S.



Problems in Circulatory System (cont.)

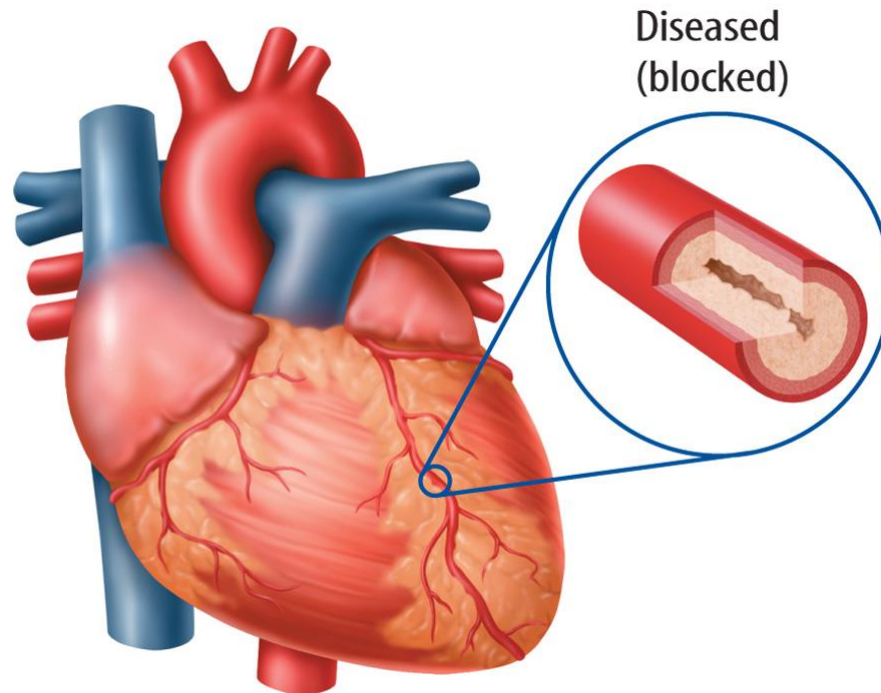
- Risk factors include:
 - being overweight
 - a diet high in saturated fat and cholesterol
 - smoking
 - high blood sugar
 - physical inactivity
 - consuming too much alcohol



Heart Attack



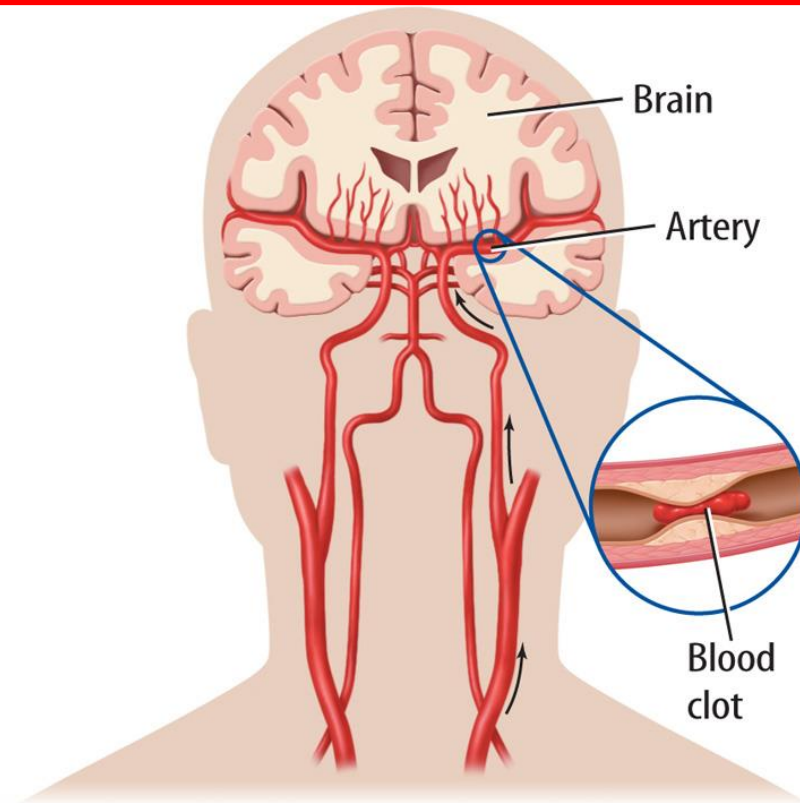
- A **heart attack** occurs if the coronary arteries cannot supply enough blood to the heart.



Stroke

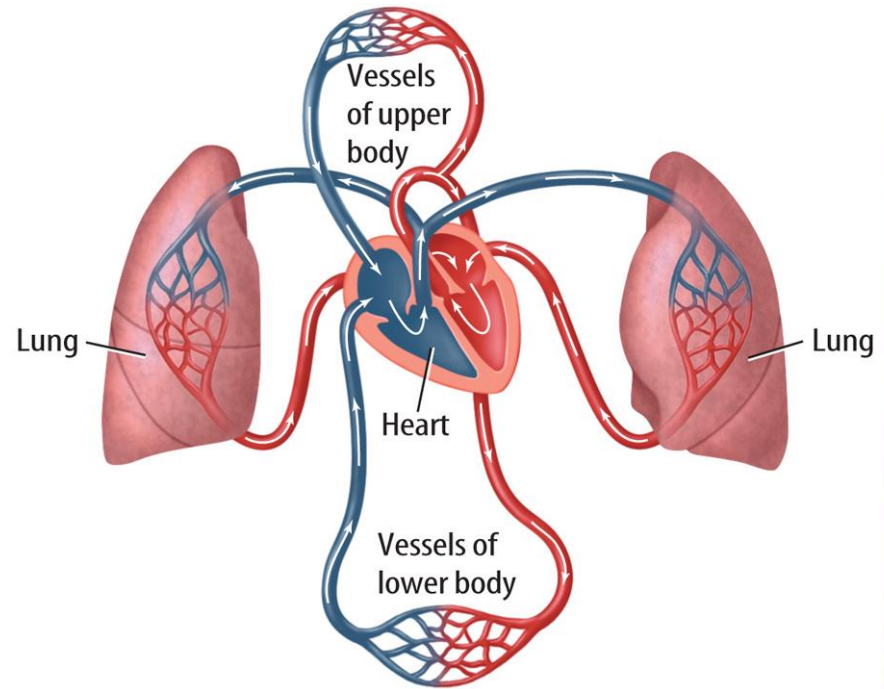


- A **stroke** is the death of brain tissue.



Exchanges Between the Pulmonary and Circulatory Systems

- The air in the alveoli and blood in the capillaries must be able to exchange oxygen and carbon dioxide freely.



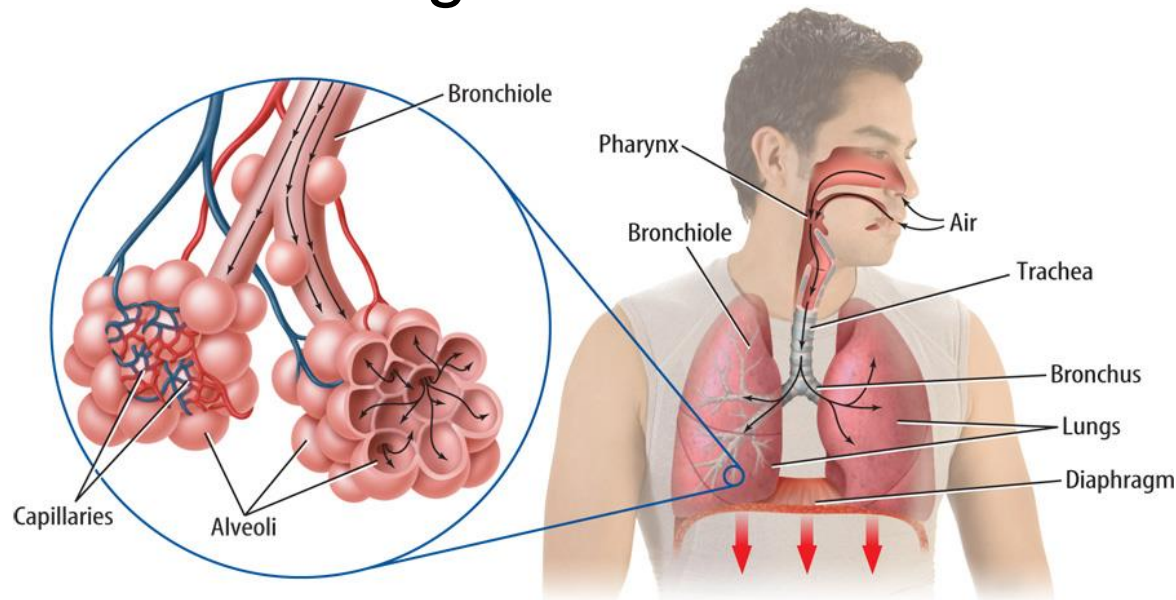
Gas Exchange

- Perhaps the most important exchange between the pulmonary and circulatory systems is gas exchange in the lungs.
- No energy is required—the gases move from regions of higher concentration to regions of lower concentration.



Exchange in the Lungs

- Alveoli are surrounded by capillaries.
- When the level of carbon dioxide in your lungs becomes great enough, you exhale without thinking.



Exchange in the Lungs (cont.)

- Respiration and breathing are not the same.
- Respiration uses oxygen and food to produce energy.
- Breathing is the physical process of inhalation and exhalation.



Preventing Problems in the Pulmonary and Circulatory Systems

- Family history, or genetics, partially determines your risk.
- However, a healthy lifestyle is the best way to prevent cardiopulmonary problems.

