



CHAPTER RESOURCES



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## Functions of the Respiratory System

- Earth is surrounded by a layer of gases called the atmosphere (AT muh sführ).
- You breathe atmospheric gases that are closest to Earth.
- For thousands of years people have known that air, food, and water are needed for life.
- However, the gas in the air that is necessary for life was not identified as oxygen until the late 1700s.



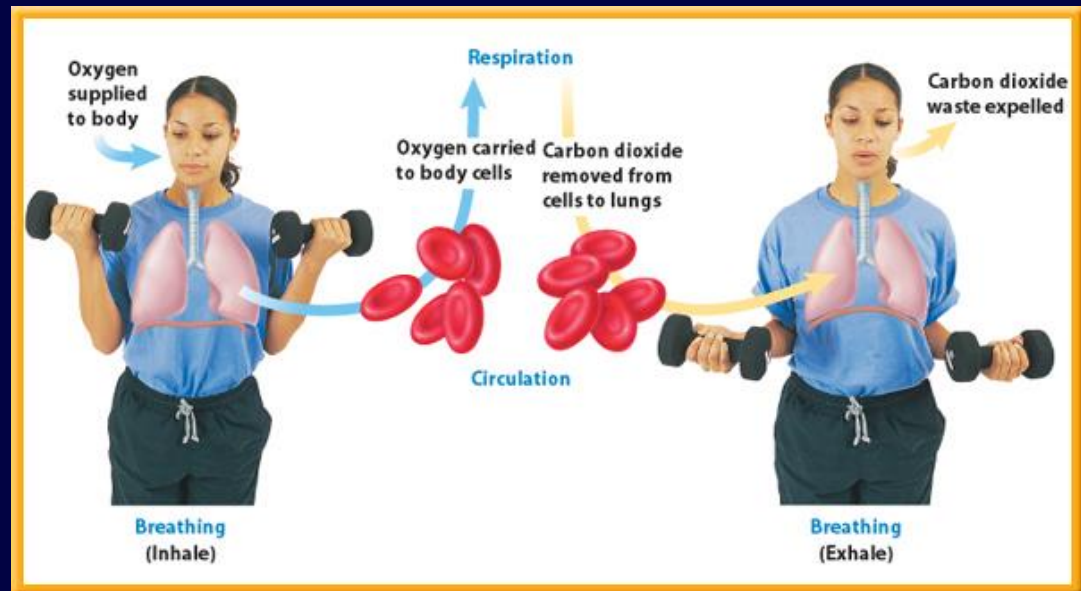
## Breathing and Respiration

- Breathing is the movement of the chest that brings air into the lungs and removes waste gases.
- Air passes from the lungs into the circulatory system because there is less oxygen in the blood than in cells of the lungs.
- Blood carries oxygen to individual cells.



## Breathing and Respiration

- The **oxygen** delivered to the cells **is used to release energy from glucose.**
- This chemical reaction is **called cellular respiration.**



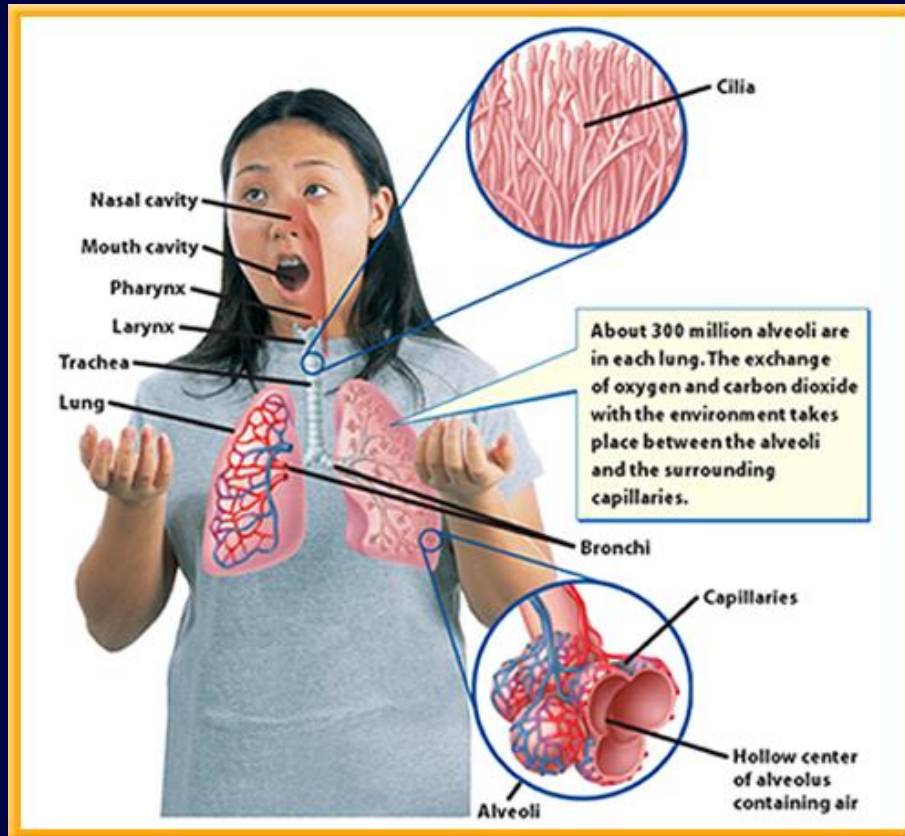
## Breathing and Respiration

- Carbon dioxide and water molecules are waste products of cellular respiration.
- They are carried back to the lungs in the blood.
- Exhaling, or breathing out, eliminates waste carbon dioxide and some water molecules.





## Organs of the Respiratory System

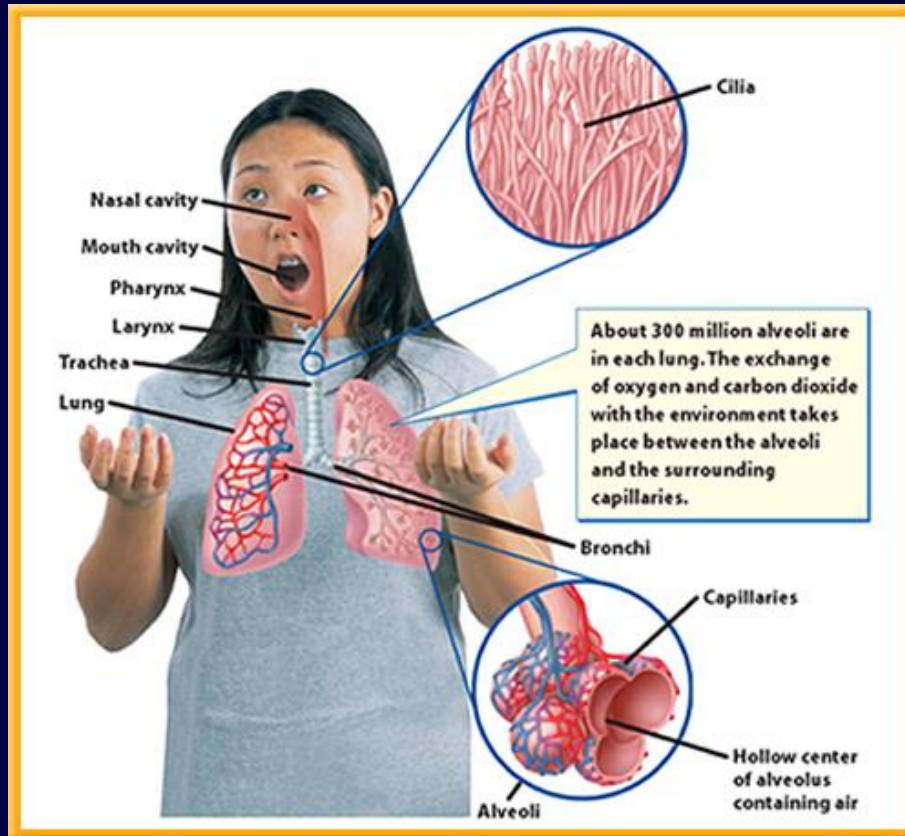


- The respiratory system is made up of structures and organs that help move oxygen into the body and waste gases out of the body.

# The Respiratory System

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## Organs of the Respiratory System



- Air enters your body through two openings in your nose called **nostrils** or through the **mouth**.



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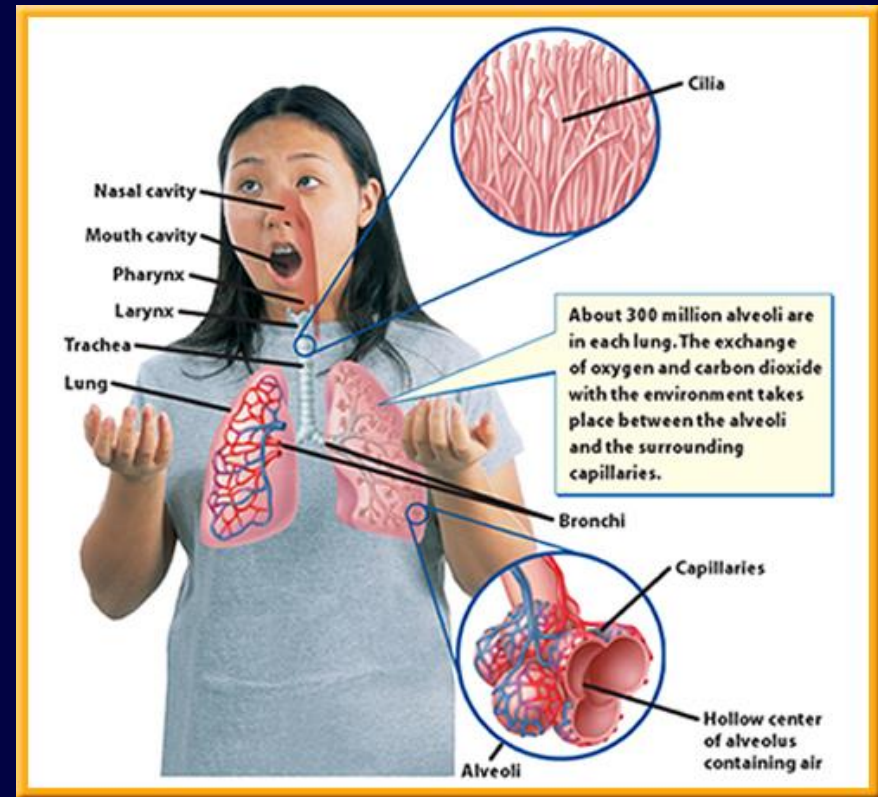
## Organs of the Respiratory System

- Air then passes through the nasal cavity, where it gets moistened and warmed by the body's heat.
- Mucus traps dust, pollen, and other materials that were not trapped by nasal hairs.
- Tiny, hairlike structures, called cilia (SIH lee uh), sweep mucus and trapped material to the back of the throat where it can be swallowed.



## Pharynx

- Warmed, moist air then enters a tubelike passageway used for food, liquid, and air called the **pharynx** (FER ingks). 



- At the lower end of the pharynx is a flap of tissue called the epiglottis (eh puh GLAH tus).


## Pharynx

- When you swallow, your epiglottis folds down to prevent food or liquid from entering your airway.
- The food enters your esophagus instead.
- If you began to choke, what do you think has happened?

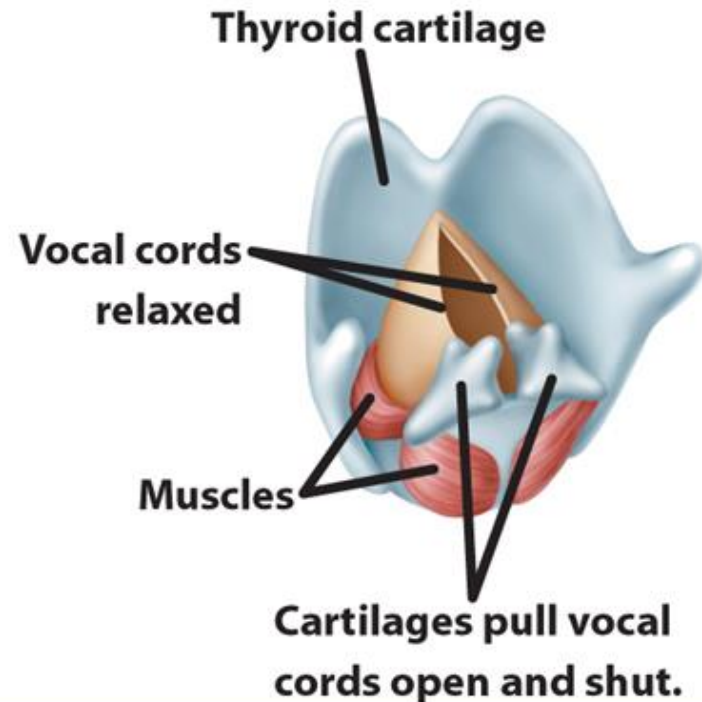


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## Larynx and Trachea

- The **larynx** is the airway to which two pairs of horizontal folds of tissue, called **vocal cords**, are attached. 
- Forcing air between the cords causes them to **vibrate and produce sounds**.

### Making a low-pitched sound



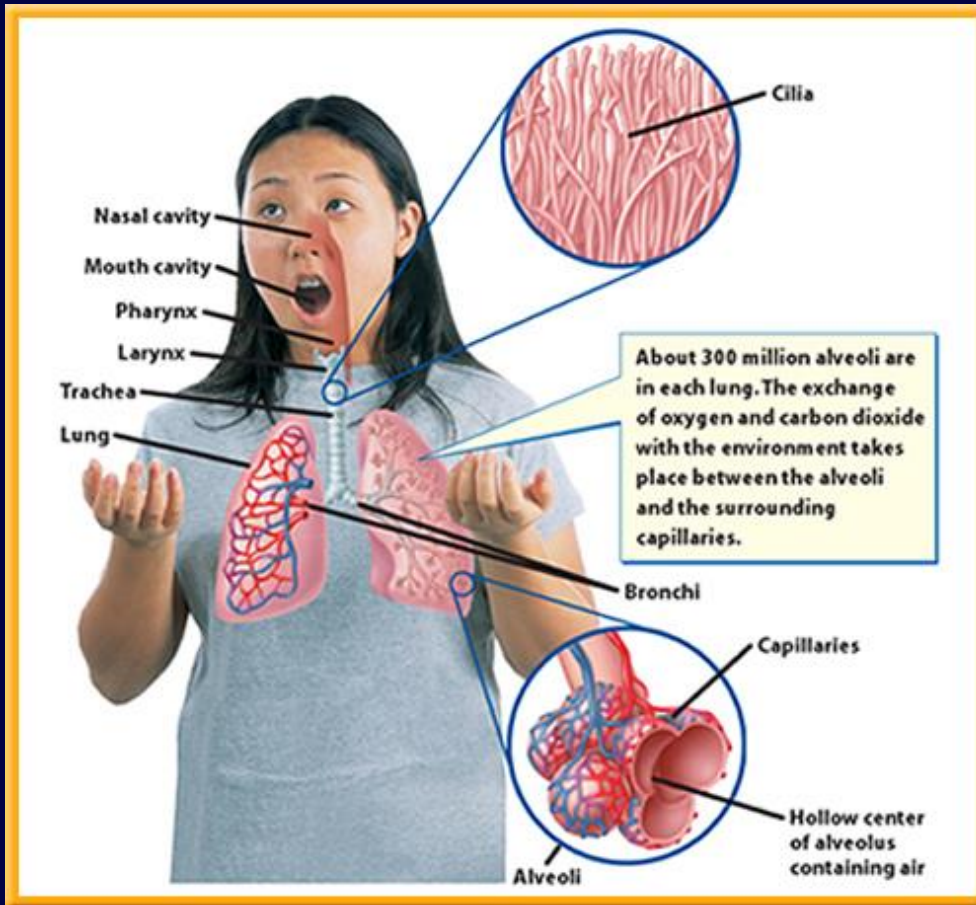
## Larynx and Trachea


- From the larynx air moves into the **trachea** (TRAY kee uh), which is a tube about 12 cm in length. 
- Strong, C-shaped rings of cartilage prevent the trachea from collapsing.
- The **trachea is lined with mucous membranes and cilia that traps dust, bacteria, and pollen.**






## Bronchi and the Lungs



- Air is carried into your lungs by two short tubes called **bronchi** (BRAHN ki) at the lower end of the trachea. 

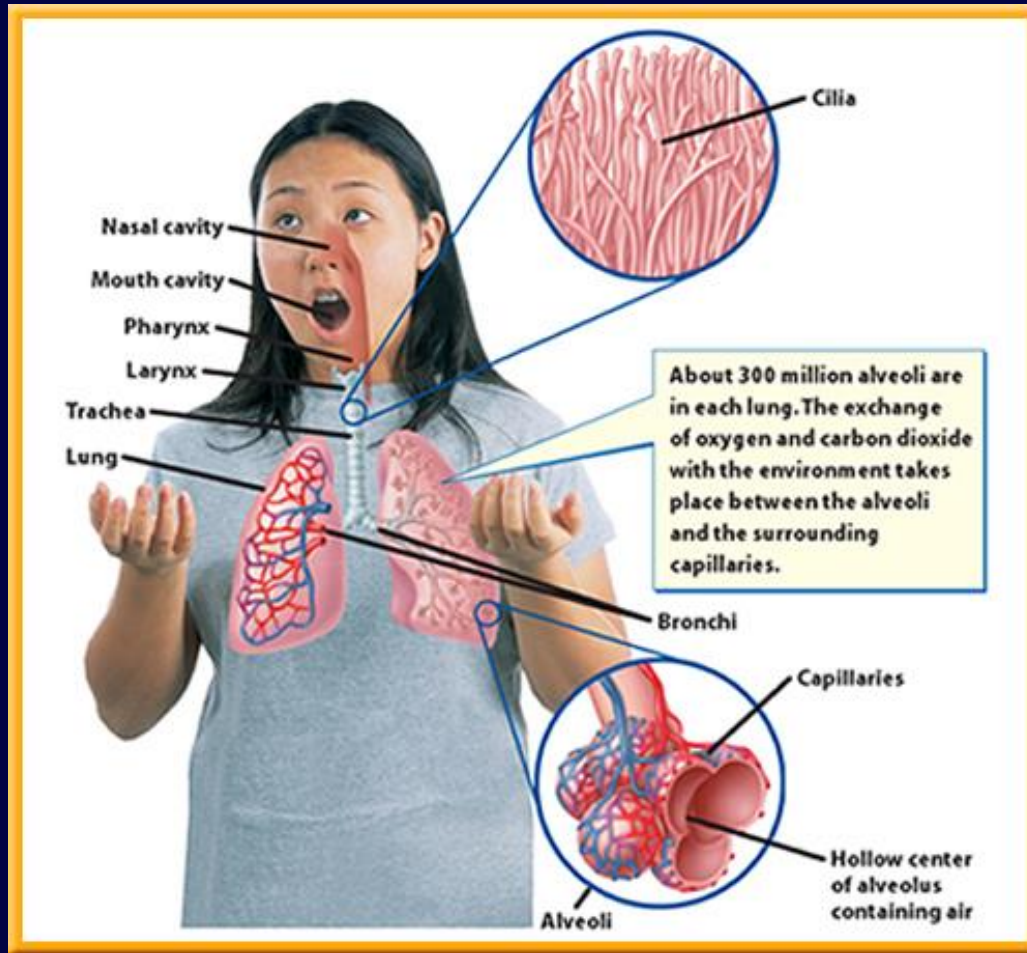


## Bronchi and the Lungs

- Within the lungs, the **bronchi** branch into smaller and smaller tubes. The smallest tubes are called bronchioles (BRAHN kee ohlz).
- At the end of each bronchiole are clusters of tiny, thin-walled sacs called **alveoli** (al VEE uh li). 



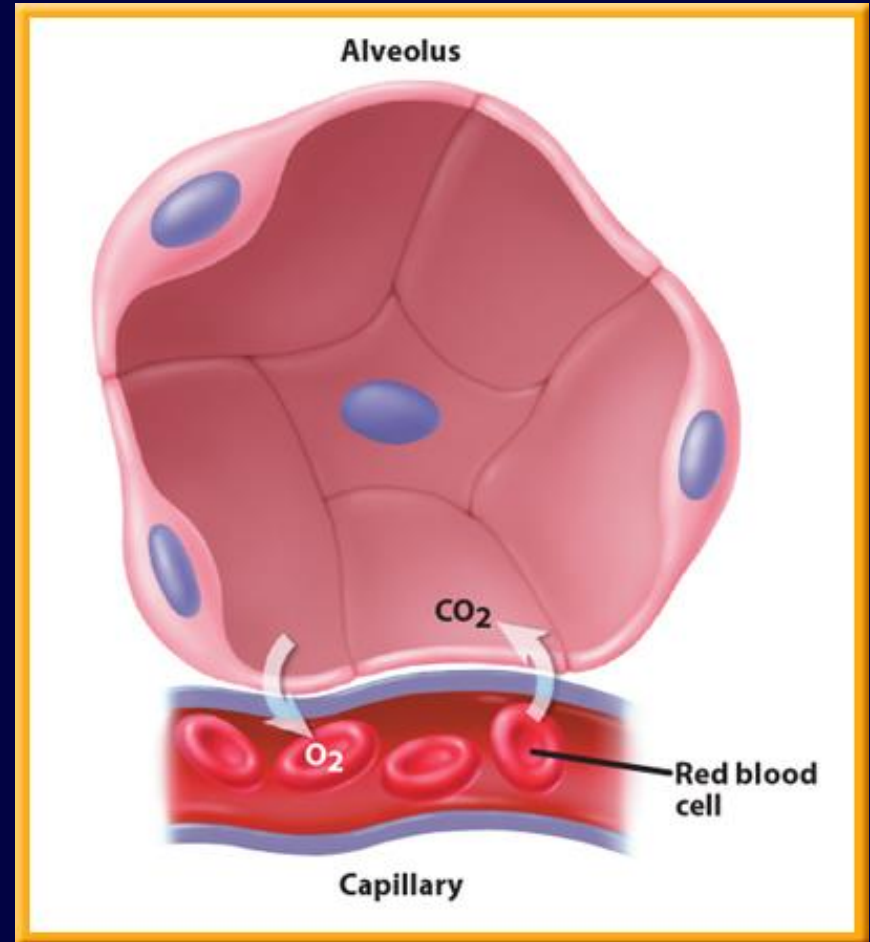
## Bronchi and the Lungs



- Lungs are masses of alveoli arranged in grapelike clusters.

## Bronchi and the Lungs

- The exchange of oxygen and carbon dioxide takes place between the alveoli and capillaries.



## Bronchi and the Lungs

- Oxygen moves through the cell membranes of the alveoli and then through the cell membranes of the capillaries into the blood.
- There the oxygen is picked up by hemoglobin (HEE muh gloh bun), a molecule in red blood cells, and carried to all body cells.
- At the same time, carbon dioxide and other cellular wastes leave the body cells.






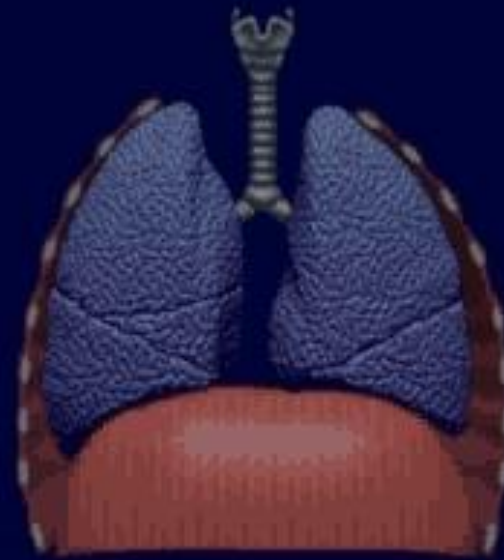
## Why do you breathe?

- You don't have to think about breathing to breathe.
- Your brain can change your breathing rate depending on the amount of carbon dioxide present in your blood.
- As carbon dioxide increases, your breathing rate increases.



## Inhaling and Exhaling

- Your **diaphragm** (DI uh fram) is a muscle beneath your lungs that contracts and relaxes to help move gases into and out of your lungs. 



Click image to view movie.



## Diseases and Disorders of the Respiratory System

- Many serious diseases are related to smoking.

Smokers' Risk of Death from Disease	
Disease	Smokers' Risk Compared to Nonsmokers' Risk
Lung cancer	23 times higher for males; 11 times higher for females
Chronic bronchitis and emphysema	5 times higher
Heart disease	2 times higher

- The chemical substances in tobacco—nicotine and tars—are poisons and can destroy cells.



## Diseases and Disorders of the Respiratory System

- Even if you are a nonsmoker, inhaling smoke from tobacco products—called secondhand smoke—is unhealthy and has the potential to harm your respiratory system.



## Respiratory Infections

- Bacteria, viruses, and other microorganisms can cause infections that affect any of the organs of the respiratory system.
- The common cold usually affects the upper part of the respiratory system—from the nose to the pharynx.





## Respiratory Infections

- The cold virus also can cause irritation and swelling in the larynx, trachea, and bronchi.
- A virus that causes influenza, or flu, can affect many of the body's systems.



## Respiratory Infections

- The virus multiplies in the cells lining the alveoli and damages them.



## Chronic Bronchitis

- When bronchial tubes are irritated and swell, and too much mucus is produced, a disease called bronchitis develops.
- Many cases of bronchitis clear up within a few weeks, but the disease sometimes lasts for a long time.
- When this happens, it is called chronic (KRAH nihk) bronchitis.




## Chronic Bronchitis

- The more a person coughs, the more the cilia and bronchial tubes can be harmed.
- When cilia are damaged, they cannot move mucus, bacteria, and dirt particles out of the lungs effectively.



## Emphysema

- A disease in which the alveoli in the lungs enlarge is called **emphysema** (em fuh SEE muh). 
- Alveoli can't push air out of the lungs, so less oxygen moves into the bloodstream from the alveoli.
- When blood becomes low in oxygen and high in carbon dioxide, shortness of breath occurs.






## Lung Cancer

- Inhaling the tar in cigarette smoke is the greatest contributing factor to lung cancer.
- Tar and other ingredients found in smoke act as carcinogens (kar SIH nuh junz) in the body.
- Carcinogens are substances that can cause an uncontrolled growth of cells. In the lungs, this is called lung cancer.



## Asthma

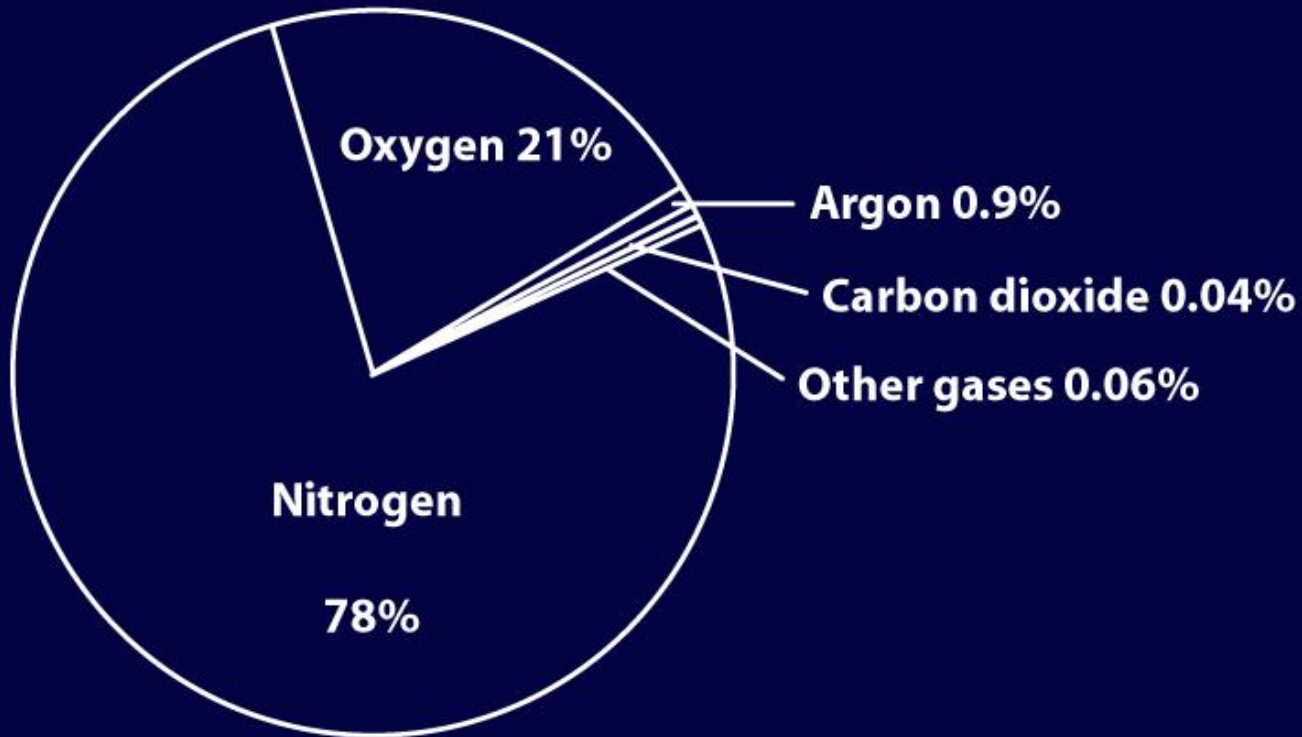
- Shortness of breath, wheezing, or coughing can occur in a lung disorder called **asthma**. 
- When a person has an asthma attack, the bronchial tubes contract quickly.
- An asthma attack can result from breathing certain substances such as cigarette smoke or certain plant pollen, eating certain foods, or stress in a person's life.



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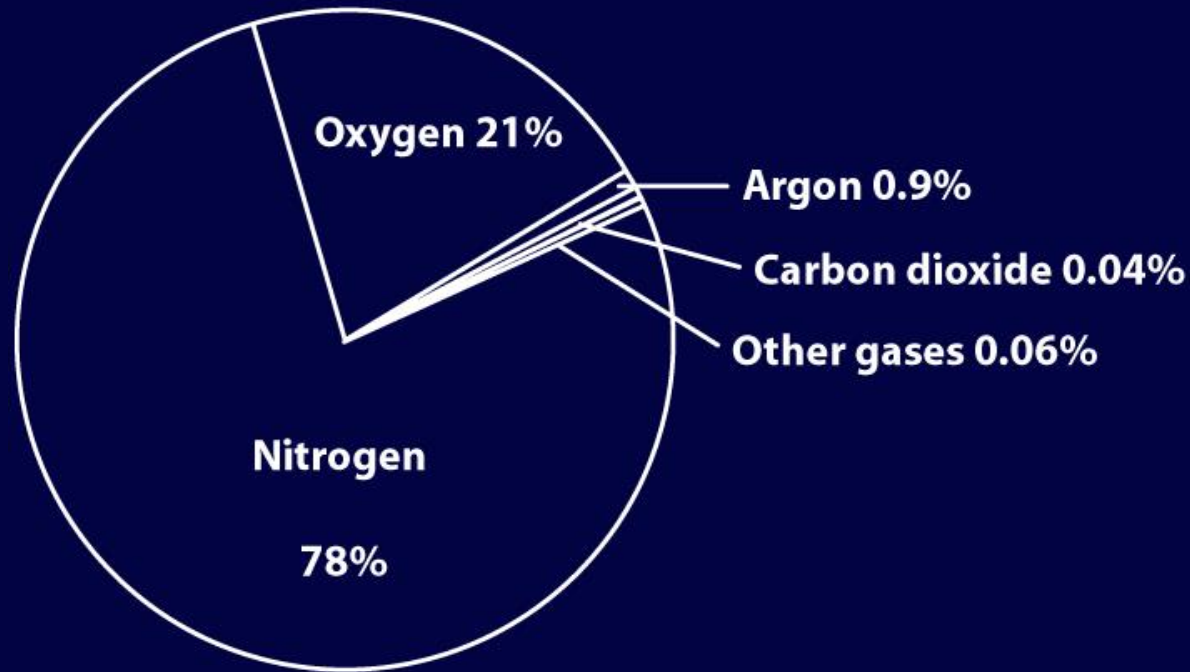
## Question 1

What does this circle chart represent?



## Section Check

1



- A. different gases used by your body
- B. gases exhaled from your lungs
- C. gases in necessary for life on Earth
- D. percent of gases in Earth's atmosphere



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1

### Answer

The correct answer is D. Of these various gases, the gas that our bodies use is oxygen.



1

### Question 2

Why is breathing important for cellular respiration?

### Answer

Breathing brings in air that contains oxygen used in cellular respiration. Oxygen is used by cells to release energy from glucose. Breathing also removes the waste gas carbon dioxide that is produced by cellular respiration.





1

### Question 3

Which one of the following habits has been found to increase your risk of lung cancer and emphysema?

- A. biting fingernails
- B. drinking caffeinated beverages
- C. lying out in the sun
- D. smoking



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### Answer

The correct answer is D. Smoking can harm your respiratory system in many different ways. High temperatures, smoke, and carbon monoxide produced when tobacco burns can injure cells.



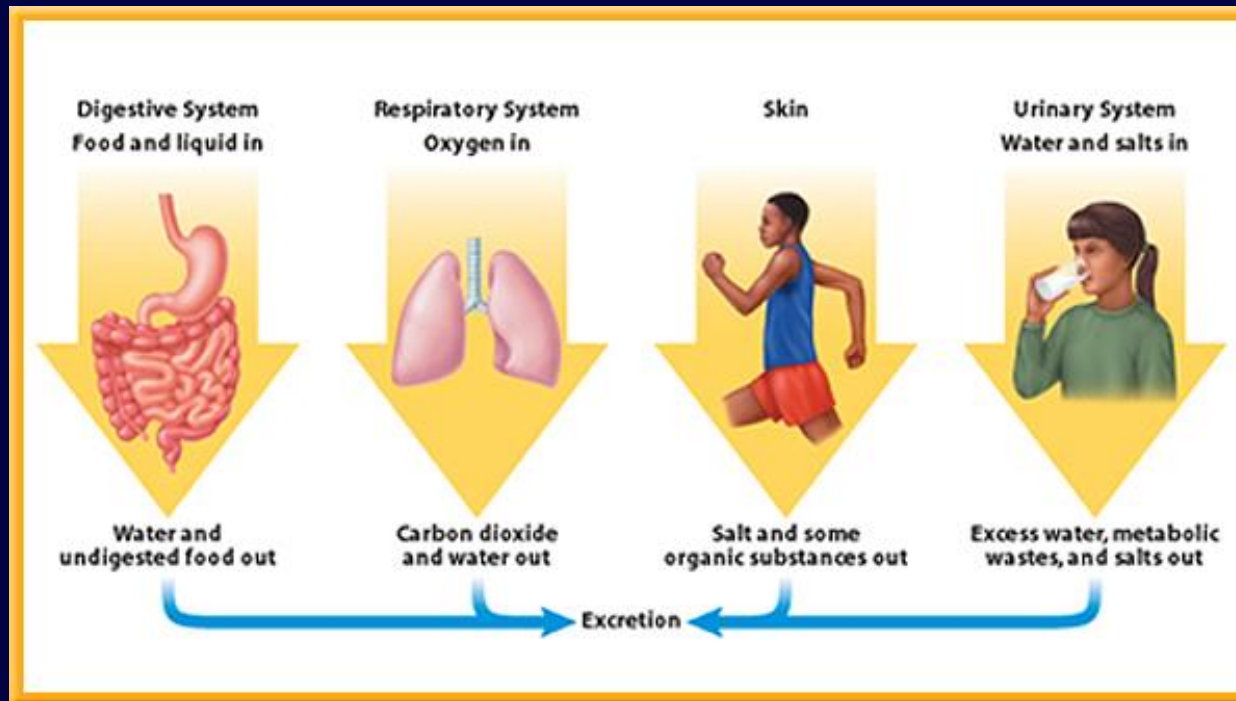
## Functions of the Excretory System

- Your body must eliminate wastes to remain healthy.
- Undigested material is eliminated by your large intestine.
- Waste gases are eliminated through the combined efforts of your circulatory and respiratory systems.




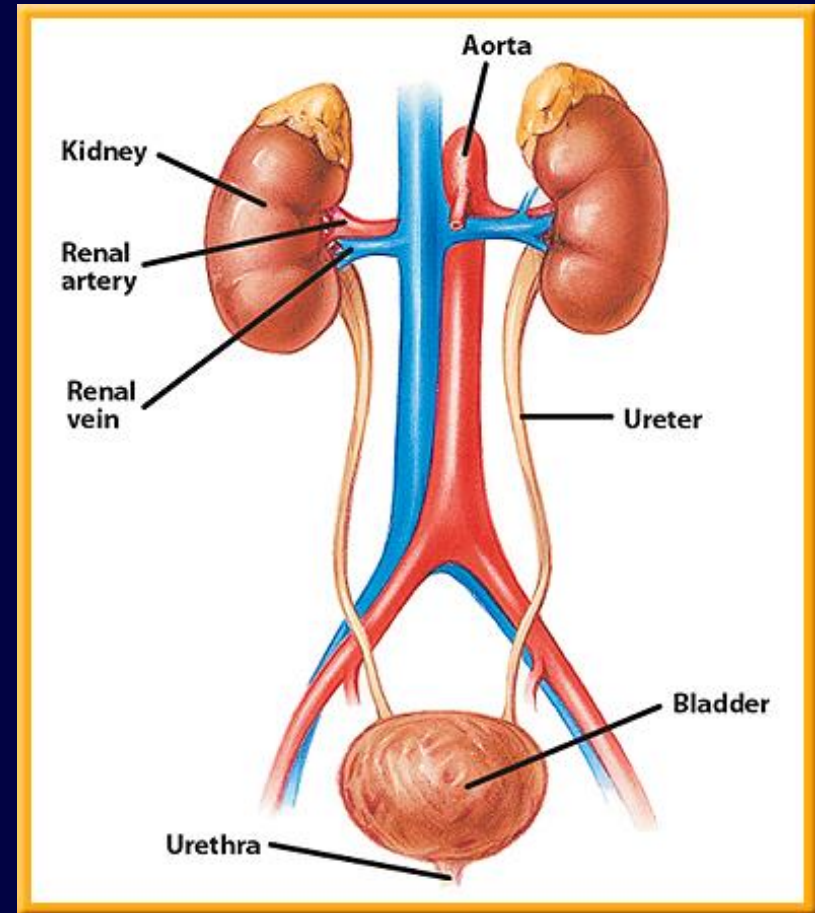
## Functions of the Excretory System

- These systems function together as parts of your excretory system.




## The Urinary System

- The **urinary system** rids the blood of wastes produced by the cells. 
- The urinary system also controls blood volume by removing excess water produced by body cells during respiration.




## Regulating Fluid Levels

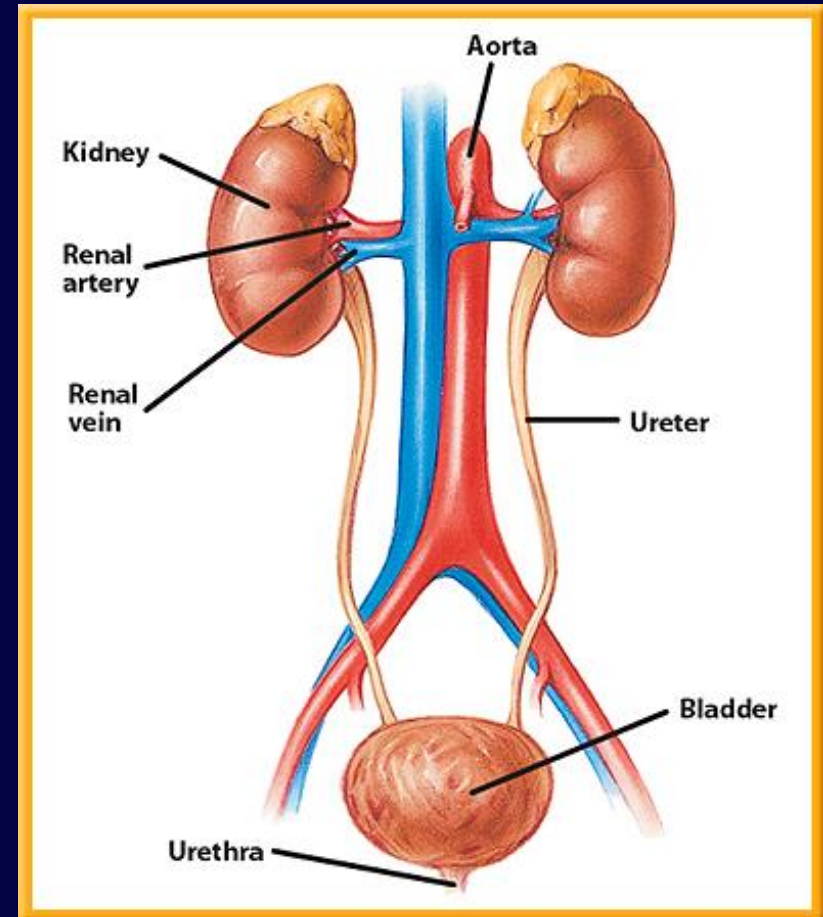
- The hypothalamus (hi poh THA luh mus), constantly monitors the amount of water in the blood.
- When the brain detects too much water in the blood, the hypothalamus releases a lesser amount of a specific hormone.
- This signals the kidneys to return less water to the blood and increase the amount of wastewater, called **urine**, that is excreted. 





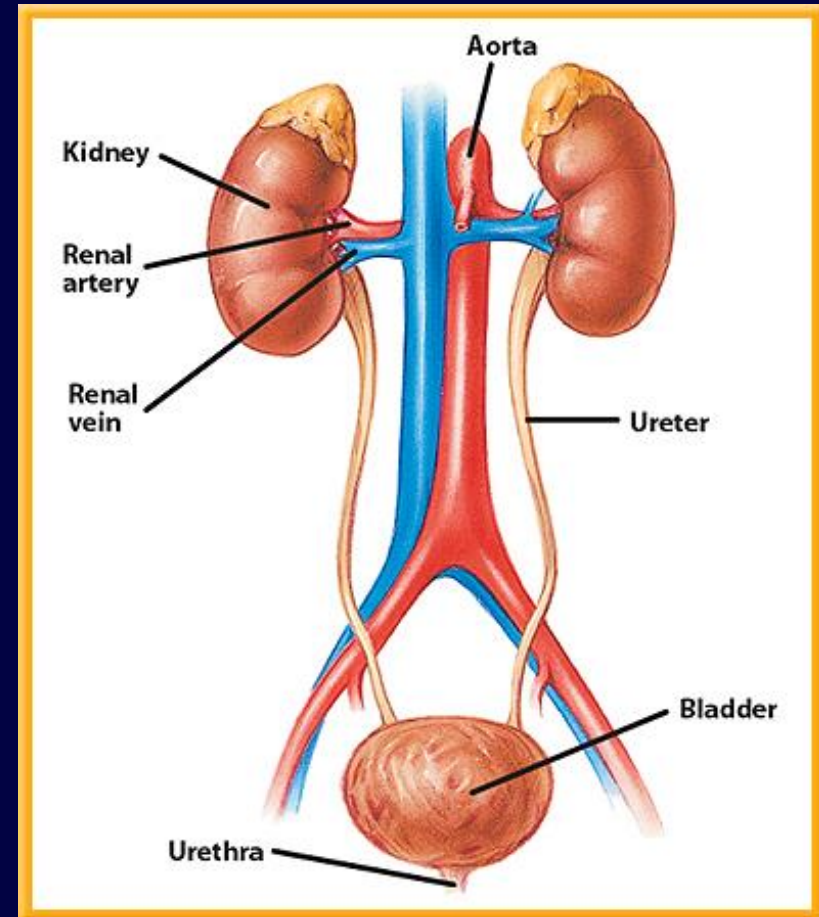
## Organs of the Urinary System

- The main organs of the urinary system are two bean-shaped **kidneys**. 
- The kidneys filter blood that contains wastes collected from cells.



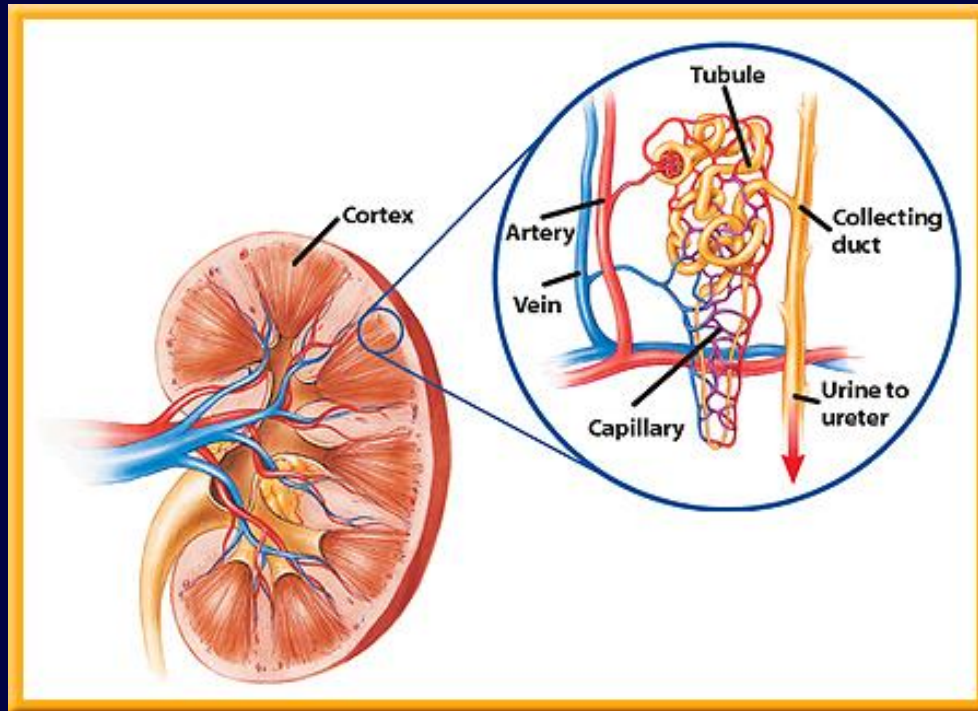
## Organs of the Urinary System


- In approximately 5 min, all of the blood in your body passes through the kidneys.



## Filtration in the Kidney

- The kidney is a two-stage filtration system.



- It is made up of about 1 million tiny filtering units called **nephrons** (NEF rahnz). 



## Filtration in the Kidney

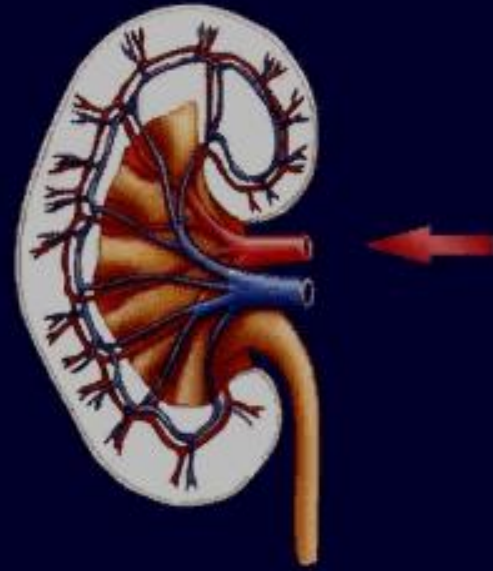
- The first filtration occurs when water, sugar, salt, and wastes from the blood pass into the cuplike structure.
- Left behind in the blood are red blood cells and proteins.



## 2

### Filtration in the Kidney

- Next, liquid in the cuplike structure is squeezed into a narrow tubule.
- Capillaries that surround the tubule perform the second filtration.
- Most of the water, sugar, and salt are reabsorbed and returned to the blood.

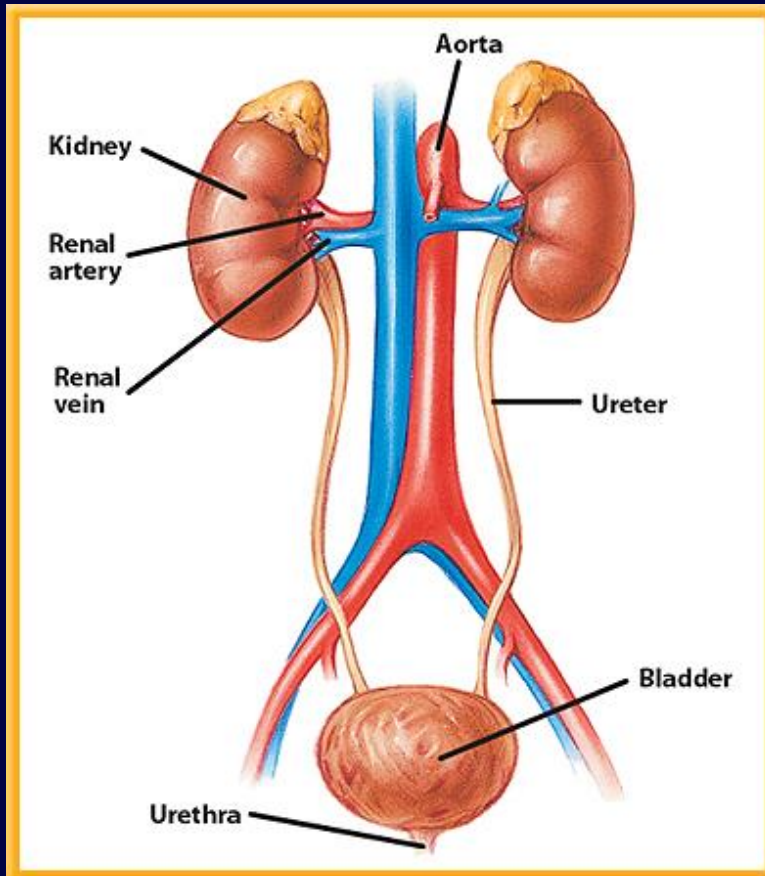



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## Urine Collection and Release





- The urine in each collecting tubule drains into a funnel-shaped area of each kidney that leads to the ureter (YOO ruh tur).
- **Ureters** are tubes that lead from each kidney to the bladder. 





## Urine Collection and Release

- The **bladder** is an elastic, muscular organ that holds urine until it leaves the body. 
- A tube called the **urethra** (yoo REE thruh) carries urine from the bladder to the outside of the body. 



## 2

## Other Organs of Excretion

- Large amounts of liquid wastes are lost every day by your body.
- The liver also filters the blood to remove wastes.
- Excess amino acids are changed to a chemical called urea (yoo REE uh) that is excreted in urine.
- Hemoglobin from broken-down red blood cells becomes part of bile, which is the digestive fluid from the liver.



## Urinary Diseases and Disorders

- Waste products that are not removed build up and act as poisons in body cells.
- Water that normally is removed from body tissues accumulates and causes swelling of the ankles and feet.



## Urinary Diseases and Disorders

- Without excretion, an imbalance of salts occurs.
- If the balance isn't restored, the kidneys and other organs can be damaged.
- Kidney failure occurs when the kidneys don't work as they should.



## Urinary Diseases and Disorders

- Infections caused by microorganisms can affect the urinary system.
- Usually, the infection begins in the bladder. However, it can spread and involve the kidneys.



## Detecting Urinary Diseases

- Urine can be tested for any signs of a urinary tract disease.
- A change in the urine's color can suggest kidney or liver problems.
- Increased amounts of a protein called albumin (al BYOO mun) indicate kidney disease or heart failure.





## 2

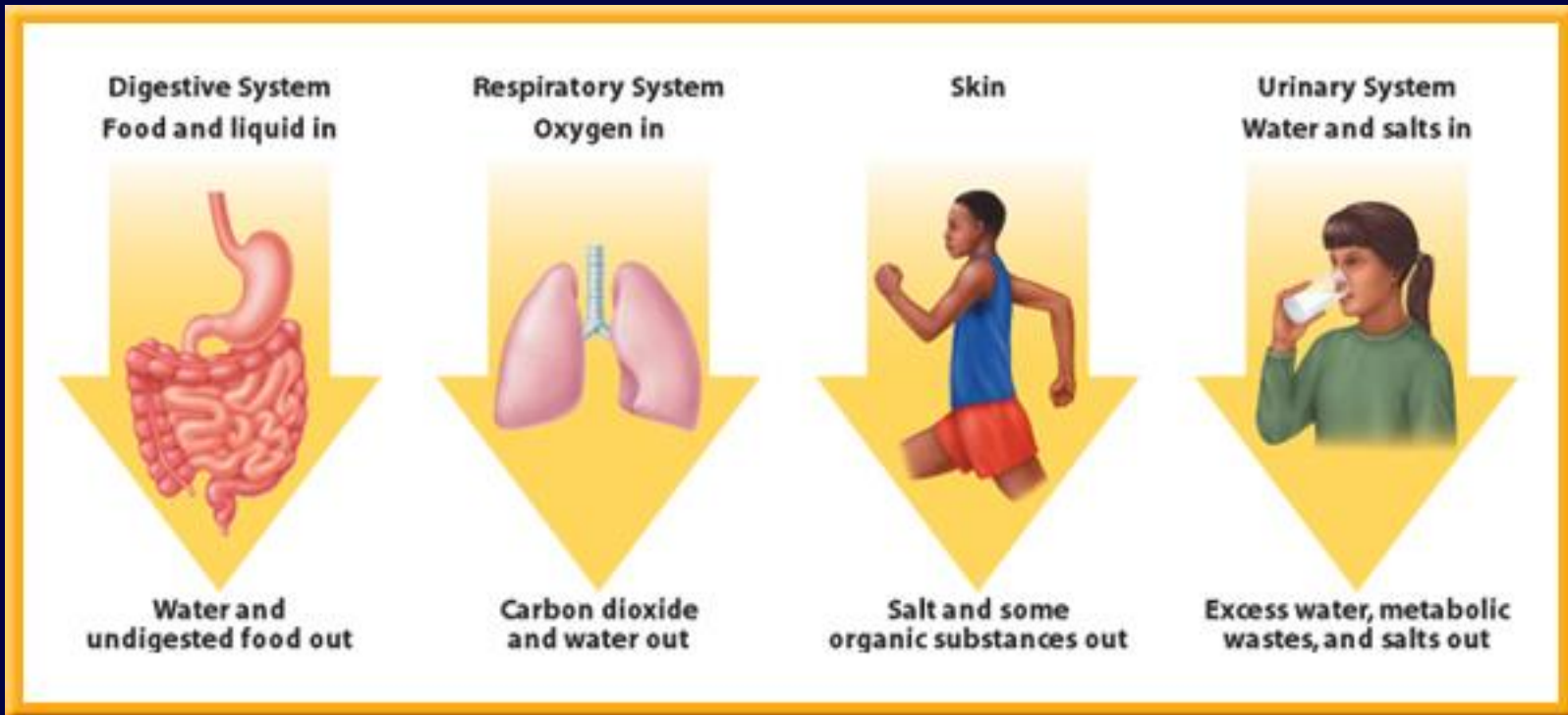
## Dialysis

- A person who has only one kidney still can live normally.
- The remaining kidney increases in size and works harder to make up for the loss of the other kidney.
- If both kidneys fail, the person will need to have his or her blood filtered by an artificial kidney machine in a process called dialysis (di AH luh sus).



### Question 1

How are all of these systems related?



2

### Answer

All of these systems are part of the excretory system. This system functions to eliminate wastes from your body so you can stay healthy.



2

### Question 2

What is filtered in the kidneys?

### Answer

The kidney filters blood that contains wastes collected from cells. In about five minutes, all the blood in your body passes through the kidneys.



2

### Question 3

If high levels of glucose are found in urine, this may be a sign of \_\_\_\_\_.

- A. bacterial infection
- B. diabetes
- C. heart failure
- D. kidney failure



2

### Answer

The correct answer is B. Urine can be tested for signs of many different diseases. A change in urine's color can suggest kidney or liver problems.





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# End of Chapter Summary File



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