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## Chapter 5 Notes: Respiration and Excretion

### Lesson 1: The Respiratory System

- The respiratory system moves air containing oxygen into your lungs and removes carbon dioxide and water from your body.

### Respiration

- **Cellular respiration**: the process in which the body cells break down glucose, using oxygen and releasing the chemical energy in glucose.
  - Carbon dioxide and water are produced during cell respiration and given off as waste.

### Breathing Structures

- **Nose**: how air moves into the body.
  - Hairs trap large particles
  - Air moves into nasal cavities, which produce mucus: sticky material that moistens air and traps particles
- **Pharynx**: throat, both nose and mouth are connected to pharynx.
  - Air and food enter pharynx
- **Trachea**: windpipe, where air moves after pharynx.
- **Cilia**: Cells that line the trachea that have tiny hairlike extensions that can move together in a sweeping motion.
  - Sweep mucus made in the trachea to the pharynx.
- **Bronchi**: Where air goes from trachea, left and right side. Take air into lungs.
- **Lungs**: Main organs of respiratory system.
- **Alveoli**: tiny, thin walled sacs of lung tissue at the end of bronchi where gases can move between air and blood.



### How Do You Breathe?

- Breathing controlled by muscles
- **Diaphragm**: large, dome-shaped muscles at the base of lungs that are used to breathe.
  - Ribs surround lungs.
- When you breathe:
  - Rib muscles and diaphragm contract --> Makes chest cavity larger --> lowers air pressure inside lungs
    - Air pressure outside body is now higher than pressure inside chest
    - Pressure difference causes air to rush into lungs
- Chest expands and you inhale

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- Muscles relax and chest contracts and you exhale
  - Chest cavity becomes smaller --> air pressure inside chest is greater than air pressure outside
  - Air rushes out of lungs

## Breathing and Speaking

- **Larynx**: voice box, located at top of trachea
- **Vocal cords**: folds of connective tissue, that stretch across the opening of the larynx
  - When speaking, muscles make vocal cords contract, narrowing opening as air rushes through.
  - Vocal cord movement makes air molecules vibrate --> causes sound --> voice

## What Happens During Gas Exchange?

- Air's final stop --> alveolus in lungs --> thin walls and surrounded by many thin-walled capillaries
- Air enters alveolus --> oxygen passes through wall of alveolus --> capillary wall into blood
- Carbon dioxide and water pass from blood --> air in alveolus

## Surface Area for Gas Exchange

- Adult lungs have 300 million alveoli
  - Creates huge amount of surface area for exchanging gases



## Lesson 2: Smoking and Your Health

What Chemicals are in Tobacco Smoke?

- Tobacco smoke has more than 4000 chemicals
  - **Tar**: dark, sticky substance that forms when tobacco burns
    - Sticks to cilia that line trachea, bronchi and smaller airways making it so cilia cannot function to keep harmful materials out of lungs.
    - Also cause cancer
  - **Carbon Monoxide**: colorless, odorless gas that makes the blood carry less oxygen to the body.
    - Smokers may have too little oxygen to meet their bodies' needs.
  - **Nicotine**: stimulant drug in tobacco that increases heart rate and blood pressure and can cause an addiction --> making it difficult to quit smoking

## How Does Tobacco Smoke Affect Health

- Over time, smokers can develop different diseases
  - Chronic Bronchitis
    - **Bronchitis**: an irritation of the breathing passages in which the small passages become narrower and may be clogged with mucus.
      - Causes difficulty of breathing
      - Chronic = long time
        - Can cause permanent damage to passageways
  - **Atherosclerosis**: Chemicals in tobacco smoke move into circulatory system and irritate walls of blood vessels --> build up of fatty material in blood vessel walls
  - **Lung Cancer**: Cancerous growths that take up space in the lungs that is needed for gas exchange
    - Cigarette smoke has 50 chemicals that cause cancer.
  - **Emphysema**: Occurs when lung tissue is damaged and breathing becomes difficult.

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- People with emphysema cannot breathe in enough oxygen or breathe out enough carbon dioxide --> short of breath
- Damage is permanent
- **Passive smoking**: Nonsmokers involuntarily inhale smoke from other people's cigarettes, cigars or pipes that contains harmful chemicals that smokers inhale.
- Can cause bronchitis, asthma, and other respiratory problems.



### Lesson 3: The Excretory System

What is the Role of the Excretory System?

- Excretory system collects wastes that cells produce and removes them from the body
  - Includes: kidneys, ureters, urinary bladder, urethra, lungs, skin and liver
  - **Excretion**: the process of removing wastes
- Body must eliminate 2 wastes
  - 1) Excess water
    - Lungs eliminate some water
    - **Urine**: fluid that eliminates remaining water, urea and other wastes
  - 2) **Urea**: a chemical that comes from the breakdown of proteins

### Structures that Remove Urine

- **Kidneys**: major organs of excretory system that act like filters to remove urea and other wastes from the blood, but keep materials that the body needs
  - Wastes eliminated in urine
  - **Ureters**: two narrow tubes through which urine flows from the kidneys
  - **Urinary bladder**: muscular sac that stores urine
  - **Urethra**: small tube through which urine leaves the body

### Waste Filtration

- Each kidney has ~1,000,000 nephrons
  - **Nephron**: tiny filtering factory that removes wastes from blood and produces urine
  - Works in 2 stages
    - 1) Both wastes and needed materials are filtered out of blood
    - 2) Needed material is returned to blood and wastes eliminated from body

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## How Does Excretion Help Your Body Maintain Homeostasis?

- Excretion helps maintain homeostasis by keeping the body's internal environment stable and free of harmful levels of chemicals
  - Kidneys
    - Filter blood
    - Regulate amount of water in body
      - Example: Hot day --> lots of water returned to blood, Cold day --> less water moves back to blood
  - Lungs, Skin and Liver
    - Help excrete waste and keep you healthy
    - Lungs --> remove carbon dioxide and some water
    - Skin --> removes water and small amount of urea
    - Liver --> Makes urea from breakdown of proteins.
      - Also breaks down many wastes LIKE old red blood cells

