The Circulatory System

Chapter 17 Lesson 1
Functions of the Circulatory System

- Your circulatory system maintains an internal environment in which all the cells in your body are nourished.
- As your heart pumps blood, blood vessels carry oxygen and nutrients to the body cells.
- At the same time, carbon dioxide and waste matter are carried from your cells and delivered to your lungs and kidneys for removal from the body.
Structure of the Circulatory System

- The main parts of your circulatory system are your heart, blood, arteries, veins, and capillaries through which fluids are carried throughout your body.
The Heart

- Along with your brain, your heart is the most important of your body’s vital organs.
- Your heart never rests, pumping blood continually to the lungs and the rest of the body.
- Much of the heart consists of a special type of muscle called **myocardium**
- The myocardium contracts rhythmically and automatically.
Chambers of the Heart

- A thick muscular wall called the septum divides the interior of the heart into right and left halves.
- Each half has two chambers—an upper chamber called an **atrium**, and a lower chamber called a **ventricle**.
- One-way valves at the exits of each chamber guarantee that blood can only flow in one direction.
- The natural sound of the heart is related to the movements of these muscles and valves.
Circulation of the Heart

- Blood that has been depleted of oxygen but contains carbon dioxide and waste matter is carried to the heart by two large blood vessels called the *vena cava*.
- This blood enters the right atrium, is transferred to the right ventricle, then is pumped to the lungs.
- Blood picks up oxygen from the lungs and releases carbon dioxide.
- The newly oxygenated blood then enters the left atrium, is transferred to the left ventricle, and then pumped to all the tissues of the body.

Blood flow: vena cava-right atrium-right ventricle-lungs-left atrium-left ventricle-aorta.
Blood

- Blood is the fluid that transports all of the substances that your body needs to sustain life.
- Blood delivers oxygen, hormones, and nutrients to cells and carries away the wastes the cells produce.
- 55% of the total volume of blood is made up of plasma - the fluid in which other parts of the blood are suspended.

Red Blood cells carry oxygen from the lungs to the body’s tissues, where oxygen is exchanged with carbon dioxide. Each red blood cell contains hemoglobin - the oxygen carrying part of blood.
• White blood cells protect the body against infection and fight infection when it occurs.

• White blood cells are larger than red blood cells, but there are fewer of them.

• Production of white blood cells increases when there is an infection.

• Some white blood cells surround invading pathogens and ingest them, while others form antibodies to make you immune to second attacks.
Blood cont.

- **Platelets**— *are the cells that prevent the body’s loss of blood.*
- Platelets initiate a chain reaction that causes blood to clot.
- When platelets come into contact with damaged blood vessel walls, they become sticky and clump the site of the injury.
- Platelets produce small fibers called **fibrin.**
- Fibrin traps platelets along with red blood cells and white blood cells to help blood clot.
Blood Vessels

- There are more than 60,000 miles of blood vessels in your body. They are divided mainly into three types:
- **Arteries** - *the vessels that carry blood away from the heart.* Pulmonary arteries carry blood from the right ventricle of the heart to the lungs. Systemic arteries carry blood from the left ventricle of the heart to the rest of the body.
- Arteries have thick, muscular, flexible walls that enable it to withstand high blood pressure whenever the heart beats.
- Smaller vessels called *arterioles* branch directly off an artery and connect to even smaller blood vessels called capillaries.
Capillaries- are the vessels that carry blood between arterioles and small vessels called venules.

Capillaries open and close in response to the body’s need for oxygen and nutrients.

Some capillaries are 50 times thinner than a strand of hair.

The opening and closing of capillaries in the skin plays an important role in regulating the body’s temperature.
Blood Vessels cont.

- **Veins** - the vessels that return deoxygenated blood toward the heart from the body’s organs and tissues.
- Like arteries, veins have a smooth, strong, flexible wall, however the pressure in veins is much lower than that of arteries.
- The inner lining of veins form valves to help prevent blood from flowing back into the capillaries.
The Lymphatic System

The lymphatic system serves 2 functions.

1. Drains tissue back into the bloodstream.
2. Helps fight infection.

The lymphatic system is your body’s second circular system since any fluid that is not absorbed through the walls of blood vessels is returned to the heart through it.

Lymphatic fluid is circulated by movement of the body’s muscles since it does not have a pump like the heart.
Lymph

- The fluid that the lymphatic system transports is **lymph** - a clear yellow fluid that fills spaces around body cells.
- Lymph is made up of proteins, fats, and **lymphocytes** - white blood cells that protect the body against **pathogens** - disease carrying agents.
Types of Lymphocytes

- **B-cells** - 10% of lymphocytes are B-cells.
  - When B-cells encounter pathogens they are stimulated to enlarge and multiply. B-cells turn into plasma cells, and plasma cells produce antibodies to destroy invading pathogens.

- **T-cells** - Two main groups: killer cells and helper cells.
  - Killer T-cells attach to abnormal cells and release toxins to destroy them.
  - Helper T-cells aid the activity of the B-cells and killer T-cells and control other aspects of the body’s immune system.
Structure of the Lymphatic System

- Lymphatic vessels are distributed throughout the body the same way blood vessels are.
- At certain places along the lymphatic vessels, lymph passes through lymph nodes.
- The nodes act as a barrier to the spread of infection, destroying or filtering out bacteria before they pass into the blood.