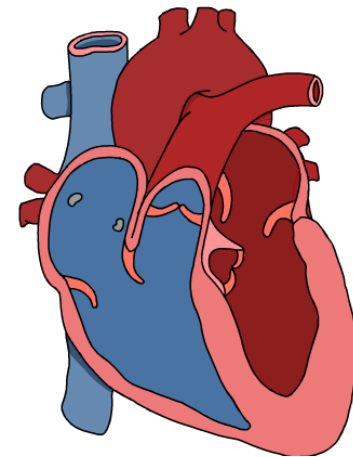


The Human Circulatory System

The circulatory system is one of the most important systems in the body. It interacts with almost every other body system and thus is a key part in maintaining homeostasis. To keep the body in balance with its external environment, the circulatory system transports gases, nutrients, electrolytes, wastes, and hormones to and from the body cells. It also helps the body regulate temperature and fight infections. The circulatory system is highly organized and consists of blood, blood vessels, and the heart.

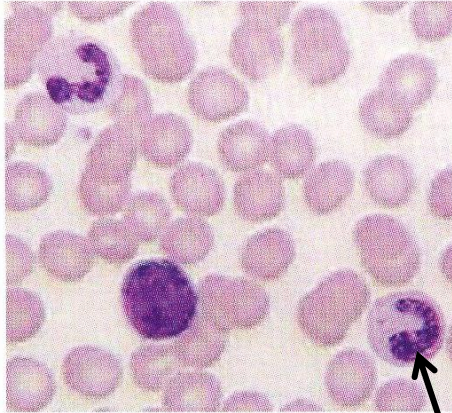
The Human Circulatory System

1. Identify the roles of the circulatory system.
2. List the substances that are transported within the circulatory system.
3. List the major structures of the circulatory system.



White Blood Cells

White blood cells are responsible for defending our bodies against infection caused from foreign material or bacteria. They also help with removing dead cells. Whenever there is an infection, white blood cells move to the site, cluster around the invader, and destroy it. There are five different types of white blood cells, also known as leukocytes (loo-cō-sites). Each type of white blood cell has a specific function in defending the body. Some of the cells surround and engulf bacteria, removing them from blood; others, known as lymphocytes, release antibodies. Antibodies are proteins that destroy bacteria and other pathogens. The lymphocytes are cells that are able to pass through capillary walls into the lymph and attack pathogens that are in the body's tissue. Lymphocytes are also part of the immune system.

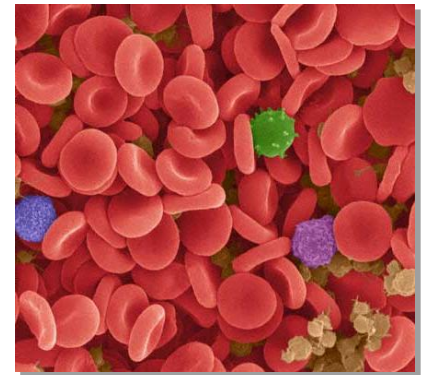


White blood cells are larger than red blood cells but are fewer in number.

White Blood Cells

1. Identify the role of white blood cells.
2. Describe how white blood cells carry out this role.
3. Identify the role of antibodies.
4. What is another name for white blood cells?

Red Blood Cells



Red blood cells, also known as erythrocytes, are round, disk-shaped cells with a slight depression in the middle due to the loss of the nucleus. Their cell membrane contains a protein that provides the cell with flexibility, allowing them to squeeze through tiny blood vessels. There are approximately five million red blood cells in each milliliter of blood. Red blood cells import oxygen and export carbon dioxide to and from the cells. They are formed in the red marrow tissue of long bones and have a life span of 120 days. The amount of erythrocytes in the blood is monitored by cells in the kidney, which signal for increased production of red blood cells when numbers dip below the set point.

Red Blood Cells

1. Identify the role of red blood cells.
2. How does the structure of the red blood cell enable movement through blood vessels?
3. Why is it important to have a large number of red blood cells in your blood?
4. What is another name for red blood cells?

Blood Type

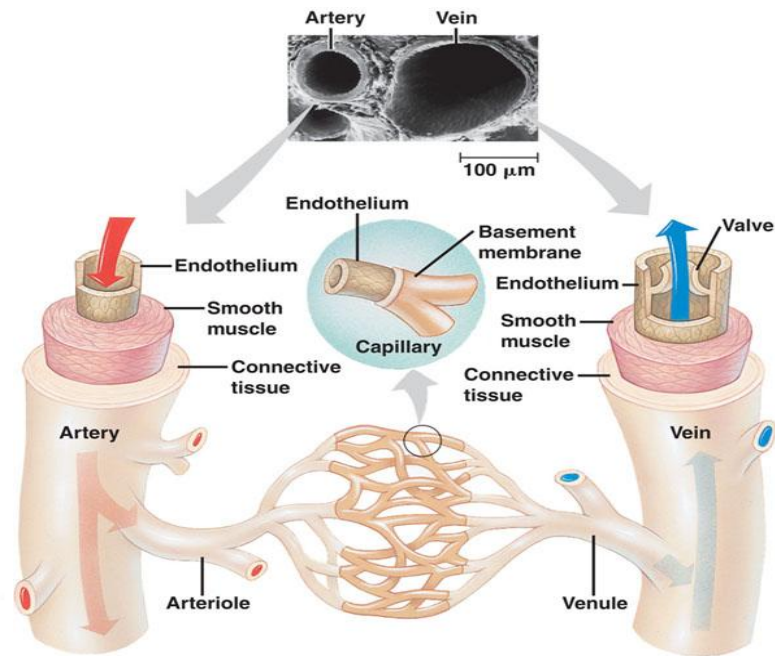
There are four different blood types: type A, type B, type AB, and type O. Do you know your blood type? Blood type is determined by the genes you inherit from your parents. Genes determine the type of protein that is produced on the surface of the red blood cell. These proteins are called **antigens**. Each blood type is named based on the protein antigen on the red blood cell. Type A blood has antigen A, type B blood has antigen B, type AB blood has both antigen A and antigen B, and type O blood has no antigens on the surface of red blood cells.

Blood Type	Antigen	Antibodies	Can Give Blood To	Can Receive Blood From
A	A	anti-B	A and AB	A and O
B	B	anti-A	B and AB	B and O
AB	A and B	none	AB	A, B, AB, O
O	none	anti-A and anti-B	A, B, AB, O	O

Blood Types

1. List the four blood types.
2. Explain how blood types are named.
3. Explain why blood type “O” is considered a “universal donor”.

Blood Vessels



Blood is a fluid tissue and, therefore, must flow in vessels. There are three major types of blood vessels: arteries, veins, and capillaries. Each vessel is different in structure and function.

Arteries are blood vessels that carry blood away from the heart. These vessels are thick-walled, muscular structures.

Arteries are like major highways that carry blood throughout the circulatory system. Like highways, the connector road gets smaller and eventually leads to a one-lane road. These one-lane roads are capillaries.

Capillaries are the smallest type of blood vessel.

Capillaries are very thin walled; they are just one cell layer thick. This allows oxygen and nutrients to pass out of the blood and into the tissues of the body.

As oxygen and nutrients enter the cells from capillaries, carbon dioxide and other wastes diffuse out of cells into the capillaries, and the blood continues its path back towards the heart.

Veins are blood vessels that carry blood to the heart. These are large vessels with little or no muscle. Veins are not as thick as arteries because the blood pressure is not as great inside their walls.

Blood Vessels

1. Describe the role of blood vessels.
2. Describe the role of capillaries.
3. Explain the difference between arteries and veins.