

How the Heart Works

Topic Overview

The heart is at the centre of your circulatory system, which is a network of blood vessels that delivers blood to every part of your body. Blood carries oxygen and other important nutrients that all body organs need to stay healthy and to work properly.

Your heart is a muscle, and its job is to pump blood throughout your circulatory system.

How does my heart pump blood?

Your heart is divided into two separate pumping systems, the right side and the left side.

- The right side of your heart receives oxygen-poor blood from your veins and pumps it to your lungs, where it picks up oxygen and gets rid of carbon dioxide.
- The left side of your heart receives oxygen-rich blood from your lungs and pumps it through your arteries to the rest of your body.

Your heart has four separate chambers (Figure 1) that pump blood, two on the right side and two on the left.

How does blood flow through the heart?

Blood flows through your heart and lungs (Figure 2) in four steps:

1. The right atrium receives oxygen-poor blood from the body and pumps it to the right ventricle through the tricuspid valve.
2. The right ventricle pumps the oxygen-poor blood to the lungs through the pulmonary valve.
3. The left atrium receives oxygen-rich blood from the lungs and pumps it to the left ventricle through the mitral valve.
4. The left ventricle pumps the oxygen-rich blood through the aortic valve out to the rest of the body.

The left and right atria are smaller chambers that pump blood into the ventricles. The left and right ventricles are stronger pumps. The left ventricle is the strongest because it has to pump blood out to the entire body. When your heart functions normally, all four chambers work together in a continuous and coordinated effort to keep oxygen-rich blood circulating throughout your body. Your heart has its own electrical system that coordinates the work of the heart chambers (heart rhythm) and also controls the frequency of beats (heart rate).

How does my heart maintain its normal function?

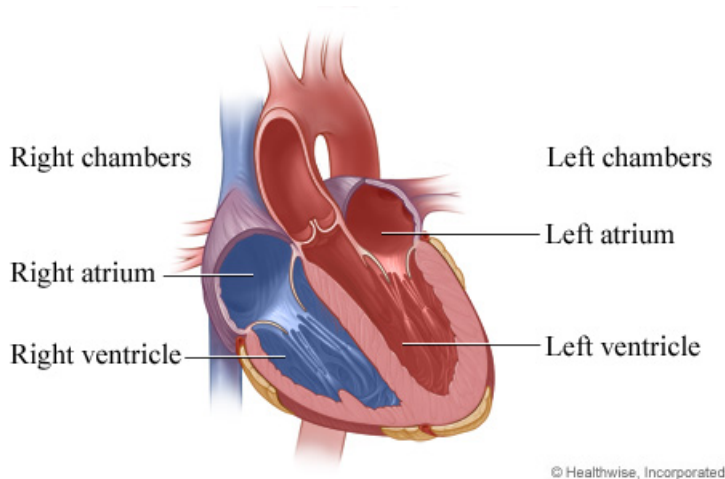
The task of your heart is to pump enough blood to deliver a continuous supply of oxygen and other nutrients to the brain and the other vital organs. To do this, your heart needs to:

- **Regulate the timing of your heartbeat.** Your heart's electrical system (Figure 3) controls the timing of the pump. The electrical system keeps your heart beating in a regular rhythm and adjusts the rate at which it beats. When the electrical system is working properly, it maintains a normal heart rate and rhythm. Problems with this electrical system can cause an arrhythmia, which means that your heart chambers are beating in an uncoordinated or random way or that your heart is beating too fast (tachycardia) or too slow (bradycardia).
- **Keep your heart muscle healthy.** The four chambers of your heart are made of a special type of muscle called myocardium. The myocardium does the main pumping work: It relaxes to fill with blood and then squeezes (contracts) to pump the blood. "Contractility" describes how well the heart muscle squeezes. After pumping, your heart relaxes and fills with blood. The muscle must be able to relax enough so that it can fill with blood properly before it pumps again. The health of your heart muscle affects both its contractility and its ability to relax, both of which determine whether your heart is able to pump enough blood each time it beats. Problems with the contractility

of your heart can be caused by problems with the muscle itself (such as a viral infection of the heart muscle or an inherited heart muscle disorder) or by problems with the blood supply to the heart muscle (such as reduced blood flow to the heart muscle, called ischemia). Your heart muscle needs its own supply of blood because, like the rest of your body, it needs oxygen and other nutrients to stay healthy. For this reason, your heart pumps oxygen-rich blood to its own muscle through your coronary arteries.

- **Keep blood flowing efficiently.** Your heart has four valves that control the flow of blood in and out of the chambers. There are valves between the atrium and the ventricle on each side of your heart. There is also a valve controlling the flow of blood out of each of your ventricles. The valves are designed to keep blood flowing forward only. When each chamber contracts, a valve opens to allow blood to flow out. When the chamber relaxes, the valve closes to prevent blood from leaking back into the chamber and to allow the chamber to fill with blood again. A problem with your heart valves can disrupt the normal flow of blood and cause problems for your heart.

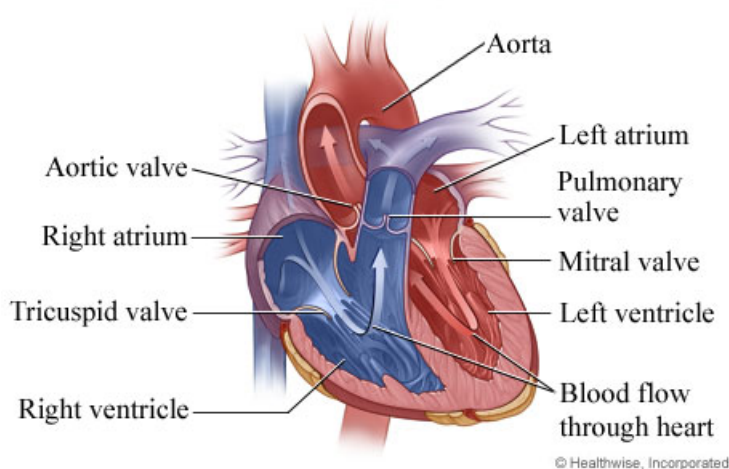
Figure 1 - Chambers of the heart

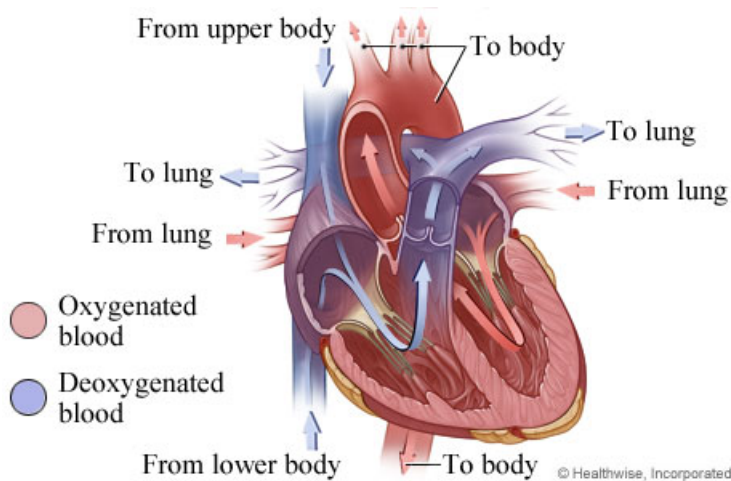


The heart has four chambers: two atria and two ventricles.

- The right atrium receives oxygen-poor blood from the body and pumps it to the right ventricle.
- The right ventricle pumps the oxygen-poor blood to the lungs.
- The left atrium receives oxygen-rich blood from the lungs and pumps it to the left ventricle.
- The left ventricle pumps the oxygen-rich blood to the body.

Figure 2 - Normal Heart





These pictures show the heart from the front. The right side of the heart is on the left side of the heart pictures. The left side of the heart is on the right side of the pictures.

Your heart has four separate chambers that pump blood. The chambers are called the right atrium, right ventricle, left atrium, and left ventricle. The right and left sides of the heart are separated by a muscular wall that prevents blood without oxygen from mixing with blood that has oxygen. The heart also has valves that separate the chambers and connect to major blood vessels.

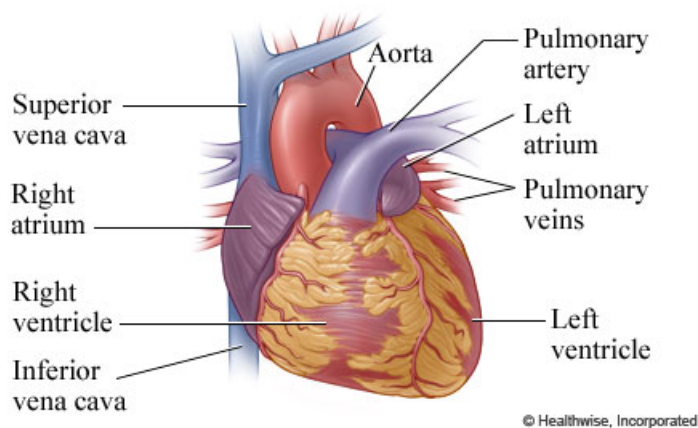
Your heart is divided into two separate pumping systems, the right side and the left side.

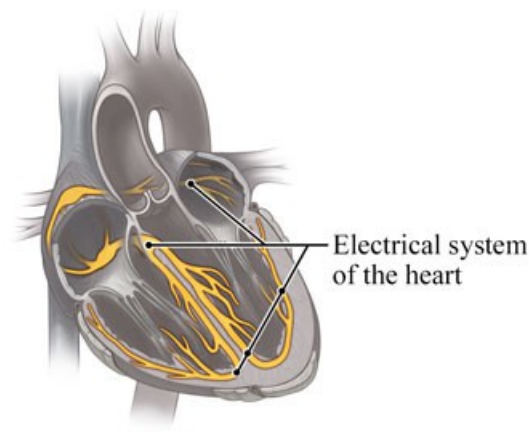
The right side of your heart receives oxygen-poor blood from your veins and pumps it to your lungs, where the blood picks up oxygen and gets rid of carbon dioxide. The left side of your heart receives oxygen-rich blood from your lungs and pumps it through your arteries to the rest of your body.

Blood travels through your heart and lungs in four steps:

- The right atrium receives oxygen-poor blood from the body and pumps it through the tricuspid valve to the right ventricle.
- The right ventricle pumps the oxygen-poor blood through the pulmonary valve to the lungs.
- The left atrium receives oxygen-rich blood from the lungs and pumps it through the mitral valve to the left ventricle.
- The left ventricle pumps the oxygen-rich blood through the aortic valve out to the rest of the body.

Figure 3 - The Heart and Its Electrical System





The heart has four chambers. The two upper chambers are called atria (the right atrium and the left atrium), and the two lower chambers are called ventricles.

Normally, the heartbeat starts in the right atrium in a group of special heart cells called the sinoatrial (or sinus) node. These cells act as a pacemaker for the heart.

The heart's pacemaker sends out an electrical signal (impulse) that spreads throughout the heart along electrical pathways. These pathways transmit the signal from the upper to the lower chambers of the heart, which causes the heart muscle to contract. Regular, rhythmic electrical signals keep the heart pumping blood to the lungs and the body.

Related Information

- [Electrical System of the Heart](#)

References

Other Works Consulted

- Hoit BD, Walsh RA (2011). Normal physiology of the cardiovascular system. In V Fuster et al., eds., *Hurst's The Heart*, 13th ed., vol. 1, pp. 94-117. New York: McGraw-Hill.

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