

Q What is the circulatory system?

A Your **circulatory system** ensures every cell in your body receives a constant supply of blood. The blood delivers nutrients and oxygen to your cells, and removes waste products and carbon dioxide. The **heart** ensures that blood flows constantly by pumping it through the **blood vessels**. Blood vessels are tubes of all different sizes that transport blood to and from the heart. Together, the heart and blood vessels make up the **circulatory system**.

Q What is the heart's function?

A The function of the heart is simple. It keeps blood circulating throughout the body by:

- Pumping blood through your **lungs** to make certain that the blood supply is constantly refreshed with oxygen and carbon dioxide is removed, and
- Pumping blood through your **body** to meet its demand for oxygen and nutrients.

The heart is an amazing pump. An average person has 40 million heartbeats a year. Through powerful contractions (heartbeats) the heart circulates your entire blood supply each and every minute. It is very sensitive to your body's needs, adjusting its rate of pumping to the demand of your body's cells. For example, with a faster heart rate during strenuous exercise, the heart can increase the amount of blood up to four times the amount it pumps at rest, within only a matter of seconds.

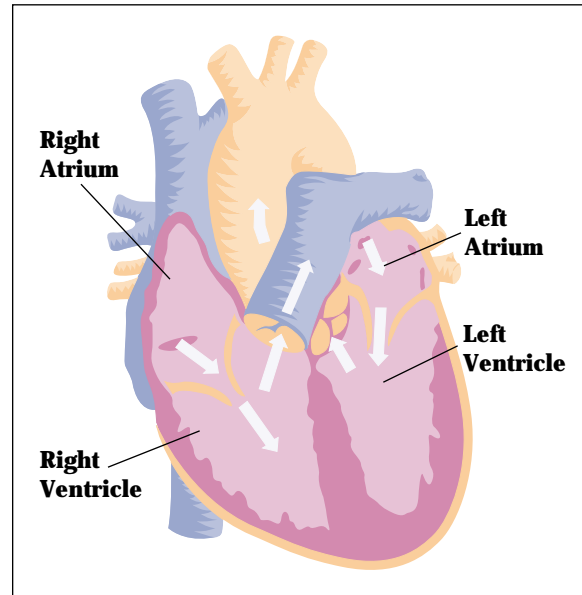


Diagram of the Heart showing blood flow

Q How is the heart structured?

A The heart is a hollow, muscular organ, about the size of your fist and weighing approximately one pound. It is located behind and slightly to the left of the breastbone.

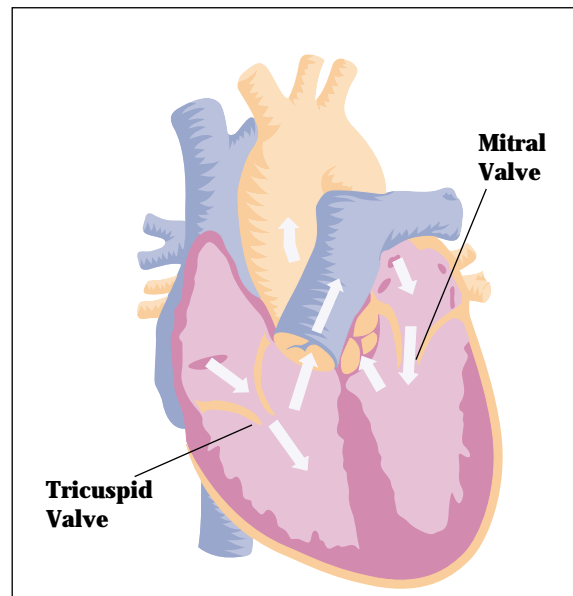
The heart has a muscle wall that separates it into a left and right side. The left and the right sides are further divided horizontally. This creates four separate heart **chambers**. The two upper chambers are the atria (**right atrium** and **left atrium**) and the lower chambers are the **right ventricle** and the **left ventricle**.

Q How does the blood flow through the heart?

A The right half of the heart circulates blood through the lungs to be refreshed with oxygen. Then the oxygen-rich blood returns to the left half of the heart and is pumped to the rest of the body.

The Atria

Oxygen-rich blood returns from the lungs and flows into the left atrium. At the same time, oxygen-depleted blood returns from the rest of the body and flows into the right atrium. When the atria are filled, the blood is released by the **atrioventricular valves** to allow the blood to proceed to the ventricles.



Atrio ventricular valves

The Atrioventricular (AV) Valves

The AV valves are located between the atria and the ventricles. All heart valves have either two or three flaps of tissue, called **leaflets**, which open and close. Healthy valve leaflets ensure that blood flows in only one direction through the heart. The closed AV valves prevent blood from flowing backward into the atria when the heart beats.

The AV valve between the right atrium and right ventricle is called the **tricuspid valve**. The AV valve between the left atrium and left ventricle is called the **mitral valve**.

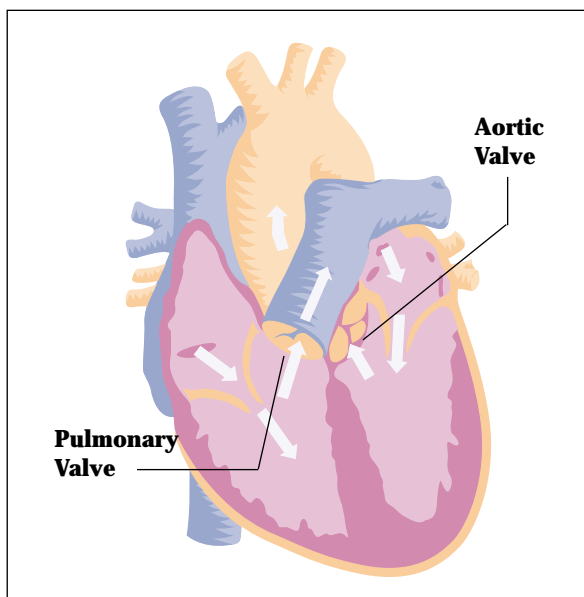
The Ventricles

The two heavily muscled lower chambers of the heart are the right ventricle and left ventricle. The right ventricle pumps blood through the lungs where it is replenished with oxygen. The left ventricle pumps blood already full of oxygen through the arteries to the rest of your body.

When the ventricles are nearly full, the AV valves close and the rising pressure inside the ventricle quickly causes two other heart valves to open. These are the **semi-lunar valves**, located at the junction of the ventricles and the great arteries.

The Semilunar Valves

Just like the AV valves, there are two semilunar valves. The **aortic valve** is located at the junction of the left ventricle and the aorta, the largest blood vessel in the body. The blood flows through the aortic valve into the aorta and then on to the rest of the body. The **pulmonary valve** is located at the junction of the right ventricle and the pulmonary arteries and allows the blood to flow toward the lungs. After blood is pumped forcefully by the ventricles through the semilunar valves out of your heart and into the arteries, the semilunar valves close to prevent blood from flowing back into your heart.



Semilunar Valves

Q What is the function of blood vessels?

A The blood vessels — arteries, capillaries, and veins — are an extensive network of elastic tubes that carry blood to and from the heart and throughout the body. The blood vessels are the transportation system of the human body.

ARTERIES are thick, muscular tubes that carry blood away from the heart. Arteries, except for the pulmonary artery, transport blood that has just circulated through the lungs and is therefore rich in oxygen.

CAPILLARIES are tiny vessels whose walls are so thin that oxygen, nutrients, and waste products flow through them. The network of capillaries is so extensive that if they were laid end to end, they would extend about 60,000 miles. Capillaries nourish virtually every cell in the body. This is amazing when you consider that the average person has about 500 trillion cells!

After flowing through the capillaries and exchanging oxygen and nutrients for waste and carbon dioxide, the blood supply needs to be refreshed. Your blood must flow back to the heart.

VEINS, except for the pulmonary vein, are the vessels that return used blood back to the heart to begin another heartbeat cycle.

Remarkably, the heart and blood vessels circulate blood throughout the body more than 100,000 times per day!

Q How can I learn more about my heart?

A Your physician or cardiology nurse is best suited to answer your questions about your heart.

Medtronic publishes a patient newsletter periodically. The newsletter contains educational articles of interest for pacemaker patients. To read or print it online, please visit www.medtronic.com/rhythms/

To be on our mailing list, please contact Medtronic at this address:

Medtronic, Inc.
Patient Services, V255
3850 Victoria St. N.
St. Paul, MN 55126-2978



United States of America
Medtronic, Inc.
7000 Central Avenue NE
Minneapolis, MN 55432-3576
USA
Toll-free: 1-800-551-5544
7:00 am to 6:00 pm CST

**24 hour general information
available on:**
<http://www.medtronic.com>

UC199300547d EN
© Medtronic, Inc. 2000
All Rights Reserved
Printed in USA



Medtronic

RESTORING THE RHYTHMS OF LIFE

The Function of the Heart
and Circulatory System