

Enrich

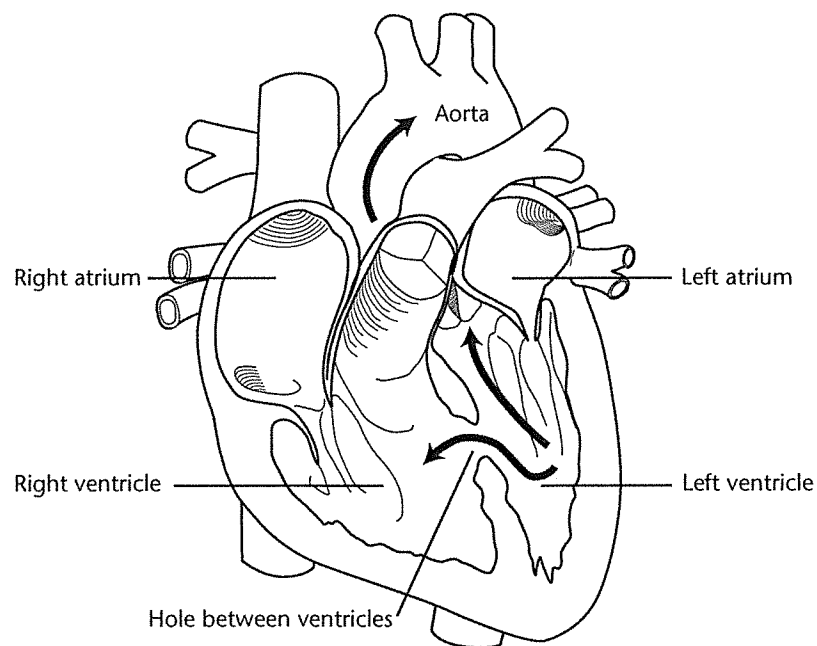
The Body's Transport System

Read the passage and study the figure. Then use a separate sheet of paper to answer the questions that follow the diagram.

Heart Murmurs

Sometimes when a doctor listens to a patient's heartbeat, he or she can hear an abnormal flow of blood through the heart. The sound of this abnormal flow is called a *heart murmur*.

Some heart murmurs are caused by blood leaking inside the heart. One type of leak occurs when there is a hole in the wall of tissue that separates the right and left sides of the heart. A hole in this wall causes blood to leak from the left side of the heart into the right side because the left side pumps with more force than the right side. The figure shows a heart with a hole between its ventricles and the direction of blood flow from its left ventricle.



1. In what two directions does blood flow from the left ventricle of the heart in the figure?
2. How does the blood flow in this abnormal heart compare to that in a normal heart?
3. Compare the blood in the right ventricle of the heart in the figure with the blood in the right ventricle of a normal heart. (*Hint: The wall of tissue normally prevents oxygen-rich blood from mixing with oxygen-poor blood.*)
4. How might a hole between the sides of the heart affect the functioning of the cardiovascular system?

Enrich

A Closer Look at Blood Vessels

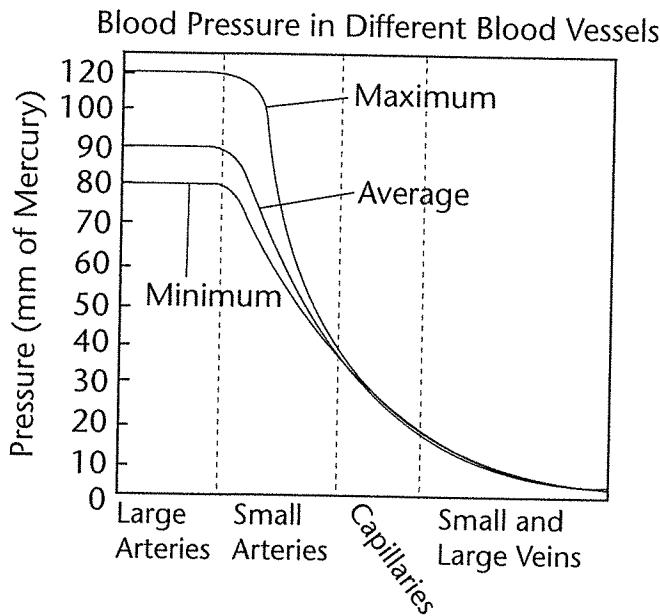
You learned that blood pressure is caused by the force with which ventricles contract. Read the passage and study the graph. Then use a separate sheet of paper to answer the questions that follow.

Blood Pressure

The graph below shows how blood pressure varies in different parts of the circulatory system. The left side of the graph represents blood pressure in an artery very close to the heart, while the right side represents the pressure of blood after it has traveled farthest, and is coming back to the heart again.

The varying blood pressure in arteries is due to the beating of the heart. Blood pressure is highest as the contracting ventricles pump blood into the arteries, then is low as the heart fills in preparation for the next beat.

Arteries provide little resistance to blood flow, so there is little loss of pressure in arteries due to friction. In smaller vessels, however, friction is higher, so pressure is lowered. As blood moves into smaller and smaller vessels away from the heart, pressure at any one location becomes constant.



1. What is the blood pressure in large arteries when the ventricles contract? (*Hint*: Remember that blood pressure is highest then.)
2. What is the blood pressure in large arteries when the ventricles relax?
3. What is the average pressure in large arteries?
4. What is the pressure when blood leaves the small arteries and enters the capillaries?

Enrich

Composition of Blood

The table below shows the percent of the U.S. population having each blood type. Read the passage and study the table. Then use a separate sheet of paper to answer the questions that follow.

More About Blood Types

The four major blood types do not occur equally in humans. Some blood types are more rare than others. The number of people with a certain blood type is one factor that determines how much of the blood supply can be safely transfused to people in need. Some people can safely receive blood from a larger percentage of the population than others. In the same way, some people can safely donate blood to a larger percentage of the population than others.

| Blood Type | Percent of Population | Can Receive Types | Percent of Population | Can Donate to Types | Percent of Population |
|------------|-----------------------|-------------------|-----------------------|---------------------|-----------------------|
| O | 45% | O | | | |
| A | 40% | A, O | | | |
| B | 11% | B, O | 56% | B, AB | 15% |
| AB | 4% | A, B, AB, O | | | |

1. Since blood type B can receive blood from O (45%) and B (11%), blood type B can receive blood from 56% of the population ($45\% + 11\% = 56\%$). Complete the remainder of the table using the information given.
2. Which blood type is most rare? Which type is most common?
3. People with type O blood are sometimes referred to as universal donors, and people with type AB blood are sometimes referred to as universal recipients. Why do you think this is so?
4. What is the total percentage of the population that has A markers on red blood cells? What total percentage has B markers?
5. What is the total percentage of the population that has anti-A clumping proteins? What percentage has anti-B clumping proteins?
6. A patient with type AB blood needs a transfusion, but the hospital has run out of AB blood. Is this a problem? Explain.

Place the outside corner, the corner away from the dotted line, in the corner of your copy machine to copy onto letter-size paper.

Enrich

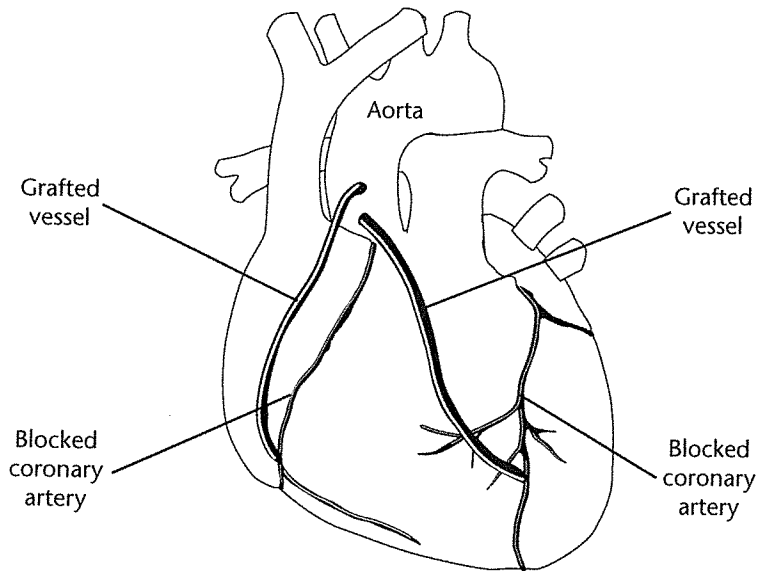
Cardiovascular Health

People with severe atherosclerosis may need to undergo surgery. Read the passage and study the figure. On a separate sheet of paper answer the questions that follow.

Bypass Surgery

A patient whose heart muscle is not receiving enough blood because of blocked coronary arteries sometimes has an operation called a *coronary artery bypass graft*. Heart surgeons often refer to this operation as a CABG or a "cabbage."

In a CABG, doctors remove a blood vessel from another part of the patient's body. For example, they may cut out a piece of a vein in the patient's leg. Then they attach, or *graft*, this vessel to the patient's heart. Blood then flows through the grafted blood vessel and around the block in the coronary artery. The figure below shows a heart that has had two blood vessels grafted to it.



1. From what blood vessel does the blood that flows through the grafted blood vessel come?
2. Why do you think the blood vessels are grafted to the artery leading from the left ventricle and not to the artery leading from the right ventricle?
3. Why do you think this type of surgery is called a bypass?
4. Using what you have learned about blood types, can you think of one reason that doctors would want to use a patient's own blood vessel in a CABG?
5. After having bypass surgery, patients are advised to follow a special diet. What types of foods should these patients avoid?