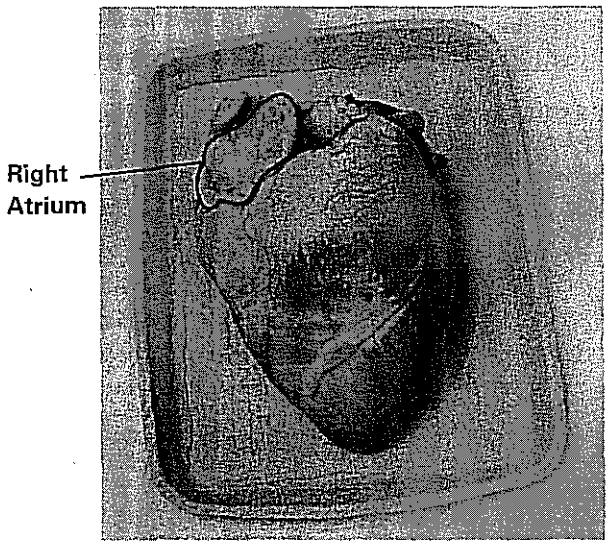
Young Scientist's Heart Dissection

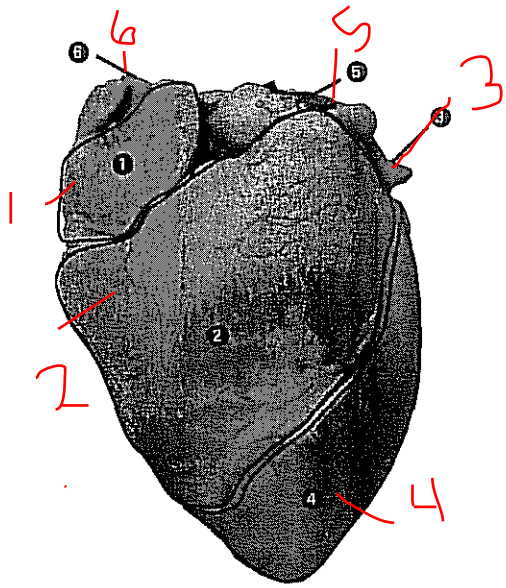
1. Just as there are differences in the shapes and sizes of animals, there are differences in the shapes and sizes of animals' hearts. Some hearts are simple organs, while others are more complex. Some animals even have more than one heart! The human heart is similar in structure to the heart of other mammals, such as pigs. A pig's heart is larger than a human's, but has all the same parts. Make a fist with one hand. Your heart is about the same size as your fist.

   Place the preserved pig heart on the dissecting tray, with the front of the heart facing upward. (**Hint:** Refer to the image below, and look for the right atrium.) Which side is the right atrium located on when you are facing it? Why is it called the "right" atrium?



Front of Heart

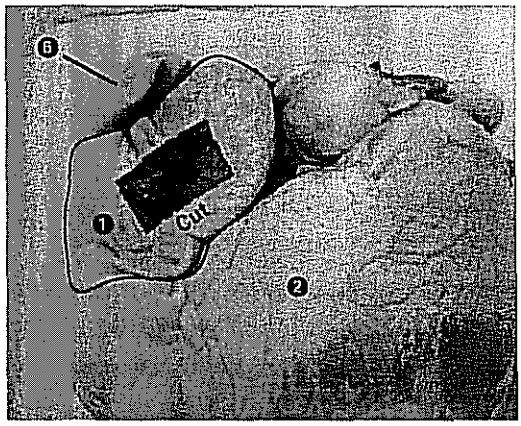
2. The heart is responsible for pumping blood throughout the body. It is an organ made up mostly of muscle, and is the strongest muscle in the human body. Touch the preserved heart. Is it soft or hard? Is it what you would expect, since it is made up of muscle?



Exterior Front

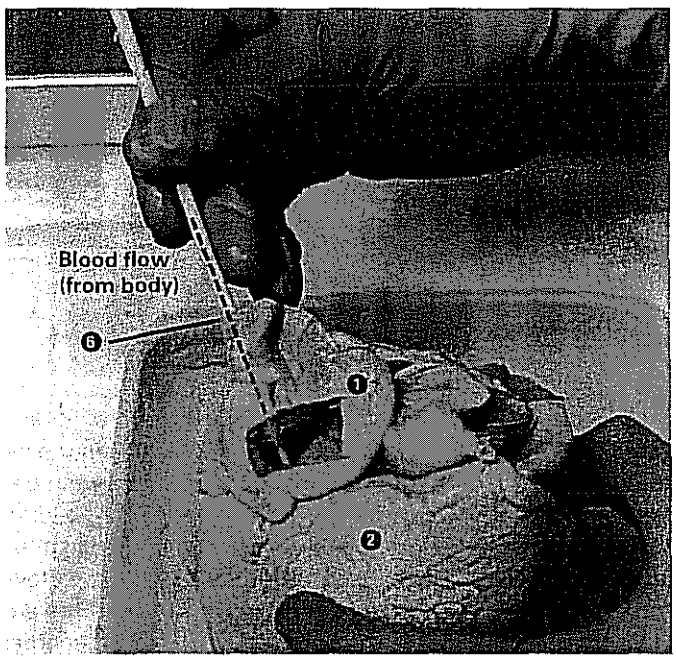
3. A mammal's heart has four separate chambers. Blood passes through all of these chambers. If the heart is functioning properly, blood moves in one direction through the chambers, and does not flow back into the area it just exited. Find the following areas on the preserved heart: **right atrium ❶**, **right ventricle ❷**, **left atrium ❸**, **left ventricle ❹**, the **aorta ❺**, and the **superior vena cava ❻**.

4. Blood carries oxygen (as well as liquids and nutrients) to all parts of the body, and it removes carbon dioxide and other wastes. Once the body uses the oxygen, the blood carries carbon dioxide back to the heart. The blood enters the heart through two large tubes, the **superior vena cava ❻** and the inferior vena cava. Then it flows into the first chamber, the **right atrium ❶**. Locate the superior vena cava and the right atrium in the photo. Cut a small square out of the wall to the right atrium (see "Right Atrium Cut"). The wall is not thick, but it may take several cuts to get through it.



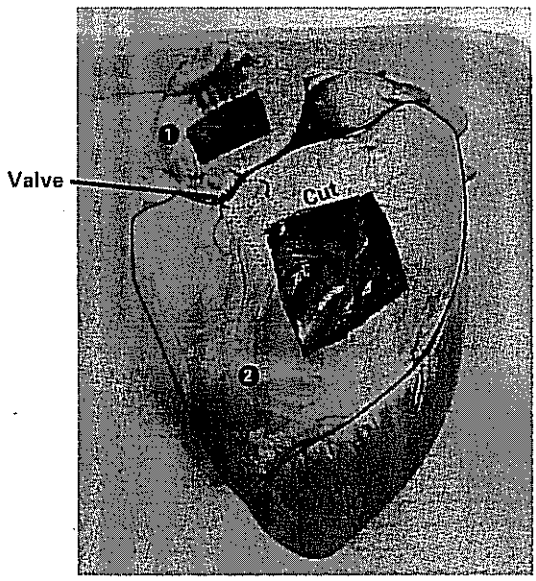
Right Atrium Cut

After you have made the cut, you should be able to see into the chamber of the right atrium. Using your probe, enter the right atrium through the tube of the superior vena cava (see "Right Atrium Blood Flow").



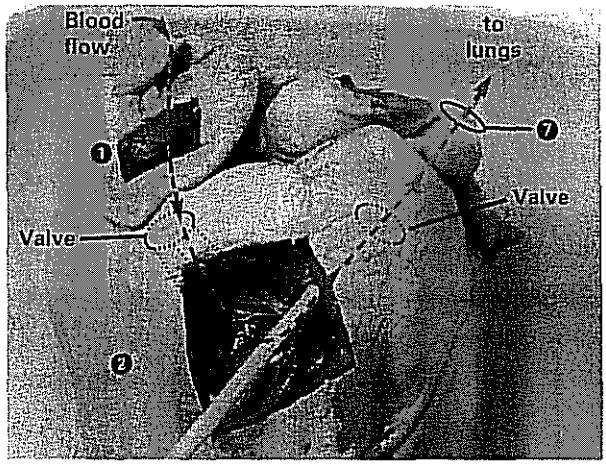
Right Atrium Blood Flow

5. Blood then flows into the right ventricle. There is a valve between the atrium and the ventricle to prevent blood from flowing backwards. When the heart beats, the noise it makes is actually the sound of different valves opening and closing. The heart contracts and expands, causing these valves to open and close and pushing the blood along. This contraction and expansion is what you feel when you hold your hand over your heart. When the valve opens between the right atrium and the right ventricle, blood flows into the ventricle. The valve then shuts so the blood will not flow back. Locate the **right ventricle** ❷. Cut a small opening in the heart, as shown (see "Right Ventricle Cut"). Like the right atrium, the wall is not thick but may take several cuts to get through.



Right Ventricle Cut

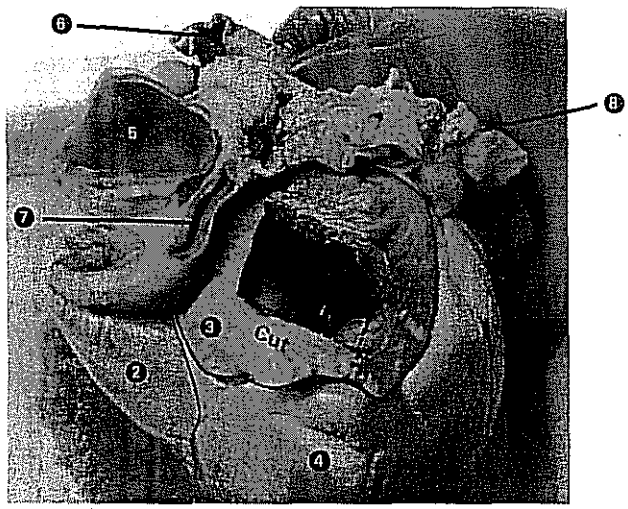
6. When the heart expands again, the blood moves into another tube called the **pulmonary artery** ❼. There is a valve between the ventricle and the pulmonary artery that prevents blood from flowing back into the ventricle. The pulmonary artery takes the blood to the lungs. Insert the probe into the right ventricle where you cut it, and push the probe through the pulmonary artery (see "Right Ventricle Blood Flow"). Every time you breathe, your lungs take oxygen out of the air and pass it into your blood. Oxygen makes blood red. What color is blood when it lacks oxygen?



Right Ventricle Blood Flow

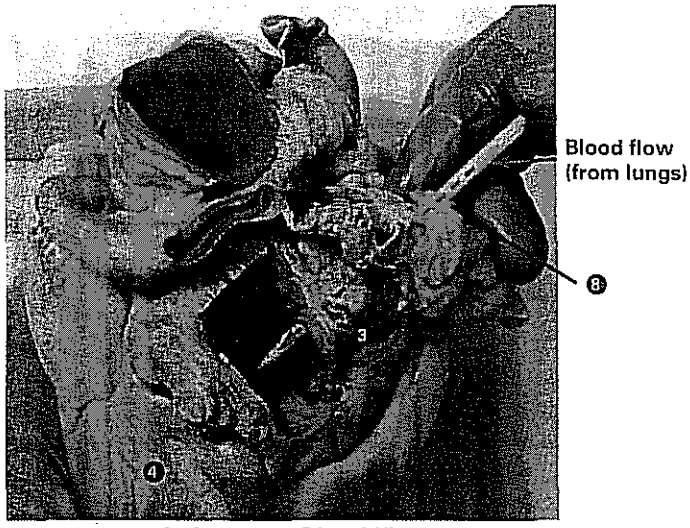
7. After the blood receives oxygen and releases carbon dioxide in the lungs, it flows back into the heart. This time, it enters the **left atrium** ❸ through the **pulmonary veins** ❽. Locate these structures on the preserved heart. You might have to turn the heart over to see the pulmonary veins.

8. Cut a small section out of the wall to expose the left atrium (see "Left Atrium Cut"). The wall is not thick, but may take several cuts to get through. Once you have made the cut, you should be able to see into the chamber of the left atrium.



Left Atrium Cut

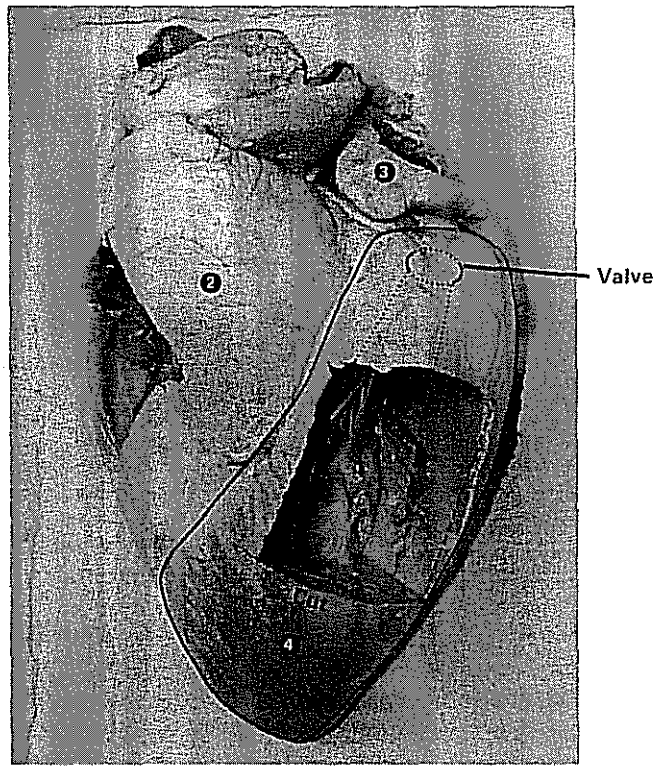
Trace the movement of blood from the lungs back into the heart by gently pushing your probe into the left atrium through a pulmonary vein (see "Left Atrium Blood Flow").



Left Atrium Blood Flow

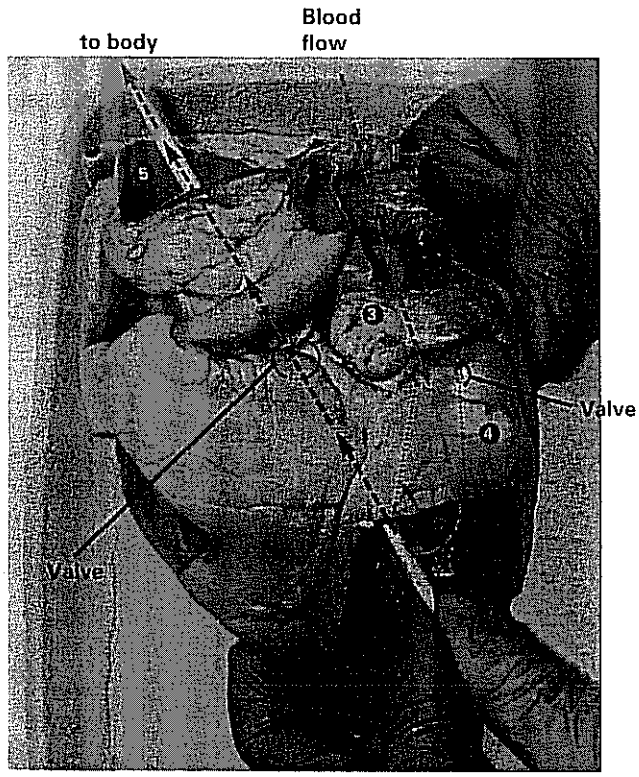
9. Next, the blood moves into the **left ventricle** ❹. Locate the left ventricle on the preserved heart. When the heart expands, it opens the valve between the atrium and ventricle, allowing the blood to move into the lower chamber. This is the last chamber that blood passes through before it is pumped out to the rest of the body. The muscle of the left ventricle is very thick. Why do you think this is so?

10. Cut a small opening in the wall of the left ventricle (see "Left Ventricle Cut"). Remember that the muscle is thicker here, so you will have to cut deeper to get to the chamber. After you have cut out an opening, look inside the chamber of the left ventricle. You should see some long, stringy tissue attached to the walls of the chamber. This is the valve that separates the atrium from the ventricle.



Left Ventricle Cut

Insert the probe into the left atrium, through the valve, and into the left ventricle (see "Left Ventricle Blood Flow"). Notice how much thicker the walls of the left ventricle are compared to the other chambers.



Left Ventricle Blood Flow

11. The next contraction of the heart closes the valve between the atrium and ventricle, and opens the valve exiting the ventricle into the **aorta** ❺. Locate the aorta. Insert the probe into the cut in the left ventricle and up through the aorta. After blood moves into the aorta, it flows into the many arteries found throughout the body, supplying oxygen. Eventually, the blood returns to the heart through the superior and inferior vena cava, and the process begins again.

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