

In this investigation, you will perform a real or virtual dissection to examine the internal structures of the circulatory system.

Question

What features of a mammalian heart can you identify in a real or virtual heart? What route does blood take through the heart?

Safety Precautions

- Be extremely careful when using dissecting instruments, particularly scalpels. Wherever possible, make cuts away from your body.
- The hearts are preserved in a chemical solution. Wear plastic gloves, safety glasses, and an apron at all times, and work in a well-ventilated area. If some of the chemical comes in contact with your skin, wash it off. At the end of the investigation or class, wash your hands thoroughly.
- Dispose of all materials as instructed by your teacher, and clean your work area.

Materials

- disposable plastic gloves or reusable rubber gloves
- safety glasses
- apron
- preserved sheep heart (or another mammalian heart)
- large tongs
- dissecting instruments
- plastic bag and tie (to store the heart if necessary)
- dissecting tray
- newspapers and/or paper towels

Procedure

1. Obtain a preserved sheep’s heart, and observe its external features. Rinse the heart thoroughly with water. This will remove any excess preservatives. Observe the pericardium, which is the sac surrounding the heart. If it is still attached, remove it. Note the fatty tissue accumulated on the heart. This is usually found along the edges of the heart chambers and surrounding the coronary arteries. Remove as much of the fatty tissue as possible.
2. Identify the apex, or pointed bottom, of the heart.
3. Use the illustrations and Figure 7.2 to help you locate the following structures:
 - a) the aorta
 - b) the superior vena cava
 - c) the pulmonary artery
 - d) the pulmonary vein
 - e) the inferior vena cava

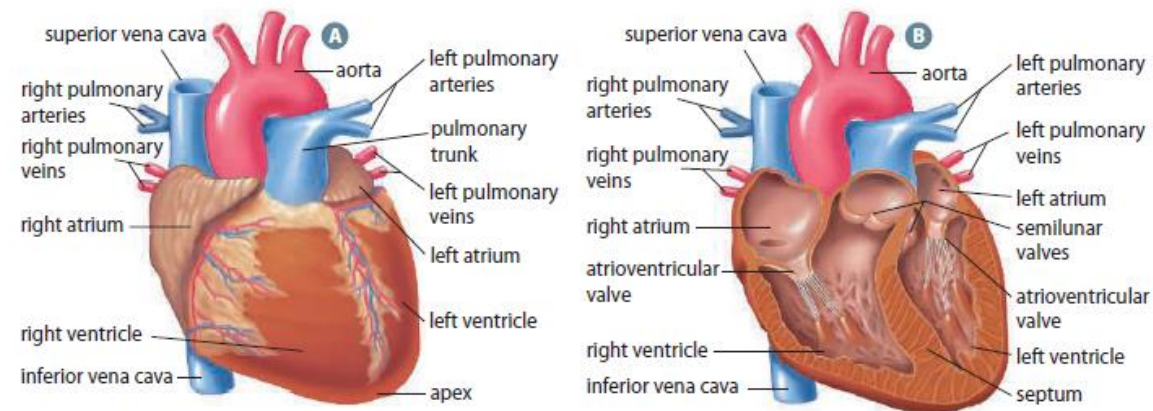


Figure 7.2 An external view (A) and a cross-sectional view (B) of the human heart

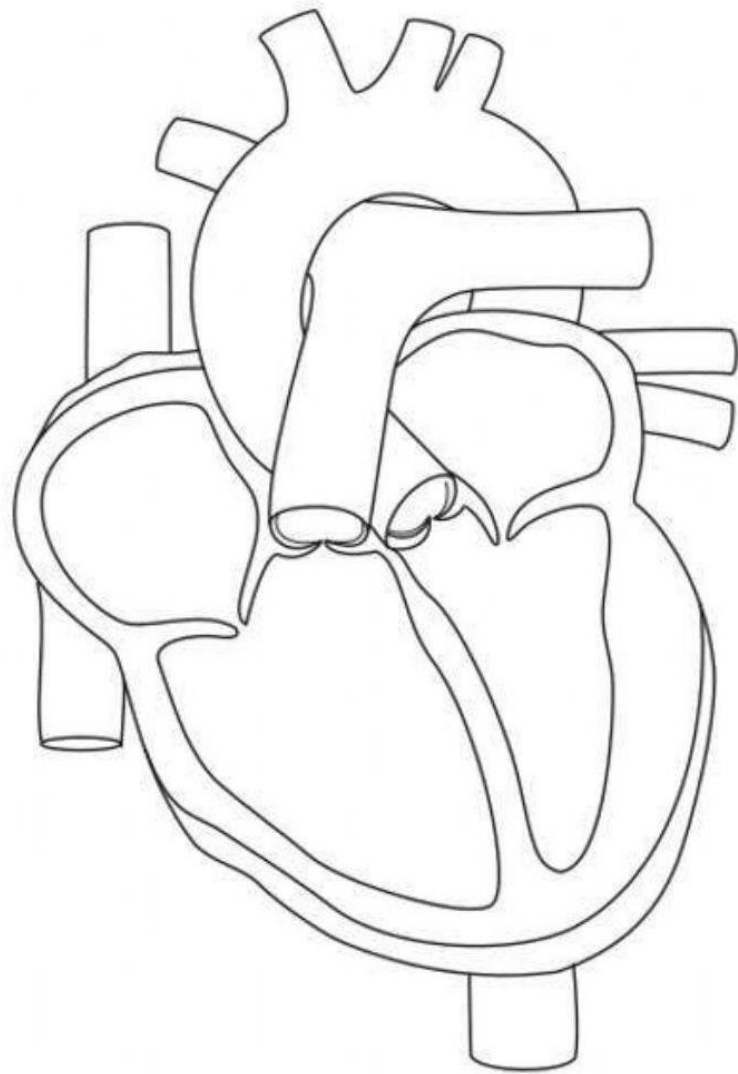
4. Begin a frontal cut through the heart at the apex, and move toward the base. Open the heart, and identify the chambers on the lower left and right sides. These are the left and right ventricles. There is a thick muscular structure separating the two ventricles. This is the septum. Identify the right and left atria, located above the ventricles. Compare the structures of the different chambers of the heart. Make a labelled drawing, and describe the structures in your own words.
5. The ventricles are separated from the atria above them by the atrioventricular valves. Identify these valves. You should also be able to see strong fibrous strings, called the chordae tendineae. Identify the left atrioventricular valve, which has two flaps or cusps, and the right atrioventricular valve, which has three cusps.
6. Complete a labelled drawing of your specimen, showing the external and internal features of the heart.

Analysis

1. Explain how the appearance of the following structures relates to their function as part of the circulatory system. Give as much detail as possible.

Structure	Size	Texture	External Structure	Internal Structure
right atrium				
left atrium				
right ventricle				
arteries, including the aorta				
left ventricle				
Veins				
heart valves				

2. Using your current understanding of the route that blood takes through the body, trace the movement of blood from the tissues through the heart and back to the tissues. Start with the superior and inferior vena cava.



Conclusions

3. Answer part (a) if you performed a real dissection. Answer part (b) if you performed a virtual dissection.

a) In what ways was your understanding of the heart and circulation enhanced by your observation of a real heart?

b) In what ways was your understanding of the heart and circulation enhanced by your observation of a virtual heart?

4. What experiences did you have that limited your observations or understanding? How could these limitations be overcome?

5. Label the following diagram using the terms below

- | | | | |
|--------------------|--------------------|------------------|----------------|
| aorta | superior vena cava | pulmonary artery | pulmonary vein |
| inferior vena cava | left ventricle | right ventricle | right atrium |
| left atrium | tricuspid valve | bicuspid valve | aortic valve |
| pulmonary valve | AV node | SA node | |

