Blood Vessels

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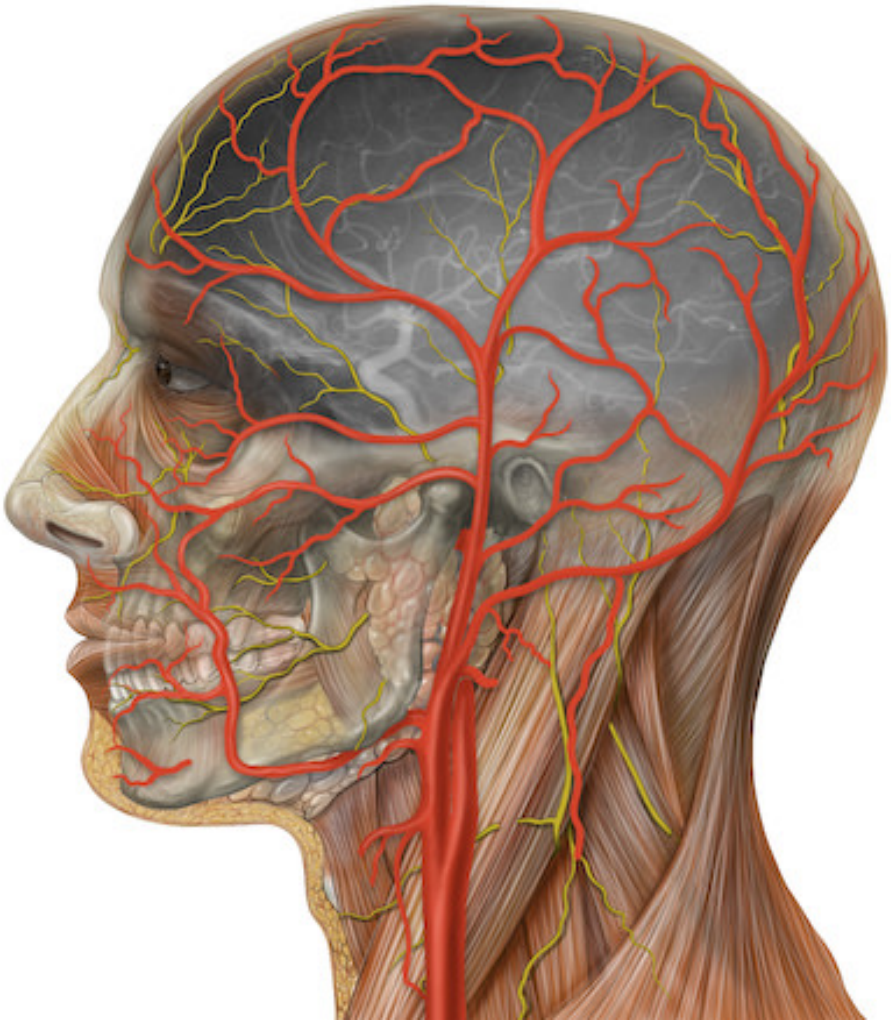
CHAPTER 1 Blood Vessels

Learning Objectives

- List the three types of blood vessels.
- Describe the major arteries and veins.
- Distinguish between systemic circulation and pulmonary circulation.



Why are these arteries so important?

The major arteries of the neck are shown here in red. The heart pumps oxygen-rich blood through these arteries to the brain. Without oxygen, the brain cannot survive longer than just a few minutes. So these arteries in the neck are very important.

Blood Vessels and Blood Circulation

The blood vessels are an important part of the cardiovascular system. They connect the heart to every cell in the body. **Arteries** carry blood away from the heart, while **veins** return blood to the heart (**Figure** 1.1).

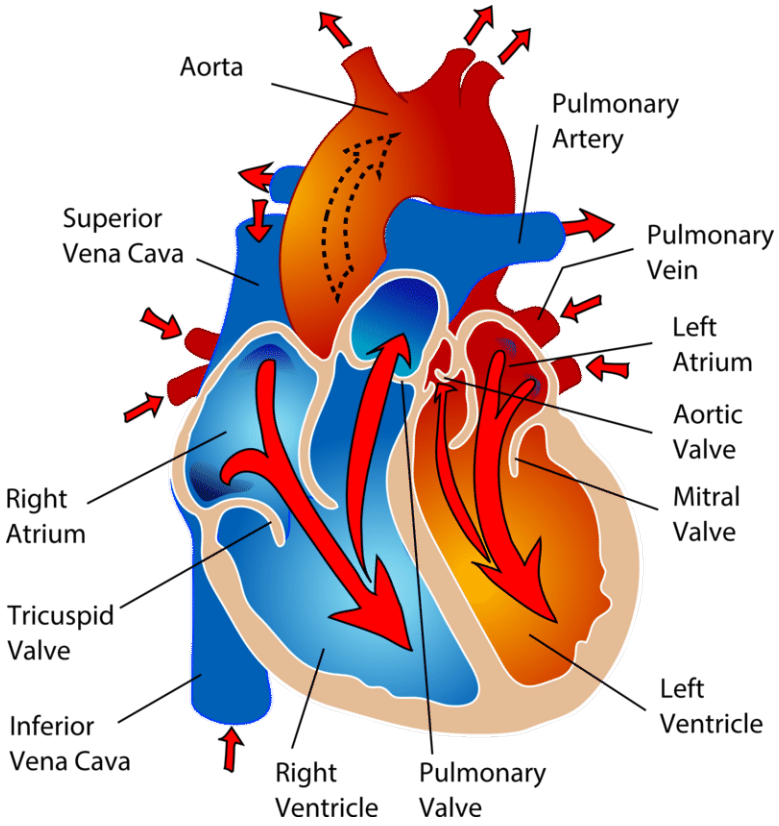


FIGURE 1.1

The right side of the heart pumps deoxygenated blood into pulmonary circulation, while the left side pumps oxygenated blood into systemic circulation.

Important Arteries and Veins

There are specific veins and arteries that are more significant than others. The **pulmonary arteries** carry oxygen-poor blood away from the heart to the lungs. These are the only arteries that carry oxygen-poor blood. The **aorta** is the largest artery in the body. It carries oxygen-rich blood away from the heart.

Further away from the heart, the aorta branches into smaller arteries, which eventually branch into capillaries. **Capillaries** are the smallest type of blood vessel; they connect very small arteries and veins. Gases and other substances are exchanged between cells and the blood across the very thin walls of capillaries.

The veins that return oxygen-poor blood to the heart are the **superior vena cava** and the **inferior vena cava**. The **pulmonary veins** return oxygen-rich blood from the lungs to the heart. The pulmonary veins are the only veins that carry oxygen-rich blood.

Pulmonary Circulation

Pulmonary circulation is the part of the cardiovascular system that carries oxygen-poor blood away from the heart and brings it to the lungs. Oxygen-poor blood returns to the heart from the body and leaves the right ventricle through the pulmonary arteries, which carry the blood to each lung. Once at the lungs, the red blood cells release carbon dioxide and pick up oxygen when you breathe. The oxygen-rich blood then leaves the lungs through the pulmonary veins, which return it to the left side of the heart. This completes the pulmonary cycle. The oxygenated blood is then pumped to the body through systemic circulation, before returning again to pulmonary circulation.

Systemic Circulation

Systemic circulation is the part of the cardiovascular system that carries oxygen-rich blood away from the heart, to the body, and returns oxygen-poor blood back to the heart. Oxygen-rich blood leaves the left ventricle through the aorta. Then it travels to the body's organs and tissues. The tissues and organs absorb the oxygen through the capillaries. Oxygen-poor blood is collected from the tissues and organs by tiny veins, which then flow into bigger veins, and, eventually, into the inferior vena cava and superior vena cava. This completes systemic circulation. The blood releases carbon dioxide and gets more oxygen in pulmonary circulation before returning to systemic circulation. The inferior vena cava returns blood from the body. The superior vena cava returns blood from the head.

Summary

- Arteries carry blood away from the heart, while veins return blood to the heart.
- Pulmonary circulation carries blood between the heart and lungs, while systemic circulation carries blood between the heart and body.

Explore More

Use the resources below to answer the questions that follow. Food and oxygen pass through the thin walls of the capillaries and into living cells.

- **Human Circulation: Blood Vessels** at http://www.youtube.com/watch?v=oruunlHsXoQ (3:50)

Explore More I

MEDIA

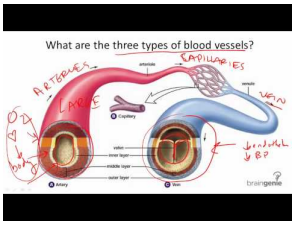
Click image to the left or use the URL below.

URL: http://www.ck12.org/flx/render/embeddedobject/57492

1. What is the difference between capillaries, veins, and arteries?
2. What is endothelium? What vessels have this tissue?
3. What do arteries and veins have that capillaries don't?

Explore More II

- **Blood Vessel Structure and Function** at http://www.youtube.com/watch?v=whtNDBIhczQ (3:16)



MEDIA

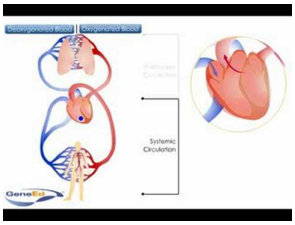
Click image to the left or use the URL below.

URL: http://www.ck12.org/flx/render/embeddedobject/57493

1. How does the structure of arteries differ from the structure of veins?
2. How is the structure of arteries related to their function?
3. How is the structure of veins related to their function?

Explore More III

- **Systemic and Pulmonary Circulation** at http://www.youtube.com/watch?v=0jznS5psypI (0:30)



MEDIA

Click image to the left or use the URL below.

URL: http://www.ck12.org/flx/render/embeddedobject/57494

1. What are the three types of circulation of the blood?
2. What is the function of the systemic circulation system?
3. What is the function of the pulmonary circulation system?

Review

1. What's the difference between veins and arteries?
2. Why can the heart be considered to be two separate pumps?
3. What is the systemic circulation?
4. What is the aorta?
5. What is a capillary? What happens in the capillaries?

References

1. Mariana Ruiz Villarreal (Wikimedia: LadyofHats), modified by CK-12 Foundation. Diagram of the circulation of blood from the heart . Public Domain