

Project 4.3.2: Varicose Veins

Introduction

An estimated 62,000 miles of blood vessels ensure that oxygen and nutrients are delivered to the trillions of cells in your body, and that waste products are taken away for disposal. If all of these blood vessels were laid out end to end, they would wrap around the Earth twice! This transportation system within your body consists of a series of tubes that branch out and come back together, making sure to service even the tiniest of tissues. Arteries carry blood away from the heart while veins transport blood back to the heart. Connecting these two types of vessels are tiny branches called *capillaries*, the site of gas exchange. Just like everything in the body, structure is highly linked to function. Since arteries and veins work in opposite directions, their structures have key differences that support what they do for the human body.

Your grandmother has noticed that she is starting to see her veins popping out on the back of her legs. Her doctor tells her that the development of these spider veins, or varicose veins, is normal for her age. She is prepared to “grow old gracefully,” but she does want more information about the cause of these annoying, wiggly veins. She knows you are taking Human Body Systems, so she comes to you for advice.

In this activity, you will explore the structure and function of veins and arteries by investigating the cause of spider veins or varicose veins. You have probably heard of varicose veins, but why haven’t you ever heard of varicose arteries?

Equipment

* Computer with Internet access
* Microscope
* Artery, vein and capillary microscope slide (Wards)
* Metric ruler
* Laboratory journal
* Various modeling supplies (optional)

Procedure

1. Use a microscope to view a prepared slide of a cross section of an artery, a vein and a capillary.
2. In your laboratory journal, use colored pencils to draw what you see. Label each vessel and make sure to note the magnification.
3. Work with your partner to devise a strategy for measuring the width of each vessel wall. Record your measurements in your laboratory journal.
4. Learn more about the structure and function of capillaries by visiting The Franklin Institute: The Human Heart – Blood Vessels at <http://learn.fi.edu/learn/heart/vessels/capillaries.html>.
5. Answer conclusion questions 1 and 2.
6. Combine with another pair to form a team of four. Working with this team, devise a way to explain how varicose veins form and to explain why people do not develop varicose arteries.
7. Use the Internet to research the structure of arteries and veins as well as the science behind varicose vein formation. Pay attention to the structural differences between the vessels and think about the force of blood flow in each type.
8. Note that the format of the final product is up to your group. You can explain the topic with diagrams and drawings. You can construct vessels using various materials such as clay, balloons, paper, straws, or tubing and *show* how varicose veins form. You can create an informative brochure. You can write a letter to your grandmother that explains (in words and in pictures) how these veins occur. Be creative.
9. Brainstorm with your group and divide tasks. Whatever the format, your project must show:

* How and why arteries and veins differ in structure
* How blood is helped in its return back to the heart (You must mention the role of at least two other body systems. Bonus points if you can show it.)
* How varicose veins form and why we do not ever see varicose arteries

1. Be prepared to share your ideas and present your final product to the class.
2. Answer the remaining conclusion questions.

Conclusion

1. What do you notice about the width of an artery wall versus the width of a vein wall? Why does this make sense given the function of the vessels?
2. Capillaries function in gas exchange. Describe at least two ways capillary structure is related to this function.
3. How do capillaries interact with the respiratory system? Make sure to mention specific structures of the respiratory system. Refer back to your graphic organizer if you need help remembering key anatomy.
4. Which artery do you think is made of thicker muscle, the aorta or the pulmonary artery? Why? Refer back to your heart box to visualize the path of these vessels.
5. Describe two ways blood is helped back to the heart in veins. Mention relevant body systems.
6. Explain why a person who spends most of the day on his/her feet is more likely to develop varicose veins.