

Keeping the Flow

OVERVIEW

In this lesson, students assess the impact of diet on the function of the cardiovascular system. They experiment in groups on how the clogging of blood vessels affects the flow of blood through the body. Additionally, they discover how cardiovascular disease develops over time and learn about ways to maintain a healthy cardiovascular system. The students discuss what they can do to maintain a healthy cardiovascular system and articulate how they plan to implement what they have learned.

AIM

To investigate the impact of diet on cardiovascular function and the development of cardiovascular disease.

SCIENTIFIC PROCESSES

- question, experiment, construct knowledge, apply

OBJECTIVES

Students will be able to:

- explain how cardiovascular disease disrupts the function of the cardiovascular system;
 - explain how diet impacts cardiovascular health;
 - state ways in which they plan to maintain cardiovascular health.
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MATERIALS

For the teacher:

- Red food coloring
- Corn starch (optional)
- Stove, microwave, or other heat source (optional)
- Plastic cup for each group of 4–6 students
- 3-inch piece of $\frac{3}{4}$ -inch clear plastic tubing
- 2 tbsp of yellow play dough

For each group of 2 students:

- Two 3-inch pieces of $\frac{3}{4}$ -inch clear plastic tubing

- 2 tbsp of yellow play dough
- 1 cup of “blood” (water mixed with red food coloring)
- small plastic bowl
- pencil

For each student:

- *HOW TO Tracker* activity sheet
- *Go With the Flow* activity sheet
- *Eating for a Healthy Heart* student reading
- *Interviewing My Family* activity sheet

PROCEDURE

Before You Begin:

- Review the *Go with the Flow* activity sheet and the *Eating for a Healthy Heart* student reading.
- Make “blood” for *Go with the Flow* activity. You can make simple “blood” by mixing red food coloring with water. You can thicken this simple blood with cornstarch. First, heat the simple blood (water + red food coloring) until almost boiling, turn off heat. Make a mix of 1 teaspoon cornstarch per cup blood with about an eighth of a cup cold water. Add the cornstarch + cold water mixture to the warm water + red food coloring mixture. Return to medium heat and stir until desired thickness. Store in covered container to avoid a film forming on the top.
- Organize the materials needed for each pair of students and be ready to distribute them.
- Follow the instructions on the *Go with the Flow* activity sheet to make one sample clogged blood vessel.
- If you have not already done so, post the Module and Unit 4 questions at the front of the classroom.

MODULE QUESTION

How can we use scientific evidence to help us make healthful food and activity choices?

UNIT QUESTION

Why are healthful food and activity choices important for our bodies?



APPLYING TO LIFE

1. HOW TO Tracker Discussion (3 min)

Have the students take out their *HOW TO Trackers*. You may give them a minute to make an entry on the tracker, but encourage them to make entries at the time of their goal attempt. Ask a few students to share their experiences with the class. Compliment success and have the students help each other brainstorm ways to overcome challenges.



QUESTIONING

2. Review Module and Unit Questions (1 min)

Remind the students that the Module and Unit questions and explain that today we are going to learn about the effect of diet on our cardiovascular system.

3. Finding Out What They Know (5 min)

Ask students if they have ever heard anyone talk about having “high cholesterol” and what this means. Listen to their responses, and see what they know already about the impact of cholesterol and fat on the cardiovascular system and the cause of heart attacks and cardiovascular disease.



EXPERIMENTING

4. Comparing Blood Flow in Clogged and Unclogged Blood Vessels (20 min)

Explain that students will do an activity in which they will compare two models of blood vessels: one that is very clogged with fat and cholesterol and thus has developed a lot of plaque (a precursor to cardiovascular disease) and one that is not clogged with plaque. As a pair, students will then compare the way “blood” flows through these two different blood

vessels to show how much harder the body has to work to pump blood through clogged arteries. Distribute the materials needed for the making the models and have each pair follow the ***Go with the Flow*** activity sheet. You can show your sample as a visual of what the clogged vessel should look like. When the blood vessel is completed, give students the “blood” so they can complete the second part of the activity. As they finish, they can answer the questions at the end of the activity sheet. At the end of the lesson, have them clean the play dough out of the clogged blood vessel by pushing a paper towel through the tube with a pencil.



THEORIZING

5. The Problems with Clogged Vessels (5 min)

Discuss students’ answers to the questions at the end of the ***Go with the Flow*** activity sheet. Review the information covered in the previous lesson about the function of the heart and circulatory system. Guide them towards making the connection that clogged blood vessels will make it more difficult to deliver the oxygen and nutrients our bodies need to get. Blood still has to get around to all parts of the body. Therefore, the heart will have to pump harder to get the blood through and blood going through clogged vessels causes increased pressure within the blood vessels causing high blood pressure. Explain that there are also blood vessels that “feed” the heart and supply it with the oxygen and nutrients it needs to keep beating. If the major blood vessel that feeds our heart (called the coronary artery) becomes completely clogged, this causes a heart attack.



SEARCHING

6. Keeping Our Blood Vessels Healthy (5 min)

Have students read the ***Eating for a Healthy Heart*** student reading. Using the results of the

experiments and what they learned from the student reading, students should discuss how diet affects the function of the cardiovascular system. *What will happen if we eat a diet rich in animal fat? What will happen if we don’t get enough exercise? What can we do to reduce the risk of cardiovascular disease?*



APPLYING TO LIFE

7. Long Term Build-Up (5 min)

Explain that the clogging of our blood vessels with plaque happens over a long period of time. It’s not as if the day after we eat a hamburger, our blood vessels are covered in fat. Yet while the clogging of blood vessels accumulates with age, this does not mean that young people cannot have clogged blood vessels. Emphasize that this is not an irreversible situation. If you change your eating and activity habits to be more “heart friendly,” you can improve the health of your heart and circulatory system, especially when you are young.



SEARCHING

8. Surveying Others (homework)

In the next lesson, students will be learning about type 2 diabetes, which is often associated with a cluster of factors including abdominal obesity, high blood pressure, high blood glucose levels, high LDL cholesterol, high blood triglycerides, and low HDL cholesterol. In an effort to make this complex syndrome applicable to their lives, ask the students to survey family members using the ***Interviewing Family Members*** activity sheet. They may want to ask them about symptoms, probable causes, and treatments.



Name	Date
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Go With the Flow

Making Blood Vessel Models

1. Examine the materials on your table. The plastic tubes represent **blood vessels**. The yellow play dough represents **plaque**, which comes from the fat and cholesterol in the foods we eat.
2. Put one of the blood vessels (plastic tubes) aside for the next part of the activity. This will be an example of a blood vessel that has *not* been clogged with plaque.
3. With a partner, use the other plastic tube to make a blood vessel that *is* clogged with a lot of plaque (play dough) and only has a small opening for blood to flow through. To do this, make a long, skinny piece of play dough a little smaller in diameter than the plastic tube, and put the skinny pieces of play dough in each end of the tube. After the tube is mostly filled with play dough, stick a pencil all the way through so that there is a small opening (about the diameter of a pencil) through the whole tube.
4. Show your blood vessel to your teacher and ask for some “blood” to do the next part of the experiment.

Comparing Blood Flow

1. Hold the *unclogged* blood vessel over the plastic bowl on your table. Have one person pour the blood through the blood vessel as fast as possible while the other person counts out seconds. Record your observations of how the blood flowed through the vessel. What did it look like?

How many seconds did it take to pour all the blood through? _____ seconds

2. Predict how you think blood will flow differently through the vessel clogged with plaque (play dough):

(continued on next page)



Name

Date

Go With the Flow

- 3. Hold the *clogged* blood vessel over the plastic bowl. Again, have one person pour the blood through while the other person counts, and record your observations of how the blood flowed through the vessel. What did it look like?

How many seconds did it take to pour all the blood through? _____ seconds

- 4. What was different about the way blood flowed through the two blood vessels?

- 5. What do you think would happen if your heart had to pump blood through very clogged blood vessels? Why would this be a problem? (Think back to what you learned about the circulatory system in Lesson 6, Inside Calvin.)

- 6. Why do you think blood vessels get clogged?

- 7. What do you think you could do to keep your blood vessels from getting clogged?



Name

Date

Eating for a Healthy Heart

Guiding Questions:

1. If we eat a lot of fatty foods, what can happen to our blood vessels?
2. What types of fat can cause your blood vessels to get clogged? Give some examples.

What are Some Heart-Friendly Foods?

Foods that come from plants like fruits, vegetables, oatmeal, cold cereal, whole wheat bread, or beans are good for our heart because they are naturally high in nutrients our body needs and low in fat.

What Foods are Not-So-Friendly to My Heart?

Foods that have too much cholesterol or a kind of fat called saturated fat can hurt your heart. Over time, eating too much saturated fat and cholesterol may cause your arteries to clog up. This makes it hard for your heart to pump blood to the rest of your body. Food from animals, especially beef, pork, and cheese, are high in saturated fat and cholesterol. Deep fried foods such as French fries and donuts are also not heart-friendly.

What are Cholesterol and Saturated Fat?

Cholesterol is a soft, fatty substance that's found in your body's cells. Your body makes some cholesterol and some of it we get from food. Saturated fat is fat from animals. They both can be found in foods like whole milk, eggs, meats cheese, and butter.

Why is Eating Too Much Fat and Cholesterol Bad for You?

Regularly eating lots of foods high in saturated fat and cholesterol can be bad for your heart. The fat and cholesterol may build up on the inside of your blood vessels and not allow blood to move through. Picture how easy it is to drink from a nice clean straw. Now picture how it might be to drink out of a straw that someone has stuffed full of butter! Yes, it would be disgusting to think about drinking through a straw full of butter, but think about how much harder you would have to breathe in to get the liquid to come through the straw. When blood vessels are clogged the heart has to work lots harder because the heart still needs to get blood to all parts of the blood. The narrower blood vessels means there is more pressure in them as blood travels through. This can cause high blood pressure.



Name

Date

Interviewing My Family

The adults in your family include your parents, grandparents, aunts, and uncles. Ask as many adults in your family as you can if they the conditions listed below. You can also ask kids too. Write the name of each person and circle which conditions he or she has.

Name	Condition (circle all that the person has)	
	None High blood pressure Type 2 diabetes or high blood sugar	High blood cholesterol or triglycerides Low good cholesterol (HDL) Fat in the stomach area (abdominal obesity)
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