



Cardiologist: Heart Anatomy

Time: 45 Minutes **Skill Level:** Middle School (age 12-14)

Background

What is Science Inquiry?

Children are natural scientists. From a very early age they explore the world, ask questions and seek answers. This journey of exploration and discovery is Science Inquiry. Science Inquiry helps young people understand their environment, solve problems and gain knowledge about scientific ideas and processes.

Next Generation Science Standards (NGSS)

Science and Engineering Practices

- 2. Developing and using models
- 6. Constructing explanations
- 7. Engaging in argument from evidence
- 8. Obtaining, evaluating, and communicating information

Disciplinary Core Ideas

LS1: From molecules to organisms: Structures and processes

Crosscutting Concepts

- 2. Cause and effect: Mechanism and explanation
- 4. Systems and system models
- 6. Structure and function

Objective

In this activity, students will build a working model of a heart and investigate a pig heart.

About the Scientist

Cardiologists are medical physicians that study the heart. The word cardiologist comes from the ancient Greek word, *kardía*, meaning *heart*. Cardiologists study a variety of heart phenomena including congenital heart defects, coronary artery disease, heart failure, and electrophysiology.

The Science of Hearts

The heart contains valves which direct the flow of blood in one direction. Blood is forced through the flexible membranes which form the valves. Once the blood passes through the membranes, the valves collapse into a barrier, preventing the blood from flowing backwards.

Students can find examples of pumps and valves in facets, aerosol sprays, automobile fuel pumps, and many household items in daily use. Some beverage containers use a valve that resembles the valves in the heart.

Point out to the students that the heart is a muscle and not a mechanical pump. It can also be

The Science of Hearts (*continued*)

pointed out that comparisons of this kind are known as reasoning by analogy and are an important part of scientific reasoning.

Watch the Video: <http://oregon.4h.oregonstate.edu/science-engineering-and-technology>

Materials List

Wide mouth jar	Scissors
Balloons	Tub or pail to collect water that spills
Skewer	Sponge
Two flexible straws	Pig heart

Discuss...What do the students know about hearts? How do you know you have a heart? What are some unique properties of the heart?

Predict...What do the students think will happen when we build a heart pump? How will this pump relate to the heart?

Experience “What to Do”- What is the plan for the investigation?

1. Find your pulse either on your neck or your wrist. Can you feel it? What is it doing? Do animals have a pulse?
2. Fill the wide mouth jar half full of water. Cut the neck of the balloon off and stretch the balloon over the jar so it fits tightly. Save the neck of the balloon for use in step three. With the skewer, poke two holes in the stretched balloon about 2 cm apart.
3. Carefully insert a straw into each of hole in the balloon. The straws should fit snugly. If there are gaps between the straws and the balloon. Start over.
4. Use the neck of the balloon to make a valve. The valve goes on the end of the straw as a flap. Secure lightly with tape. Bend the straws down. Place the jar in a tub or pail.
5. Push and release the balloon stretched over the jar several times. Can you get water to move through the straws? In what direction does the water flow?
6. Now look at the pig heart. What comparisons can you make? Using the heart parts worksheet, can you identify the parts of the heart?

Share ...Ask students to describe what they observed happening after each pump. Ask students to think about how this relates to a heart.

Reflect ...Analyze and interpret the data and results. Discuss among the group. What other questions do you have now that you have conducted this experiment? What other things does the heart do? Do your animals have hearts? What do animal hearts do?

Generalize ...to real world examples. Construct explanations. What does the heart do and how does it work? Why is this important to understand for animal science?

Apply ...outside the classroom or club meeting.

How can we use the information we just learned?

Developed by Dani Annala, Hood River Co. 4-H Agent, Dani.Annala@oregonstate.edu

Agriculture Sciences & Natural Resources, Family & Community Health, 4-H Youth, Forestry & Natural Resources, and Extension Sea Grant programs. Oregon State University Extension Service offers its programs and materials equally to all people.