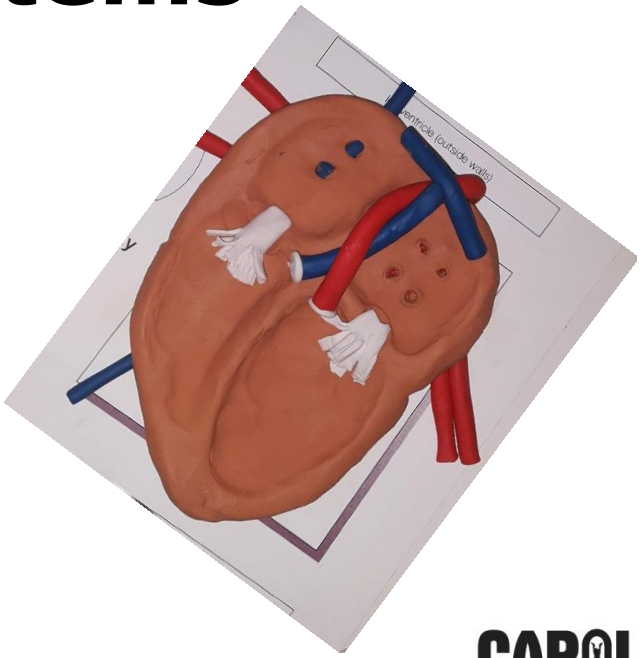
Carolina Biological Supply Company

The Pressure's On: Creating and Using Models of Body Systems



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Session Objectives

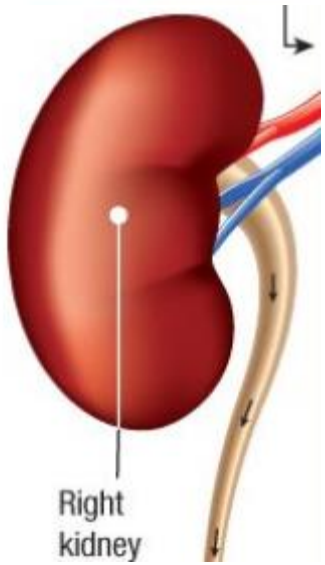
- **Try some fun, hands-on activities for teaching interactions between the urinary and cardiovascular system, and structure and function of the heart**
- **Learn about Carolina's anatomy and physiology kits**

Building Toward 3-Dimensional Learning

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
• Planning and carrying out investigations: Identify what is to be recorded, what are independent and dependent variables, and how data collected are used to test existing theories. • Constructing explanations: Construct logically coherent explanations of phenomena that incorporate students' current understanding of science.	**LS1.A:** Structure and function: Special structures are responsible for particular functions. **LS1.D:** Information processing: Each sense receptor responds to different inputs.	• Cause and effect: Mechanism and explanation: Explaining causal relationships and the mechanisms by which they are mediated. Predict and explain events in new contexts. • Structure and function: The way a living thing is shaped determines many of its properties and functions.[1]

1. NGSS Lead States, *Next Generation Science Standards: For States, By States* (Washington, DC: The National Academies Press, 2013), retrieved from www.nextgenscience.org or ngss.nsta.org.

Learning Context



- **Middle School Life Science**—Cardiovascular system, structure and function
- **High School Life Science**—Cardiovascular system, structure and function
- **Anatomy and Physiology**—Cardiovascular system, structure and function
- **Medical Careers or Allied Health**—Cardiovascular system, structure and function

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Safety Issues

- **Personal Protective Equipment**
  Aprons and gloves are provided

- **Clutter-Free Work Space**
  Place all personal items on the floor

- **Safety Tip**
  If you are not using an instrument, set it down

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Modeling Kidney Function

Materials

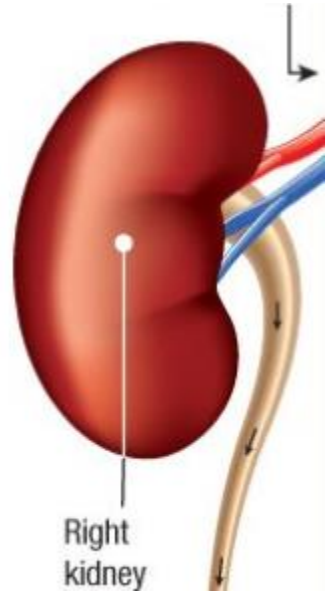
- Carolina® Simulated Kidney Blood
- Dialysis tubing
- Plastic cups
- Simulated salt test strips
- Pipets
- Absorbent pad

Procedure

1. 20 cm of dialysis tubing is presoaked on your table.
2. Half fill your cup with water.

Modeling Kidney Function

3. Dip a simulated salt test strip into the water. Swirl for 3 seconds. Record results after 3 minutes.
4. Tie one end of your dialysis tubing into a knot.
5. Use a graduated pipet to measure 10 mL of simulated kidney blood into the dialysis tubing.
6. Carefully tie a knot in the open end of the tubing.
7. Rinse your tubing to remove any simulated blood from the outside.



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Modeling Kidney Function

8. Place the tube in your cup of water.
9. After 5 minutes, record any observable changes to your cup.
10. After 10 minutes, dip a simulated salt test strip in the cup. Swirl for 3 seconds. Record results after 3 minutes.

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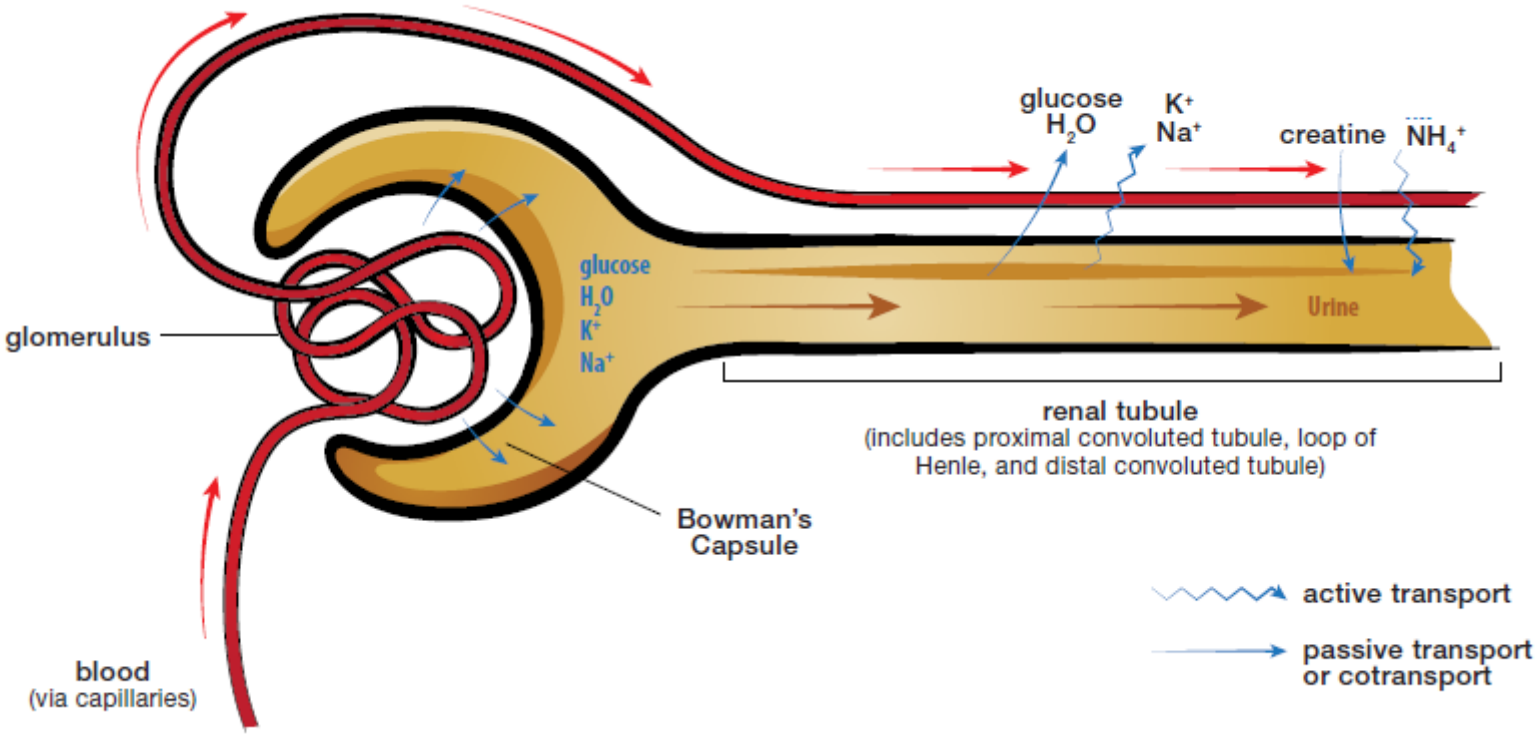
Excretory and Cardiovascular Interactions

Microscope Demonstration



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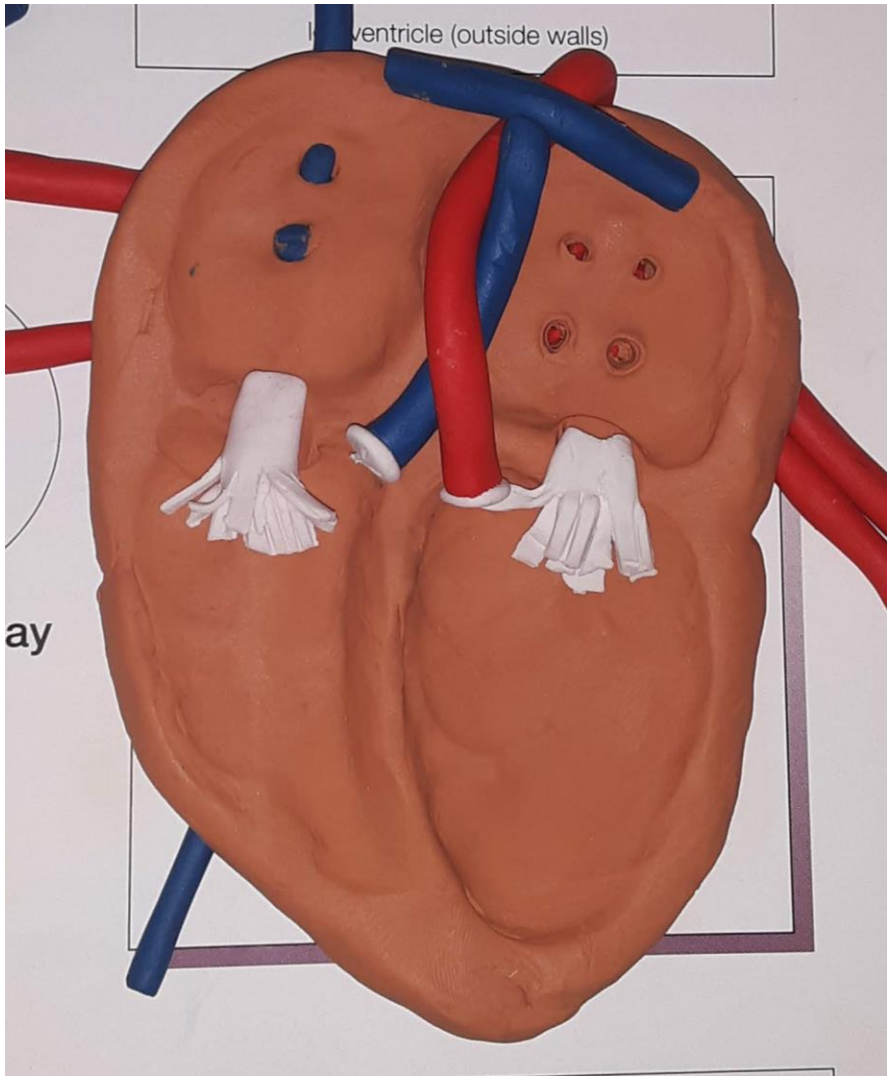
Modeling the Internal Anatomy of the Human Heart



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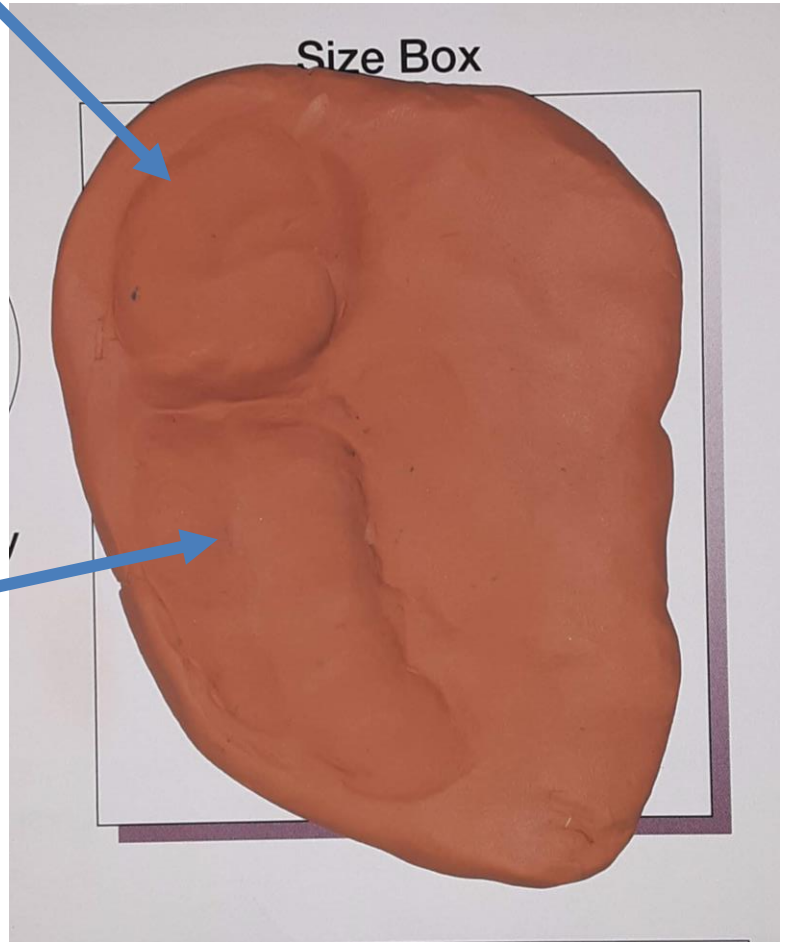
Modeling the Internal Anatomy of the Human Heart

Materials

- ½ stick terra cotta clay
- ¼ stick each of blue, red, white clay
- Clay sculpting tool
- Workstation mat

Procedure

1. Mold the terra cotta clay into a strawberry shape.
2. Start by forming the right atrium.
3. Below the right atrium, form the right ventricle.



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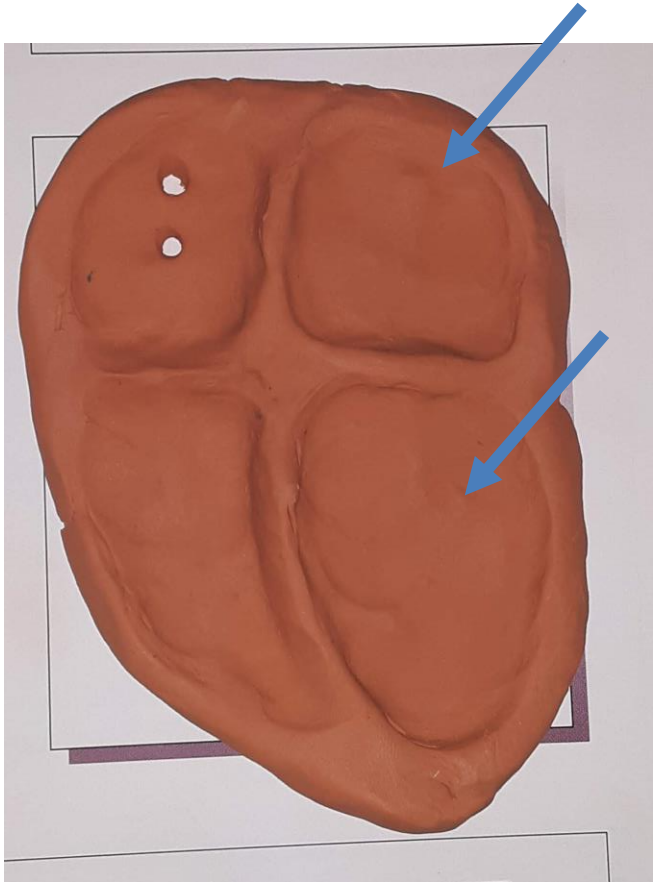
Modeling the Internal Anatomy of the Human Heart

4. **Form the left atrium. Be sure to leave the septum intact between the left and right atria.**
5. **Form the left ventricle, leaving a wall between the atrium and ventricle. Remember that the left ventricle is the largest chamber of the heart.**
6. **Poke 2 holes in the top of and through the back wall of the right atrium.**



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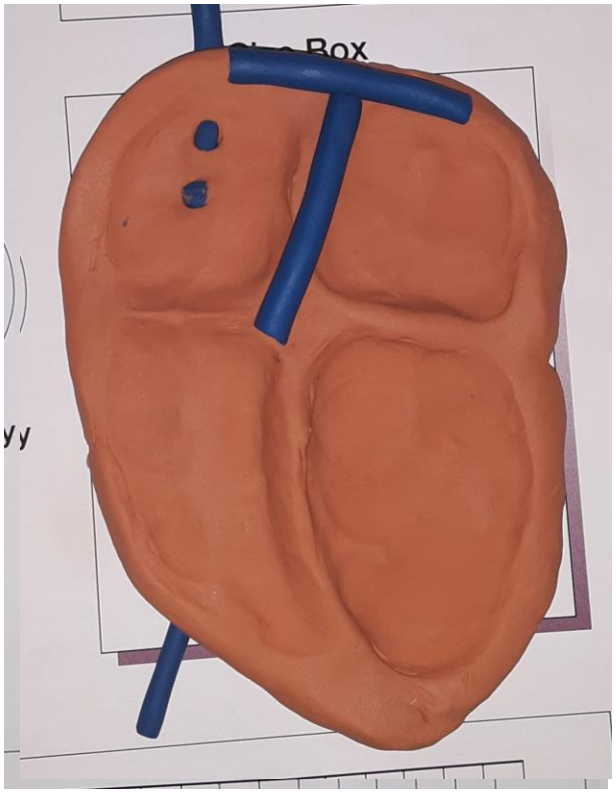
Modeling the Internal Anatomy of the Human Heart

7. **Using blue clay, roll two 2- to 3-inch "snakes" and insert them into the holes made in step 6. The "snakes" are the <u>superior vena cava and inferior vena cava</u>.**



8. **Roll two blue 2½-inch "snakes." Roll this into a T shape. Place them in a T shape on the surface of the heart, connecting to the right ventricle and its top across the top of the atria. This is the <u>pulmonary artery</u>.**

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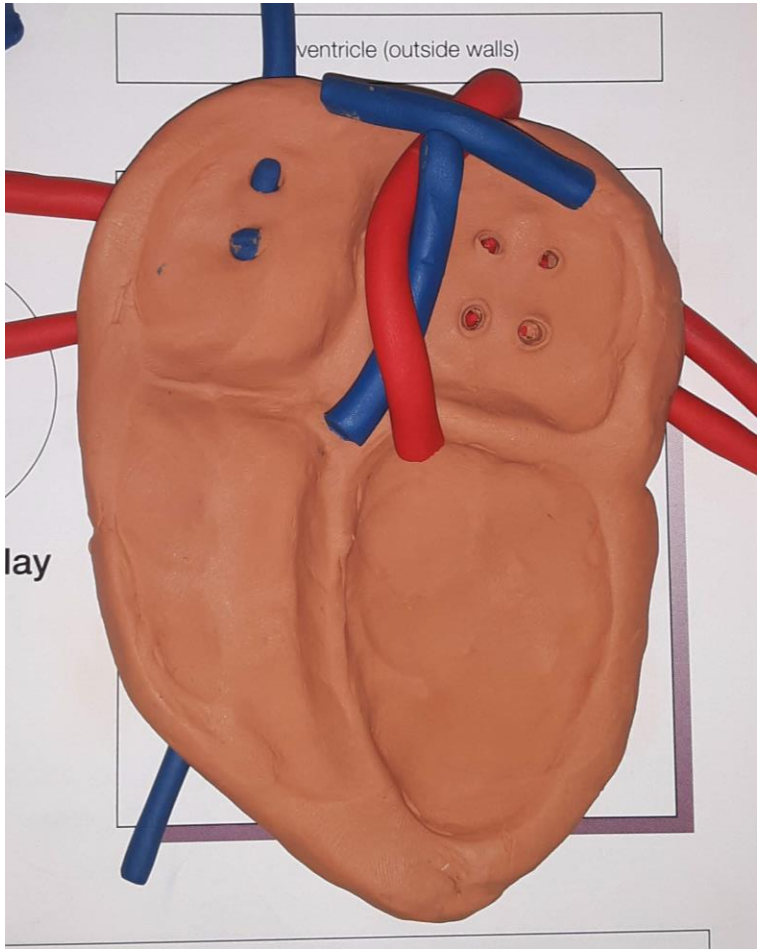
Modeling the Internal Anatomy of the Human Heart

9. **Make 2 pairs of small vertical holes in the back wall of the left atrium.**
10. **Using red clay, roll four 2- to 3-inch "snakes." These are the <u>pulmonary veins</u>. Attach them to the holes made in step 9.**
11. **Roll a 3-inch red "snake" and place it on the surface of the heart. This is the <u>aorta and aortic arch</u>.**



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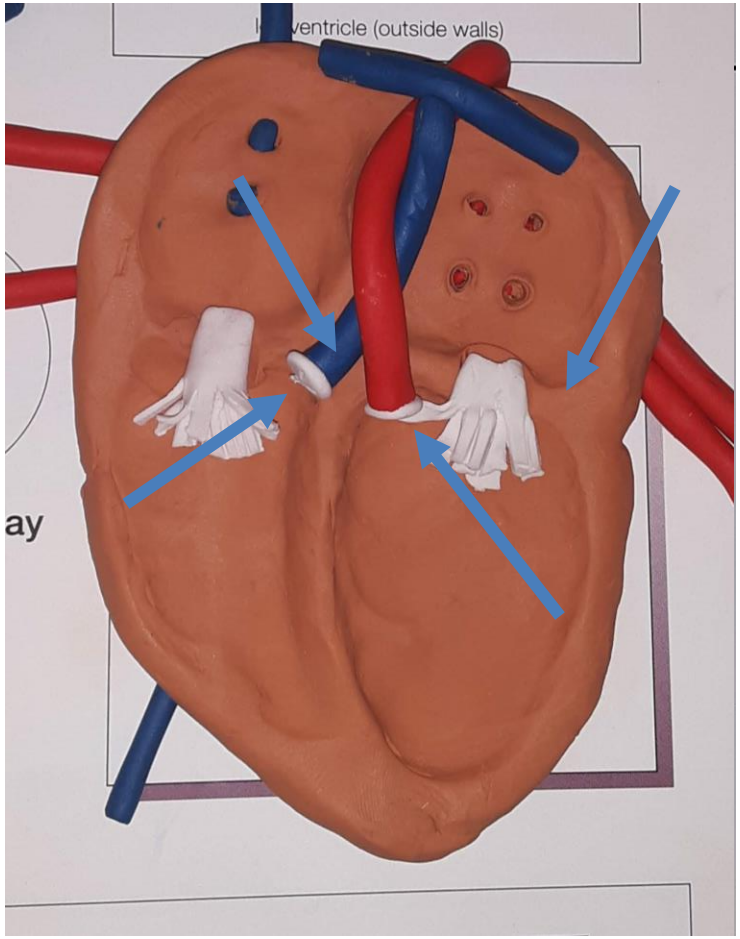
Modeling the Internal Anatomy of the Human Heart

12. **Poke a small hole in the wall between the right atrium and right ventricle. Repeat on the left.**
13. **Using white clay, make 2 small rectangles. Cut strips on each that look like fringe.**
14. **Roll each rectangle into a tube. These are <u>chordae tendineae</u>.**
15. **Using white clay, make 2 small discs. Place them on the ends of the pulmonary artery and the aorta. Draw a Y on each. These are <u>pulmonary and aortic valves</u>.**



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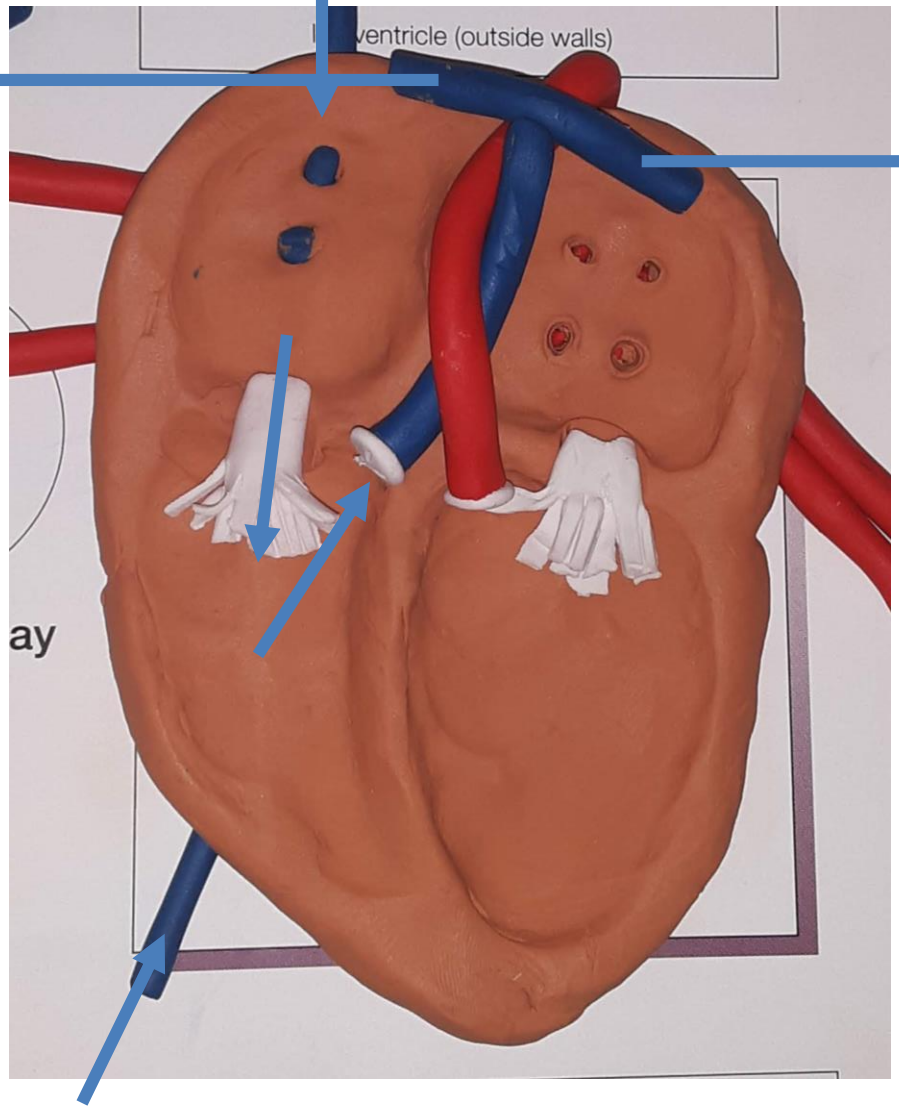
Modeling the Internal Anatomy of the Human Heart



Blood flows into the right atrium from the superior vena cava and inferior vena cava

Blood flows through the tricuspid valve to the right ventricle

Blood flows through the pulmonary valve into the pulmonary artery to the lungs.

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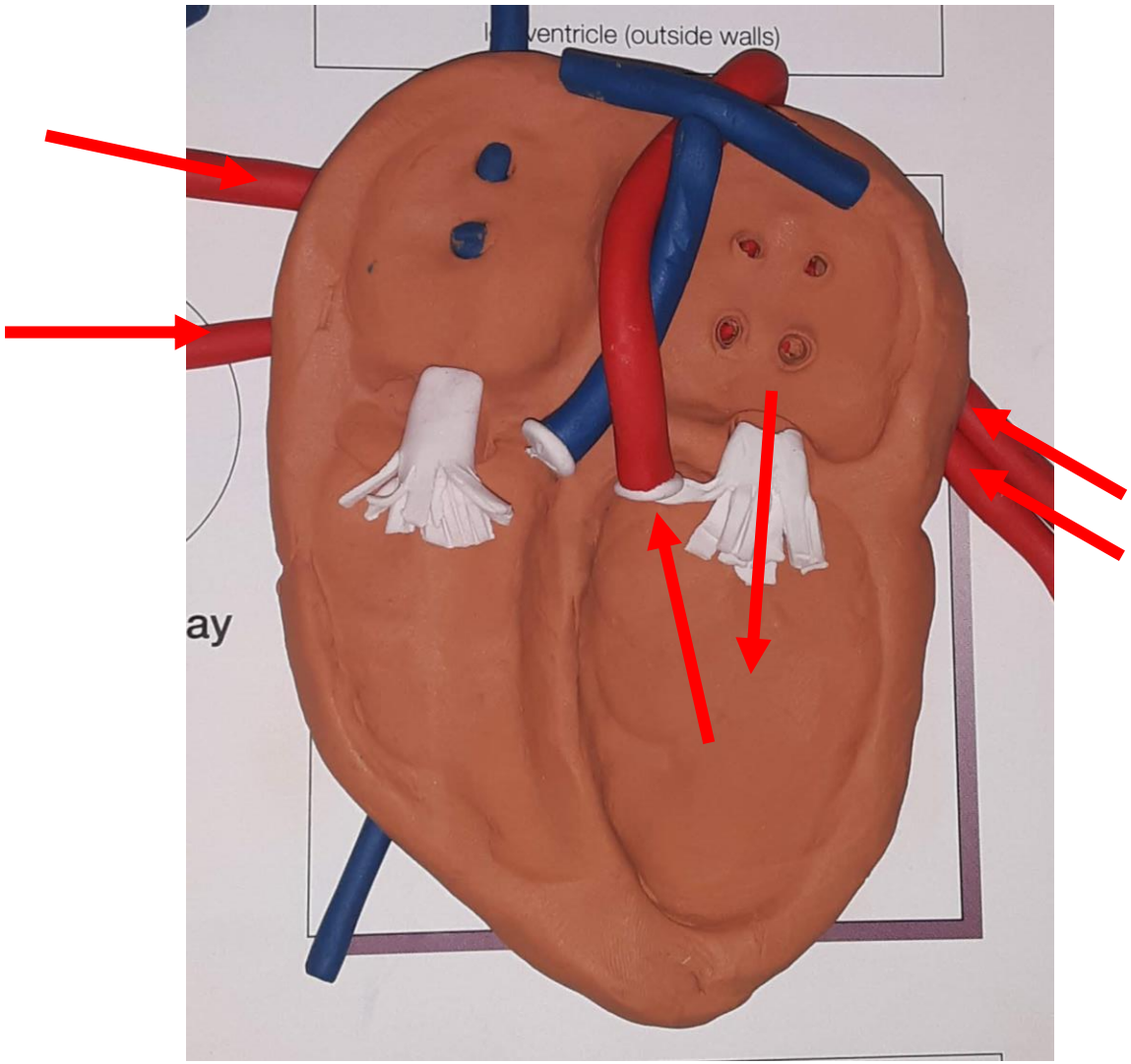
Modeling the Internal Anatomy of the Human Heart



Blood returns from the lungs to the left atrium through the pulmonary veins

Blood moves through the mitral valve into the left ventricle

Blood exits the heart through the aortic valve into the aorta and out to the body

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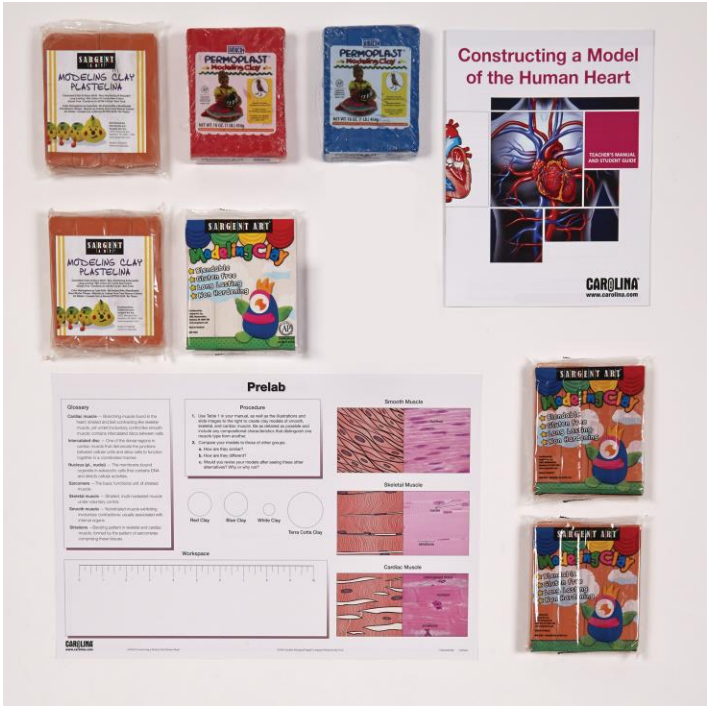
New Carolina Anatomy and Physiology Kits

Modeling Kidney Function with Concentration Gradients and Selective Permeability Kit (item #695801)



Constructing a Model of the Human Heart Kit (item #695650)

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