



Hughes
Undergraduate
Biological
Science
Education
Initiative



Building a Better Pump: Evolution of the Vertebrate Circulatory System
TEACHER INFORMATION

OBJECTIVES:

- Provide opportunity for students to learn about the evolution of the vertebrate heart
- Provide opportunity to integrate knowledge of natural selection into an activity about anatomy
- Introduce students to the structure and function of the physical components of the vertebrate circulatory system
- Provide opportunity to integrate knowledge of cellular respiration into an activity about anatomy

PRE-REQUISITE CONCEPTS/UNITS (not absolutely necessary, but helpful):

- Energy and living things (ATP, cellular respiration)
- Natural Selection

MATERIALS:

per student group (suggested group size = 4)

- 5-8 syringes (5cc): (Fisher #14-823-35, \$20 pkg of 100)
- 2-4 syringes (60cc): (Fisher #14-823-2D, \$35 pkg of 30)
- 4-8 luer adaptors with 3-way stop: (Fisher #K420163-4503, \$30 pkg of 10)
- aquarium tubing (6ft): hardware store or pet shop
- connector, male luer with lock ring 5/32": (Fisher #05-700-207, \$7 pkg of 10)
- plastic tubing to fit the tubing-to-luer adaptors(if not ordering size of adaptor specified above)(1ft): hardware store
- 2-4 gang valves: hardware store or pet shop
- beaker
- scissors or tubing cutter
- optional (other items for altering heart models: different sizes of tubing, connectors, silicone sealant, balloons or latex gloves, etc.)

Fisher ordering: 1-800-766-7000

plus
red food coloring
water

PREPARATION:

- ✓ Assemble one heart model per group (Figure 1).
- ✓ Check all connections to make sure that they don't leak.
- ✓ Add a small amount of red food coloring to the syringe representing the point of entry of oxygen into the bloodstream. Make sure that the stop is closed so that the dye stays in the syringe.
- ✓ Divide extra materials so that they are evenly distributed among the groups.

ADDITIONAL RESOURCES:

<http://www.hhmi.org/grants/lectures/98lect/circulatorium/>