Name_____

Force & Pressure in Blood Vessels

Purpose: To explore the relationship between pressure and vessel diameter. To create a model that represents how high blood pressure may affect weakened vessels.

Background Information: Changes in the diameter of a blood vessel can affect the flow of moving blood. Vessels that become clogged offer more resistance to the movement of fluid. This may cause blood to backup or the pressure to build to dangerous levels. Under excessive pressure, blood vessels can burst open with fatal consequences. Often, this rip occurs in a region of the vessel that has been weakened or damaged. A **stroke** occurs when the blood supply to the part of the brain is suddenly interrupted or when a blood vessel in the brain bursts, spilling blood into the spaces surrounding the brain cells. Surgery can repair vessel damage in and around the brain.

Materials:

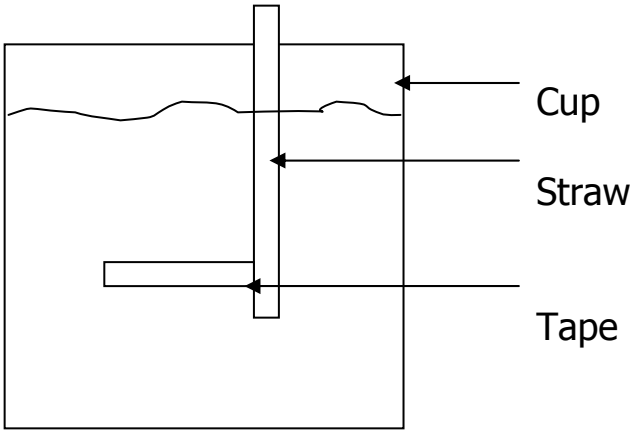
Clean drinking straws	Paperclip	Scissors	Paper towels
Waterproof clay	Clear plastic cups	Tape	Ruler

Part 1- Vessel Flow

Procedure:

1. Work with a partner.
2. Fill a plastic container 2/3 full of water.
3. Insert a clean straw about halfway down the cup's length measured from the bottom of the cup to its top. Remember this depth because it is a **controlled variable**.
4. Use a piece of tape to mark this depth on the outside of the cup. Make sure the tape is even with the lower edge of the straw.
5. One team member blows into the straw with a steady air stream that produces a continual stream of bubbles. Describe the blowing effort needed to produce this steady, but non-violent stream of bubbles.
6. Completely pack the end of a second straw with a bean-sized lump of clay.
7. Unbend a paperclip and use it to poke a small hole through the clay plug.

8. Insert this straw to the depth marked in step 2.
9. Again, blow a steady air stream into the straw. How does the effort compare to when the passageway was larger? Does the appearance of the bubble stream change? How? Don't throw these straws away
10. Switch roles with your partner. Make sure to use two new straws when you repeat the above steps.



Conclusions:

1. What did the clay represent?
2. What happens when the clay constricts the flow of air?

3. What did you have to do to maintain the steady bubble rate?

4. Why was the depth of the straw marked and kept constant throughout the activity?

PART 2 - Wall Weakness

Think and answer the questions below:

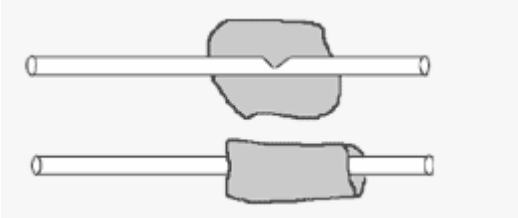
1. What physical properties are necessary in materials used to build both water pipes and living vessels?

2. Suppose you were patching a bicycle tire. How what the patch material is made of affect the long-term success of your repair job?

Procedure:

1. Make sure that all straws to be used in this activity are completely dry.
2. Both partners should use scissors to make a "v" snip about 2/3 of the way up the length of the two straws you each used in the previous activity. The hole should be about the same size in all straws.

3. Take four pea-sized lumps of clay and flatten each one out into a thin, rectangular clay patch that is large enough to form a "collar" around the straw.
4. Lay the patch on a flat surface. Put the straw's hole above the middle of the patch. Lightly press the straw against the patch and roll it so that the patch forms a complete "collar" around that section of the straw. Make sure that the clay sticks to the straw's surface and that the seal has no leaks.



5. Test the straw that is **unobstructed** (no inner plug). Take turns inserting your straws into the water-filled container. Make sure that the patch remains above the water level. Start blowing. What happens?
6. Take turns testing the obstructed straw. Insert the clay-plugged end into the water filled container. Keep the patch above the water level. Start blowing. What happens?

Analysis of The Model

Think about the following questions and discuss them based on the above investigation.

1. In your model, what does the plastic straw represent?

2. What does the flattened clay seal represent?

3. How can the experience above be applied to the obstruction/constriction of blood vessels?

4. Why does the seal rupture when air is blown through the plugged straw?

5. Write a short paragraph describing what happens when a blood vessel gets clogged.

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