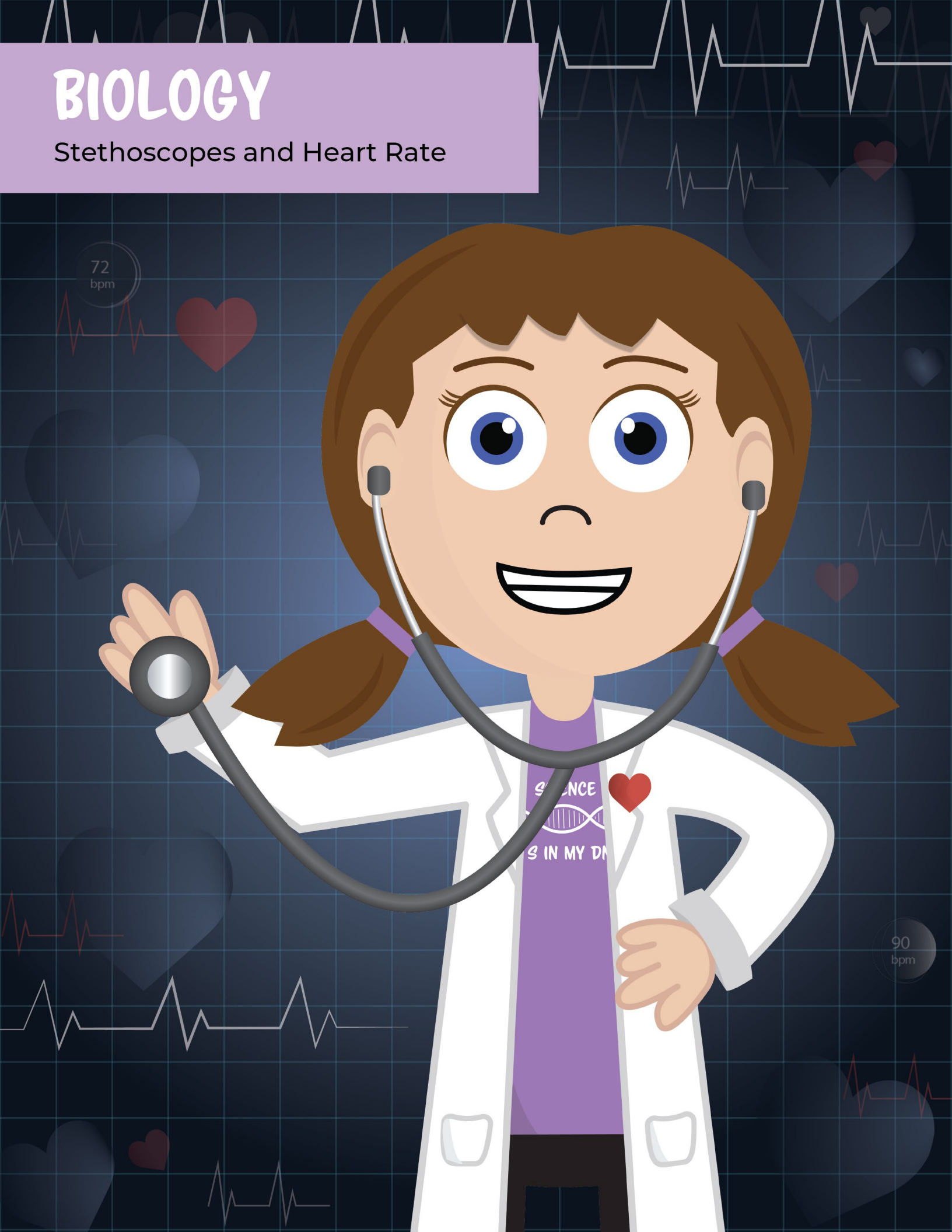
BIOLOGY

Stethoscopes and Heart Rate



Stethoscopes and Heart Rate

NGSS

MS-LS1-1

Objective

The student will understand what heart rate is and how heart rate changes in response to physical activity or other stimuli (e.g. stress).

The student will be able to take a pulse and use a stethoscope to listen to the heart.

Vocabulary

Pulse: Rhythmic throbbing of arteries as blood is being pumped through them

Heart Rate: Number of heart beats per minute (bpm)

Red Blood Cell: Cell located in the blood that transports oxygen and carbon dioxide to and from tissues

White Blood Cell: Defenders of the body, which make up the immune system

Platelets: Colorless blood cells that help blood clot

Plasma: Liquid component of blood that holds the blood cells in whole blood suspension

Stethoscope: A medical instrument used to listen to a person's heart.

Background

The heart is the organ responsible for pumping oxygenated blood into the tissues and deoxygenated blood into the lungs for re-oxygenation. (Think of the veins as tunnels and blood cells as mailmen: the veins pick up oxygen in the lungs and deliver it to the heart and other areas of the body). The heart is about the size of your fist and weighs about the same as a lemon. (At this point you can ask the students to place their palms at the center of their chest and hold their breath, they should be able to feel or "hear" their heart beating.) The heart also pumps nutrients into the

tissues by contracting and relaxing (same concept as before: it's a delivery system!).

The rate at which our heart pumps blood into the periphery is directly related to how much oxygen our body needs at that time. For example, when we are sleeping, we are not burning many calories, so we do not require that much oxygen, and our heart rate slows. When we are exercising, however, our tissues develop a massive need for oxygen, and our heart rate increases accordingly. As a person begins to exert physical activity, there is a higher demand for oxygen in the brain and muscles. To sufficiently supply the body with oxygen, the heart rate will increase as needed (Average resting pulse is about 60-100 bpm). A healthy heart rate is instrumental to a long healthy life, which we all want to live! Aerobic exercise can decrease the risk of heart disease by 20 to 60 percent, depending on the exertion level, duration and frequency. In this exercise, we will have students determine their resting heart rate by measuring their pulse (neck or wrist) for 30 seconds.

This 6-minute video does an excellent job of explaining the heart: http://www.aboutkidshealth.ca/en/justforkids/body/pages/heart.aspx

Materials

Candy Blood Vessel Demonstration

- Red Hots (or a red candy) (10 per student)
- Certs (or a white candy) (2 per student)
- Salt (1 pinch per student)
- Candy sprinkles (1 pinch per student)
- Light corn syrup
- Red food dye
- Ziploc sandwich bags (1 per student)
- Plastic spoons (for mixing) (1 per group)

Pulse Demonstration

- A phone or clock

Stethoscope Demonstration

- 1 large funnel (per group)

- 1 small funnel (per group)
- 1 hose, cut into 18-inch pieces (per group)
- Duct tape
- 1 stethoscope (per group)

Procedure

1. Hand out candy, bags, salt
    a. Red candy – red blood cells
    b. White candy – white blood cells
    c. Salt – ions in blood
    d. Sprinkles – platelets
    e. Corn syrup - plasma
2. Fill bags ½ way with corn syrup, then add candy, salt, and food dye. Mix well.
3. Close the bags tightly and then roll each bag into a cylinder.
4. Explain the functions of the various components in this blood vessel.

Pulse Demonstration

1. There are different areas on the body where the pulse can be taken. The two most common are on the radial artery (wrist) and the carotid artery (side of neck).
2. Teach the students how to test their heart rate. Use the 30-second method (count beats in a 30-second span and multiply by 2 to get bpm).
3. Have the students record their resting heart rates.
4. Have students do jumping jacks until they do ~50 reps.
    a. Immediately record heart rate at the 0 minutes mark.
    b. Record every minute thereafter for 3 minutes.
5. Have students hold their breath for 30 seconds and record heart rate while holding breath.

Stethoscope Demonstration

1. Have the students pair up, and have a volunteer group pass out a large and small funnel and one hose piece to each group.
2. Ask another student to hand out two 8-inch pieces of duct tape to each group.
3. Instruct the students to attach a funnel to either end of the hose piece with the duct

tape.

4. Allow the students to attempt to listen to both their own and their partner's heart with their custom stethoscope and with the regular stethoscope.
5. Have students listen to lung sounds by placing stethoscopes on their partner's back and instructing their partner to "deep breathe". Then have students listen while that person wheezes. (They will have to fake the wheezing).
6. Have students try to listen to bowel sounds by placing stethoscopes onto their abdomens. If they just ate, they may have good luck.
7. Clean up!

Guiding Questions

- Why does our heart beat?
- What is the purpose of blood in the body?
- Who uses stethoscopes? (Good opportunity to talk about health careers)

Career/Future Application

Any job in a healthcare setting (physician, nurse, PA, phlebotomist, medic, paramedic, etc.) must understand how and why blood circulates to the peripheral tissues and how stethoscopes work.

Sources

http://health.howstuffworks.com/diseases-conditions/cardiovascular/heart/exercise-important-for-heart-health1.htm

http://www.sciencebuddies.org/science-fair-projects/project_ideas/HumBio_p033.shtml?from=Pinterest#procedure