K-STATE
Research and Extension

you are what you eat

leader's guide

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Leader's Guide

Learning Objectives for Students

- Understand how different nutrients affect their cardiovascular, respiratory, digestive, and musculoskeletal systems.
- Gain a better understanding of the cardiovascular, respiratory, digestive, and musculoskeletal systems.
- Gain knowledge on how to make healthy food choices.
- Learn ideas for healthy snack options.

Suggested Preparation and Presentation

- Look over important words and the information presented in the lessons ahead of time.
- Gather any materials needed for activities.
- Go through each lesson with students in the order they are discussed below.
- Have students look ahead to the questions, so they have an idea of ideas to pay especially close attention to.
- You can read through them out loud as a class using the "popcorn reading" technique (a student reads a section then says "popcorn" and passes off the reading to another student).
- Encourage students to ask questions as they have them.
- Allow time for the students to answer the Learning Check questions on their own, and then discuss the answers as a class.
- Encourage students to bring healthy snacks to school.
- Answers to the Learning Check questions and activity directions are discussed in each section of the leader's guide.

Cardiovascular System

~20 minutes

Activity: Simon Says

Play "Simon Says" while incorporating actions such as jumping jacks and running in place to get students' hearts pumping. After this game, discuss the functions of the heart explained in the lesson as well as what molecules are involved in contraction of the heart.

Several other demonstrations (pinching a hose, distribution of water and sodium) are discussed in this lesson that can be used if time and resources are available.

Learning Check Key

Note: All possible answers are shown in bold type.

- What does blood transport? **oxygen and nutrients**
- Name two ions important in the contraction of the heart. **sodium, calcium, potassium**
- **HDL** is the "good" cholesterol and **LDL** is the "bad" cholesterol.
- Which type of fat is the healthier type of fat? **unsaturated fat**
- What are three foods containing this healthy type of fat? **fish, nuts, seeds, avocados, olives, and walnuts as well as vegetable oils such as corn, olive, soybean, safflower, and canola**
- **T** A cofactor helps enzymes carry out important processes in your body.
- Name three foods that are good sources of magnesium. **leafy greens, nuts, legumes, whole grains, seeds, low-fat milk, and yogurt**
- **T** Potassium can help lower blood pressure.
- What would happen to your heartbeats if you did not have enough potassium? **The heart would not be able to relax after it contracts, so your heartbeats would not be normal.**
- **F** Most Americans do not get enough sodium in their diets.
- What are three foods high in sodium? **breads, cold cuts or cured meats, pizza, soups, cheeseburgers, cheese, pasta, chips, pretzels, popcorn, processed foods**

Respiratory System 

~20 minutes

Activity: 4 Corners

Have each corner of the room represent one of the four nutrients discussed. List foods and have students go to the corner representing the nutrient they think is the most important nutrient found in that food.

Foods

- Oranges: vitamin C
- Tomatoes: vitamin C
- Potatoes: copper
- Seafood/fish: folate, iron
- Whole grain bread: folate and iron (fortified), copper
- Green leafy vegetables: *Any corner: folate, iron, copper, vitamin C

Activity Discussion: An important lesson for this activity is that some foods may be a good source of multiple nutrients. From this, discuss the importance of eating foods that have many different good nutrients in them.

Learning Check Key

Note: All possible answers are shown in bold type.

- **F** A main function of the respiratory system is to take in carbon dioxide for the body to use.
- Oxygen is important for making **b. ATP.**
- What would happen if you did not have enough oxygen? **Your body could not make ATP and your organs would not be able to function properly.**
- Not having enough folate in your diet can decrease the number of **red blood** cells in the body.
- What nutrient is commonly added to grain products? **folic acid**
- Iron is important for making what molecule? **hemoglobin**
- What molecule does iron bind to that is important for making ATP? **oxygen**

- **Heme** iron is absorbed better in the body.
- Name two groups of people who are at an increased risk of not getting enough iron. **adolescents, vegetarians, and women**
- Vitamin C increases the absorption of what nutrient? **iron**
- Name three foods high in vitamin C. **red and green peppers, tomatoes, broccoli, green vegetables, and citrus foods**
- What two nutrients are important for the absorption of iron? **vitamin C and copper**

Digestive System 

 ~20 minutes

Activity: Let's make energy! *(After section on B vitamins)*

Students will represent different parts of the electron transport chain;

- 1 NAD
- 1 FAD
- 3 Hydrogen ions
- 3 ATP

A line of about 10 feet of yarn with an opening in the center will represent the cell membrane. Have one student pretend to be NAD and another represent FAD. The student representing NAD will be linked arm-in-arm with one student representing a hydrogen ion, while the student representing FAD will link arms with two students representing hydrogen ions. The NAD student and FAD student "lose" their hydrogen ions on one side of the membrane. Now all of the hydrogen ions are on one side of the membrane, so they want to flow through the channel to be more spread out. Three students representing ATP come out of the channel every time a hydrogen ion comes through it.

This video can help you visualize what is happening during the electron transport chain (start at approx. 50 seconds):
https://www.youtube.com/watch?v=j6_e39ueJBo

Activity Discussion: What would happen if you did not have any B vitamins to make NAD and FAD? Would you be able to make ATP for energy? What would happen to your body if you didn't have ATP for energy?

Learning Check Key

Note: All possible answers are shown in bold type.

- The majority of nutrients are absorbed in the **b. small intestines.**
- **F** Fiber is found in animal products.
- Fiber can help prevent you from becoming **constipated**.
- What are two vitamins that are added to flour in the United States? **niacin and riboflavin**
- What are two cofactors that help make ATP, which is needed for energy? **NAD and FAD**
- What are the two categories of carbohydrates? **simple and complex**
- Which type of grain contains all the important nutrients found in grain products? **b. Whole grains**
- **F** All 20 amino acids must come from the foods that you eat.
- What does the enzyme amylase break down? **carbohydrates**
- Match the following foods to make complementary proteins:

  Dry beans---Rice

  Whole grain bread---Peanut butter

  Taco shells---Beans

  Hummus---Pita bread

  Yogurt---Nuts

  Milk---Whole grain cereal

Musculoskeletal System

~20 minutes

Activity: Move those muscles! (After section on protein)

Materials

- Rope (representing a muscle fiber)
- Colored pieces of cardstock taped to the rope

The "blocks" (cardstock) are spaced on the rope to prevent students from moving their hands from where they are holding onto the rope. Find the center of the rope and have the students stand between the "blocks" while facing the end of the rope closest to them. Other students who represent calcium will then remove the "blocks." The students holding the rope can then grab the rope in front of them where the "block" used to be and pull it towards them in a step-by-step manner. This represents the contraction of muscle as the ends of the rope (muscle fiber) contract into the center.

This video can help you visualize what each part represents (start at approx. 55 seconds): http://www.youtube.com/watch?v=CepeYFvqmk4

Yellow dots: calcium

Red lines: actin/rope

Green lines: myosin/students facing outwards and pulling the rope towards them

Activity Discussion: What happens if you do not have any calcium to remove the block? What happens if you do not have the protein block to prevent the muscle from always being contracted?

Other suggested activity: Bring in common foods with nutrition facts labels and have students discuss the major ingredients in the product as well as the important nutrients in the product. Discuss why certain foods may be healthier choices than others.

Learning Check Key

Note: All possible answers are shown in bold type.

- Muscles are under **voluntary** control.
- What are bones made of? **calcium and phosphate**
- **F** Once your bones are fully grown, they never change.
- **F** Dairy products are the only way you can get calcium in your diet.
- **F** Meats are the only sources of protein.
- A large portion of the protein in the body can be found in **muscles**.
- 85% of phosphorus in the human body is found in bones and **teeth**.
- Humans can use the phosphorus found in **animal** sources better.
- Vitamin D helps us absorb **calcium**.
- **F** We do not need to eat any foods with vitamin D because our bodies can make it.

Authors

Tandalayo Kidd; Ph.D., specialist in human nutrition, K-State Research and Extension; Dani Dobratz; graduating senior in human nutrition, Kansas State University

Reviewers

Dr. Katharine Grunewald, professor, human nutrition, Kansas State University

Dr. Brian Lindshield, associate professor, human nutrition, Kansas State University

Notes

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