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▶▶ November 2012 ◀◀

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LESSON ONE: ADOLESCENT NUTRITION

FOCUS:

Adolescents who lack nutrition information and who make independent food choices are at risk for developing nutritional deficiencies. However, maintaining a nutritious diet throughout life and during the later years is one factor that contributes to sustaining good health and an active life. As students look at their own recommended daily allowances for calories, iron, calcium, and protein, they may be encouraged to investigate the nutritional needs of people at each stage of the life cycle.

OBJECTIVES:

Students will:

- ▶ Construct graphs from data on recommended dietary allowances for teenagers.
- ▶ Explain that people at each stage of the life cycle possess different nutrient needs.

PRE-ACTIVITY: FAD DIETS AND NUTRIENT NEEDS

Introduce this lesson with a discussion of fad diets. Ask the students to identify as many fad diets as they can. Ask the students to consider whether any of these fad diets enable teenagers to receive proper nutrition. Are there special nutritional needs during the teen years? Are the nutrient needs the same for teenage males and females? Are nutrient needs the same as we age?

BACKGROUND INFORMATION FOR THE TEACHER:

Identify the nutrients: carbohydrates, fats, proteins, vitamins, minerals, and water. Discuss how only the carbohydrates, fats, and proteins provide calories (a unit of energy measurement). Refer to the Food Pyramid handout as a guideline to follow to ensure nutrient needs are met. Explain to the students they will be examining the recommended daily allowances by the U. S. Department of Agriculture for protein, iron, calcium, and calories. Discuss sources of protein, iron, and calcium while examining the Food Pyramid which can be found in Unit 7, page 28. Have references available in the classroom that pertain to important sources and functions of these nutrients. The teacher will want to review bar graphing skills with the students. The students will interpret recommended daily allowances for calories, protein, iron, and calcium. Inform the students that the RDAs for adolescents are not based on experimental data from adolescents, but, from studies of younger children or adults, derived from results of animal experiments, or based on intakes that have been found to be associated with good health and optimal growth. Emphasize to the students that the RDAs serve as useful general guidelines.

* Use the information on the following page to evaluate the student's explanations for the RDA values studied:

CALORIES: In general, males have higher energy requirements than females because males have a higher proportion of lean body mass to adipose tissue than do females. Also, adolescents who are sedentary have lower energy requirements than those adolescents who are more active.

IRON: Iron requirements increase in adolescence because of the greater muscle mass and blood volume associated with the growth spurt. In addition, the onset of menstruation increases the iron requirements for females. The recommendations for iron are based on the assumption that iron is not well absorbed. Iron found in foods containing heme iron (*such as red meats*) is absorbed best. Iron from nonheme sources (*such as grains and vegetables*) is not absorbed as well as heme iron, but consumption of vitamin C along with nonheme iron enhances its usefulness to the body. Adolescents need to consume foods with a high availability of iron, such as red meats, or eat combinations of good nonheme sources of iron along with foods rich in vitamin C.

CALCIUM: The increase in skeletal mass that is part of the adolescent growth spurt increases calcium requirements. If calcium intake is very low, the body maintains normal blood-calcium levels by drawing calcium from the bones. This can have serious consequences: Adolescents may not develop optimal bone density, which may increase their susceptibility to osteoporosis later in life. In general, a healthy adult absorbs about 30 to 40 percent of the calcium in an ordinary diet. If extra calcium is consumed, the total amount absorbed tends to remain about the same. Calcium absorption increases in times of extra need, such as during growth, pregnancy, and breastfeeding.

A number of dietary factors affect calcium absorption. Excessive phosphorus or the presence of oxalic acid (*a substance in cocoa, spinach, chard, rhubarb*) or phytic acid (*a substance in soybeans and other legumes and bran*) hinder calcium absorption, but an important amount of phosphorus is needed to lay down bone. A high intake of dietary fiber also may reduce calcium absorption. Inactivity also disturbs calcium metabolism, as demonstrated by the fact that bedridden people are subject to rapid bone loss and increased formation of calcium kidney stones. Calcium supplements can interfere with iron absorption, and calcium carbonate supplements are very poorly absorbed by the elderly, who have decreased gastric acid. Excessive calcium from supplements can cause loss of appetite, nausea, vomiting, weakness, dizziness, lethargy, kidney damage, and calcium deposits in many soft tissues, including the kidneys and eyes. Milk and milk products are our best sources of calcium. Other sources include dried beans and peas, broccoli, and dark green leafy vegetables (*except spinach*).

PROTEIN: Many boys in later adolescence (*ages 15 to 18*) eat twice the recommended allowance of protein, or more, in the belief that a diet high in protein will give them a competitive advantage in sports. Once the body's requirements for protein have been met, excess protein is processed just like any other excess form of calories; it is deposited as fat, not muscle. In addition, chronic excess protein consumption may have adverse effects on kidney function in the long term. The meat and dairy food groups are important sources of protein.

Herbert, Victor, M.D. and Subak-Sharpe, Genell J, M.S., "Adolescent Nutrition," *Total Nutrition: The Only Guide You'll Ever Need*, St. Martin's Press: New York, 1995.

ACTIVITY 1A: GRAPHING RECOMMENDED DIETARY ALLOWANCES

Refer students to the handout, “Recommended Dietary Allowances for Adolescents, Ages 11 to 18.” Have students construct bar graphs of the following:

- calorie needs for boys and girls, 11–14 years and 15–18 years
- protein needs for boys and girls, 11–14 years and 15–18 years
- iron needs for boys and girls, 11–14 years and 15–18 years
- calcium needs for boys and girls, 11–14 years and 15–18 years

Materials:

1. Recommended Dietary Allowances for Adolescents handout
2. Graphing Paper

ACTIVITY 1B ADOLESCENT NUTRITION SCENARIOS

After completing the bar graphs, have students examine and answer the questions on the Scenario Worksheet.

Materials:

1. Bar Graphs from Activity A or RDAs for Adolescents
2. Scenario Worksheet on Adolescent Nutrition

ACTIVITY 1C: FOOD DIARY ANALYSIS OF AN ELDERLY PERSON

Students will keep a food diary on an elderly person at home or in the community. They will compare the dietary recommendations by the National Institute on Aging concerning the number of servings in the food groups and the eating habits of the elderly adult. Encourage the students to interview the person to collect any information that could pertain to the elderly person’s eating habits.

****EXTENSION ACTIVITY 1: DIETARY INTERVIEWS**

Have students interview a person in one of the following age groups listed below. Students should ask questions about the dietary habits of the person. Students should be encouraged to record other information that may be relevant to the diet habits of the person such as activity level and oral health (e.g., use of dentures, problems chewing and swallowing). Students should compare the nutrient intake of their subject with the nutrient needs of the subject's age group.

Have students write summary reports. You may wish students to share their findings. Make sure the students do not reveal the name of the person they interviewed for confidentiality. Teachers must approve student's questions prior to the interview.

AGE GROUPS:

mother of an infant

young child

older child

adolescent in the school

adult at home, in school, or in the community

elderly person at home or in the community

Materials:

1. Information on Nutrition of Different Age Groups

****EXTENSION ACTIVITY 2: ANALYZING OTHER RDAs**

Have students analyze other nutrient RDA values.

****EXTENSION ACTIVITY 3: GUEST SPEAKER**

Invite an elderly person to the class to talk about their eating habits and issues that relate to their nutrition.

THE FOOD GUIDE PYRAMID

A Guide to Daily Food Choices

Key

- Fat (naturally occurring and added)
- ▼ Sugars (added)

These symbols show fat and added sugars in foods. They come mostly from the fats, oils, and sweets group. But foods in other groups—such as cheese or ice cream from the milk group or french fries from the vegetable group—can also provide fat and added sugars.

Fats, Oils, & Sweets
USE SPARINGLY

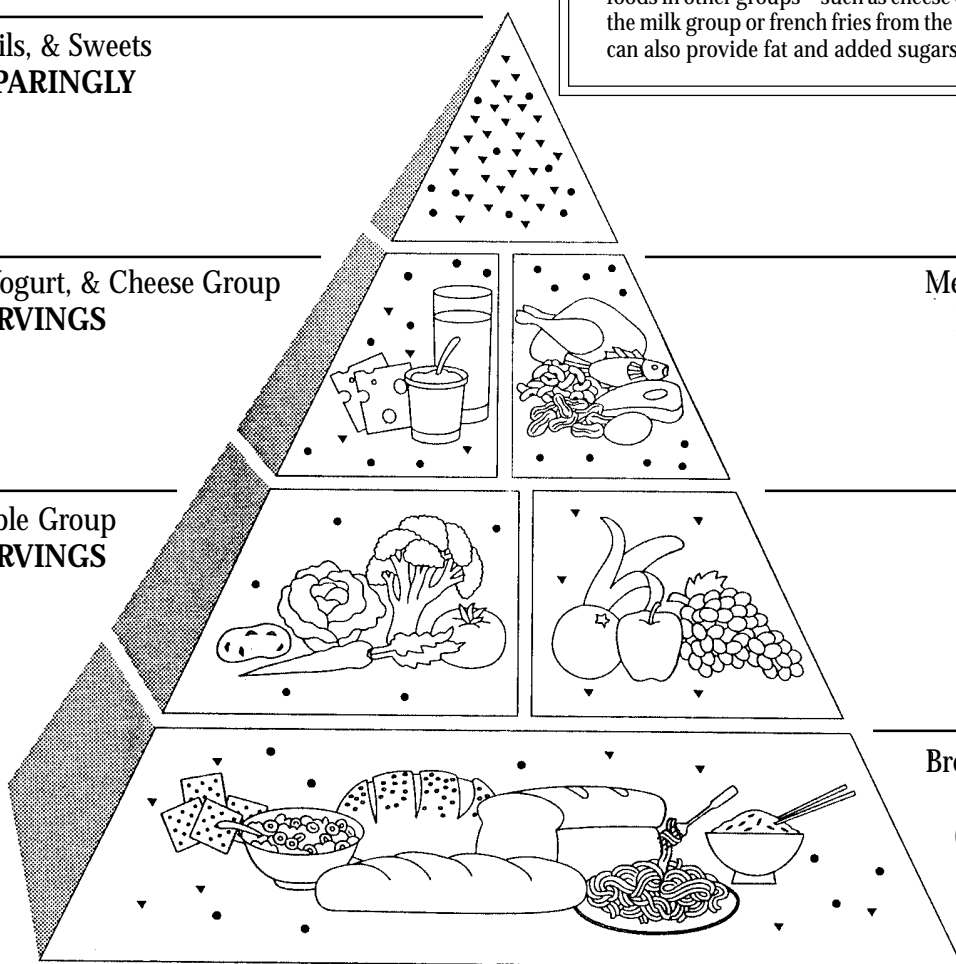
Milk, Yogurt, & Cheese Group
2-3 SERVINGS

Meat, Poultry, Fish,
Dry Beans, Eggs,
& Nuts Group
2-3 SERVINGS

Vegetable Group
3-5 SERVINGS

Fruit Group
2-4 SERVINGS

Bread, Cereal, Rice,
& Pasta Group
6-11 SERVINGS



RECOMMENDED DIETARY ALLOWANCES FOR ADOLESCENTS, AGES 11 TO 18

Age and Size				
Nutrient	BOYS		GIRLS	
	11–14 Years (99 lb. 62 in.)	15–18 Years (145 lb. 69 in.)	11–14 Years (101 lb. 62 in.)	15–18 Years (120 lb. 64 in.)
Calories	2500	3000	2200	2200
Protein (gm)	45	56	46	46
Vitamin A activity (RE) ^b	1000	1000	800	800
Vitamin D (μg) ^c	10	10	10	10
Vitamin E (mg α = TE) ^d	10	10	8	8
Vitamin C (mg)	50	60	50	60
Thiamine (mg)	1.3	1.5	1.1	1.1
Riboflavin (mg)	1.5	1.8	1.3	1.3
Niacin (mg NE) ^e	17	20	15	15
Vitamin B ₆ (mg)	1.7	2.0	1.4	1.5
Folacin (μg) ^f	100	150	150	180
Vitamin B ₁₂ (μg)	2.0	2.0	2.0	2.0
Calcium (mg)	1200	1200	1200	1200
Phosphorus (mg)	1200	1200	1200	1200
Magnesium (mg)	270	400	280	300
Iron (mg)	12	12	15	15
Zinc (mg)	15	15	12	12
Iodide (μg)	150	150	150	150

^aThe allowances are intended to provide for individual variations among most normal persons as they live in the United States under usual environmental stresses. Diets should be based on a variety of common foods to provide other nutrients for which human requirements have been less well defined.

^bRetinol equivalents; 1 RE = 1 μg retinol or 6 μg β carotene. From animal source, 1 RE = 3 1/3 IU; from plant source, 1 RE = 10 IU.

^cAs cholecalciferol; 10 μg cholecalciferol = 4000 IU of vitamin D.

^dα-tocopherol equivalents; 1 mg d-α tocopherol = 1 α-TE.

^eNiacin equivalent; 1 NE = 1 mg of niacin or 60 mg of dietary tryptophan.

^fThe folacin allowances refer to dietary sources as determined by *Lactobacillus casei* assay after treatment with enzymes (conjugates) to make polyglutamyl forms of the vitamin available to the test organism.

Herbert, Victor, M.D. and Subak-Sharpe, Genell, J., M.D., "Adolescent Nutrition," *Total Nutrition: The Only Guide You'll Ever Need*, St Martin's Press: New York, 1995.

ACTIVITY 1B:

ADOLESCENT NUTRITION: SCENARIO WORKSHEET

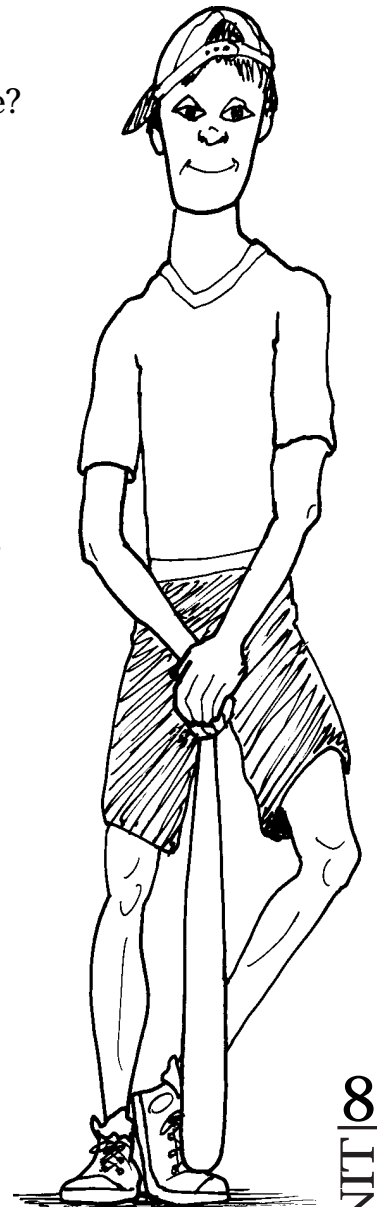
NAME _____

Directions: Read each scenario carefully. Use the bar graphs constructed in Activity 1A to analyze the scenarios below. Think about the many changes that are occurring during an adolescent's life.

Scenario #1

Gilbert is an eleven-year-old male who weighs 102 pounds. He likes to play baseball in school.

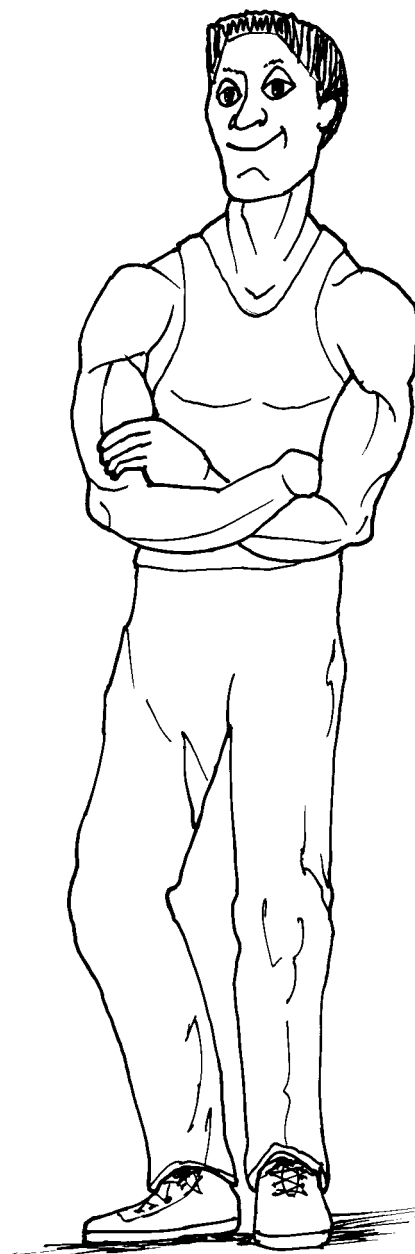
1. Explain Gilbert's calorie needs as he goes through adolescence. What is the recommended daily allowance (RDA) for his intake?
2. Give the reasons for these needs and why they escalate or decline.
3. What long-term effects could result if Gilbert's calorie intake is consistently greater than the recommended RDA value as he enters adulthood?
4. Explain why teenage girls Johnny's age have different calorie needs.



Scenario #2

Roberto is a seventeen-year-old male athlete. He eats twice the recommended allowance of protein in the belief that a diet high in protein will give him a competitive advantage in sports.

1. Give reasons for the differences in RDA values for teenage males and females, 11–14 years old.
2. Compare the RDA protein values for teenage males as they age from 11 to 18 years old. Using this information, advise Roberto about his protein intake.
3. Why does Roberto need protein for his body? How can you explain the RDA protein value for 18 year olds?



Scenario #3

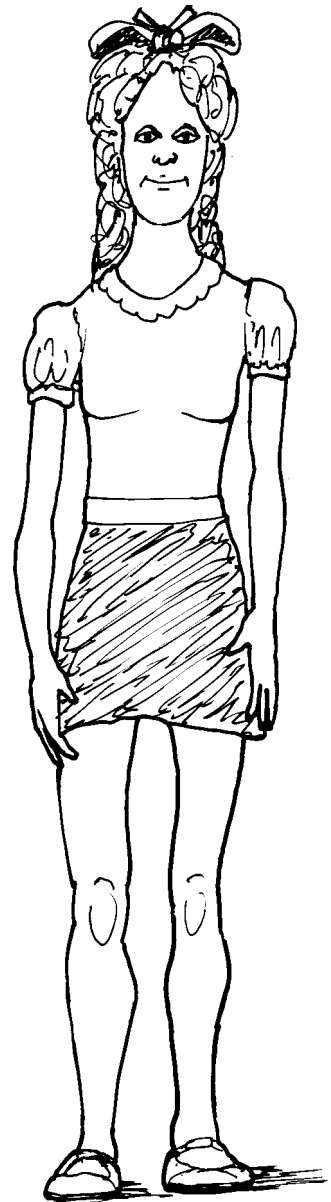
Susie is a fourteen-year-old female who weighs 104 pounds. She is concerned about her iron intake.

1. Why would the RDA values for iron intake for teenage boys and girls be special values for this age group?

2. Compare the iron RDA values for teenage males and females. Explain any differences you observe.

3. What food sources would provide these iron needs?

4. Do we absorb all the iron we consume?



Scenario #4

Sally is a twelve-year-old female who does not like to drink milk. She is concerned about her calcium needs. She thinks she will not have to worry about her calcium intake once she is an adult because she will have completed her growth.

1. Compare the calcium needs of teenage males and females.
2. Why are these calcium needs special needs in teenage males and females?
3. What other sources could provide Sally with calcium?
4. Explain health problems that may result as Sally ages if she reduces her calcium extremely below the recommended RDA value as she goes into adulthood and her later years.
5. What is the downside, if there is any, from consuming foods with high calcium content?
6. Do we absorb all the calcium we consume?



ACTIVITY 1C:

INSTRUCTIONS

Using the following data collection form, record the type of food, describe it (raw or cooked, type of cooking [e.g. baked or boiled], size of serving [e.g., ounces or cups], and the number of servings consumed by your elder volunteer. Record all the food they ate in a 24-hour period. Next to the number of servings they actually ate, record the number of recommended servings.

Your Name _____ Date: _____

Age of elderly person _____ Gender of elderly person _____

[illegible]

Daily Recommendations by the National Institute on Aging as Suggested by the Department of Agriculture (USDA)

- At least two servings of milk (*or dairy products low in lactose, such as aged hard cheeses and yogurt*).
- Two servings of high-protein foods (*lean meat, poultry fish, eggs, legumes, nuts, peanut butter*).
- Four servings of fruits and vegetables, which should include a citrus fruit (*or juice*) and a dark green leafy vegetable.
- Four servings of bread or cereal products, whole-grain or enriched.

ANALYSIS

Based on the food diary information and the recommendations by the National Institute on Aging concerning the number of servings from the food groups, report your findings and give recommendations on the eating habits of this elderly person. Include any observations or information you know that could influence the person's eating habits.