

NUTRITIONAL NEEDS OF INDIVIDUALS AND FAMILIES ACROSS THE LIFESPAN

Nutrition Issues and Adolescents Grade Levels: 9-12

Concept: Type 2 Diabetes

Comprehensive Standard: 6.2 Evaluate the nutritional needs of individual and families in relation to health and wellness across the lifespan

Technical Standard: 6.2.2 Examine the relationship of nutrition and wellness to individual and family health throughout the life span

LESSON COMPETENCIES:

- Define diabetes
- Identify risk factors for diabetes
- Explore the defenses against diabetes
- Plan meals appropriate for a diabetic

ANTICIPATED BEHAVIORAL OUTCOMES:

- Students monitor physical activity by following Dietary Guidelines for physical activity
- Students set dietary and activity goals in order to reduce the risk of type 2 diabetes and other chronic diseases

Resources Needed:

- Internet access for all students or copies of articles identified for each student
- Copies of handouts for all students
- Menus from area restaurants and fast food establishments that students frequent

References for teachers and students:

Two very good articles on diabetes, *The Challenge of Type 2 Diabetes in Children* and *Diabetes: A Growing Concern*, from the Food Insights newsletter, a publication of the International Food Information Council Foundation can be found at their website at www.ific.org Conduct a search on the website for these articles and others on diabetes.

The [National Center for Chronic Disease Prevention and Health Promotion](http://www.cdc.gov/chronicdisease/preventionandpromotion/) (CDC) website has a lot of information on diabetes and diabetes prevention, including an annual fact sheet on diabetes, at www.cdc.gov/diabetes/ . The site also has many links to other reputable websites.

NEW More information can be found at the [Juvenile Diabetes Research Foundation](http://www.jdrf.org/) website found at www.jdrf.org/ . The site includes personal stories from teens and kids with diabetes that could be used for teaching activities as well as links to articles and other websites on diabetes. The site has information about Kids Walk To Cure Diabetes and this section of the website has a curriculum all about diabetes with lessons

that could be adapted for classroom use or as part of a service learning project focused on education about diabetes or fund raising for a cure, to go directly to the curriculum link see: www.jdrf.org/index.cfm?page_id=102995

NEW Medline Plus has an interactive tutorial on diabetes and meal planning; the weblink is

www.nlm.nih.gov/medlineplus/tutorials/diabetesmealplanning/htm/_no_50_no_0.htm

NEW A website dedicated to diabetes can be found at www.diabetes.org. This site is the site of the [American Diabetes Association](http://www.diabetes.org) and includes nutrition information, exercise information, recipes, games and puzzles and a section for kids with diabetes – lots of good interactive activities. Check out this site before moving forward with this lesson. There is a special section especially for teens with diabetes at

www.diabetes.org/for-parents-and-kids/for-teens.jsp

NEW The Washington State University Extension service has a series of lessons with handouts available at <http://nutrition.wsu.edu/diabetes/lwd.html>

NEW – An entire curriculum is available on preventing Type II diabetes at www.alamoahec.org/html/diabetes/DiabetesCurriculum.pdf

NEW - The [National Diabetes Clearinghouse Center](http://www.nidDK.org) from the National Institute of Health is an excellent source of information

NEW – A [Recipe and Meal Planner Guide](http://www.nidDK.org) is also available as part of the National Diabetes Education Program.

NEW – An article clearing up myths about [Sweeteners and Desserts](http://www.diabetes.org) as it relates to dietary choices of diabetics is available at the American Diabetes Association site.

Background Information:

UPDATED STATISTICS Diabetes is one of the most serious health problems facing the world today (National Diabetes Education Program). The [National Centers for Disease Control and Prevention \(CDC\)](http://www.cdc.gov) reported the following in the [National Diabetes Fact Sheet, 2005](http://www.cdc.gov)

- 20.8 million people – 7.0% of the population – have diabetes
- About 176,500 people under the age of 20 years of age have diabetes.
- About 1 in every 400-600 children and adolescents has type 1 diabetes.
- Overweight is a serious health concern for children and adolescents. Data from two [NHANES surveys \(1976–1980 and 2003–2004\)](http://www.cdc.gov) show that the prevalence of overweight is increasing: for children aged 2–5 years, prevalence increased from 5.0% to 13.9%; for those aged 6–11 years, prevalence increased from 6.5% to 18.8%; and for those aged 12–19 years, prevalence increased from 5.0% to 17.4%.
- Overweight and obesity, influenced by poor diet and inactivity, are significantly associated with an increased risk of diabetes, high blood pressure, high cholesterol, asthma, arthritis and poor health status.
- The number of Americans with diabetes increased by 49% during the same decade from 1990-2000 (from 4.9% to 7.3% of the population)

- Although no ethnic group is untouched, diabetes is disproportionately affects American Indian, African American, Mexican American and Pacific Islander youth.
- Diabetes was the sixth leading cause of death listed on U.S. death certificates in 2002
- The risk for death among people with diabetes is about twice that of people of without diabetes of a similar age

Diabetes occurs when the body no longer makes or is able to use insulin, a hormone produced by the pancreas. Insulin allows the energy from carbohydrates in foods to be used by the body's cells. When insulin is not present or is ineffective, blood sugar levels rise. Over time, high blood sugar levels can cause damage to the eyes, nerves, kidneys and other vital organs.

There are 3 main types of diabetes: type 2, type 1 and gestational.

Type 2 diabetes accounts for about 90-95% of all diabetes cases. It occurs when the pancreas produces some, but not enough insulin or the body is unable to properly use the insulin that it produces. When the body cannot respond to insulin, glucose builds up in the blood.

Being overweight is the greatest risk factor for developing type 2 diabetes. This form of diabetes is considered for the most part preventable. According to the Center for Disease Control, many people with type 2 diabetes can control their blood glucose level with diet and exercise, by losing weight and by taking oral medication. This usually occurs in adults over 40 but people of any age who are overweight and lead a sedentary lifestyle are at greater risk for developing type 2 diabetes.

According to the National Diabetes Education Program (<http://ndep.nih.gov>), increasingly, health care providers are finding more children and teens with type 2 diabetes, a disease usually seen in people over age 45. Although there are no national data, some clinics report that one-third to one-half of all new cases of childhood diabetes are now type 2. African American, Hispanic/Latino and American Indian children who are obese and have a family history of type 2 diabetes are at especially high risk for this type of diabetes.

Far less common is type 1 diabetes, which occurs when the pancreas makes little or no insulin, regardless of activity or weight level. People with this form of diabetes must take insulin to regulate blood glucose. Type 1 diabetes occurs most often in children and young adults and requires daily injections of insulin to maintain normal blood glucose levels.

Gestational diabetes is a form of glucose intolerance that is diagnosed in some women during pregnancy. During pregnancy, gestational diabetes requires treatment to normalize maternal blood glucose levels to avoid complications in the infant. After pregnancy, only 5-10% of women with gestational diabetes are found to have type 2 diabetes. However, women who have had gestational diabetes have a 20-50% chance of developing diabetes in the next 5-10 years.

Risk factors for diabetes include:

- Being overweight or obese
- A sedentary lifestyle with little or no regular exercise

- A family history of diabetes or a member of a high risk racial or ethnic group. African American, Latino, Asian American, Pacific Islander or Native American are higher risk groups.
- A woman who has had a baby who weighs more than 9 pounds

Updated: The American Diabetes Association recommends these [general guidelines](#) for people with diabetes:

- Limit saturated fat to 7 % or less of daily calories; limit dietary cholesterol to less than 200 mg/day and intake of trans fat should be minimized
- Follow protein intake recommendations for that of the general population of 15-20% of daily calories
- Limit cholesterol to 200 milligrams or less daily
- Consume a minimum of 14 grams of fiber/1000 calories daily

Most of these guidelines are a good idea for the general population as well. Those who are overweight may also restrict calorie intake.

Learning Activities:

High School Level

- Write the word **diabetes** on the board, ask students to identify words or phrases that they associate with this disease by filling in words in a crossword puzzle fashion as in the example below:

	D	
D	I	A
B		B
E	T	E
T	E	S
S		
N	A	
S	D	
U	L	
L	Y	
I		
N		

Discuss the student's associations with these words. What do they know about diabetes?

- Invite a health professional, for example, registered dietitian, school nurse, local nurse or doctor to discuss diabetes, importance of diet and exercise for diabetics and health concerns related to diabetes.
- **NEW** Read about meal planning for diabetics in the series of articles, [Making Healthy Choices](#) (www.diabetes.org/nutrition-and-recipes/nutrition/healthyfoodchoices.jsp) found at the American Diabetes Association website; students should complete the study guide for the article, [Nutrition Guide for People with Diabetes](#). Before reading, prepare the students by asking these questions:
 - Can diabetics eat the same foods as everyone else? Why or why not?
 - What foods do diabetics have to avoid or count carefully?
 - How would you know if you had diabetes?
 - What causes diabetes?

Revisit these questions with students after they have finished the assignment.
NOTE TO TEACHER: read the article and complete an answer key before using this activity.

- Considering the information discussed in the article, ask students to plan a [Meal and Exercise Plan](#) that follows the guidelines discussed in the article. Compare this diet to *MyPyramid* and Dietary Guidelines and discuss how this diet would be healthy for all.
- **NEW** Use the transparency master, [Freddie's Food Choices](#), and ask students to evaluate Freddie's food choices. Consider:
 - food groups
 - food portions
 - quality of food choices, for example – whole grain or refined grain, lean meat, low-fat dairy, wise fat/oil choices, snacks (of lack of),
- Ask students to read the article titles, [Your Guide to Eating Out](#) (<http://www.diabetes.org/nutrition-and-recipes/nutrition/eatingoutguide.jsp>) from the American Diabetes Association. Copies can be printed out using the printer friendly format. After reading the article, have students work in teams using menus from area restaurants and/or fast food establishments; then, ask them to complete a meal plan for a diabetic friend by finishing the activity [Eating Out and Diabetes](#)

Extended Learning Activities:

- **Student Body Project** - Prepare a display on diabetes for the local library or school library during National Diabetes Awareness Month (November) or National Nutrition Month (March)
- **Student Body Project** - Include a booth and information on diabetes as a part of a school-wide health and fitness fair.
- **After School Fitness Activities** – Plan physical activities for preschool or elementary school age children involved in after school care programs. Plan activities 2-3 times a week for a month. This could be duplicated for middle and secondary students during lunch period or before school if time permits.

NEW Academic Connections:

- ✓ **Science/Chemistry:** Reinforce science concepts by having students determine if a food contains starch by using an iodine test for starch. See the [Testing for Starch](#) for steps for a lab.

NOTE TO TEACHER: A complete lab activity on *Identifying Basic Nutrients in Foods* can be found in the Food Science Lab Manual for text, [Food Science: The Biochemistry of Food and Nutrition](#) (2006) by Kay Yockey Mebas (FCS teacher) and Sharon Lesley Rodgers (Chemistry / Physics teacher).

- ✓ **Science/Biology:** Explore the relationship between genetics and diabetes; a curriculum addressing diabetes in the Native American population can be accessed at:
http://www.ihs.gov/medicalprograms/diabetes/nutrition/nutritioncur06_index.asp
- ✓ An entire curriculum is available on preventing Type II diabetes at
<http://www.southcentraltxahec.org/html/diabetes/DiabetesCurriculum.pdf>.
- ✓ A background article can be found at
<http://darwin.nmsu.edu/~molbio/diabetes/disease.html#Economic%20Impact%20of%20Type%20II%20Diabetes>
- ✓ **Language Arts/Cultural Awareness** – Work with elementary education teachers and use *The Eagle Books Series: A Guide for Educators and Communities*

As described at the CDC site, “The *Guide* includes more than 60 pages of cultural, physical, and nutritional activities. The activities, designed for

classrooms (Head Start through 4th grade) and other community sites (e.g., home, libraries, community centers), are organized into five areas—storytelling, native culture and health, learning about healthy foods, participating in physical activity, and diabetes prevention. Many activities are cross-curricular, integrating health and physical education, social studies, science, art, and math. Teachers will find lists of suggested vocabulary and selected resources accompanying each activity, with vocabulary definitions and more extensive resource references provided in the resources section, including information about type 2 diabetes, eagles, and American Indian and Alaska Natives.

[The Eagle Books Series: A Guide for Educators and Communities](#) (PDF, 809KB) is available in both electronic and printed formats.

Nutrition Guide for People with Diabetes STUDY GUIDE

Name _____

Read the information about meal planning for people with diabetes found at [Making Healthy Choices](http://www.diabetes.org/nutrition-and-recipes/nutrition/healthyfoodchoices.jsp) (www.diabetes.org/nutrition-and-recipes/nutrition/healthyfoodchoices.jsp), and answer the questions below:

1. What is a diabetes meal plan?

2. The right meal plan can help diabetics and all of us improve:
 - a.

 - b.

 - c.

 - d.

3. Why do diabetics need to take extra care in planning their eating and meal plans?

4. What medical professionals will help diabetics in developing meal plans?

5. For people with type 1 diabetes (the person must use insulin), food is one tool they can use to treat their diabetes. The goal of the food plan is to keep the blood glucose level as normal as possible. Therefore, meals should be planned at _____ times and the diabetic should closely monitor _____ levels.

Daily Guidelines:

An easy way to develop a healthy meal plan is to [Rate Your Plate](#). Complete the Rate Your Plate activity at the website.

6. According the Rate Your Plate guidelines, how should your plate be divided?
 - a. About _____ of the plate should be filled with grains
 - b. About _____ of the plate should be protein.
 - c. About _____ of the plate should be fruits and non-starchy veggies.

7. What foods belong to the grain group? And what starchy veggies are a part of this group?

8. What foods belong to the protein group?

9. What foods belong to the fruit and non-starchy group?

10. A key message for people with diabetes is “Carbs Count” – they should limit the carb choices to ____ to ____ at one meal and ____ to ____ for snacks following the serving size recommendations. Why do diabetics need to be concerned about carbohydrates?

11. What is a dietitian? How can a dietitian help a person with diabetes?

MEAL AND EXERCISE PLAN

NAME _____

DAILY MEAL PLAN	EXERCISE PLAN
BREAKFAST	
SNACK	
LUNCH	
SNACK	
DINNER	

Freddie's Food Choices

Breakfast

Orange Juice – 1 glass

Cornflakes - 1 bowl

Lowfat milk – ½ cup

Bagel with margarine

Lunch

Roast Beef Sandwich

With mayo and mustard

Potato Chips – 12 oz. bag

Apple

Soda - 12 oz.

Dinner

Chicken – 4 ounces

Baked Potato with margarine

Broccoli – 1 cup

Lettuce Salad – 1 cup

Dressing – 1 tablespoon

Dinner Roll with margarine

Eating Out and Diabetes

NAME _____

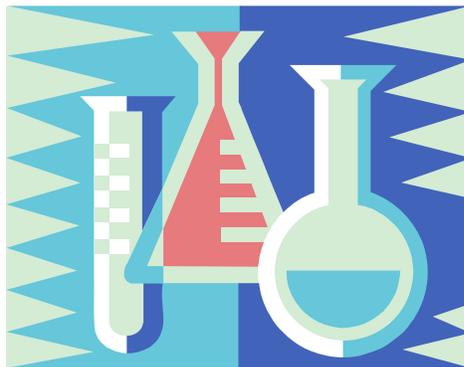
Your friend, Jordan, was recently diagnosed with diabetes. Jordan is struggling in following a healthy eating plan, especially when eating out with friends. A group of friends has plans to go out on Friday night for dinner and a movie. You plan to stop at a local fast food restaurant for dinner before the movie. What kinds of things on the menu would be healthy choices for Jordan (and for the entire group of friends!)?

Testing For Starch in Foods

Directions for TEACHERS: Follow the steps below to set up a lab for students on testing food for starch. Work with a science teacher if possible.

Supplies needed:

- Food samples for each group
 - Wax paper
 - Bottle of iodine
 - Eyedroppers
 - Paper towels
 - Latex gloves and lab coats/aprons, optional
1. Explain how iodine can be used to test if a food contains starch by demonstrating how iodine changes color when it touches starch – use a saltine cracker and drop one small drop of iodine. Explain how the color changes from brown to purple. Reinforce that only one small drop of iodine is needed.
 2. **Warn** students to keep iodine off their hands and clothes to avoid stains; if possible use latex disposable gloves and lab coats or aprons to protect hands and clothing.
 3. Have class work in groups of 2 or 3 for this activity.
 4. Hand out the worksheets/lab reports with a list of foods that they will be testing. Ask them to make predictions as to which foods will have starch before beginning their testing.
 5. Ask students to complete the lab report as they test each sample.
 6. Discuss the results and ask students to compare their results to their predictions.
 7. Explain the difference between simple and complex carbohydrates and the reasons why diabetics need to be concerned about counting carbs – discuss how the body breaks down carbs.



Adapted from a lesson at www.hallofhealth.org

Testing For Starch in Foods Lab Report

Name(s): _____

Directions: After receiving directions from your instructor, complete the following lab report based on your observations.

Trial	Food	Prediction	Color	Conclusion
#1	Bread	Yes Starch No Starch		
#2	Cheese	Yes Starch No Starch		
#3	Pasta	Yes Starch No Starch		
#4	Pear	Yes Starch No Starch		
#5	Rice	Yes Starch No Starch		
#6	Beans	Yes Starch No Starch		
#7	Cabbage	Yes Starch No Starch		
#8	Egg white	Yes Starch No Starch		
#9		Yes Starch No Starch		
#10		Yes Starch No Starch		

Conclusions: Based on this experiment, what can you conclude about foods containing starch? What foods are higher in starch than others?