

Carbohydrates-Simple and Complex

Summary

Grain products are staple foods and sources of simple and complex carbohydrates that provide energy for the body.

Main Core Tie

Food And Nutrition

[Strand 3 Standard 1](#)

Background for Teachers

Carbohydrates, the main nutrient in grain products in the orange section of MyPyramid, provide much of the fuel that keeps the body going, in much the same way that gasoline provides fuel to keep a car going.

Carbohydrates can be classified into categories.

CARBOHYDRATES are the body's most preferred source of energy. They make up, by far, the largest volume (60%) of our daily food. They are taken in the form of all foods made up of grain flour, cereals, pasta, potatoes and other vegetables, and also in the form of sugars contained in fruits, syrups, honey and candy, as well as in the pure crystalline form of our familiar table "sugar".

Carbohydrate is the element in our food which:

- supplies the energy for the body's automatic activity and for the performance of our daily tasks. The more physical work we perform daily, the more carbohydrates we must proportionately consume.

- plays a vital part in the digestion, assimilation (metabolism) and oxidation of protein and fat. If we take in more carbohydrate of any kind than is needed for immediate use the unused portion is stored in the liver or converted into fat and deposited in the tissues for future use.

Most carbohydrates come from foods of plant origin. The major simple carbohydrates or sugars are glucose, maltose, fructose, and sucrose which come from plants. Lactose is found in milk.

FOOD SOURCES OF CARBOHYDRATE

We generally think of grains (Bread & Cereal group) as the only source of carbohydrates. In reality carbohydrates come from many other sources that also give us other essential nutrients.

Carbohydrates come mainly from plant sources, although milk and many milk products contain some carbohydrates in the form of lactose. Some of the most important sources of carbohydrates are shown on FOOD FOR THOUGHT.

SIMPLE CARBOHYDRATES

Simple carbohydrates are quick energy sources, but they do not usually supply any other nutrients or fiber.

SUGARS - Glucose is the major kind of simple sugar. Glucose is the basic source of energy for all living things. Glucose supplies the body with quick energy. It occurs naturally in some fruits and vegetables and is also produced in the body by breaking down other foods into glucose.

Miniglossary of kCaloric Sweeteners

Sucrose: commonly known as table sugar, beet sugar, or cane sugar. Sucrose occurs in many fruits and some vegetables.

Fructose: known as fruit sugar. Most plants contain fructose, especially fruits and saps.

Glucose: sometimes known as blood sugar, sometimes as grape sugar. Nearly all plant foods contain glucose.

Maltose: known as malt sugar. Found in grains.

Lactose: commonly known as milk sugar. It is the principal carbohydrate found in milk.

COMPLEX CARBOHYDRATES

Complex carbohydrates often supply energy and other nutrients and fiber that the body needs. They are a better choice.

STARCH - in the body breaks down into simple sugars. The body has to break down all sugar/starch into glucose to use it. Starch supplies the body with long, sustained energy.

All starchy foods are plant foods. Seeds are the richest source; 70 percent of their weight is starch. Many human societies have a staple grain from which their people derive their food energy. In Canada, the United States, and Europe the staple grain is wheat. Rice is the staple grain of the Orient. Corn is the staple grain of much of South America and the southern United States. The staple grains of other peoples include millet, rye, barley, and oats. In each society a bread, meal, or flour is made from the grain and is then used for many purposes. These staple foods are the major source of food energy for people of the world. They support human activity and energy.

The second important source of starch is the bean and pea family. These include dry beans found at your local supermarket such as lima beans, pinto beans, kidney beans, black-eyed peas, chickpeas (garbanzo beans), and soybeans. These vegetables are about 40 percent starch by weight and also contain a substantial amount of protein.

The third major source of starch is the tubers, such as the potato, yam, and cassava. These serve as the primary starch sources in many non-Western societies.

DIETARY FIBER - which is found in plant cells. Because it is tough and stringy, it does not break down completely in the body. Fiber is essential for regulating the body. It is the non-digestible part of plants.

SOME OF THE IMPORTANT SOURCES OF CARBOHYDRATES ARE:

SIMPLE CARBOHYDRATE:

Sugar - fruit, fruit juice, table sugar, honey, soft drinks, and other sweets

COMPLEX CARBOHYDRATE:

Starch - bread, cereal, potatoes, pasta, rice, and legumes (dried peas and beans)

Fiber - bran, whole-grain foods, raw vegetables and fruit (especially the seeds and skins), legumes, nuts, seeds and popcorn

Instructional Procedures

LEARNING ACTIVITIES AND TEACHING STRATEGIES

OPTION #1

Have the students take notes on [Carbohydrates, Part I](#) on the [SIX ESSENTIAL NUTRIENTS worksheet](#), or use [CARBOHYDRATES WORKSHEET](#).

When discussing the three types of carbohydrates include amounts needed in terms of grams. Tell students that a gram is the basic unit in the metric system of measurement equal to about 1/28th of an ounce and that a kilogram is 1000 grams. To help them visualize a gram use the following examples:

100 grams is (very roughly) the weight of:

 a half-cup portion of most vegetables

 a half-cup of liquids such as milk or juice

A teaspoon of any dry powder such as salt, sugar, or flour weighs (very roughly) 5 grams.

OPTION #2

Using the previously generated list of foods that students have eaten during the past week have the students make lists of their ten favorite carbohydrate foods. Classify the foods as simple or complex carbohydrates. Use [CARBOHYDRATES - SIMPLE OR COMPLEX worksheet](#). Answer questions at bottom of chart.

VARIATION: To give them a more clear picture of their eating habits and those of their peers, have the students complete the [CARBOHYDRATES - SIMPLE OR COMPLEX worksheet](#) on their own

personal eating habits and then complete a worksheet as a unit group. This will help them look at their own diets and also see the tendencies of their age group.

After completing worksheets discuss student's lists using the following items to guide discussion.

Which list is longer?

Make a generalization concerning the types of foods found in each list.

Relate your findings to the Dietary Guidelines.

How can the simple carbohydrates be increased and complex carbohydrates be decreased. (refer to FOOD FOR THOUGHT handout)

Define complex carbohydrate and simple carbohydrate. (Have students record definitions on their NUTRIENT TERMS worksheet.)

NOTE TO TEACHER: To illustrate the difference between simple and complex carbohydrates, draw a bell curve on the board and have it represent the simple carbohydrate: quick high, quick low. Draw a horizontal line across the bell curve to represent complex carbohydrates: long sustained, over the long-haul, continuous energy supply.

OPTION #3

NOTE: The research for Part A and Part B can be divided among the class members and done on one day with the market orders completed and turned in. This can then be a two-period activity.

PART A

Have students research cook books and choose recipes which represents the simple carbohydrate group. Analyze the recipes as to why they are in the simple carbohydrate group.

Have each unit prepare a different recipe and share product with the rest of the class. (see [SUGGESTED SIMPLE/COMPLEX RECIPES](#) or other recipes of choice)

PART B

Have students research cook books and choose recipes which represents the complex carbohydrate group. Analyze the recipes as to why they are in the complex carbohydrate group.

Have each unit prepare a different recipe and share product with the rest of the class. (see [SUGGESTED SIMPLE/COMPLEX RECIPES](#) or other recipes of choice)

NOTE TO TEACHER: This would be a good place to incorporate teaching some skills - e.g. leavening agents, types of batters (pour, drop, dough___soft and roll). An example might be Eclair Shells:

leavening agent___air

batter___drop

carbohydrate___complex

filling or frosting___simple carbohydrate

OPTION #4

As a BELL RINGER show the students a food can without a label. Ask them if they would eat the product in the can without knowing what was inside.

Have the students analyze several different cereal box or bread labels for their carbohydrate and fiber content. Guide the students to the idea that carbohydrates should be their major source of food energy. ([WHAT ARE YOUR SOURCES OF CARBOHYDRATES?](#))

NOTE TO TEACHER: This assignment uses the ability to read labels. Included here is some background information on LABELING LAWS. Each teacher should contact their Extension Agent for the latest information on LABELING LAWS. This information could be put on a poster for students to refer to.

According to law, all labels must state:

The common name of the product.

The name and address of the manufacturer, packer, or distributor.

The style, type, description of the product.

The net contents in terms of weight, measure, or count.

Any special information that affects people with health problems.

Presence of artificial color, flavor, or preservatives.

A list of ingredients in order of weight in the package. The ingredient of the largest amount is listed first.

Nutritional labeling must be done if the food has nutrients added or if it claims to be highly nutritious.

This information has to be prominently displayed, typically on the front of the package, and in ordinary words. On the front or side of the package, most products are required to state the ingredients, listed in descending order of predominance by weight. That is all there is to the required label, but if you know how to read the front and side of a package you're already one step ahead of the naive general public. This is particularly true in regard to the ingredient list. Whatever is listed first is what the package contains the largest amount of.

If any nutrition information or claim is made on the label, (e.g. provides 9 essential vitamins and minerals) it must conform to the following format:

serving or portion size

serving or portions per container

calorie content per serving

protein grams per serving

fat grams per serving

protein, vitamins, and minerals as percentages of the United States RDA (Recommended Daily Allowance)

OPTION #5

Have the students do a [GRAINS AND CEREALS SHOPPING SURVEY](#) while working in groups. This could be done as a field trip, in class mock store set-up, homework assignment or text book research. After the data is collected, have students compare results. Discuss.

NOTE TO TEACHER: Consider making this option an extra credit assignment. Some students may be reluctant about doing a survey.

Group #1 will survey the cereal section of a super market to identify cereals from wheat and other grains.

Group #2 will survey the bread and bread products department and identify all breads and bread products made from wheat and all breads and bread products made from other grains.

Group #3 will survey the frozen food section and identify foods using wheat and/or grain products.

Group #4 will survey the "dry" foods section and identify the variety of foods (such as pasta) that contain wheat or other grains.

OPTION #6

Evaluate students' knowledge of carbohydrates and fiber with a [CARBOHYDRATE TEST](#).

Authors

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