

# Fat - A Concentrated Energy Source

## Summary

The role of fat as a nutrient that provides a source of concentrated energy and is also necessary for the body to utilize other nutrients, namely some important vitamins.

## Main Core Tie

Food And Nutrition

[Strand 4 Standard 4](#)

## Background for Teachers

Fat is a necessary constituent of the balanced diet, but not all fats are equal.

Remember that each nutrient plays a specific and important role in keeping the body healthy. Fat is one of 3 nutrients that provide energy. The other two are carbohydrates and proteins.

Fat is the most concentrated source of food energy. Fat that is liquid at room temperature is called an oil. Fats can also be a solid. A small amount of fat is needed by our bodies. Certain fats contain vitamins A,D,E & K. Fat is needed to carry these vitamins through the body.

Butter, margarine, shortening and oil are obvious sources of fat. Well marbled meats, poultry skin, whole milk, cheese, ice cream, nuts, seeds, salad dressings and some baked products also contain lots of fat.

**FUNCTION OF FAT:** A small amount of fatty food with meals makes the meal remain in the stomach for a longer time, giving one a pleasant feeling of satiety and satisfaction, and supplies necessary heat, energy and storage material.

Too many foods with fat cause weight gain. Fats have a little more than double the calories than carbohydrates and proteins have. On account of its being stored under the skin and in the abdomen (around the heart and in the marrow of the bones) it serves well in emergencies, when the body is in need of extra fuel (as in diseases with high fever, when the appetite is poor, and when greatly increased oxidation is going on in the body). Fat is often associated with cholesterol and health problems in the United States.

Excessive amounts of fat taken with meals interfere with digestion and, of course, if persisted in, will result in obesity. Being overweight is the cause of many troubles in the body, besides much inconvenience.

MyPyramid recommends that you make most of your fat sources from fish, nuts, and vegetable oils. Eat limited amounts of fats like butter, margarine, shortening, and lard. Check nutrition labels to keep fat content in check.

The 2,000 calorie MyPyramid plan that we use recommends 6 teaspoons of oil per day. 10% of your total calories should come from fat, or about 22 grams of fat/day. To figure the percent of calories from fat:

Take grams of fat and multiply by 9 calories

Divide by total calories

Multiply by 100

**CHOLESTEROL** is a fat-like substance made by the body which has some useful functions:

Found in every body cell

Part of skin tissue

Transports essential fatty acids

Needed to produce hormones

Your body makes the cholesterol it needs, eliminating the need to include it in your diet. It is present in all animal tissues, milk products and egg yolks, chicken legs, fins or wings\_\_\_\_anything that can

walk, swim or fly.

Cholesterol is not found in foods of plant origin such as fruits, vegetables, grains, dry beans and peas. Cholesterol is found in the membrane between the cells not in the cells or fleshy part of the meat.

Sometimes you hear about "good" and "bad" cholesterol. LDL or low-density lipoprotein takes cholesterol from the liver to wherever it is needed. Excess amounts of LDL can build up on artery walls and increase risk for heart disease. LDL is the "bad" cholesterol. HDL or high-density lipoprotein, the "good" cholesterol, picks up excess cholesterol and takes it back to the liver for excretion. (Food for Life)

FATTY ACIDS are the basic chemical units or organic acids which make up fat. All fat is one of three types of fatty acid:

**SATURATED** - found in animal sources such as milk, cream, cheese, butter, meat, poultry. Also in coconut and palm oil. Because it can be made from saturated fatty acids, cholesterol levels in the blood are related to the amount of saturated fat eaten. Appear to raise LDL or bad cholesterol.

**POLYUNSATURATED** - are better than saturated fats. They are found in vegetable oils and fish. Seem to help lower cholesterol levels.

**MONOUNSATURATED** - the best type of fat. It is found in olives, avocados, nuts, and olive, canola and peanut oils. Most margarines and hydrogenated vegetable oils are highly monounsaturated. These seem to lower LDL and raise HDL levels.

All three types of fats have the same number of calories. A diet of foods high in cholesterol and saturated fat will increase the "blood cholesterol level" of many people. As a result plaque can build up in the arteries (atherosclerosis) which increases the risk of heart attack and stroke.

Your body can't make all the fatty acids it needs. Those that must be obtained through foods are called essential fatty acids. One important essential fatty acid is omega-3, which may reduce the risk of heart disease. Omega-3 fatty acids are prevalent in fish, which is why it is recommended that one eat fish; especially fatty fish like trout, albacore tuna and salmon, at least twice a week.

There is much recent talk about trans fats; in fact, food producers must now add trans fat information to food labels. Read labels and ingredient lists carefully because if the amount of trans fat is small enough per serving, it may be listed as 0 trans fat, while it still contains a trace. A trans fat is when a liquid vegetable oil is chemically changed to a solid through a process called hydrogenation. Trans fats are used in products like margarine, baked goods, snack foods, and fast foods to increase shelf life and add extra flavor. Beware! These are probably the worst fats as they can increase LDL and seem to lower HDL. Avoid foods rich with trans fats.

Fats are also necessary because vitamins A, D, E, and K are dissolved in fat. If a body does not have some fat, these important vitamins are not accessible. Their function protects the body's organs from injury and insulates against shock and temperature changes.

It is important to understand the connection between carbohydrates, cholesterol and fat as they relate to weight and energy. Sugar impacts weight because excess sugar, beyond what is needed for energy output, is converted by the body and is stored as fat. This is also true of other carbohydrates and proteins eaten in excess of energy output.

## Instructional Procedures

### LEARNING ACTIVITIES AND TEACHING STRATEGIES

#### OPTION #1

As a bell ringer use legos to represent the grams of fat in food products available in the food lab. Discuss with the students the ramifications of having so much fat in the diet.

As an introduction to the nutrient fat, display one average portion of butter (square served in restaurants), a bowl of cereal and milk (whole), meat and cereal grains consumed, and the oil on

salads. Discuss how too much fat in the diet can contribute to obesity and high cholesterol.

#### OPTION #2

During discussion on fats have the students complete the FAT section of the SIX ESSENTIAL NUTRIENTS worksheet, or use the [FATS AND OILS STUDY GUIDE](#). (If available, use The Learning Seed video: *The Fats of Life*.)

Help the students to define the following terms: fat, lipid, unsaturated fat, saturated fat, visible and invisible fat, poly-unsaturated fat, fatty acid, cholesterol, and hydrogenated fat. Develop a graphic organizer to help the students see the relationships among these terms.

Add the FAT section of MyPyramid to the bulletin board.

Using the transparency [NUTRIENTS IN FATS & OILS](#) have a class discussion on the value of fat in the diet. Discuss the harm of too much fat in the diet. This information could also be used as a hand-out.

#### OPTION #3

Have the students select one day from their Daily Food Intake Charts and calculate their fat for the day. To calculate the percent of calories from fat:

- Take grams of fat and multiply by 9 calories

- Divide by total calories

- Multiply by 100

VARIATION: Supply the students with empty cartons and/or labels. Have them find the percentage of fat in five different foods.

#### OPTION #4

Select at least six fast foods. From the transparency reference [FAT IN FAST FOODS](#) have students analyze the amount of fat consumed from each item. Relate the fat content to calories. (If available, show The Learning Seed dvd "Fast Food Survival Guide" available at [www.ncescatalog.com](http://www.ncescatalog.com))

Melt shortening and fill test tubes or glass measuring cups with the corresponding amount of fat for each of the foods represented or color water yellow and use it as a more economical substitute. Label the amount of fat in grams but do not identify the food item. Provide student groups with a list of the foods represented. Have the groups match the foods and the test tube samples. As a class, discuss reasons for the varying amounts of fat in each item. Legos can be used for this illustration.

To summarize, use the figures in the transparency to show the total fat in a meal at any fast foods outlet.

#### OPTION #5

Using the four [FAT TRANSPARENCIES](#) supplied by the Utah Division of the American Heart Association, discuss the fat content of foods shown. Help students discover that the method of food preparation contributes to the overall fat content.

Show two transparencies: [SAMPLE MENUS](#) and [SIMPLE MENU CHANGES](#) to help the students discover that simple substitutions in food choices will lower the overall fat content of the meal.

Show the transparency [HOW TYPES OF MILK AFFECTS FAT CONTENT OF LUNCHES](#) and discuss with the students how food choices affect the overall fat content of the meal. Illustrate the fat in various forms of milk:

- in one glass labelled SKIM put nothing

- in one glass labelled 1% MILK put 1/2 teaspoon butter or shortening

- in one glass labelled 2% MILK put 1 teaspoon butter or shortening

- in one glass labelled 4% MILK or REGULAR MILK put 2 teaspoons butter or shortening

#### OPTION #6

##### PART A

Provide the students with food labels and ask them to identify the fats listed. Tell the students to write each type of fat on an index card. Put the categories "good fat" and "bad fat" on the chalkboard. Have the students categorize the fats written on the index cards. Propose to students that the following

statements are true.

Most plant sources of fat are healthy.

Excessive amounts of fat from animal sources are harmful.

Next, have the students rearrange the list already generated and discuss the following questions.

Are foods advertised as made from 100% vegetable oil made from unsaturated fats? Explain.

If a food label says "no cholesterol" is this all you need to know about the fat content of the food? Explain.

NOTE TO TEACHER: Possible answers - Not all vegetable oils are poly-unsaturated. Olive oil, canola oil and peanut oil are high in mono-unsaturated fats. Coconut oil (plant source) is more saturated than cream (milk source). Palm oil is highly saturated.

#### PART B

Continue the discussion on fats by using [VEGETABLE OIL FAT COMPARISON](#) (handout or transparency which can be color coded). Each student will complete [OILS AND FATS...THE CONSUMER REPORT](#) utilizing products the teacher has displayed in class, or products found at a grocery store.

#### OPTION #7

Select ten foods such as mayonnaise, tuna fish salad, lunch meat, fruit slices, and French fries. Place each food on a paper towel and allow it to stand overnight. Label each paper towel then remove the food to plates. Allow the towels to dry. Discuss the results and have the students match the food to the towel. Use the following questions to guide discussion.

What effect did each food have on the paper towel?

How would you categorize the foods as to their fat content?

#### OPTION #8

The students will make a collage. One side will display foods high in saturated fat while the other side displays food containing polyunsaturated, monounsaturated, low fat or no fat foods. Each group of students will utilize pictures from magazines which will be cut out and glued on poster board. Posters can be displayed in class.

#### OPTION #9

To illustrate what plaque in the arteries looks like have two students perform the following demonstration: obtain two small sections of a garden hose or tubing. Add layers of hot glue into one section. Let cool. Pour water through both sections. Show how the glued section restricts the flow of water as compared to the clean section which allows the water to flow freely.

#### OPTION #10

Have the students complete the resource [HAVE YOU GOTTEN THE MESSAGE ON CHOLESTEROL?](#) This resource can be used as a pre-test or the basis for a class discussion and demonstrations to help dispel myths, fallacies and false advertising about cholesterol.

#### OPTION #11

Have the students work as individuals, as partners, in groups or as a total class to brainstorm and create a list of the 16 ways to cut down on fat in the diet. Have volunteers prepare a poster showing the ideas. Use [16 TIPS TO HELP YOU AVOID TOO MUCH FAT, SATURATED FAT AND CHOLESTEROL](#) as a handout and reference key for this activity.

#### OPTION #12

Compare [HIGH FAT MENUS/LOW FAT MENUS](#). Discuss the differences and how menus can be changed to reduce the fat intake.

Have the students identify where the fat is located in the HIGH FAT MENU by underlining or highlighting the food item.

#### OPTION #13

Evaluate the students' knowledge of fats and sugars with a [FATS AND SUGARS TEST](#).

