

# 2

## Designing a Healthful Diet

### Chapter Objectives

after reading this chapter you will be able to:

1. Describe the four characteristics of a nutritious diet, pp. 40–44.
2. interpret the Nutrition Facts table on a food label, pp. 42–44.
3. Use the food groups and recommended number of servings of each in *Eating Well with Canada's Food Guide* to plan a nutritious diet, pp. 50–56.
4. Name at least four ways to apply guidelines for healthy eating when eating out, p. 63.





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**Shivani and her parents moved to Canada from India** when she was six years old. Although she was delicate in comparison to her Canadian peers, Shivani was healthy and energetic, excelling in school and riding her new bike in her suburban neighbourhood. By the time Shivani entered high school, her weight had caught up to that of her Canadian classmates. Now in her first year of university, she has joined the 23% of 18 and 19 year olds in Canada who are overweight or obese (Stats Canada, 2011) Shivani explains, “In India, the diet is mostly rice, lentils, and vegetables. Many people are vegetarians, and many others eat meat only once or twice a week, and very small portions. Deserts are only for special occasions. When we moved to Canada, I wanted to eat like all the other kids: hamburgers, french fries, soft drinks, and sweets. I gained a lot of weight on that diet, and now my doctor says my cholesterol level, my blood pressure, and my blood sugar level are all too high. I wish I could start eating like my relatives back in India again, but they don’t serve rice and lentils at the residence cafeteria.”

What influence does diet have on health? What exactly qualifies as a “poor diet,” and what makes a diet healthful? Is it more important to watch how much we eat or what kinds of foods we choose? Is low-carb better, or low-fat?

The truth is, there’s no one way to eat that’s right for everyone. We’re individuals with unique preferences, needs, and cultural influences. You may love broccoli, whereas your roommate can’t stand it. A person with diabetes may need to eat less added sugar than a person without diabetes. People following certain religious practices may avoid specific meats and dairy products. Thus, there are literally millions of ways to design a healthful diet to fit individual needs.

## Test Yourself

1. **T F** a nutritious diet can include most foods.
2. **T F** Food labels are the most commonly used tool for choosing healthy foods.
3. **T F** the portion sizes used in *Eating Well with Canada’s Food Guide* are based on the “average” portion sizes eaten by Canadians.
4. **T F** Manufacturers must list the ingredients in packaged food in descending order by weight.
5. **T F** Manufacturers can claim that eating their food products helps prevent diseases like cancer.

Test Yourself answers can be found at the end of the chapter.



▲ A healthful diet can help prevent disease.

**healthful diet** A diet that provides the proper combination of energy and nutrients and is adequate, moderate, balanced, and varied.

**adequate diet** A diet that provides enough of the energy, nutrients, and fibre needed to maintain a person's health.

**moderation** Eating any foods in moderate amounts—not too much and not too little.

**balanced diet** A diet that contains the combinations of foods that provide the proper proportions of nutrients.

Given all this potential confusion, it's a good thing there are nutritional tools to guide us in designing our own healthful diet. In this chapter, we'll discover these tools, including *Eating Well with Canada's Food Guide*. Before we explore the question of how to design a healthful diet, however, we should first make sure we understand what a healthful diet *is*.

## What Is a Healthful Diet?

A **healthful diet** provides the proper combination of energy and nutrients. It has four characteristics: it is adequate, moderate, balanced, and varied. No matter if you are young or old, overweight or underweight, healthy or ill, if you keep these characteristics in mind, you will be able to select foods that provide you with the optimal combination of nutrients and energy each day.

### A Healthful Diet Is Adequate

An **adequate diet** provides enough of the energy, nutrients, and fibre to maintain a person's health. A diet may be inadequate in only one area, or many areas. For example, many people in Canada do not eat enough vegetables and therefore are not consuming enough of the fibre and micronutrients vegetables provide. However, their intake of protein, fat, and carbohydrate may be adequate. In fact, some people who eat too few vegetables are overweight or obese, which means that they are eating a diet that, although inadequate in one area, exceeds their energy needs. On the other hand, a generalized state of undernutrition can occur if an individual's diet contains an inadequate level of several nutrients for a long period of time.

A diet that is adequate for one person may not be adequate for another. For example, the energy needs of a young woman who is lightly active are approximately 7100 kJ to 8400 kJ (1700 to 2000 kcal) each day, whereas a highly active male athlete may require more than 16 800 kJ (4000 kcal) each day to support his body's demands. These two individuals differ greatly in their activity level and in their quantity of body fat and muscle mass, which means they require very different levels of fat, carbohydrate, protein, and other nutrients to support their daily needs.

### A Healthful Diet Is Moderate

Moderation is one of the keys to a healthful diet. **Moderation** refers to eating any foods in moderate amounts—not too much and not too little.

If we eat too much or too little of certain foods, we cannot reach our health goals. For example, some people drink as much as 1875 mL (60 fluid ounces as three, 20 oz. bottles) of soft drinks on some days. Drinking this much contributes an extra 3200 kJ or 765 kcal of energy to a person's diet. To allow for this extra energy and avoid weight gain, most people would need to reduce their food intake significantly. This could mean eliminating many healthful food choices. In contrast, people who drink mostly water or other beverages that contain little or no energy can consume more nourishing foods that will support their health. Excess intake of sweets and fats are associated with overweight and obesity and high salt intake is associated with high blood pressure and heart disease.

### A Healthful Diet Is Balanced

A **balanced diet** contains the combinations of foods that provide the proper proportions of nutrients. As you will learn in this course, the body needs many types of foods in varying amounts to maintain health.



▲ A diet that is adequate for one person may not be adequate for another. A woman who is lightly active may require fewer kilojoules or kilocalories of energy per day than a highly active male.

For example, fruits and vegetables are excellent sources of fibre, vitamin C, potassium, and magnesium. In contrast, meats are not good sources of fibre and these nutrients. However, meats are excellent sources of protein, iron, zinc, and copper. By eating the proper balance of all healthful foods, including fruits, vegetables, and meats or meat substitutes, we can be confident that we're consuming the balanced nutrition we need to maintain health.

## A Healthful Diet Is Varied

**Variety** refers to eating many different foods from the different food groups on a regular basis. With thousands of healthful foods to choose from, trying new foods is a fun and easy way to vary your diet. Eat a new vegetable each week or substitute one food for another, such as raw spinach on your turkey sandwich in place of iceberg lettuce. Selecting a variety of foods increases the likelihood that you will consume the multitude of nutrients your body needs. As an added benefit, eating a varied diet prevents boredom and helps you avoid the potential of getting into a “food rut.” Later in this chapter, we'll provide suggestions for eating a varied diet.

**RECAP** A healthful diet provides adequate nutrients and energy, and it includes sweets, fats, and salty foods in moderate amounts only. A healthful diet includes an appropriate balance of nutrients and a wide variety of foods.

**variety** Eating a lot of different foods each day.



## What Tools Can Help Me Design a Healthful Diet?

Many people feel it is impossible to eat a healthful diet. They may mistakenly believe that the foods they would need to eat are too expensive or not available to them, or they may feel too busy to do the necessary planning, shopping, and cooking. Some people rely on dietary supplements to get enough nutrients instead of focusing on eating a variety of foods. But is it really that difficult to eat healthfully?

Although designing and maintaining a healthful diet is not as simple as eating whatever you want, most of us can improve our diets with a little practice and a little help. Let's look at some tools for designing a healthful diet.

▲ The serving size on a nutrition label may not be the same as the amount you eat.

## Canada's Food Labels

A new set of labelling regulations became mandatory for all prepackaged foods in Canada on December 12, 2007. These regulations specify which foods need a food label, provide detailed descriptions of the information that must be included on the food label, and outline the food products that are exempt from carrying nutrition information on their food labels. The latter are shown in **table 2.1**.

**TABLE 2.1** Examples of Foods Exempt from Carrying Nutrition Information

- foods such as spices and coffee, where the amounts of nutrients required on the label would be “0”
- alcoholic drinks (with an alcohol content of more than 0.5%)
- fresh vegetables or fruits, with no added ingredients
- fresh meats
- foods sold at roadside stands, craft shows, flea markets, fairs, or farmers' markets by the person who prepared and processed them
- individual servings of food sold for immediate consumption, such as salads and sandwiches, that have not been treated or packaged to extend their durable life
- one-bite candies or desserts
- prepackaged individual portions of food intended to be served with meals or snacks by a restaurant or other commercial enterprise
- some cow and goat milk products sold in refillable glass containers

Source: Canada Gazette, Vol. 137, No. 1, January 1, 2003, “Food and Drug Act: Regulations Amending the Food and Drug Regulations,” B.01.401, <http://canadagazette.gc.ca/partII/2003/20030101/html/sor11-e.html> (accessed January 2006). Reproduced with the permission of the Minister of Public Works and Government Services Canada, 2005.



▲ Choosing a smaller-size drink of pop, or switching to diet pop, helps to maintain a healthy body weight. Better yet—drink water to quench your thirst!



➤ In this chapter you will learn how to read food labels, a skill that can help you meet your nutritional goals.

Food labels allow food manufacturers to communicate directly with purchasers and consumers to compare similar products. The food label has three main purposes (Health Canada, 2003):

- To give basic product information, including a list of ingredients, product weight or net quantity, best-before or expiry dates, grade or quality, country of origin, and the name and address of the manufacturer, dealer, or importer. Some manufacturers also include 1-800 phone numbers or website addresses for consumers to contact them directly with product-related questions.
- To provide health, safety, and nutrition information. This includes nutrition information such as the amount and type of fats, proteins, carbohydrates, vitamins, and minerals present in a specified serving size (in the Nutrition Facts table). The label may also give instructions for safe storage and handling of the product.
- To provide a means for marketing or promoting the product by label claims such as “low fat,” “cholesterol free,” “high source of fibre,” “product of Canada,” “no preservatives added,” and so on.

### Food Labels Can have Four Main Components

The labels on packaged foods can have four main parts, as shown in **Figure 2.1**.

1. *Ingredient list:* The ingredients must be listed in descending order by weight. This means that the first product listed in the ingredient list is the predominant ingredient, by weight (not volume amount), in that food. This information is essential for people with food allergies. Such individuals need to see whether a food contains an ingredient they are allergic to, such as wheat or peanuts. But it can

**President's Choice**

**BLUE MENU**

**FIBRE FIRST**

**MULTI-BRAN CEREAL**

**VERY HIGH IN FIBRE**

**13 g FIBRE**

**525 g**

**Ingredient list**

**Nutrition Facts table**

**Nutrient content claims**

**Health claims**

**Information of food manufacturer, packer, or distributor**

**Ingredient list:** WHEAT, CORN, RYE, BARLEY, OAT, RICE, MILK, SUGAR, SALT, BAKING SODA, VANILLA, VITAMINS AND MINERALS (IRON, NIACIN, THIAMINE, RIBOFLAVIN, NIACIN, B6, CALCIUM PANTOTHENATE, PYRIDOXINE, HYDROXYCHLORIDE (VITAMIN B6), FOLIC ACID)

**Nutrition Facts table:**

Nutrition Facts		Per 1/2 cup (30 g)	
		Cereal With 1/2 cup 1% milk	
Amount		% Daily Value	
Calories	110	170	
Fat	1 g	2 %	3 %
Saturates	0 g	0 %	5 %
Trans	0 g		
Polyunsaturates	0.4 g		
Omega-6	0.4 g		
Omega-3	0 g		
Monounsaturates	0.2 g		
Cholesterol	0 mg		
Sodium	270 mg	11 %	14 %
Carbohydrate	23 g	8 %	10 %
Fibre	13 g	52 %	52 %
Soluble Fibre	0.5 g		
Insoluble Fibre	12 g		
Sugars	5 g		
Protein	3 g		
Vitamin A	0 %	6 %	
Vitamin C	0 %	0 %	
Calcium	2 %	15 %	
Iron	30 %	30 %	
Vitamin D	0 %	20 %	
Thiamine	45 %	50 %	
Riboflavin	8 %	20 %	
Niacin	8 %	10 %	
Vitamin B6	10 %	15 %	
Folate	8 %	10 %	
Vitamin B12	0 %	20 %	
Panthenate	6 %	10 %	
Phosphorus	20 %	30 %	
Magnesium	30 %	40 %	
Zinc	20 %	25 %	

**Health claims:** A HEALTHY DIET LOW IN SATURATED AND TRANS FATS MAY REDUCE THE RISK OF HEART DISEASE. PC® BLUE MENU™ FIBRE FIRST™ MULTI-BRAN CEREAL IS FREE OF SATURATED AND TRANS FATS.

**Information of food manufacturer, packer, or distributor:** PRODUCT OF CANADA/PRODUIT DU CANADA (SUGARS INC. MONTREAL, QUEBEC, CANADA) 1-888-495-5111 www.presidentchoice.ca

➤ **Figure 2.1** The four main parts of a food label and the contact information. (Courtesy of President's Choice®, www.presidentchoice.ca.)

be very useful in many other situations as well; for example, when you are looking for foods that are lower in fat or sugar, or attempting to identify foods that contain whole wheat instead of white flour. The ingredient list has been mandatory on packaged foods for many years.

2. **Nutrition Facts table:** The **Nutrition Facts table** is required on all products except those listed in Table 2.1. The amount of energy and 13 core nutrients (fat, saturated fat, trans fat, cholesterol, sodium, carbohydrate, fibre, sugar, protein, vitamin A, vitamin C, calcium, and iron) in 1 serving of the food must be provided. Canada was the first country to require the amount of trans fat to be listed on product labels.

In the Nutrition Facts table and nutrient content claims (discussed next), the energy content is given as **Calories**. (Recall that 1 Calorie is equal to 1 kilocalorie and both are equivalent to 4.184 kilojoules.) Manufacturers have the option of adding the energy content in kilojoules (kJ) in parentheses.

Manufacturers also have the option of stating the amounts of additional nutrients in an expanded format: potassium, soluble and insoluble fibre, sugar alcohol, starch, and the following vitamins and minerals: vitamin D, vitamin E, vitamin K, thiamin, riboflavin, niacin, vitamin B<sub>6</sub>, folate, vitamin B<sub>12</sub>, biotin, pantothenic acid, phosphorus, iodide, magnesium, zinc, selenium, copper, manganese, chromium, molybdenum, and chloride.

For foods made specifically for children under the age of two years, a simplified version of the Nutrition Facts table is used. The amount of Calories and 10 nutrients are listed, but the saturated and trans fats and cholesterol content are not required. **Figure 2.2** compares the standard format, the expanded format, and the simplified form used for children under the age of two years.

3. **Nutrient content claims:** These are claims about the amount of a nutrient in a food; for example, “reduced in fat,” “high in fibre,” “cholesterol free,” and “source of iron.” The nutrient content claims have been revised so that they are based on standardized serving sizes for similar products. Before these terms can be used on a label or in an advertisement, the exact amount of a nutrient in 1 serving has to be determined and has to meet set criteria (see **table 2.2** for examples of these).

These nutrient content claims are usually on the front of food packages, where consumers can easily see them. Any of the following words may indicate a nutrient content claim:

- free
- less
- reduced
- very high
- source of
- good source of
- low
- more
- lower
- light or lite
- high source of
- excellent source of

**TABLE 2.2** Examples of Common Nutrient Content Claims

- Claims of “free” mean that the number of kJ (kcal) or the amount of a nutrient is nutritionally insignificant in a specified amount of food. For example, to be “sodium free,” a product has to contain less than 5 mg of sodium per serving. “Free of sugar” means that a product has less than 50 mg of sugar and fewer than 17 kJ (5 kcal) per serving. Other wording can be used instead of “free of sugar”: “no sugar,” “0 sugar,” “contains no sugar,” and “sugar free” all mean the same thing on a label.
- “Low” means there is a small amount of a nutrient present in 1 serving. For example, “low fat” indicates the product contains 3 g of fat or less per serving.
- “Reduced” indicates that there is at least 25% less of a nutrient in 1 serving, compared to the “original” product or a similar product. For example, Christie’s Ritz 25% Less Fat™ crackers have 25% less fat than the original Ritz™ crackers. Kellogg’s Frosted Flakes 1/3 Less Sugar™ cereal has 33% less sugar than the original Frosted Flakes™ product.
- “Source” means that there is a significant amount of a nutrient in 1 serving. For example, a product must contain 2 or more grams of dietary fibre to be called a “source of fibre.”

Source: Health Canada. 2003. Frequently Asked Questions About Nutrition Labelling. [http://hc-sc.gc.ca/fn-an/label-etiquet/nutrition/educat/te\\_quest-eng.php#18](http://hc-sc.gc.ca/fn-an/label-etiquet/nutrition/educat/te_quest-eng.php#18). (accessed September 2008).

**Nutrition Facts table** The table on a food package label that gives the amount of energy and a minimum of 13 key nutrients in one serving of the food.

**Calorie** 1 Calorie = 1 kcal = 4.184 kilojoules.

<b>Nutrition Facts</b>		
Serving Size 125 mL (35 g)		
Servings Per Container 13		
<b>Amount Per Serving</b>		
<b>Calories 90</b>	Calories from fat 9	
Calories from Saturated + Trans 0		
<b>% Daily Value*</b>		
<b>Total Fat 1 g</b>		<b>2 %</b>
Saturated 0 g		<b>0 %</b>
+ Trans 0 g		
Omega-6 Polyunsaturated 0.5 g		
Omega-3 Polyunsaturated 0 g		
Monounsaturated 0.2 g		
<b>Cholesterol 0 mg</b>		<b>0 %</b>
<b>Sodium 300 mg</b>		<b>12 %</b>
<b>Potassium 410 mg</b>		<b>12 %</b>
<b>Total Carbohydrate 27 g</b>		<b>9 %</b>
Dietary Fibre 12 g		<b>48 %</b>
Soluble Fibre 0 g		
Insoluble Fibre 11 g		
Sugars 6 g		
Sugar Alcohols 0 g		
Starch 9 g		
<b>Protein 4 g</b>		
Vitamin A 0 %	Vitamin C 0 %	
Calcium 2 %	Iron 35 %	
Vitamin D 0 %	Vitamin E 6 %	
Vitamin K 10 %	Thiamine 55 %	
Riboflavin 4 %	Niacin 25 %	
Vitamin B <sub>6</sub> 10 %	Folate 10 %	
Vitamin B <sub>12</sub> 0 %	Biotin 30 %	
Pantothenate 8 %	Phosphorus 30 %	
Iodide 0 %	Magnesium 50 %	
Zinc 25 %	Selenium 6 %	
Copper 20 %	Manganese 10 %	
Chromium 10 %	Molybdenum 10 %	
Chloride 10 %		
* Percent Daily Values are based on a 2,000 Calorie diet. Your daily values may be higher or lower depending on your Calorie needs:		
	Calories: 2,000	2,500
Total Fat	Less than 65 g	80 g
Saturated + Trans	Less than 20 g	25 g
Cholesterol	Less than 300 mg	300 mg
Sodium	Less than 2,400 mg	2,400 mg
Potassium	3,500 mg	3,500 mg
Total Carbohydrate	300 g	375 g
Dietary Fibre	25 g	30 g
Calories per gram:		
Fat 9	Carbohydrate 4	Protein 4

<b>Nutrition Facts</b>	
Per 125 mL (87 g)	
Amount	% Daily Value
<b>Calories 80</b>	
<b>Fat 0.5 g</b>	<b>1 %</b>
Saturated 0 g	<b>0 %</b>
+ Trans 0 g	
<b>Cholesterol 0 mg</b>	
<b>Sodium 0 mg</b>	<b>0 %</b>
<b>Carbohydrate 18 g</b>	<b>6 %</b>
Fibre 2 g	<b>8 %</b>
Sugars 2 g	
<b>Protein 3 g</b>	
Vitamin A 2 %	Vitamin C 10 %
Calcium 0 %	Iron 2 %

<b>Nutrition Facts</b>	
Per 1 jar (128 mL)	
	Amount
<b>Calories</b>	110
<b>Fat</b>	0 g
<b>Sodium</b>	10 mg
<b>Carbohydrate</b>	27 g
Fibre	4 g
Sugars	18 g
<b>Protein</b>	0 g
% Daily Value	
Vitamin A 6 %	Vitamin C 45 %
Calcium 2 %	Iron 2 %

(a) (b) (c)

Figure 2.2 Label formats. (a) Standard format; (b) additional information (expanded); (c) format for foods for children less than two years of age.

Source: Compendium of Templates for "Nutrition Facts" Tables, Fig. 1.1, Fig. 18.1, and Fig 20.1. [www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/reg/compend\\_nut\\_fact\\_tc-repertoire\\_etiquetage\\_nut\\_tm\\_e.html](http://www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/reg/compend_nut_fact_tc-repertoire_etiquetage_nut_tm_e.html) (accessed January 2006). Health Canada, © 2003. Reproduced with the permission of the Minister of Public Works and Government Services Canada, 2008.

Manufacturers can decide whether they want to have nutrient content claims on their products. Some of the more important changes to nutrient content claims include:

- Claims for saturated fatty acids include a restriction on levels of both saturated and trans fatty acids. In other words, for a label to indicate that a product is low in trans fats, the product must also be low in saturated fats.
- The claim “[product name] is fat free” is allowed only if accompanied by the statement “low fat” or “low in fat” (3 g of fat or less per serving).
- The nutrient content claim “light” is allowed only on foods that meet the criteria for either “reduced in fat” or “reduced in Calories.” There must be a statement that explains what makes the food light (i.e., “low in fat” or “low in Calories”).
- “Light” can also be used to describe a characteristic of a food, such as “light tasting” and “lite in colour.”
- Terms related to the carbohydrate content of foods, such as “low carb,” “low carbohydrate,” and “carbohydrate reduced,” are not allowed.
- Claims related to the glycemic index (see Chapter 4) are also not permitted, as they are considered drug claims. Examples include “rapid absorption,” “does not raise blood sugar,” “non-glycemic,” and “low glycemic index.”
- The only nutrient content claims that are permitted for foods for children under two years of age are “source of protein,” “excellent source of protein,” “more protein,” “no added salt,” and “no added sugar.”

4. **Health claims:** These are defined by the Canadian Food Inspection Agency (CFIA, 2011) as “any representation in labelling or advertising that states, suggests, or implies that a relationship exists between consumption of a food, or an ingredient in the food, and health.” There are three main types of health claims: disease risk reduction and therapeutic claims; function claims; and general health claims (CFIA, 2011). Our focus here is on the first category, disease risk reduction and therapeutic claims; at the present time, there are no therapeutic claims approved and there are seven disease risk reduction claims approved.

According to Health Canada (2011), a **disease risk reduction claim** “is generally a statement that links a food or a constituent of a food to reducing the risk of developing a diet-related disease or condition, (e.g., osteoporosis, hypertension) in the context of the total diet.” **table 2.3** outlines the disease risk reduction claims that are currently allowed on Canadian food labels. Health claims involving fat and cancer as well as dietary fibre and cancer are currently permitted in the United States but not in Canada.

**Disease risk reduction claim** A statement that links a food or a food ingredient with reduced risk of disease or a condition in the context of a total diet.

### how to read and Use the Nutrition Facts table on Foods

**Figure 2.3** shows an example of a bilingual Nutrition Facts table with additional information (i.e., the expanded format). There is a variety of information in this table that is useful when planning a nutritious diet.

You can use this information to learn more about an individual food, and you can also use it to compare one food to another. Let’s start at the top of the table and examine how to use this information.

1. **Serving size and servings per container:** Describes the serving size in a common metric measure (e.g., millilitres) and a weight (e.g., grams). Keep in mind that the serving size listed on the package may not be the same as 1 serving according to *Canada’s Food Guide*. It also may not be the same as the amount *you* eat! You must factor in how much of the food you eat when determining the amount of nutrients that this food contributes to your actual intake.
2. **Calories, Calories from fat, and Calories from saturated + trans fats per serving:** Describes the total number of Calories. In this example, 1 serving of the food has 90 Calories (380 kJ), with 9 of those Calories coming from fat. This means that 10% of the Calories in this product come from fat ( $9 \div 90 = 10\%$ ), making it relatively low in fat. Notice in the list of nutrients that saturated and trans fats are summed together, and if manufacturers choose to list the amount of omega-3



**TABLE 2.3** Disease Risk Reduction Claims Permitted on Food Labels**psyllium products and blood Cholesterol Lowering**

Primary statement:

"[serving size from Nutrition Facts table in metric or common household measures] of (Brand name) [name of food] with psyllium supplies/provides X% of the daily amount of the fibres shown to help reduce/lower cholesterol."

For example:

"1 cup (30 g) of Brand X cereal with psyllium supplies 50% of the daily amount of fibres shown to help lower cholesterol."

The "daily amount" referred to in the primary statement is 7 grams psyllium fibre.

**Oat products and blood Cholesterol Lowering**

Primary statement:

"[serving size from Nutrition Facts table in metric and common household measures] of (Brand name) [name of food] [with name of eligible fibre source] supplies/provides [X% of the daily amount] of the fibres shown to help reduce/lower cholesterol."

For example:

If the eligible fibre source is a food itself: "1 cup (X g) of Quaker Oatmeal supplies X% of the daily amount of the fibres shown to help reduce cholesterol"

If the eligible fibre source is an ingredient: "1 muffin (X g) with oat bran provides X% of the daily amount of the fibres shown to help lower cholesterol"

The "daily amount" referred to in the primary statement is 3 grams beta-glucan oat fibre.

**plant sterols (phytosterols) and blood Cholesterol Lowering**

Primary statement:

"[serving size from Nutrition Facts table in metric and common household measures] of [naming the product] provides X% of the daily amount of plant sterols shown to help reduce/lower cholesterol in adults."

Two additional statements that could be used in combination or alone:

1. "Plant sterols help reduce [or help lower] cholesterol."
2. "High cholesterol is a risk factor for heart disease."

The "daily amount" referred to in the primary statement is 2 grams.

**Calcium and Osteoporosis**

"A healthy diet with adequate calcium and vitamin D, and regular physical activity, help to achieve strong bones and may reduce the risk of osteoporosis. (Naming the food) is an excellent source of calcium and vitamin D."

There are five other slight variations in wording allowed for this claim.

**Fruits, vegetables and Cancer**

"A healthy diet rich in a variety of vegetables and fruit may help reduce the risk of some types of cancer."

The following are excluded from this claim: potatoes, yams, cassava, plantain, corn, mushrooms, mature legumes and their juices, jams and jellies, olives, and powdered fruits and vegetables.

**Dietary Fat, saturated Fat, Cholesterol, t rans Fatty a cids and Coronary heart Disease**

"A healthy diet low in saturated and trans fats may reduce the risk of heart disease. (Naming the food) is low in saturated and trans fats."

**sodium and hypertension**

"A healthy diet containing foods high in potassium and low in sodium may reduce the risk of high blood pressure, a risk factor for stroke and heart disease. (Naming the food) is a good source of potassium and is low in sodium."

There are five other slight variations in wording allowed for this claim.

Source: Health Canada: Health Claim Assessments (Oct. 2011). Reproduced from <http://www.hc-sc.gc.ca/fn-an/label-etiquet/claims-reclam/assess-evalu/index-eng.php>.

**Percent daily values (%DV)**

Information on a Nutrition Facts table that identifies how much a serving of food contributes to your overall intake of nutrients listed on the label; based on an energy intake of 2000 Calories (8400 kJ) per day.

- polyunsaturated fatty acids, they must also list the amount of omega-6 polyunsaturated fatty acids. Monounsaturated fatty acids are listed separately.
3. **Percent daily values (%DV):** **Percent daily values (%DV)** information tells you how much a serving of food contributes to your overall intake of the various nutrients listed on the label. The amounts of fat, saturated fat, and trans fat, sodium, carbohydrate, and fibre in 1 serving are stated in grams or milligrams, as well as a %DV. The remaining nutrients are listed as a %DV only. The %DV is based on recommendations for a healthy adult 2000-Calorie (8400 kJ) diet and is an easy way of determining the relative amount (i.e., a little or a lot) of a nutrient in 1 serving. For example, using a 2000-Calorie diet with 30% of its Calories as fat, the daily value for fat would be 65 grams. A product with

<b>Nutrition Facts</b> <b>Valeur nutritive</b>		<b>% Daily Value / % valeur quotidienne*</b>																																	
Serving Size 125 mL (35 g) / Portion 125 mL (35 g)		Vitamin D / Vitamine D	0 %																																
Servings Per Container 13		Vitamin E / Vitamine E	6 %																																
Portions par contenant 13		Vitamin K / Vitamine K	10 %																																
<b>Amount Per Serving / Teneur par portion</b>		Thiamine / Thiamine	55 %																																
<b>Calories / Calories 90 (380 kJ)</b>		Riboflavin / Riboflavine	4 %																																
Calories from fat / Calories des lipides 9		Niacin / Niacine	25 %																																
Calories from Saturated + Trans 0		Vitamin B <sub>6</sub> / Vitamine B <sub>6</sub>	10 %																																
Calories des lipides saturés et trans 0		Folate / Folate	10 %																																
<b>% Daily Value / % valeur quotidienne*</b>		Vitamin B <sub>12</sub> / Vitamine B <sub>12</sub>	0 %																																
<b>Total Fat / Lipides 1 g</b>	<b>2 %</b>	Biotin / Biotine	30 %																																
Saturated / saturés 0 g		Pantothenate / Pantothénate	8 %																																
+ Trans / trans 0 g	<b>0 %</b>	Phosphorus / Phosphore	30 %																																
Polyunsaturated / polyinsaturés 0.5 g		Iodide / Iodure	0 %																																
Omega-6 / oméga-6 0.5 g		Magnesium / Magnésium	50 %																																
Omega-3 / oméga-3 0 g		Zinc / Zinc	25 %																																
Monounsaturated / monoinsaturés 0.2 g		Selenium / Sélénium	6 %																																
<b>Cholesterol / Cholestérol 0 mg</b>	<b>0 %</b>	Copper / Cuivre	20 %																																
<b>Sodium / Sodium 300 mg</b>	<b>12 %</b>	Manganese / Manganèse	10 %																																
<b>Potassium / Potassium 410 mg</b>	<b>12 %</b>	Chromium / Chrome	10 %																																
<b>Total Carbohydrate / Glucides 27 g</b>	<b>9 %</b>	Molybdenum / Molybdène	10 %																																
Dietary Fibre / Fibres alimentaires 12 g	<b>48 %</b>	Chloride / Chlorure	10 %																																
Soluble Fibre / Fibres solubles 0 g		* Percent Daily Values are based on a 2,000 Calorie diet. Your daily values may be higher or lower depending on your Calorie needs:																																	
Insoluble Fibre / Fibres insolubles 11 g		<table border="1"> <thead> <tr> <th></th> <th>Calories:</th> <th>2,000</th> <th>2,500</th> </tr> </thead> <tbody> <tr> <td>Total Fat</td> <td>Less than</td> <td>65 g</td> <td>80 g</td> </tr> <tr> <td>Saturated + Trans</td> <td>Less than</td> <td>20 g</td> <td>25 g</td> </tr> <tr> <td>Cholesterol</td> <td>Less than</td> <td>300 mg</td> <td>300 mg</td> </tr> <tr> <td>Sodium</td> <td>Less than</td> <td>2,400 mg</td> <td>2,400 mg</td> </tr> <tr> <td>Potassium</td> <td></td> <td>3,500 mg</td> <td>3,500 mg</td> </tr> <tr> <td>Total Carbohydrate</td> <td></td> <td>300 g</td> <td>375 g</td> </tr> <tr> <td>Dietary Fibre</td> <td></td> <td>25 g</td> <td>30 g</td> </tr> </tbody> </table>			Calories:	2,000	2,500	Total Fat	Less than	65 g	80 g	Saturated + Trans	Less than	20 g	25 g	Cholesterol	Less than	300 mg	300 mg	Sodium	Less than	2,400 mg	2,400 mg	Potassium		3,500 mg	3,500 mg	Total Carbohydrate		300 g	375 g	Dietary Fibre		25 g	30 g
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Sugars / Sucres 6 g		* Pourcentage de la valeur quotidienne selon un régime alimentaire de 2 000 Calories. Vos valeurs quotidiennes personnelles peuvent être plus ou moins élevées selon vos besoins énergétiques :																																	
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Starch / Amidon 9 g		Calories per gramme :																																	
<b>Protein / Protéines 4 g</b>		Fat 9	Carbohydrate 4																																
Vitamin A / Vitamine A	0 %		Protein 4																																
Vitamin C / Vitamine C	0 %	* Pourcentage de la valeur quotidienne selon un régime alimentaire de 2 000 Calories. Vos valeurs quotidiennes personnelles peuvent être plus ou moins élevées selon vos besoins énergétiques :																																	
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Iron / Fer	35 %	Calories par gramme :																																	
		Lipides 9	Glucides 4																																
			Protéines 4																																

◆ **Figure 2.3** Bilingual Nutrition Facts table with additional information. (Compendium of Templates for “Nutrition Facts” Tables, Fig. 19.1. [www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/reg/compend\\_nut\\_fact\\_tc-repertoire\\_etiquetage\\_nut\\_tm\\_e.html](http://www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/reg/compend_nut_fact_tc-repertoire_etiquetage_nut_tm_e.html) (accessed January 2006). Health Canada, © 2003. Reproduced with the permission of the Minister of Public Works and Government Services Canada, 2005.

13 grams of fat in 1 serving has a % daily value of  $13/65 \times 100 = 20\%$ . In other words, 1 serving of this food would provide 20% of the daily value (DV) for fat. Foods that contain less than 5% DV of a nutrient are considered low in that nutrient, while foods that contain more than 15% DV are considered high in that nutrient. If you are trying to consume more calcium in your diet, selecting foods that contain more than 15% DV for calcium are good choices. In contrast, if you are trying to consume lower-fat foods, selecting foods that contain less than 5% or 10% of the fat DV will help you reach your goals. By comparing the %DV between foods for any nutrient, you can quickly decide which food is higher or lower in that nutrient without having to know anything about how many Calories you need.

You may be asking yourself, “How do the %DV relate to the Recommended Dietary Allowances (RDA) and the Dietary Reference Intakes (DRIs) we discussed in Chapter 1?” Remember that the DRI is an umbrella term that applies to a group of nutrient standards, including the RDA, Estimated Average Requirement (EAR), Adequate Intake (AI), Tolerable Upper Intake Level (UL), and Acceptable Macronutrient Distribution Ranges (AMDR). Many of these values are specific to life-stage and gender. In contrast, the %DV is used as a food labelling tool, and its value is determined by using two additional standardized values, the

**TABLE 2.4** Standards Used to Calculate the % Daily Value (2000 Calories or 8400 kJ)

vitamin or Mineral Nutrient	Units	persons 2 Years of age or Older	infants and Children Less than 2 Years Old
<b>(a) r ecommended Daily intake</b>			
Vitamin A	RE <sup>a</sup>	1000	400
Vitamin D	µg <sup>b</sup>	5	10
Vitamin E	mg <sup>c</sup>	10	3
Vitamin C	mg	60	20
Thiamin, thiamine, or vitamin B <sub>1</sub>	mg	1.3	0.45
Riboflavin, or vitamin B <sub>2</sub>	mg	1.6	0.55
Niacin	NE <sup>d</sup>	23	8
Vitamin B <sub>6</sub>	mg	1.8	0.7
Folacin, or folate	µg	220	65
Vitamin B <sub>12</sub>	µg	2	0.3
Pantothenic acid, or pantothenate	mg	7	2
Vitamin K	µg	80	30
Biotin	µg	30	8
Calcium	mg	1100	500
Phosphorus	mg	1100	500
Magnesium	mg	250	55
Iron	mg	14	7
Zinc	mg	9	4
Iodide	µg	160	55
Selenium	µg	50	15
Copper	mg	2	0.5
Manganese	mg	2	1.2
Chromium	µg	120	12
Molybdenum	µg	75	15
Chloride	mg	3400	1000
Nutrient	a mount		
<b>(b) r eference standards</b>			
Fat	65 g		
The sum of saturated fatty acids and trans fatty acids	20 g		
Cholesterol	300 mg		
Carbohydrate	300 g		
Fibre	25 g		
Sodium	2400 mg		
Potassium	3500 mg		
<sup>a</sup> RE = retinol equivalents <sup>b</sup> µg = micrograms <sup>c</sup> mg = milligrams <sup>d</sup> NE = niacin equivalents. Source: From Canada Food Inspection Agency. Guide to Food Labelling and Advertising, 6.3.2 Recommended Daily Intake, Table 6-5 Recommended Daily Intake for Vitamins and Mineral Nutrients and Table 6-7 Reference Standards. <a href="http://www.inspection.gc.ca/english/fssa/labeti/guide/ch6e.shtml#6.3.2">www.inspection.gc.ca/english/fssa/labeti/guide/ch6e.shtml#6.3.2</a> (accessed June 2008).			

**Recommended Daily Intakes (RDI)** for vitamins and minerals and the **reference standards** for nutrients other than vitamins and minerals. **table 2.4** lists the RDIs and reference standards used as the basis of the %DV for labelling purposes. Refer to the You Do the Math box (on the next page) to learn how to use the %DV to calculate specific amounts of nutrients.

- Footnote** (or lower part of the Nutrition Facts table): The lower part of the table includes a footnote that appears only on the expanded format. This footnote tells you that the %DV are based on a 2000-Calorie (8400 kJ) diet and that your needs may be higher or lower based on your individual energy needs. The remainder of the footnote includes a table with values that illustrate the differences in recommendations between a 2000-Calorie (8400 kJ) and 2500-Calorie (10 500 kJ) diet; for instance, someone eating 2000 Calories should strive to eat less than 65 grams of fat per day, while a person eating 2500 Calories should eat less than 80 grams of fat per day.

### Recommended Daily Intakes (RDI)

The amounts of vitamins and minerals used to calculate the % daily values.

**reference standards** The amounts of nutrients other than vitamins and minerals used to calculate the % daily values.

# YOU DO THE MATH

## Using the % Daily values (%Dv) to Calculate specific amounts of Calcium and iron

The %DV can be used to calculate specific amounts of any nutrient listed on the label. Let's say you are a male who is 23 years of age. You are interested in meeting the DRI standards for both calcium and iron, and you are curious about how much of the food shown in Figure 2.3 contributes to your daily intake of these two nutrients. We will use Table 2.4 and Figure 2.3 to assist us in these calculations.

- a. *Calcium*: The %DV for calcium listed on the label is 2%. As you can see in Table 2.4, the RDI for calcium is 1100 mg. By multiplying the %DV by 1100 mg, you will get the total amount of calcium (in milligrams) in 1 serving of this food:

$$2\% = 0.02$$

$$0.02 \times 1100 \text{ mg} = 22 \text{ mg}$$

How do we know how much this food contributes to your calcium requirement as described by the DRI standards? ~~By looking at the tables in Appendix C, you can see that the~~ RDA for calcium for a man 23 years of age is 1000 mg. By dividing the amount of calcium in milligrams in 1 serving of this food by the AI for calcium (1000 mg) and multiplying by 100, you will get the percentage of your RDA for calcium from this food:

$$22 \text{ mg} \div 1000 \text{ mg} \times 100 = 2.2\% \text{ of your RDA for calcium}$$

- b. *Iron*: The %DV for iron listed on the label is 35%. As you can see in **table 2.4**, the RDI for iron is 14 mg. By multiplying the %DV by 14 mg, you will get the total amount of iron (in milligrams) in 1 serving of this food:

$$35\% = 0.35$$

$$0.35 \times 14 \text{ mg} = 4.9 \text{ mg}$$

How do we know how much this food contributes to your iron requirement as described by the DRI standards? ~~By looking at the tables in Appendix C, you can see that the~~ Recommended Dietary Allowance (RDA) for iron for a man 23 years of age is 8 mg. By dividing the amount of iron in milligrams in 1 serving of this food by the RDA for iron (8 mg) and multiplying by 100, you will get the percentage of your RDA for iron from this food:

$$4.9 \text{ mg} \div 8 \text{ mg} \times 100 = 61\% \text{ of your RDA for iron}$$

These calculations are very helpful when you need to determine how well a food meets your individual nutrient needs based on your gender and age. The %DV are a helpful guide in determining whether a food is high or low in a given nutrient, and the calculations just shown can further assist you when you do not eat a 2000-Calorie (8400 kJ) diet or you want to determine how well your diet is meeting the DRI standards.

By comparing labels from different foods, you can start planning a more nutritious diet today. Try looking at the two labels in **Figure 2.4** to decide which food is a better choice. First, decide which nutrients are most important to you. Let's assume you are trying to eat foods with more dietary fibre and iron. The label on the left shows that Cereal

A contains 1 gram of dietary fibre and 30% of the DV for iron per serving. The label on the right shows that Cereal B contains 6 grams of dietary fibre and 60% of the DV for iron per serving. For these two nutrients, Cereal B, on the right, would clearly be the more nutritious choice.

Notice that Cereal B is a denser cereal, though. One serving of Cereal B is 25 biscuits, or approximately 1 cup; this weighs 55 grams and contains 270 Calories when served with 125 mL (1/2 cup) of 2% milk. One serving of Cereal A is 250 mL (1 cup) of flakes, which weighs 30 grams and contains 180 Calories when served with 125 mL (1/2 cup) of 2% milk. Part of the reason that Cereal B has more energy and nutrients for the same 250 mL (1 cup) amount is that it is denser—biscuits are more compact than flakes.

Health Canada (2008) has an interactive nutrition label and quiz on their website, to help you learn the parts of the food label and interpret the information. Visit their website at [www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/cons/interactive-eng.php](http://www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/cons/interactive-eng.php).

Nutrition Facts		
Serving 1 cup (30 g) Cereal A		
Amount	Cereal Only	With 1/2 cup 2% milk
<b>Calories</b>	120	180
	% Daily Value	
<b>Fat</b> 0 g*	0%	4%
Saturated 0 g	0%	8%
+ Trans 0 g		
<b>Cholesterol</b> 0 g	0%	3%
<b>Sodium</b> 160 mg	7%	10%
<b>Potassium</b> 30 mg	1%	6%
<b>Carbohydrate</b> 30 g	10%	12%
Fibre 1 g	4%	4%
Sugars 8 g		
Starch 21 g		
<b>Protein</b> 3 g		
Vitamin A	0%	8%
Vitamin C	0%	0%
Calcium	10%	20%
Iron	30%	30%
Vitamin D	0%	25%
Thiamin	45%	50%
Riboflavin	35%	50%
Niacin	8%	15%
Vitamin B <sub>6</sub>	10%	15%
Folate	10%	10%
Vitamin B <sub>12</sub>	0%	25%
Pantothenate	6%	15%
Phosphorus	10%	20%
Magnesium	10%	15%
Zinc	6%	10%
*Amount in cereal		

Nutrition Facts		
Serving 25 biscuits (55 g) Cereal B		
Amount	Cereal Only	With 1/2 cup 2% milk
<b>Calories</b>	210	270
	% Daily Value	
<b>Fat</b> 1 g*	2%	6%
Saturated 0.4 g	2%	9%
+ Trans 0 g		
<b>Cholesterol</b> 0 g	0%	3%
<b>Sodium</b> 5 mg	0%	3%
<b>Potassium</b> 200 mg	6%	11%
<b>Carbohydrate</b> 49 g	16%	18%
Fibre 6 g	24%	24%
Sugars 15 g		
Starch 28 g		
<b>Protein</b> 5 g		
Vitamin A	0%	8%
Vitamin C	0%	0%
Calcium	0%	15%
Iron	60%	60%
Vitamin D	0%	25%
Thiamin	80%	90%
Riboflavin	2%	15%
Niacin	10%	15%
Vitamin B <sub>6</sub>	20%	20%
Folate	15%	15%
Vitamin B <sub>12</sub>	0%	25%
Pantothenate	15%	20%
Phosphorus	0%	10%
Magnesium	20%	30%
Zinc	20%	25%
*Amount in cereal		

➤ **Figure 2.4** Labels from two breakfast cereals. Note that there is less dietary fibre and iron in Cereal A than in Cereal B, but the serving size and energy content of Cereal B are higher.



### Logo programs Can help Consumers Make healthier Choices in Grocery stores

To help Canadians quickly tell if a food is a nutritious choice, the Heart and Stroke Foundation of Canada launched Health Check™, a non-profit food information program to promote healthy eating. The program logo, including the words *Heart and Stroke Foundation*, appears on over 1500 food products that have met specific nutrient content criteria developed by the Canadian Heart and Stroke Association and designed to be consistent with *Canada's Food Guide*. Manufacturers voluntarily participate in the program and pay a one-time evaluation fee, plus an annual licensing fee, to have their products assessed. Some nutrient content criteria were not in keeping with new Health Canada guidelines (e.g., trans fat guidelines) and the new *Food Guide*; as a result, criteria for fat, trans fat, sugar, sodium, and fibre have been revised (Health Check, 2008). For example, a 10 gram serving of margarine must be non-hydrogenated, contain 2 g or less saturated and trans fat combined, have 2% or less of total fat as trans fat, and have 140 mg or less sodium. A limited number of family restaurants also participate in the Health Check™ program, including Boston Pizza™, Swiss Chalet™, and Druxy's™.

There are other programs using logos to help consumers make healthier choices, but they use different nutritional criteria. These criteria are developed by the manufacturer, rather than a non-profit health organization, and they vary in their emphasis. For example, the President's Choice® line of products has over 400 products in their Blue Menu™ program.

**RECAP** Reading food labels is a necessary skill when planning a nutritious diet. Food labels must list the ingredients in a food, in descending order by weight, and include a Nutrition Facts table. The Nutrition Facts table provides specific information about Calories (kJ), macronutrients, and select vitamins, minerals, and other components (such as dietary fibre). The %DV is useful to compare food products or to tell if the product contains a little or a lot of a specific nutrient. Nutrient content claims and seven specific disease risk reduction claims are also allowed.

## Dietary Guidance in Canada

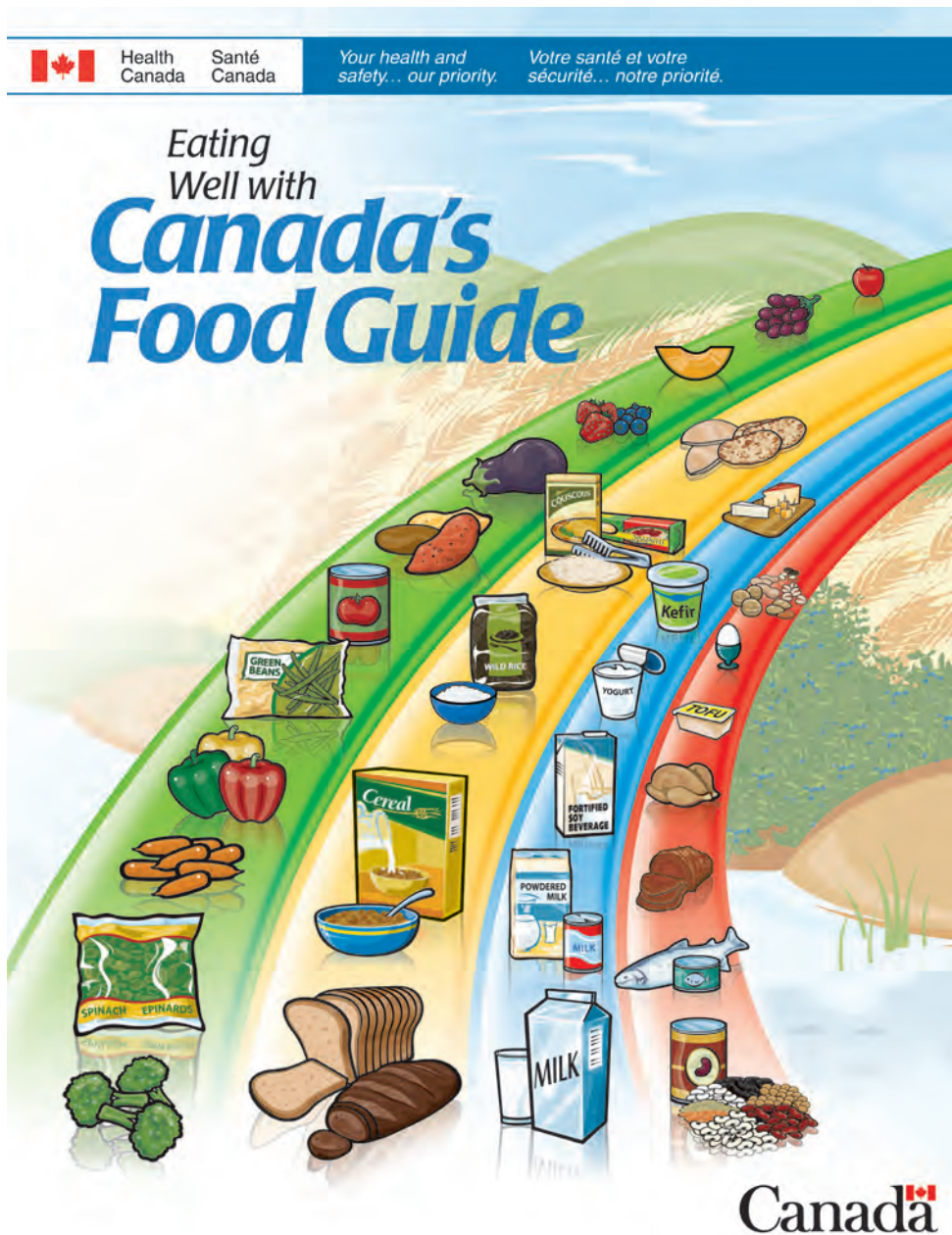
The Canadian government first issued nutrition advice to Canadians in 1942. The world was at war, some foods were rationed or hard to get (e.g., milk), and many people didn't have enough money to buy the food they needed. The government felt it should give people guidance on how to eat to stay healthy in spite of food shortages. *Canada's Official Food Rules* (1942) listed the amounts of "health protective foods" to be eaten every day.

Over the years, as the Canadian food supply changed, people changed their eating habits, and as new scientific information became available, nutrition advice also changed. *Canada's Official Food Rules* (1942) became *Canada's Food Rules* (1944, revised in 1949), then *Canada's Food Guide* (1961, with two subsequent revisions in 1977 and 1982), then *Canada's Food Guide to Healthy Eating*, released in 1992, and finally, in February 2007, *Eating Well with Canada's Food Guide*.

While the original purpose of nutrition advice was to prevent nutrition deficiencies, few people today have malnutrition because they don't get enough food. In fact, many Canadians are overweight or obese and at risk for diseases that are linked to diets containing too much energy or fat. Today's nutrition advice for Canadians is designed (1) to reduce the risk of chronic disease and obesity, and (2) to help people get all the nutrients they need for good health. This advice focuses on how much to eat *and* the kinds of food to eat. Unlike previous versions of *Canada's Food Guide*, which were double-sided tear-sheets, the newest version is a six-page fold-out booklet, to provide consumers with age- and gender-specific advice. It is available in 10 languages in addition to French and English: Arabic, Simplified Chinese, Farsi (Persian), Korean, Punjabi, Russian, Spanish, Tagalog, Tamil, and Urdu.

### What Does *Eating Well with Canada's Food Guide* tell You?

The cover of *Canada's Food Guide* (Figure 2.5) shows four arcs of a rainbow, representing the four food groups. The outermost arc is green, and contains the Vegetables



▲ **Figure 2.5** *Eating Well with Canada's Food Guide* cover. The four arcs of the rainbow represent the four food groups.

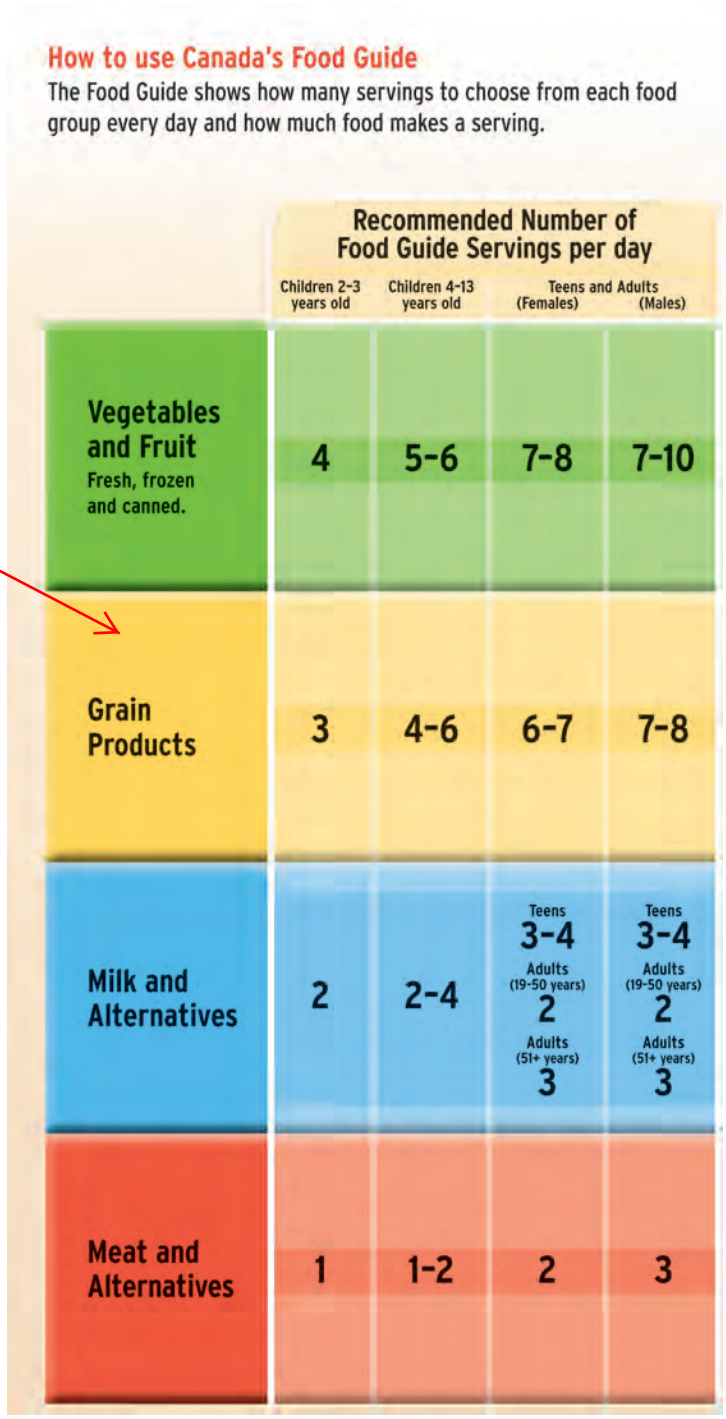
Source: *Eating Well with Canada's Food Guide*, <http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php>. © Her Majesty the Queen in Right of Canada, represented by the Minister of Health Canada, 2007. HC Pub.:4651, Cat.:H164-38/1-2007E, ISBN:0-662-44467-1.

and Fruits food group. The next largest arc is yellow, and contains the Grain Products. Note that in the previous version of *Canada's Food Guide*, these two food groups were in reverse order. The next arc is blue, and contains the Milk and Alternatives food group, and the smallest, inner-most arc is red, representing the Meat and Alternatives group.

The first panel inside the booklet shows the recommended number of *Food Guide* servings per day (**Figure 2.6**). There are three age categories for children: 2–3 years; 4–8 years; and 9–13 years. Within each age category, the number of recommended servings for boys and girls is the same for each of the four food groups. In the teen years, ages 14 to 18, females and males have different recommended daily amounts, except for Milk and Alternatives. There are two age categories for adults,

**Figure 2.6** *Eating Well with Canada's Food Guide* recommended number of *Food Guide* servings per day from each of the four food groups. Source: *Eating Well with Canada's Food Guide*, [www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php](http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php). © Her Majesty the Queen in Right of Canada, represented by the Minister of Health Canada, 2007. HC Pub.:4651, Cat.:H164-38/1-2007E, ISBN:0-662-44467-1.

here is a note from the accuracy checker and Judy's response: this was sent to the permissions researcher. from AR: This is not accurate for Fruits &Vegetables and Grains for teens and adults. The recommended servings are different within the genders in these age ranges. from Judy: Hmmm I don't know when this changed. Can we replace this chart with the one at this link: <http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/basics-base/quantit-eng.php>



ages 19–50 years and 51+ years, and both list the recommended number of servings from each food group for men and women separately.

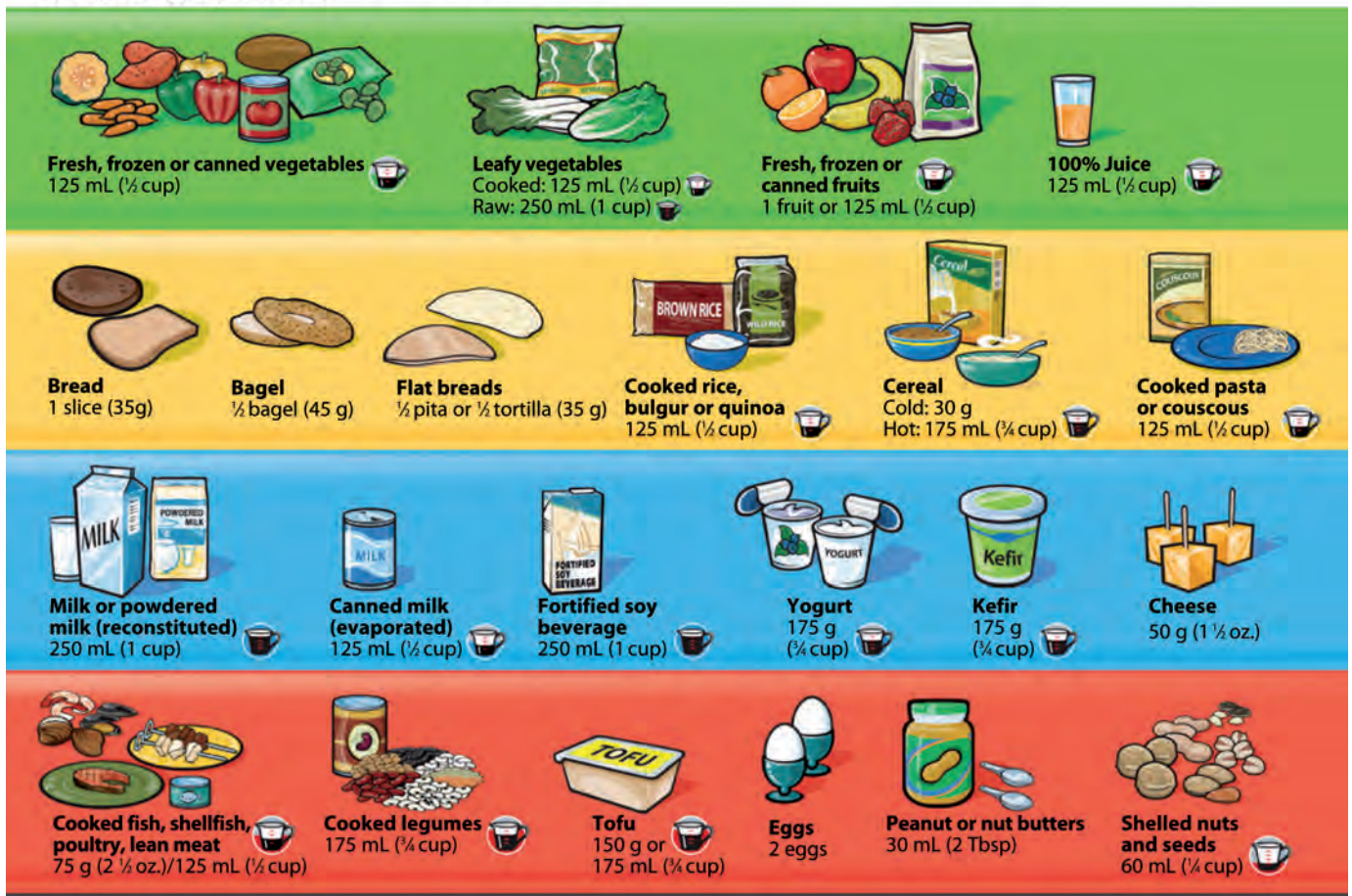
This is the first time that *Canada's Food Guide* has tailored *Food Guide* servings per day to nine different age and sex groups, to help ensure that consumers who follow the guide are eating the recommended amounts of various nutrients each day while preventing obesity.

**What is One Food Guide serving in Eating Well with Canada's Food Guide?**

What is considered 1 *Food Guide* serving in *Eating Well with Canada's Food Guide*? The middle panel in *Canada's Food Guide* (Figure 2.7) shows examples of serving sizes for foods in each group.

## What is One Food Guide Serving?

Look at the examples below.



### Oils and Fats

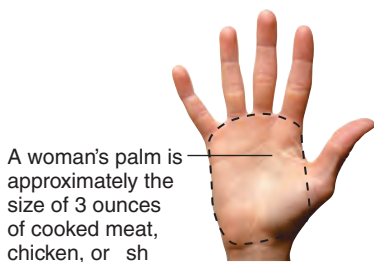
- Include a small amount – 30 to 45 mL (2 to 3 Tbsp) – of unsaturated fat each day. This includes oil used for cooking, salad dressings, margarine and mayonnaise.
- Use vegetable oils such as canola, olive and soybean.
- Choose soft margarines that are low in saturated and trans fats.
- Limit butter, hard margarine, lard and shortening.

▲ **Figure 2.7** *Eating Well with Canada's Food Guide* suggested serving sizes. The amount shown for each food represents one food guide serving.

Source: *Eating Well with Canada's Food Guide*, [www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php](http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php). © Her Majesty the Queen in Right of Canada, represented by the Minister of Health Canada, 2007. HC Pub.:4651, Cat.:H164-38/1-2007E, ISBN:0-662-44467-1.

A serving of vegetables is 250 mL (1 cup) of raw leafy vegetables such as uncooked spinach or 125 mL (1/2 cup) of chopped fresh, frozen, or canned vegetables such as broccoli or squash. A serving from the Grain Products group is defined as 1 slice of bread, 1/2 of a regular pita or hamburger bun, or 30 g (1 oz.) of cold cereal. Fortified soy beverages (250 mL or 1 cup) and Kefir (175 g or ¾ cup) are now included in the Milk and Alternatives food group. A serving of cooked lean meat, fish, shellfish, or poultry is 75 g (2.5 oz.), which is approximately the size of a deck of cards. A serving of meat alternatives could be 2 eggs, 30 mL (2 Tbsp) peanut butter, 150 grams or 175 mL (¾ cup) tofu, 175 mL (¾ cup) cooked legumes, or 60 mL (¼ cup) nuts and seeds. Although it may seem unnatural or inconvenient to measure our food servings, understanding the size of a serving is critical to planning a nutritious diet.





(a)

A woman's fist is about the size of 1 cup of pasta or vegetables (a man's fist is the size of about 2 cups)



(b)

About 1 tbsp. of vegetable oil



(c)

➤ **Figure 2.8** Use your hands to help you estimate the serving sizes of common foods.

It is important to understand that there is no standardized definition of a serving size for any food. A serving size as defined in *Canada's Food Guide* may not be equal to a serving size listed on a food label. In addition, a “medium-sized” vegetable or fruit may be much smaller than the vegetables and fruit that we buy. Try the Nutrition Label Activity to see how well you know the recommended portion sizes in *Eating Well with Canada's Food Guide*. See **Figure 2.8** for some tips on estimating serving sizes using your hands.

### Make each *Food Guide* serving Count....Wherever You are—at home, at school, at Work, or When eating Out!

Accompanying each of the four food groups are recommendations for the best quality, most nutrient-rich food choices to help reduce the risk of chronic disease and obesity.

#### vegetables and Fruit

- Choose one dark green and one orange vegetable each day.
  - Go for dark-green vegetables such as broccoli, romaine lettuce, and spinach.
  - Go for orange vegetables such as carrots, sweet potatoes, and winter squash.
- Choose vegetables and fruit prepared with little or no added fat, sugar, or salt.
  - Enjoy vegetables steamed, baked, or stir-fried instead of deep-fried.
- Have vegetables and fruit more often than juice.

Vegetables and Fruit are grouped together because they are good sources of carbohydrate, dietary fibre, vitamins A and C, folate, potassium, and magnesium. Dark-green and orange vegetables and fruit are especially rich in vitamins A and C. These foods also contain differing amounts and types of naturally occurring chemicals called phytochemicals that enhance our health. A detailed explanation of phytochemicals is presented in the *In Depth* section following this chapter.

#### Grain products

- Make at least half of your grain products whole grain each day.
  - Eat a variety of whole grains such as barley, brown rice, oats, quinoa, and wild rice.
  - Enjoy whole-grain breads, oatmeal, or whole wheat pasta.
- Choose grain products that are lower in fat, sugar, or salt.
  - Compare the Nutrition Facts table on labels to make wise choices.
  - Enjoy the true taste of grain products. When adding sauces or spreads, use small amounts.

Bread, cereal, rice, and pasta are clustered together in the Grain Products food group because they provide complex carbohydrates and dietary fibre, and are good sources of the nutrients riboflavin, thiamin, niacin, iron, folate, zinc, protein, and magnesium. Whole-grain products are especially good sources of dietary fibre and the nutrients listed, while enriched products have some of the nutrients lost in processing added back into the final product.

#### Milk and Alternatives

- Drink skim, 1%, or 2% milk each day.
  - Have 500 mL (16 fl. oz. or 2 cups) of milk every day for adequate vitamin D.
  - Drink fortified soy beverages if you do not drink milk.
- Select lower-fat milk alternatives.
  - Compare the Nutrition Facts table on yogurts or cheeses to make wise choices.

The Milk and Alternatives food group contains foods that are good sources of calcium, phosphorus, riboflavin, protein, and vitamin B<sub>12</sub>. In addition, many of these foods are also fortified with vitamins D and A. Lower-fat products have the same levels of these nutrients as their full-fat counterparts, with only the fat removed. If you

don't consume milk products, you will need to replace them with other foods that provide calcium, such as calcium-fortified orange juice and soy milk, turnip greens, broccoli, kale, black-eyed peas, or sardines. A diet that lacks adequate amounts of calcium may put you at risk for excessive bone loss and its related health consequences (see Chapter 9).

### Meat and Alternatives

- Have meat alternatives such as beans, lentils, and tofu often.
- Eat at least 2 *Food Guide* servings of fish each week.
  - Choose fish such as char, herring, mackerel, salmon, sardines, and trout.
- Select lean meat and alternatives prepared with little or no added fat or salt.
  - Trim the visible fat from meats. Remove the skin on poultry.
  - Use cooking methods such as roasting, baking, or poaching that require little or no added fat.
  - If you eat luncheon meats, sausages, or prepackaged meats, choose those lower in salt (sodium) and fat.

The Meat and Alternatives food group consists of foods that are good sources of protein, phosphorus, vitamin B<sub>6</sub>, vitamin B<sub>12</sub>, zinc, magnesium, iron, niacin, riboflavin, and thiamin. Dried peas, beans, and lentils are called legumes and are promoted because they are high in dietary fibre and low in fat. Meats, particularly processed meat products, and poultry can be high in saturated fats; leaner cuts of meat, low-fat processed meat products, skinless poultry, and fish are recommended.

In the previous version of *Canada's Food Guide* (1992), there was a paragraph about "Other Foods"—foods and beverages that were not part of any food group. They included foods that were high in fat, sugar, or salt; beverages such as tea, coffee, and soft drinks; and seasonings and condiments. The new *Eating Well with Canada's Food Guide* encourages consumers to eat well by:

Limiting foods and beverages high in Calories, fat, sugar, or salt (sodium) such as cakes and pastries, chocolate and candies, cookies and granola bars, doughnuts and muffins, ice cream and frozen desserts, french fries, potato chips, nachos and other salty snacks, alcohol, fruit flavoured drinks, soft drinks, sports and energy drinks, and sweetened hot or cold drinks.

Guidance on choosing appropriate amounts of healthier oils and fats is also provided in *Canada's Food Guide*:

- Include a small amount—30 to 45 mL (2 to 3 Tbsp)—of unsaturated fat each day. This includes oil used for cooking, salad dressings, margarine, and mayonnaise.
- Use vegetable oils such as canola, olive, and soybean.
- Choose soft margarines that are low in saturated and trans fats.
- Limit butter, hard margarine, lard, and shortening.

### Advice for Different ages and stages

On the back of the *Food Guide* is a panel that provides specific advice for children, women of childbearing age, and men and women over 50. Parents are advised not to limit the fat intake of young children who need energy to support their growth and development. All women of childbearing age are advised to take a multivitamin supplement containing folic acid every day, and to ensure that they also have iron in their multivitamin supplement if they become pregnant. Finally, men and women over the age of 50 are advised to consume the recommended servings of food groups and take a daily vitamin D supplement of 10 µg (400 IU). This is the first time that *Canada's Food Guide* has recommended that certain groups supplement their food intakes with specific vitamins and minerals.

### eat Well and be active today and every Day!

The last panel of the *Food Guide* (Figure 2.9) encourages people to think about their activity levels in addition to their food intakes. **table 2.5** lists some ways that you can incorporate *Canada's Food Guide* into your daily life.



➤ When grocery shopping, try to select a variety of fruits and vegetables.



➤ Eating a diet rich in whole-grain foods like whole wheat bread and brown rice can enhance your overall health.



➤ Being physically active for at least 30 minutes each day can reduce your risk for chronic diseases.

▶ **Figure 2.9** *Eating Well with Canada's Food Guide* activity recommendations for better health and a healthy body weight.

Source: *Eating Well with Canada's Food Guide*, [www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php](http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php). © Her Majesty the Queen in Right of Canada, represented by the Minister of Health Canada, 2007. HC Pub.:4651, Cat.:H164-38/1-2007E, ISBN:0-662-44467-1.

### Advice for different ages and stages...

Children	Women of childbearing age	Men and women over 50
<p>Following <i>Canada's Food Guide</i> helps children grow and thrive.</p> <p>Young children have small appetites and need calories for growth and development.</p> <ul style="list-style-type: none"> <li>• Serve small nutritious meals and snacks each day.</li> <li>• Do not restrict nutritious foods because of their fat content. Offer a variety of foods from the four food groups.</li> <li>• Most of all... be a good role model.</li> </ul>	<p>All women who could become pregnant and those who are pregnant or breastfeeding need a multivitamin containing <b>folic acid</b> every day. Pregnant women need to ensure that their multivitamin also contains <b>iron</b>. A health care professional can help you find the multivitamin that's right for you.</p> <p>Pregnant and breastfeeding women need more calories. Include an extra 2 to 3 Food Guide Servings each day.</p> <p><b>Here are two examples:</b></p> <ul style="list-style-type: none"> <li>• Have fruit and yogurt for a snack, or</li> <li>• Have an extra slice of toast at breakfast and an extra glass of milk at supper.</li> </ul>	<p>The need for <b>vitamin D</b> increases after the age of 50.</p> <p>In addition to following <i>Canada's Food Guide</i>, everyone over the age of 50 should take a daily vitamin D supplement of 10 µg (400 IU).</p>

### How do I count Food Guide Servings in a meal?



Here is an example:

#### Vegetable and beef stir-fry with rice, a glass of milk and an apple for dessert

250 mL (1 cup) mixed broccoli, carrot and sweet red pepper	=	2 Vegetables and Fruit Food Guide Servings
75 g (2 ½ oz.) lean beef	=	1 Meat and Alternatives Food Guide Serving
250 mL (1 cup) brown rice	=	2 Grain Products Food Guide Servings
5 mL (1 tsp) canola oil	=	part of your Oils and Fats intake for the day
250 mL (1 cup) 1% milk	=	1 Milk and Alternatives Food Guide Serving
1 apple	=	1 Vegetables and Fruit Food Guide Serving

### Get personalized Food Guide information!

For the first time, consumers can visit *Canada's Food Guide* online at [www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php](http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php) and take a guided tour of the new guide or use interactive tools. Try filling in your own age, sex, food preferences, and favourite ways to be active in *My Food Guide*, to get your own customized version of *Canada's Food Guide*.

**RECAP** *Eating Well with Canada's Food Guide* can be used to plan a nutritious diet—one that provides adequate nutrients and energy and includes foods that are less nutritious in moderate amounts only, to prevent obesity. Following the advice in *Canada's Food Guide* will ensure your diet includes an appropriate balance of foods from the four food groups, and a wide variety of foods. The recommended number of servings from the four food groups—Vegetables and Fruit; Grain Products;

**TABLE 2.5** Ways to Incorporate *Eating Well with Canada's Food Guide* into Your Daily Life

if You Normally Do t his	t ry Doing t his instead
Watch television when you get home at night	Do 30 minutes of stretching or lifting of hand weights in front of the television
Drive to the store down the block	Walk to and from the store
Go out to lunch with friends	Take a 15- or 30-minute walk with your friends at lunchtime 3 days each week
Eat white bread with your sandwich	Eat 100% whole wheat bread or some other bread made from whole grains
Eat white rice or fried rice with your meal	Eat brown rice or even try wild rice
Choose cookies or a candy bar for a snack	Choose a fresh nectarine, peach, apple, orange, or banana for a snack
Order french fries with your hamburger	Order a green salad with low-fat salad dressing on the side
Spread butter or margarine on your white toast each morning	Spread fresh fruit compote on whole-grain toast
Order a bacon double cheeseburger at your favourite restaurant	Order a turkey burger or grilled chicken sandwich without the cheese and bacon, and add lettuce and tomato
Drink regular soft drinks to quench your thirst	Drink iced tea, ice water with a slice of lemon, seltzer water, or diet soft drinks
Eat regular potato chips and pickles with your favourite sandwich	Eat carrot slices and crowns of fresh broccoli and cauliflower dipped in low-fat or non-fat ranch dressing

Milk and Alternatives; and Meat and Alternatives—depends upon your age and sex. It is important to realize that the serving sizes of foods listed in *Canada's Food Guide* may be smaller than the amounts we normally eat or are served. Use the interactive tool provided on Health Canada's website to create your own customized *My Food Guide*.

## Eating Well with Canada's Food Guide: First Nation, Inuit and Métis

For the first time, Health Canada has produced a food guide specifically for Aboriginal peoples: *Eating Well with Canada's Food Guide: First Nation, Inuit and Métis* (Figure 2.10).

# NUTRITION LABEL ACTIVITY

## How Realistic Are the Serving Sizes Listed on Food Labels?

Many people read food labels to determine the energy (caloric) value of foods, but it is less common to pay close attention to the actual serving size that corresponds to the listed caloric value. To test how closely your “naturally selected” serving size matches the actual serving size of certain foods, try these label activities:

- Choose a breakfast cereal that you commonly eat. Pour the amount of cereal you would normally eat into a bowl. Before adding milk, use a measuring cup to measure the amount of cereal you poured. Now read the label of the cereal to determine the serving size, for example, 125 mL or 250 mL (1/2 cup or 1 cup) and the caloric value listed on the label. How do your “naturally selected” serving size and the label-defined serving size compare?

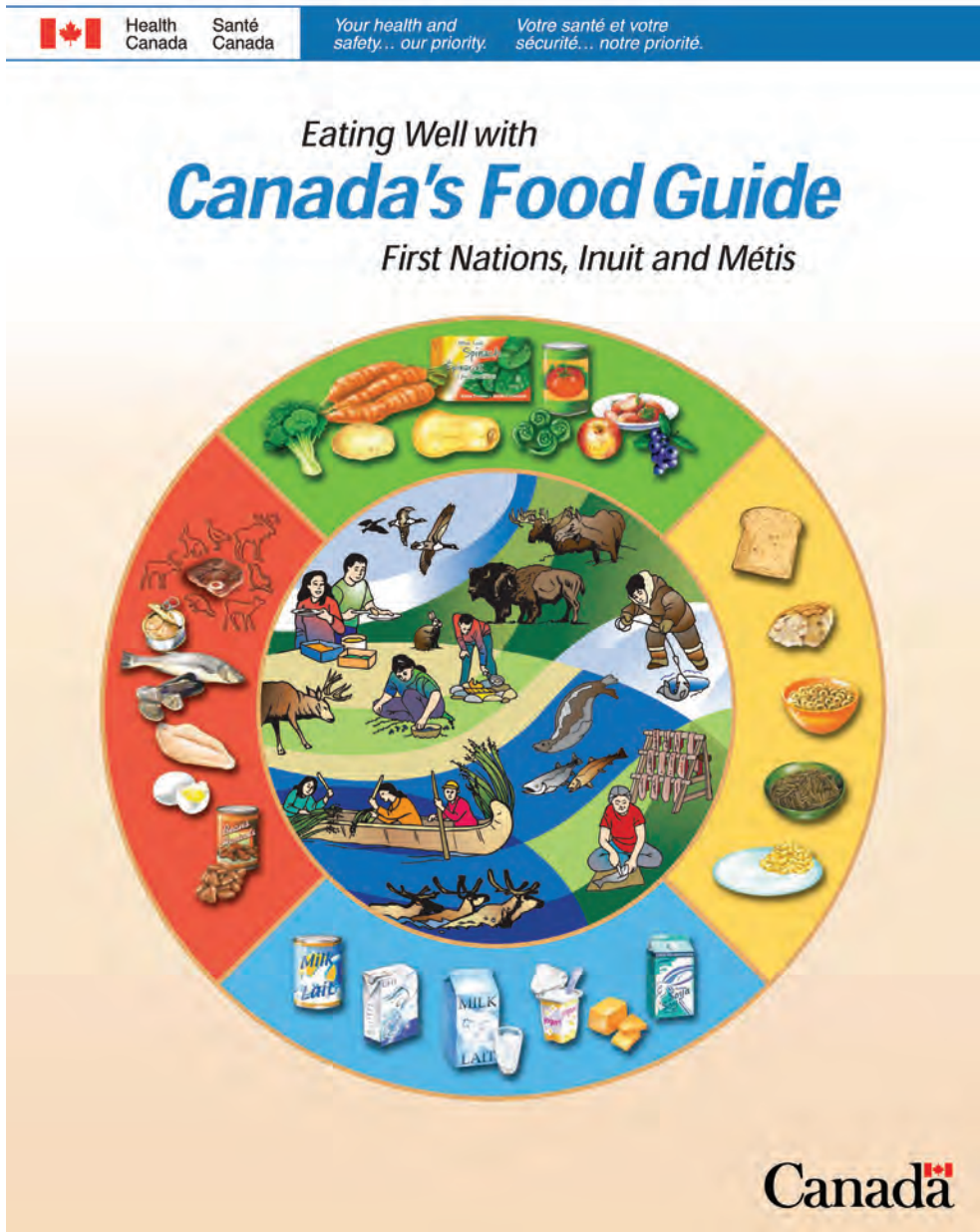


- At your local grocery store, locate various boxes of snack crackers. Look at the number of crackers and total Calories per serving listed on the labels of crackers such as regular Triscuits, reduced-fat Triscuits, Vegetable Thins, and Ritz crackers. How do the number of crackers and total Calories per serving differ for the serving size listed on each box? How do the serving sizes listed in the Nutrition Facts Panel compare to how many crackers you would usually eat?

These activities are just two examples of ways to understand how nutrition labels can help you make balanced and healthful food choices. As many people do not know what constitutes a serving size, they are inclined to consume too much of some foods (such as snack foods and meat) and too little of other foods (such as fruits and vegetables).

**Figure 2.10** *Eating Well with Canada's Food Guide: First Nation, Inuit and Métis.*

Source: *Eating Well with Canada's Food Guide: First Nation, Inuit and Métis*, [www.hc-sc.gc.ca/fn-an/pubs/fnim-pnim/index-eng.php](http://www.hc-sc.gc.ca/fn-an/pubs/fnim-pnim/index-eng.php). © Her Majesty the Queen in Right of Canada, represented by the Minister of Health Canada, 2007. HC Pub.:3426, Cat.:H34-159/2007E-PDF, ISBN:0-662-44562-7.



➤ Nutrient-packed foods—such as kale, which is an excellent source of calcium—should be part of a well-rounded diet.

Notice that this version of *Canada's Food Guide* uses a circle rather than a rainbow format, and the centre of the circle illustrates various traditional ways in which Aboriginal peoples are physically active. Foods enjoyed by these cultural groups, such as bannock, fiddleheads, seaweed, and traditional game meats, are included within the four food groups.

## Other Food Guides

The Mediterranean Diet, which is itself a variation on the old U.S. Pyramid model, has enjoyed considerable popularity. Does it deserve its reputation as a healthy diet? Check out the Hot Topic box to learn more about the Mediterranean Diet.

### Choose Foods high in Nutrient Density

As a general guideline, you should choose foods rich in nutrients—foods that have a high nutrient density. This means eating foods that give you the highest amount of nutrients for the least amount of energy (or kcal). As an example,

# YOU DO THE MATH

## How Much Exercise Is Needed to Combat Increasing Food Portion Sizes?

Although the causes of obesity are complex and result from different factors, most researchers agree that one reason obesity rates are rising is a combination of increased energy intake due to expanding portion sizes and a reduction in overall daily physical activity. This box explores how portion sizes have increased over the past 30 years and how much physical activity you would need to expend the excess energy provided by these larger portion sizes.

The photos in **Figure 2.11** show foods whose portion sizes have increased substantially. A few decades ago, a bagel had a diameter of approximately 7.6 cm (3 in.) and contained 590 kJ (140 kcal). Today, a bagel is about 15.2 cm (6 in.) in diameter and contains 1470 kJ (350 kcal). Similarly, 30 years ago, a cup of coffee was 250 mL (8 fl. oz.) and, if consumed without milk and sugar, contained about 2 kcal. Today, a standard coffee mocha is twice that size and contains 1470 kJ (350 kcal); this excess energy comes from sugar, milk, and flavoured syrup.

On her morning break at work, Judy routinely consumes a bagel and a coffee drink like the ones described here. How much physical activity would Judy need to do to “burn” this excess energy? Let’s do some simple math to answer this question.

- Calculate the excess energy Judy consumes from both of these foods:
  - Bagel: 1470 kJ (350 kcal) in larger bagel—590 kJ (140 kcal) in smaller bagel = 880 kJ (210 kcal) extra
  - Coffee: 1470 kJ (350 kcal) in large coffee mocha—8 kJ (2 kcal) in small regular coffee = 1462 kJ (348 kcal) extra

Total excess energy for these two larger portions = 2340 kJ (558 kcal)

- Judy has started walking each day in an effort to lose weight. Judy currently weighs 91 kg (200 lb). Based on her relatively low fitness level, Judy walks at a slow pace (approximately 3.2 km per hour); it is estimated that walking at this pace expends 11 kJ per kg (1.2 kcal per pound) of body weight per hour. How long does Judy need to walk each day to expend 2340 kJ (558 kcal)?

- First, calculate how much energy Judy expends if she walks for a full hour by multiplying her weight by the energy cost of walking per hour:  $11 \text{ kJ/kg body weight} \times 91 \text{ kg} = 1000 \text{ kJ}$  or

$$1.2 \text{ kcal/lb body weight} \times 200 \text{ lb} = 240 \text{ kcal}$$

- Next, you need to calculate how much energy she expends each minute she walks by dividing the energy cost of walking per hour by 60 minutes:

$$1000 \text{ kJ/hour} \div 60 \text{ minutes/hour} = 17 \text{ kJ/minute}$$

$$240 \text{ kcal/hour} \div 60 \text{ minutes/hour} = 4 \text{ kcal/minute}$$

- To determine how many minutes she would need to walk to expend 2340 kJ (558 kcal), divide the total amount of energy she needs to expend by the energy cost of walking per minute:

$$2340 \text{ kJ} \div 17 \text{ kJ/minute} = 138 \text{ minutes}$$

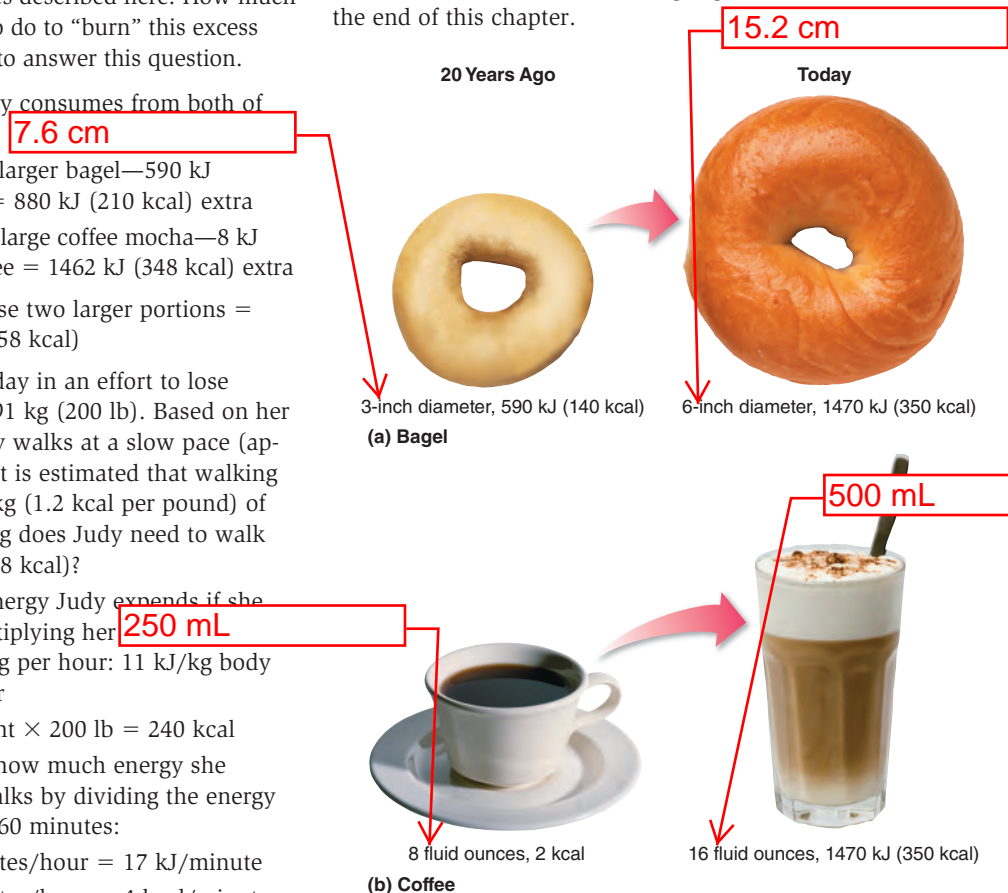
$$558 \text{ kcal} \div 4 \text{ kcal/minute} = 139.5 \text{ minutes}^*$$

Thus, Judy would need to walk for approximately 140 minutes, or about 2 hours and 20 minutes, to expend the excess energy she consumes by eating the larger bagel and coffee. If she wanted to burn off all of the energy in her morning snack, she would have to walk even longer, especially if she enjoyed her bagel with cream cheese!

Now use your own weight to determine how much walking you would have to do if you consumed the same foods:

- $11 \text{ kJ/kg (1.2 kcal/lb)} \times (\text{your weight in kilograms or pounds}) = \text{kJ/hour (kcal/hour)}$   
(If you walk at a brisk pace, use 22 kJ/kg or 2.4 kcal/lb.)
- $\text{kJ/hour (kcal/hour)} \div 60 \text{ minutes/hour} = \text{kJ/minutes (kcal/minute)}$
- $2340 \text{ extra kJ (558 extra kcal) in bagel and coffee} \div \text{kJ/minutes (kcal/minutes)} = \text{minutes}$

For more information about large portion sizes and the physical activities necessary to avoid weight gain, see Web Resources at the end of this chapter.



**Figure 2.11** Examples of increases in food portion sizes over the past 20 years. **(a)** A bagel has increased in diameter from 7.6 cm (3 in.) to 15.2 cm (6 in.); **(b)** a cup of coffee has increased from 250 mL (8 fl. oz.) to 500 mL (16 fl. oz.) and now commonly contains Calorie-dense flavoured syrup as well as steamed whole milk.

\* slight differences are due to rounding of kJ.

# HOT TOPIC

## the Mediterranean Diet

A Mediterranean-style diet has received significant attention in recent years, as the rates of cardiovascular disease in many Mediterranean countries are substantially lower than the rates in the United States. These countries include Portugal, Spain, Italy, France, Greece, Turkey, and Israel. Each country has unique dietary patterns; however, they share the following characteristics:

- Meat is eaten monthly, and eggs, poultry, fish, and sweets are eaten weekly, making the diet low in saturated fats and refined sugars.
- The fat used predominantly for cooking and flavour is olive oil, making the diet high in monounsaturated fats.
- Foods eaten daily include grains, such as bread, pasta, couscous, and bulgur; fruits; beans and other legumes; nuts; vegetables; and cheese and yogurt. These choices make this diet high in fibre and rich in vitamins and minerals.

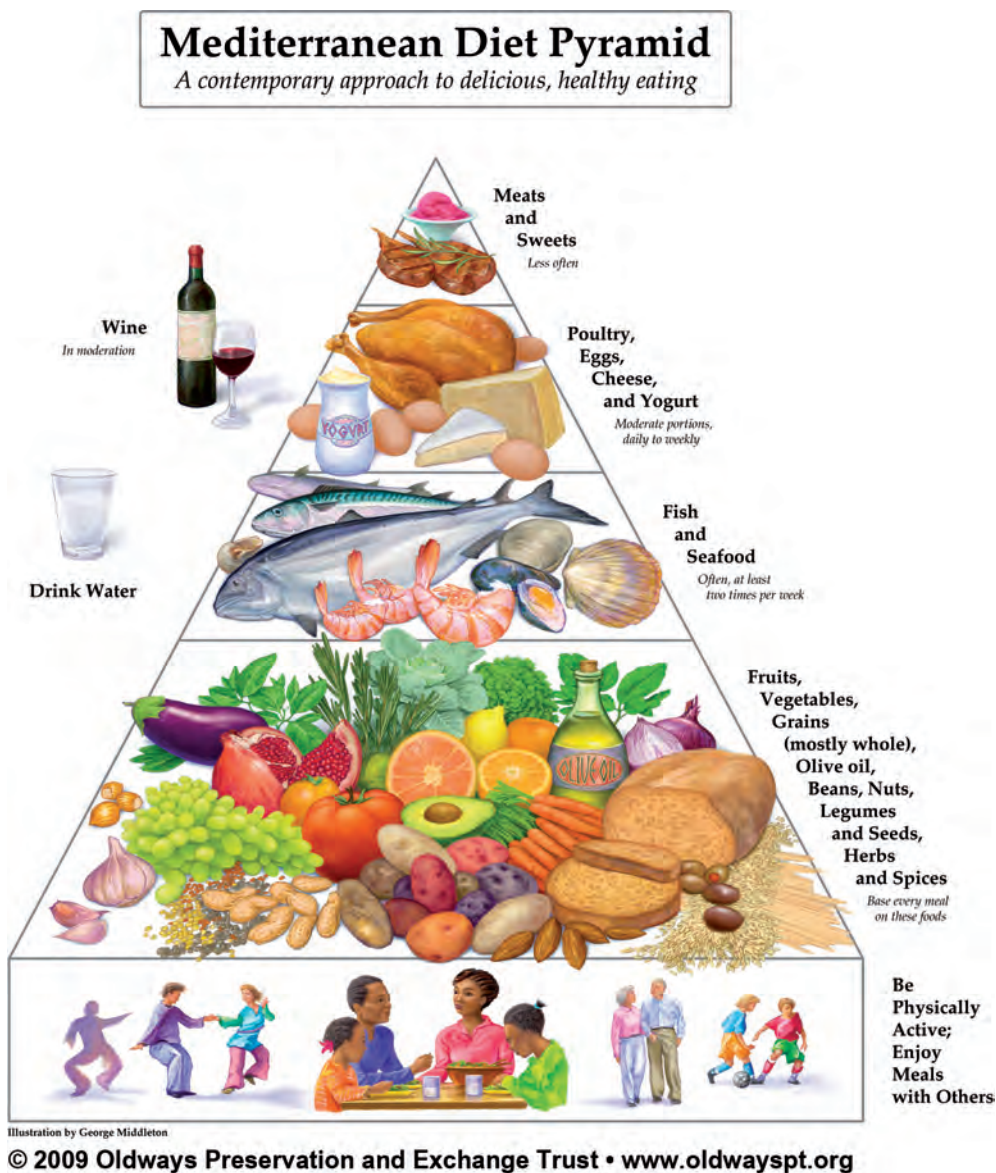
**Figure 2.12** illustrates the Mediterranean Diet Pyramid. Its similarities to *Canada's Food Guide* include suggestions for daily physical activity and a daily intake of breads, cereals, other grains, fruits, and vegetables. It is different from *Canada's Food Guide* in that it includes the daily consumption of beans, other legumes, and nuts and the infrequent consumption of meat, fish, poultry, and eggs. Cheese and yogurt, rather than milk, are the primary dairy sources. A unique feature of the Mediterranean Diet is the consumption of wine and olive oil daily.

**TABLE 2.6** A Comparison of One Day's Meals that Contain Foods High in Nutrient Density to Meals that Contain Foods Low in Nutrient Density

Meals with Foods High in Nutrient Density	Meals with Foods Low in Nutrient Density
<p><b>breakfast:</b>                      250 mL (1 cup) cooked oatmeal with 125 mL (4 fl. oz.) skim milk                      1 slice whole wheat toast with 5 mL (1 tsp) butter                      175 mL (6 fl. oz.) grapefruit juice</p>	<p><b>breakfast:</b>                      250 mL (1 cup) puffed rice cereal with 125 mL (4 fl. oz.) whole milk                      1 slice white toast with 5 mL (1 tsp) butter                      175 mL (6 fl. oz.) grape drink</p>
<p><b>snack:</b>                      1 peeled orange                      250 mL (1 cup) non-fat yogurt</p>	<p><b>snack:</b>                      355 mL (12 fl. oz.) can orange pop                      45 g (1 1/2 oz.) cheddar cheese</p>
<p><b>Lunch:</b>                      Turkey sandwich:                      90 g (3 oz.) turkey breast                      2 slices whole-grain bread                      10 mL (2 tsp) Dijon mustard                      3 slices fresh tomato                      2 leaves red leaf lettuce                      250 mL (1 cup) baby carrots with broccoli crowns                      500 mL (16 fl. oz.) cola soft drink</p>	<p><b>Lunch:</b>                      Hamburger:                      90 g (3 oz.) cooked regular ground beef                      1 white hamburger bun                      10 mL (2 tsp) Dijon mustard                      15 mL (1 Tbsp) tomato ketchup                      2 leaves iceberg lettuce                      1 snack-sized bag potato chips</p>
<p><b>snack:</b>                      1/2 whole wheat bagel                      15 mL (1 Tbsp) peanut butter                      1 medium apple</p>	<p><b>snack:</b>                      3 chocolate sandwich cookies                      355 mL (12 fl. oz.) can diet pop                      10 Gummi Bears candy</p>
<p><b>Dinner:</b>                      Spinach salad:                      250 mL (1 cup) spinach leaves                      60 mL (1/4 cup) diced tomatoes                      60 mL (1/4 cup) green pepper                      125 mL (1/2 cup) kidney beans                      15 mL (1 Tbsp) fat-free Italian dressing                      90 g (3 oz.) broiled chicken breast                      125 mL (1/2 cup) cooked brown rice                      125 mL (1/2 cup) steamed broccoli                      250 mL (8 fl. oz.) skim milk</p>	<p><b>Dinner:</b>                      Green salad:                      250 mL (1 cup) iceberg lettuce                      60 mL (1/4 cup) diced tomatoes                      5 mL (1 tsp) green onions                      60 mL (1/4 cup) bacon bits                      15 mL (1 Tbsp) regular ranch dressing                      90 g (3 oz.) beef round steak, breaded and fried                      125 mL (1/2 cup) cooked white rice                      125 mL (1/2 cup) kernel corn                      250 mL (8 fl. oz.) iced tea</p>
<p><small>Note: The conversions between Imperial and metric measures used here are not exact, but are common conversions used in recipes and on food products in Canada. The exact conversions are slightly different in the United States (e.g., 1 fl. oz. = 29.57 mL; 8 fl. oz. = 1 cup = 237 mL) and in Canada (1 fl. oz. = 28.41 mL; 8 fl. oz. = 1 cup = 227 mL). As a result, U.S. volume measures are slightly larger (approximately 4%) than Canadian measures.</small></p>	

three Oreo cookies provide the same number of Calories as a medium banana and 125 mL (1/2 cup) of fresh blackberries. Yet as you might guess, the density of nutrients in the fruit is far superior, giving you more true nourishment per kcal (**Figure 2.13**).

A helpful analogy for selecting nutrient-dense foods is shopping for clothes on a tight budget. If you had only \$40 in your clothing budget, you would most likely buy two pairs of pants on sale for \$20 each instead of one pair of pants for \$40. Because you can only “afford” a certain number of Calories each day to maintain a healthy weight, it makes sense to maximize the nutrients you can get for each Calorie you consume. **table 2.6** provides a comparison of one day of meals that are high in nutrient density to meals that are low in nutrient density. This example can assist you in selecting the most nutrient-rich foods when planning your meals.



◆ **Figure 2.12** The Mediterranean Diet Pyramid. Interestingly, the Mediterranean Diet is not lower in fat; in fact, about 40% of the total energy in this diet is derived from fat, which is much higher than the dietary fat recommendations made in Canada and the United States. However, the majority of fat in the Mediterranean Diet is from plant oils, which are more healthful sources than the animal fats found in the North American diet, making the Mediterranean Diet more protective against cardiovascular disease.

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(a)



(b)

◆ **Figure 2.13** Examples of foods that are low and high in nutrient density. **(a)** Three chocolate sandwich cookies; **(b)** The combination of one medium banana and 125 mL (1/2 cup) fresh blackberries. Each bowl of food provides approximately 600 kJ (145 kcal). The cookies provide 230 kJ (56 kcal) from fat (6.2 grams), 1 gram of fibre, and very few vitamins and minerals. The fruit combination provides almost 7 grams of fibre, 32 kJ (8 kcal) from fat (0.85 grams), and a significant amount of other nutrients, such as potassium (608 mg), vitamin A (21 RE), and vitamin C (26 mg). For our limited daily energy budget, the fruit is richer in nutrients (more nutrient-dense) and a more healthful choice. (Calculated using USDA Nutrient Database for Standard Reference, Release 15, September 2002.)

## Can Eating Out Be Part of a Healthful Diet?

How much of your food budget do you spend each week on restaurant meals? According to Statistics Canada, Canadian households spent an average of \$143 weekly for food in 2010; 28% of their food dollars were on restaurant meals and 72% was spent on food purchased from stores (Statistics Canada, 2012).

### The Hidden Costs of Eating Out

**table 2.7** lists some of the foods served at Tim Hortons and Burger King restaurants. As you can see, a regular Burger King hamburger has only 1090 kJ or 260 kcal, whereas the WHOPPER with Cheese has 3180 kJ (760 kcal). A meal of the WHOPPER with Cheese, large french fries, and a large Coke provides 6360 kJ (1520 kcal). This meal has almost enough energy to support an entire day's needs for a small, lightly active woman! Similar meals at other fast-food chains are also very high in Calories, not to mention total fat and sodium.



**TABLE 2.7** Nutritional Value of Selected Fast Foods in Canada

Menu item	t total kcal	Fat (% of kcal)	t total Fat (grams)	saturated Fat (grams)	t rans fat (grams)	sodium (mg)
<b>t im hortons</b>						
Turkey Bacon Club Sandwich	370	17	7	2	0	1410
Egg Salad Sandwich	360	33	13	3	0	760
Ham & Swiss Sandwich	390	28	12	5	0.2	1450
Bagel BELT	460	29	15	6	0.2	1000
English Muffin, Egg, Sausage, Cheese	430	52	25	10	0.2	940
Maple Oatmeal	220	10	2.5	0.5	0	220
Chili	300	57	19	7	1	1320
Boston Cream Donut	250	29	8	3.5	0.1	260
Maple Dip Donut	210	34	8	3.5	0.1	190
Oatmeal Raisin Spice Cookie	220	33	8	5	0.1	200
Iced Cappuccino (10 oz.)	250	40	11	6	0.4	50
Café Mocha (10 oz.)	190	38	8	7	0.3	170
Hot Chocolate (10 oz.)	240	23	6	5	0.2	360
<b>burger King</b>						
Hamburger	260	38	11	4	0.4	500
Cheeseburger	300	42	14	6	0.5	710
WHOPPER	670	54	40	11	1	910
WHOPPER with cheese	760	56	47	16	1.5	1320
Double WHOPPER	910	57	58	19	2	980
Original Chicken	680	57	43	8	0.4	1430
Tendergrill Chicken	370	39	16	2.5	0.1	910
Fries, small	220	45	11	2	0.2	500
Fries, medium	350	44	17	3.5	0.4	790
Fries, large	440	45	22	4.5	0.5	1000
Onion rings, small	150	48	8	1.5	0.1	290
Onion rings, medium	320	48	17	2.5	0.1	620
Onion rings, large	410	46	21	3.5	0.1	790

Source: Tim Hortons Nutrition Guide, [www.timhortons.com/ca/pdf/nutrition-guide-can.pdf](http://www.timhortons.com/ca/pdf/nutrition-guide-can.pdf); and Burger King Canada, [http://en.burgerking.ca/cms/en/us/cms\\_out/digital\\_assets/files/pages/NutritionInformation.pdf](http://en.burgerking.ca/cms/en/us/cms_out/digital_assets/files/pages/NutritionInformation.pdf) (accessed March 2012), reprinted with permission of Burger King Corporation.



📌 Foods served at fast-food chains are often high in Calories, total fat, and sodium.



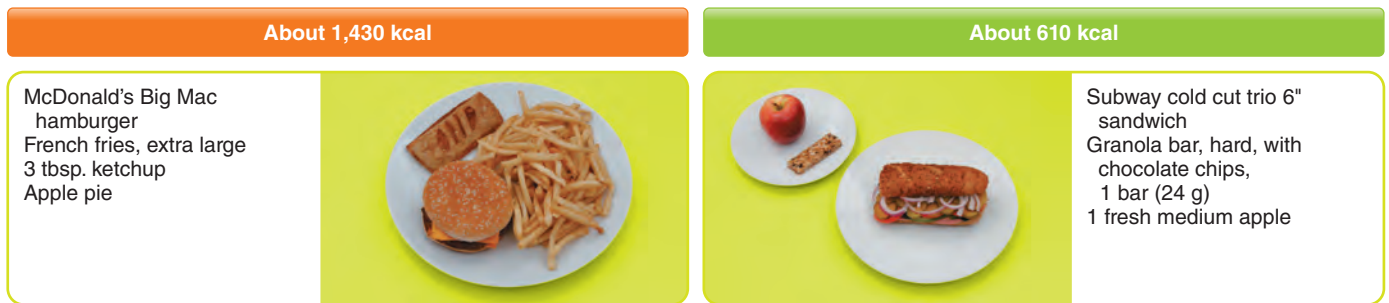
📌 Eating out can be a part of a healthful diet, if you are careful to choose wisely.

Fast-food restaurants are not alone in serving large portions. Most sit-down restaurants also serve large meals, which may include bread with butter, a salad with dressing, sides of potatoes and other vegetables, and free refills of sugar-filled drinks. Combined with a high-fat appetizer, such as potato skins, fried onions, fried mozzarella sticks, or buffalo wings, it is easy to eat more than 8400 kJ or 2000 kcal at one meal.

Does this mean that eating out cannot be a part of a healthful diet? Not necessarily. By becoming an educated consumer and making wise meal choices, you can enjoy both a healthful diet and the social benefits of eating out.

## The Healthful Way to Eat Out

Most restaurants, even fast-food restaurants, offer lower-fat menu items. For instance, eating a regular Burger King hamburger, a small order of french fries, and a diet beverage or water provides 2000 kJ or 480 kcal and 22 g of fat. To provide some



➤ **Figure 2.14** The energy density of two fast-food meals. The meal on the left is higher in total energy and fat, while the meal on the right is lower in energy and fat and is the preferred choice for someone trying to lose weight.

vegetables for the day, you can add a side salad with low-fat or non-fat salad dressing. Other fast-food restaurants also offer smaller portions, sandwiches made with whole-grain bread, grilled chicken or other lean meats, and side salads. Many sit-down restaurants offer “lite” menu items, such as grilled chicken and a variety of vegetables, which are usually a much better choice than foods from the regular menu. See the energy density of two fast-food meals, shown in **Figure 2.14**.

Here are some other suggestions on how to eat out in moderation. Practice some of these Quick Tips every time you eat out.

## QUICK TIPS

### Eating Right When You're Eating Out

- Avoid all-you-can-eat buffet-style restaurants.
- Avoid appetizers that are breaded, fried, or filled with cheese or meat, or skip the appetizer completely.
- Order a healthful appetizer as an entrée instead of a larger meal.
- Order your meal from the children's menu.
- Share an entrée with a friend.
- Order broth-based soups instead of cream-based soups.
- Order any meat dish grilled or broiled, and avoid fried or breaded meat dishes.
- If you order a meat dish, select lean cuts of meat.
- Order a meatless dish filled with vegetables and whole grains. Avoid dishes with cream sauces and a lot of cheese.
- Instead of a beef burger, order a chicken burger, fish burger, or veggie burger.
- Order a salad with low-fat or non-fat dressing served on the side.
- Order steamed vegetables on the side instead of potatoes or rice. If you order potatoes, make sure to get a baked potato (with very little butter or sour cream, on the side).
- Order beverages with few or no Calories, such as water, tea, or diet drinks. Avoid coffee drinks made with syrups, as well as those made with cream, whipping cream, or whole milk.
- Don't feel you have to eat everything you're served. If you feel full, take the rest home for another meal.

- Skip dessert or share one dessert with a lot of friends, or order fresh fruit for dessert.
- Watch out for those “yogurt parfaits” offered at some fast-food restaurants. Many are loaded with sugar, fat, and Calories.



- When ordering your favourite coffee drink, avoid flavoured syrups, cream, and whipping cream and request reduced-fat or skim milk instead.

# Nutrition DEBATE

## Can Probiotics Improve Our Health?

**W**hen you see the word “probiotics” on products, what first comes to mind? Do you know what they are? Do you gravitate towards products that advertise themselves to be probiotic? Do you believe their claims?

Probiotics are defined by the Food and Agriculture Organization of the United Nations and the World Health Organization as “Live microorganisms, which when administered in adequate amounts, confer a health benefit on the host” (FAO, 2001). This definition means a number of things. First, probiotic microorganisms (specific genus, species, and strains such as *Bifidobacterium animalis* DN 117-001) must be tested to prove that they have health benefits for humans. Second, studies must identify the proper number of microorganisms required to safely provide health benefits. Third, the microorganisms must still be alive by the end of the shelf life of the product for people to get the health benefits (Reid et al., 2008).

Let’s consider designer yogurts with added probiotics. People have been consuming yogurt for thousands of years. Yogurt contains live bacteria, called *probiotics* (“pro-life”), which are known to benefit human health. These helpful bacteria reproduce in the food naturally during the production process. Probiotics are also available in supplement form.

How do probiotics work? When a person consumes a product containing probiotics, the bacteria adhere to the intestinal wall for a few days, exerting their beneficial effects. Although their exact actions are currently being researched, it is believed that some crowd out harmful bacterial, viral, and fungal species; some produce nutrients and other helpful substances; and others influence the immune system (Saier and Mansour, 2005). They may be beneficial for conditions such as some forms of

diarrhea, irritable bowel syndrome, inflammatory bowel disease, lactose intolerance, and certain types of infections (Saier and Mansour, 2005; Doron and Gorbach, 2006; Ezendam and van Loveren, 2006).

It is important to remember that, to be effective, foods containing probiotics must provide an adequate number of bacteria, thought to be 1 to 10 billion (Sanders et al., 1996). In the United States, the National Yogurt Association has created a “Live Active Culture” seal to be placed on yogurt containers to indicate that the yogurt has an adequate amount of active bacteria per gram. Canada does not currently have this kind of seal. Also, because they can survive in the body for only a limited period of time, probiotics should be consumed daily, and they must be stored properly (usually refrigerated) and consumed within a relatively brief period of time.

Some food manufacturers are employing researchers to find and cultivate strains of probiotic bacteria that have specific health benefits. For example, Activia, a yogurt made by Danone, contains a probiotic species said to promote regular bowel movements by reducing the time stool stays in the colon. The longer fecal matter remains in the colon, the more water is removed from it, and the harder it gets, so reduced transit time means softer bowel movements. Is this claim valid?

In January of 2008 in the United States, a class action lawsuit was filed against Dannon Co. Inc. (Danone in Canada; part of the larger French company, Groupe Danone) claiming it made false probiotic claims for its products (CTV.ca, 2008). Dannon advertised that its products, Activia yogurt and DanActive, had been clinically proven to give health benefits. Those filing the suit claimed that some of

Dannon’s studies on their products actually showed that there was no conclusive evidence of health benefits from these products and that Dannon was fully aware of the failed studies before their \$100 million campaign add on probiotics. Dr. Gregor Reid, a leading researcher in Canadian probiotics as well as the Chair of the United Nations/World Health Organization Expert Panel and Working Group on Probiotics, defended Dannon, saying it had actually conducted a number of successful studies on their probiotic products. Four studies published in peer-reviewed journals found that consuming three, 4-oz. (125 mL) servings of Activia a day for 10 to 14 days sped up stool transit time by 10% to 40%. This effect was seen in both men and women. Convinced? If constipation were a problem for you, would you eat Activia three times a day?

For trustworthy information about probiotics, visit the Canadian Research & Development Centre for Probiotics: [www.crdc-probiotics.ca](http://www.crdc-probiotics.ca).



➤ Consuming Activia yogurt may improve bowel function.

# Chapter Review

## Test Yourself ANSWERS

- 1. true.** A nutritious diet can include most foods.
- 2. true.** Most Canadians report that they look at food labels when they are shopping, to make healthy choices.
- 3. False.** The portion sizes used in *Eating Well with Canada's Food Guide* are not based on the “average” portion sizes eaten by Canadians; they are recommended portion sizes. Most Canadians have portion sizes that are larger than those in the *Food Guide*.
- 4. true.** Manufacturers must list the ingredients in packaged food in descending order by weight, not by volume or amount.
- 5. False.** Manufacturers can claim that eating their foods or food products contain ingredients that are associated with reduced risks of some diseases, in the context of a healthy diet. However, they are not permitted to suggest that eating their product can prevent or treat a disease.

## Find the Quack

Amanpreet is a 19-year-old first-year university student. Everyone in Amanpreet's family is either overweight or obese, but now that she is away from home and living at an out-of-province school Amanpreet has become determined to break out of her “family pattern” and lose weight. In a fashion magazine she reads about a grapefruit diet called the Mayo Clinic Diet. Amanpreet figures that any diet with a medical clinic behind it must be reputable, so she decides to try it. The diet requires that Amanpreet eat two eggs and two slices of bacon every morning with a 250 mL (8 fl. oz.) glass of grapefruit juice or half a grapefruit; eat a salad, red meat or poultry, and another serving of grapefruit at lunch; and eat a salad, red meat or poultry, and another serving of grapefruit at dinner. No snacks between meals are allowed. The diet is to be followed for 8 weeks: 12 days on the diet followed by 2 days off, then resumption of the diet again.

The magazine article makes the following claims:

- The consumption of grapefruit or grapefruit juice is absolutely essential because the grapefruit “is a catalyst that starts the fat-burning process.”
- The consumption of bacon and eggs at breakfast and salad at lunch and dinner is also absolutely essential because these foods combine to promote fat burning.
- Anyone following the diet will lose 24 kg or 52 lb. in eight weeks. No weight loss will occur during the first four days, but the average weight loss for the remainder of the eight-week period will be 0.5 kg or 1 lb. a day.

- The diet is safe and healthful if followed as described for eight weeks.

1. Although you have not yet studied digestion and the absorption of food, do you believe the article's claim that there is something unique about grapefruit that catalyzes (initiates and speeds up) fat burning? Why or why not?
2. If the loss of 0.5 kg or 1 lb. of body weight requires the body to expend 14 600 kJ or 3500 kcal more than it takes in, do you think it is possible for anyone trying the grapefruit diet to lose 24 kg (52 lb.) in 56 days, without any prescribed physical activity and the daily consumption of two eggs, two strips of bacon, three servings of grapefruit, two salads, and two servings of meat or poultry? Why or why not?
3. What two food groups are entirely missing from this diet? Do you think this is problematic for some dieters? Why or why not?
4. Do you believe that this grapefruit diet, which the article refers to as the Mayo Clinic Diet, is truly endorsed by the Mayo Clinic—the medical institution based in Rochester, Minnesota, and known internationally for its high-quality healthcare? Go online and, using your favourite search engine, type in the search terms “grapefruit diet” and “Mayo Clinic.” What do you discover?

Answers can be found on the Companion Website, at [www.pearsonhighered.com/thompsonmanore](http://www.pearsonhighered.com/thompsonmanore)



**NutriTools**

Check out the Companion Website at [www.pearsonhighered.com/thompsonmanore](http://www.pearsonhighered.com/thompsonmanore), or use MyNutritionLab.com, to access interactive animations, including:

- MyPyramid Food Groups
- What's Missing on This Label?

## Review Questions

- The Nutrition Facts table identifies which of the following?
  - All of the nutrients and Calories in the package of food.
  - The Recommended Dietary Allowance for each nutrient found in the package of food.
  - A footnote identifying the Tolerable Upper Intake Level for each nutrient found in the package of food.
  - The % daily values of select nutrients in a serving of the packaged food.
- An adequate diet
  - provides enough energy to meet minimum daily requirements.
  - provides enough of the energy, nutrients, and fibre to maintain a person's health.
  - provides a sufficient variety of nutrients to maintain a healthy weight and to optimize our body's metabolic processes.
  - contains combinations of foods that provide healthful proportions of nutrients.
- Which of the following are required on labels for foods intended for infants and children less than two years of age?
  - Saturated and trans fats
  - Starch and fibre
  - Cholesterol and trans fats
  - Protein and iron
- The Health Check™ symbol on a package tells you that the food
  - meets a set of criteria by the Canadian Heart and Stroke Association for a “heart-healthy” choice.
  - has been approved by the Canadian Diabetes Association for diets for people with diabetes.
  - meets Health Canada's criteria for a nutritious food choice.
  - is part of *Canada's Food Guide* for people with high blood pressure.
- What does it mean to choose foods for their nutrient density?
  - Dense foods such as peanut butter or chicken are more nutritious choices than transparent foods such as mineral water or gelatine.
  - Foods with a lot of nutrients relative to their energy content, such as fish, are more nutritious choices than foods with less nutrients, such as candy.
  - Energy-dense foods such as cheesecake should be avoided.
  - Fat makes foods dense, and thus foods high in fat should be avoided.
- Choose the correct statement.
  - Percent daily values indicate the amount a nutrient should contribute to your overall energy intake per day.
  - Ingredients must be listed in ascending order by weight.
  - If Omega-3 polyunsaturated fats are listed, omega-6 polyunsaturated fats must be listed as well.
  - Health claims relate to the amount of nutrient in a food.
- List ways to make eating out healthy. Hint: Think of what you order when you're out to dinner and describe ways you could tweak the meal to make it healthy and lower the number of Calories consumed.
- How can Percent Daily Values aid in making healthy food choices?
- Defend the statement that no single diet can be appropriate for every human being.
- Describe the main characteristics of a traditional Mediterranean Diet.
- Your little sister, Laura, comes home in tears because her elementary school has removed the vending machine with all of her favourite recess snacks. Laura is a healthy, active Grade 4 student who always brings a packed lunch with nutrient-dense foods like sandwiches, vegetables, and fruit. She whines that removing vending machines isn't fair. Do you agree with the school's decision to remove the vending machines?
- Vending machines are a source of extra income for many schools as the schools may receive a percentage of the profits from sales. Is this situation a conflict of interest for schools? While schools cannot control what students choose to eat, should they be held accountable for making these nutrient-void snacks so readily available? If you were on the committee deciding the fate of elementary school vending machines, what side would you be on, and what would your arguments be?

## Case Study

Now that you've had the opportunity to learn about nutritious diet planning, let's discuss Katie, a 20-year-old university student who lives in an apartment with one roommate. Since moving away from home, Katie has found it difficult to eat regular, nutritious meals. She often finds herself in the grocery store lost at the thought of having

to make decisions about which product to purchase. The choices are seemingly endless!

Questions:

- What tools are available directly on the product package to aid Katie in making healthful food choices?

- b. Katie decides to purchase a large meat lasagna to last her several meals. The whole meat lasagna is 1.2 kg (1200 g). One portion (300 g) contains 390 Calories and 13 grams of fat.
- If Katie eats one-half of the meat lasagna at dinner, how many grams of fat did she consume?
  - If Katie's recommended intake of fat is 65 grams, what is her percent daily value of fat from the meat lasagna?
- c. According to *Canada's Food Guide*, how many servings from each food group should she aim to consume each

day? List several healthful food choices found at the grocery store for each group (remember to think about why they are healthy choices).

- d. List several foods that you would advise Katie to purchase sparingly.

*Answers to Review Questions can be found at the back of this text, and additional essay questions and answers are located on the Companion Website, at [www.pearsonhighered.com/thompsonmanore](http://www.pearsonhighered.com/thompsonmanore).*

## Web Resources

### [www.dietitians.ca](http://www.dietitians.ca)

Dietitians of Canada

Click on “Your Health” and then “Assess Yourself” and “EATracker” to see if your eating and physical activity patterns are on track!

### [www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/cons/interactive\\_e.html](http://www.hc-sc.gc.ca/fn-an/label-etiquet/nutrition/cons/interactive_e.html)

Health Canada's Interactive Nutrition Label

This is an interactive site to help you learn about the new food label. When you think you know the parts of the label, take the interactive quiz!

### [www.5to10aday.com](http://www.5to10aday.com)

5-to-10-a-Day for Better Health

Visit this site to learn more about The Mix it up! Campaign, a social marketing initiative aimed at helping Canadians of all ages eat more fruits and vegetables as part of a healthy diet and active lifestyle to better their health.

### [www.healthcheck.org](http://www.healthcheck.org)

Heart and Stroke Foundation of Canada's Health Check

Developed by the Heart and Stroke Foundation, Health Check™ is a non-profit food information program to promote healthy food choices. Over 1500 food products in Canada carry the Health Check™ logo and explanatory messages on the website describe how the food products fit in a healthy diet.

### [www.mcdonalds.ca/ca/en/food/nutrition\\_calculator.html](http://www.mcdonalds.ca/ca/en/food/nutrition_calculator.html)

McDonald's Canada

Log on to the nutrition calculator and select different beverages and foods to see their nutrient contents.

### [www.bk.com](http://www.bk.com)

Burger King

Trying selecting various food and beverage items from the Menu tab to see the amounts of energy and nutrients they contain.

### [www.inspection.gc.ca](http://www.inspection.gc.ca)

Canadian Food Inspection Agency

If you are interested in more information about the new food labels in Canada, health claims, and so on, this is the place to find it.

### [www.hc-sc.gc.ca/ahc-asc/branch-dirigen/hpfb-dgpsa/onpp-bppn/index-eng.php](http://www.hc-sc.gc.ca/ahc-asc/branch-dirigen/hpfb-dgpsa/onpp-bppn/index-eng.php)

Office of Nutrition Policy and Promotion, Health Canada

Learn more about *Eating Well with Canada's Food Guide* and other Canadian nutrition policies.

### [www.oldwayspt.org](http://www.oldwayspt.org)

Oldways Preservation and Exchange Trust

Find variations of ethnic and cultural food pyramids.

### [www.crdc-probiotics.ca](http://www.crdc-probiotics.ca)

The Canadian Research & Development Centre for Probiotics

Visit this centre to learn more about Canadian research on probiotics.



[www.masteringnutrition.pearson.com](http://www.masteringnutrition.pearson.com)

#### Assignments

Animation Reading Labels

Activities NutriTools

#### Study Area

Practice Tests • Diet Analysis • eText



# Phytochemicals

## Want to Find Out...

- what's behind all the fuss about phytochemicals?
- why stressing your cells can be a good thing?
- why you can't put fruits and veggies into a pill?

**R**EAD ON  
Imagine a patient seeing his physician for his annual physical exam. The physician measures his blood pressure and finds it slightly elevated. At the close of the visit, she hands the patient a prescription: *one apple, 2 servings of dark-green leafy vegetables, a half cup of oatmeal, and 2 cups of soy milk daily*. The patient accepts the prescription gratefully, assuring his physician as he says goodbye, "I'll stop at the market on my way home!"

Sound unreal? As researchers provide more evidence of the link between nutrition and health, scenarios like this might become familiar. Here, we explore *In Depth*



some of the reasons that certain chemicals that occur naturally in plant foods are thought to promote health. Who knows? When you finish reading, you might find yourself writing up your own health-promoting grocery list!

## What Are Phytochemicals?

*Phyto-* means “plant,” so **phytochemicals** are plant chemicals. These naturally occurring compounds are believed to protect plants from a variety of injurious agents, including insects, microbes, the oxygen they produce, and the UV light they capture and transform into the nutrients we need. Although more than 5000 different phytochemicals have already been identified, researchers believe there are thousands more (Liu, 2003). Any one food can contain hundreds. **Figure 1** shows some groups of only a few of the most common.

Phytochemicals are not considered nutrients—that is, substances necessary for sustaining life. Even for carotenoids, a well-studied class of phytochemicals, the Food and Nutrition Board of the Institute of Medicine concluded in 2000 that there is not enough evidence to establish a daily recommended intake (Food and Nutrition Board IOM, 2000). So, whereas a total lack of vitamin C or iron is incompatible with life, a total lack of

**phytochemicals** Compounds found in plants that are believed to have health-promoting effects in humans.

**diseases of aging** Conditions that typically occur later in life as a result of lifelong accumulated risk, such as exposure to high-fat diets, a lack of physical activity, and excess sun exposure.

**metabolites** The form that nutrients take when they have been used by the body. For example, lactate is a metabolite of carbohydrate that is produced when we use carbohydrate for energy.

lutein or allylic sulphur compounds is not known to be fatal. On the other hand, eating an abundance of phytochemical-rich foods has been shown to reduce the risk for cardiovascular disease, cancer, diabetes, Alzheimer’s disease, cataracts, and age-related functional decline (Liu, 2003; Food and Nutrition Board IOM, 2000; Chun et al., 2007).

The evidence supporting this observation of a reduced disease risk stems mainly from large epidemiological studies in which people report their usual food intake to researchers, who then look for relationships between specific dietary patterns and common diseases. These large studies often find that the reduced disease risk from high intakes of plant foods cannot be attributed solely to differences in intake of macronutrients and micronutrients. This suggests that other compounds in plant foods may be reducing the risk for disease.

As we noted in Chapter 1, epidemiological studies can only reveal *associations* between general patterns of food intake and health conditions; they cannot prove that a food or dietary pattern directly *causes* a health outcome. To better understand how phytochemicals influence health and disease, researchers have turned to biochemical, cellular, and animal studies.

## How Do Phytochemicals Reduce Our Risk for Disease?

For decades, laboratory experiments have shown that, at least in the test tube, many phytochemicals have antioxidant properties. As you will learn in Chapter 8, antioxidants can neutralize certain unstable, highly reactive compounds, called *free radicals*, that damage our cells. Free radicals are an unavoidable by-product of normal metabolism, but they are also produced in response to radiation, air pollution, industrial chemicals, tobacco smoke, infections, and even intense exercise.

The health effects of this damage, also known as oxidative damage,

typically don’t arise until later in life. Many **diseases of aging**, such as cardiovascular disease, cancer, cataracts, arthritis, and certain neurologic disorders, have been linked to oxidative damage that accumulates over years. It’s no surprise, therefore, that antioxidant-rich foods reduce the risk for these conditions.

Unfortunately, biology is not fully explained by a few simple chemical reactions. In fact, the latest research evidence on phytochemicals suggests that their health-promoting properties are largely unrelated to the antioxidant activity measured in the test tube (Melton, 2006; Linus Pauling Institute, 2005). This is in part because phytochemicals can be modified during digestion and after absorption, so that cells are exposed to **metabolites** that are structurally different from the phytochemicals found in foods (Linus Pauling Institute, 2005). Clearly, the test tube cannot explain what is happening inside the body.

Fortunately, researchers have also done cellular and animal studies, which have revealed that phytochemicals have many health-promoting functions independent of their antioxidant properties. For example, phytochemicals are thought to

- reduce inflammation (Beauchamp et al., 2005), which is linked to the development of Alzheimer’s disease and cardiovascular disease and is symptomatic of arthritis.
- protect against cancer by slowing tumour cell growth, instructing cancer cells to die, and enhancing the activity of enzymes that detoxify cancer-promoting agents, called carcinogens (Liu, 2004).



▶ Apricots contain carotenoids, a type of phytochemical.



Phytochemical	Health Claims	Food Source
<b>Carotenoids:</b> alpha-carotene, beta-carotene, lutein, lycopene, zeaxanthin, etc.	Diets with foods rich in these phytochemicals may reduce the risk for cardiovascular disease, certain cancers (e.g., prostate), and age-related eye diseases (cataracts, macular degeneration).	Red, orange, and deep-green vegetables and fruits, such as carrots, cantaloupe, sweet potatoes, apricots, kale, spinach, pumpkin, and tomatoes
<b>Flavonoids:<sup>1</sup></b> flavones, flavonols (e.g., quercetin), catechins (e.g., epigallocatechin gallate or EGCG), anthocyanidins, isoflavonoids, etc.	Diets with foods rich in these phytochemicals are associated with lower risk for cardiovascular disease and cancer, possibly because of reduced inflammation, blood clotting, and blood pressure and increased detoxification of carcinogens or reduction in replication of cancerous cells.	Berries, black and green tea, chocolate, purple grapes and juice, citrus fruits, olives, soybeans and soy products (soy milk, tofu, soy flour, textured vegetable protein), flaxseed, whole wheat
<b>Phenolic acids:<sup>1</sup></b> ellagic acid, ferulic acid, caffeic acid, curcumin, etc.	Similar benefits as flavonoids.	Coffee beans, fruits (apples, pears, berries, grapes, oranges, prunes, strawberries), potatoes, mustard, oats, soy
<b>Phytoestrogens:<sup>2</sup></b> genistein, diadzein, lignans	Foods rich in these phytochemicals may provide benefits to bones and reduce the risk for cardiovascular disease and cancers of reproductive tissues (e.g., breast, prostate).	Soybeans and soy products (soy milk, tofu, soy flour, textured vegetable protein), flaxseed, whole grains
<b>Organosulphur compounds:</b> allylic sulphur compounds, indoles, isothiocyanates, etc.	Foods rich in these phytochemicals may protect against a wide variety of cancers.	Garlic, leeks, onions, chives, cruciferous vegetables (broccoli, cabbage, cauliflower), horseradish, mustard greens

<sup>1</sup> Flavonoids, phenolic acids, and stilbenes are three groups of phytochemicals called phenolics. The phytochemical Resveratrol is a stilbene. Flavonoids and phenolic acids are the most abundant phenolics in our diet.

<sup>2</sup> Phytoestrogens include phytochemicals that have mild or anti-estrogenic action in our body. They are grouped together based on this similarity in biological function, but they also can be classified into other phytochemical groups, such as isoflavonoids.

▲ **Figure 1** Health claims and food sources of phytochemicals.

- protect against infections indirectly by enhancing immune function and directly by acting as antibacterial and antiviral agents (Liu, 2004).

- reduce the risk for cardiovascular disease by lowering blood lipids, blood pressure, and blood clotting (Liu, 2003).

It is not yet known which of these roles is most important in reducing disease risk. Many other issues are also not well understood yet, such as which phytochemicals are needed and how much.

## Is There an RDA for Phytochemicals?

Most well-controlled studies research only one phytochemical or food at a time. When the results are published, we read about them in the popular press: one day we're advised to eat tomatoes, another day blueberries, and then pomegranates. But these individual findings can be misleading. As scientists begin to "map" more and more phytochemicals, they're making the following discoveries:

- Phytochemicals interact with each other in the body to produce a synergistic effect, which is greater than the sum of the effects of individual phytochemicals (Liu, 2003). This may explain why whole tomatoes were found to reduce prostate cancer in rats, whereas a phytochemical called lycopene that is present in tomatoes, when given alone, did not (Boileau et al., 2003).
- Phytochemicals interact with macronutrients and vitamins and minerals. For example, the anticancer effect of garlic is enhanced by vitamin A, selenium, and certain fats (Milner, 2001).



➤ Choose whole foods as sources of phytochemicals, rather than supplements, whenever possible.

### Web Resources

[www.aicr.org](http://www.aicr.org)

American Institute for Cancer Research  
Search for "phytochemicals" to learn about the AICR's stance on and recommendations about phytochemicals and their roles in cancer prevention.

[lpi.oregonstate.edu](http://lpi.oregonstate.edu)

Linus Pauling Institute

This extensive website covers not only phytochemicals but also nutrients and other cutting-edge health and nutrition topics.

## HOT TOPIC

### Will a pb&j Keep the Doctor a way?

Whole-grain bread, natural peanut butter, and grape jelly: how could a food that tastes so good be good for the body, too? We've known for decades about the fibre, micronutrients, and healthful fats a PB&J provides. But recently, research has revealed that the comforting PB&J is a good source of resveratrol, a phytochemical being studied in labs worldwide. Research has linked resveratrol to protective effects against cancer, heart disease, obesity, viral infections, and neurologic diseases, such as Alzheimer's disease; however, so far, the effects have been demonstrated only in mice (Baur et al., 2006; Lagouge et al., 2006).

A flavonoid, resveratrol is found in the skins of dark grapes, in dark grape juice, in most red wines, and in dark berries, such as blueberries and cranberries. However, fruits are not the only source: resveratrol also happens to be plentiful in peanuts, including peanut butter. Still, no one knows what an effective "dose" of resveratrol looks like, or whether the amounts in a PB&J qualify. We also don't yet know whether high doses, such as those found in supplements, can be harmful.

If you decide to add resveratrol to your diet, we hope you'll bypass supplements in favour of the humble PB&J. Although the jury is still out on the benefits of its resveratrol content, it makes a highly nutritious meal or snack, doesn't need refrigeration, is inexpensive, and tastes great.

Phytochemicals can act in different ways under different circumstances in the body. For example, phytoestrogens in soy appear to reduce the incidence of breast cancer in healthy women, but they may enhance cancer development when the disease is already present (Rice and Whitehead, 2006). For these reasons, no RDA for phytochemicals can safely be established for any life-stage group.

In addition, although epidemiological studies suggest that the more phytochemicals we consume, the better our health, this benefit appears to be limited to the phytochemicals consumed in foods. That is, phytochemicals appear to

be protective in the low doses commonly provided by foods, but they may have very different effects as supplements. This may be due to their mode of action: scientists now believe that, instead of *protecting* our cells, phytochemicals might benefit our health by *stressing* our cells, causing them to rev up their internal defence systems (Melton, 2006). Cells are very well equipped to deal with minor stresses, but not with excessive stress, which may explain why clinical trials with phytochemical supplements rarely show the same benefits as high intakes of plant foods (Melton, 2006; Meyskens and Szabo, 2005).

So, are phytochemical supplements harmful? Generally speaking, taking high doses of anything is risky. A basic principle of toxicology is that any compound can be toxic if the dose is high enough. Dietary supplements are no exception to this rule. For example, clinical trials found that supplementing with 20 to 30 mg/day of beta-carotene for four to six years increased lung cancer risk by 16% to 28% in smokers (The Alpha-Tocopherol, Beta-Carotene Cancer Prevention Study Group, 1994; Omenn et al., 1996). Based on these and other results, experts recommend against beta-carotene supplementation (US Preventive Services Task Force, 2003).

In short, whereas there is ample evidence to support the health benefits of diets rich in fruits, vegetables, legumes, whole grains, and nuts, no recommendation for precise amounts can be given, and phytochemical supplements should be avoided. The best advice for optimal health is to consume a plant-based diet consisting of as many whole foods as possible.

