CHAPTER 5

NUTRITION

Eating for Optimum Health

CONSIDER THIS . . .

Ahmed is a first-year student living in residence and using the food services provided. At "food hall," the same sorts of choices are available to Ahmed each day (burgers and fries, pizza, stir fry, pasta and sauce, soup, sandwiches, and tossed salads), foods are often overcooked, there are few fresh vegetables or fruits, and beverages offered include soft drinks, iced tea, milk, and various watered-down juices. Although Ahmed eats daily at "food hall," he supplements his food intake with fast food, ice cream, and other salty and/or sweet snacks. Ahmed is gaining weight and not feeling very good about himself physically or emotionally. As a result, Ahmed wants to eat better, but when he goes to "food hall" or out to eat, he is not sure what to do differently.

What factors contribute to students' attitudes and behaviours toward their food choices? Why do some students find it difficult to eat well? Do you think Ahmed should change his eating habits? Why or why not? What would you suggest he do differently? Do you or your friends have similar problems? Where on your campus could you go for help?

CHAPTER OBJECTIVES

- Summarize the history of Eating Well with Canada's Food Guide and the objectives that guided each stage of its development.
- Describe how to ensure a healthy dietary intake by using the Food Guide.
- Review each major essential nutrient and the purpose each serves in maintaining overall health.
- Identify typical problems university or college students experience when trying to eat healthily.
- Identify current food safety concerns and what students can do to ensure their food is safe for consumption.

Today, we face dietary choices and nutritional challenges that our grandparents never dreamed of—exotic foreign foods; dietary supplements; artificial sweeteners; no-fat, low-fat, and artificial-fat alternatives; cholesterol-free, trans fat–free, sugar free, low sodium, high-protein, high-carbohydrate, and low-calorie products. Thousands of alternatives bombard us daily. Caught in the crossfire of advertised claims by the food industry and advice provided by health and nutrition experts, most of us find it challenging to make wise dietary choices. The ability to sift through the untruths, half-truths, and scientific realities and select a dietary plan that satisfies individual preferences and needs is an essential health-promoting skill—particularly when you are living away from home for the first time. Past patterns of eating influence current dietary attitudes and behaviours. Understanding the reasons behind your dietary attitudes and behaviours may help you make more positive dietary choices.

HEALTHY EATING

We often take our ability to eat what we want, when we want, where we want for granted. We assume we will have sufficient food to get us through the day, and rarely are forced to eat foods we do not like for survival. Although we have undoubtedly experienced **hunger**, few of us have suffered the type of hunger that continues for days and threatens survival. We often eat because of **appetite**, a learned psychological desire to eat whether or not we are hungry. Our appetite can be triggered by smell, taste, time of day, special occasions, or proximity to favourite foods such as freshly baked bread, pizza, or chocolate chip cookies. Other factors also stimulate our desire to eat, including cultural and social meanings attached to food, convenience and advertising, habit or custom, emotional comfort, nutritional value, social interaction, and regional/seasonal trends. Finding the right balance between eating to maintain body functions (eating to live) and eating to satisfy our appetite and/or cultural needs (living to eat) is a problem for many, as evidenced by the increased prevalence of overweight and obesity in our population.

Many factors influence what we eat, when we eat, why we eat, and how much we eat. Social pressures, including family traditions, social events that involve food, and busy work schedules also influence the quality and quantity of our dietary intake. The Your Spiritual and Emotional Health box also discusses some of the cultural influences on our eating attitudes and behaviours.

Although our grandparents typically sat down to at least three big meals per day, they also laboured heavily in the fields or at other physical work, effectively using the calories consumed. Today, eating three large meals combined with a physically inactive lifestyle—at work and at play—is the perfect recipe for weight and fat gain.

Nutrition is the science that investigates the relationship between physiological function and the elements of the foods we eat. With the abundance of food available in our society, the options available, and easy access to almost every **nutrient** (water, proteins, carbohydrates, fats, vitamins, and minerals) 24 hours a day, Canadians should have few nutritional problems. However, nutritionists believe that our "diet of affluence" is responsible for many diseases and disabilities. This country's history as a land of agricultural abundance accounts for the traditional Canadian diet: high in fats and calories with typically large servings of red meats, potatoes, and rich desserts. More recent trends indicate that Canadians are changing to a white-meat diet (that is, poultry and fish) with less fats and more vegetables and fruits.

Why do so many of us have nutritional problems? Much of our preoccupation with food and our tendency to eat too much of certain foods stems from our early eating habits.

Monitoring Calories

Canadians consume more calories per person per day than many other people in the world. A **calorie** is a unit of measure that indicates the amount of energy obtained from a particular food. Calories are eaten in the form of proteins, fats, and carbohydrates, three of the basic nutrients necessary for life. Three other nutrients also necessary for life—water, vitamins, and minerals—do not contribute calories to our dietary intake even though they provide vital functions.

Excess calorie consumption is a major factor in gaining weight. However, it is not just the quantity of food we eat that results in weight gain and associated diseases: it is also the relative proportion of nutrients consumed and, perhaps more importantly, low levels of physical activity. Canadian adults obtain their dietary energy from proteins (16–18 percent), carbohydrates (50–56 percent), and fats (29–31 percent), close to the recommended levels for their specific age/sex groups.[1] It is the high concentration of fats in the Canadian diet—particularly saturated (largely animal fats) and trans fats (produced when polyunsaturated oils are hydrogenated)—that likely most increase risk

Cultural Practices and Healthy Eating

Many factors influence healthy eating, including culture. Culture permeates all aspects of life, including food preparation, food selection, and attitudes and behaviours toward eating. Some of the attitudes and behaviours relate to portion sizes, how, where, and when food is consumed as well as who with (or without). Food may also be consumed to sooth the spirit. This textbox focuses primarily on cultural eating of three ethnicities. Traditional dietary intakes such as Mediterranean, Asian, and Western are influenced by ethic and religious beliefs in addition to culture, climate, terrain, material resources, and technology. In regard to our nutrition and overall health, we can learn from other cultural eating practices.

MEDITERRANEAN

The traditional Mediterranean diet found in Spain, southern France and Italy, former Yugoslavia, Greece, Turkey, Cyprus, Crete, Lebanon, Israel, Palestine, Egypt, Libya, Algeria, Tunisia, and Morocco, typically includes a lot of bread and other cereal products (usually made of wheat), vegetables and fruits, fish, cheese, olive oil, tree nuts such as walnuts and almonds, and wine (in non-Islamic countries). Food is flavoured extensively with herbs and spices. Little meat is consumed, and when it is, it is most often included in everyday dishes. The traditional hot drink is coffee, which in modern times is sweetened with sugar. Desserts are also sweet, but consumption is relatively low such that overall sugar intake is low. This traditional Mediterranean diet has been associated with lower incidences of coronary heart disease. It is also thought that this dietary pattern may be protective against cancer.

ASIAN

Although Asian cuisines (including those of India, Sri Lanka, Thailand, Cambodia, Vietnam, China, and Korea) can be very diverse, the traditional Asian diet typically includes rice as its staple cereal and main source of energy. The consumption of vegetables, fruits, and fish varies based upon prosperity. Similar to the Mediterranean diet, herbs and spices are used extensively to flavour food. Tea is the traditional hot drink. Overall, the traditional Asian diet tends to be low in fat and sugar consumption. In addition to lower risks of coronary heart disease, individuals who consume a traditional Asian diet tend to have lower rates of obesity, type 2 diabetes, and some types of cancers.

WESTERN

"Traditional" dietary patterns considered Western are a result of an industrialized food system. The traditional Western diet is energy dense and includes increasingly more and more processed foods. Specifically, the traditional Western diet includes large amounts of meat, milk and milk products, fatty and/or sugary foods (that is, processed meats, pastries, baked goods, confectionery, etc.), and alcoholic drinks. Further, relatively low intakes of vegetables and fruits are common in traditional Western cuisine. As a result, this diet tends to be high in calories, fat, and sugar and low in fibre. Thus, the typical Western diet is associated with overweight and obesity, as well as greater risk for type 2 diabetes, cardiovascular disease, stroke, some cancers, and other chronic diseases.

Source: Adapted from World Cancer Research Fund/American Institute for Cancer Research, 2007, *Food, Nutrition, Physical Activity, and the Prevention of Cancer: A Global Perspective*. Washington DC: AICR.

for various chronic diseases, including heart disease. Elevated concentrations of highly processed sugars also increase risk for other diseases such as tooth decay.

what do you THINK?

Think about your eating habits. Why do you eat the way you do? What/who influences your food choices? How can you change your attitudes and behaviours to eat better?

Hunger: The feeling associated with the physiological need to eat.

Appetite: The desire to eat; often more psychologic than physiological.

Nutrition: The science that investigates the relationship between physiological function and the essential elements of foods we eat.

Nutrients: The constituents of food that sustain us physiologically: water, proteins, carbohydrates, fats, vitamins, and minerals.

Calorie: A unit of measure that indicates the amount of energy obtained from a particular food.

What's Your EQ (Eating Quotient)?

myhealthlab

Keeping up with the latest on what to eat—or not eat—isn't easy. If you think a few facts might have slipped past you, this quiz should help. There's only one correct answer for each question.

1. Fresh fruits and vegetables contain more nutrients than canned or frozen varieties.

   True or False

2. While you are shopping, it makes a difference what area of the store you start in, in terms of keeping your foods safe.

   True or False

3. Fruit drinks count as a serving from the fruit group in the MyPyramid Plan.

   True or False

4. Baked potatoes have a higher glycemic index (carbohydrates' ability to raise blood sugar levels quickly) than sweet potatoes or apples.

   True or False

5. A late dinner is more likely to cause weight gain than eating the same meal earlier in the day.

   True or False

6. Nuts are okay to eat if you are trying to stick to a low-fat diet.

   True or False

7. Certain foods, such as grapefruit, celery, or cabbage soup, can burn fat and make you lose weight.

   True or False

8. Which of the following has the most fibre?
   a. chuck roast
   b. dark-meat chicken with skin
   c. skinless chicken wing
   d. they are all about the same

9. Which of the following is the strongest predictor of obesity in Canada today?
   a. region of the country you live in
   b. ethnicity/culture
   c. lack of exercise
   d. socioeconomic status

10. When you eat a meal, how long does it take for your brain to get the message that you are full?
    a. 10 minutes
    b. 20 minutes
    c. at least an hour
    d. 2 hours or more

11. Which of the following are at the top of the list in bacterial levels among domestically grown vegetables?
    a. green onions, cantaloupe, and cilantro
    b. beets, potatoes, and summer squash
    c. celery, leaf lettuce, and parsley
    d. strawberries, apples, and tomatoes

12. Which of the following foods contains the most grams of fibre per serving?
    a. 1/2 cup of strawberries
    b. 1/2 cup of kidney beans
    c. 1 cup popcorn
    d. 1 medium banana

13. To ensure that you are getting your antioxidants each day, which tip below would be most helpful?
    a. Eat several dark green vegetables and orange, red, and yellow fruits and vegetables.
    b. Eat at least 2 servings of lean red meat per day.
    c. Eat whole-grain foods with at least 2 grams of fibre per serving.
    d. Eat several servings of tuna and salmon per week.

14. Olive oil, one of the heart-healthy monounsaturated fats, is a great source for antioxidants. To reap the most benefits from olive oil, which recommendation should you follow?
    a. Buy it only in amounts that you will use relatively quickly. Nutrients are lost quickly after 12 months sitting on the shelf.
    b. If you buy larger bottles, separate it into smaller bottles and keep the lid on tightly to reduce oxidation from air contact. Refrigerate if possible. Refrigeration causes cloudiness but doesn't affect quality.
    c. Store it in opaque airtight glass bottles or metal tins away from heat and light.
    d. All of the above.

15. Which strategy will help you identify high-fibre breads to maximize your quality carbohydrate intake?
    a. Choose a whole-grain bread that lists a whole grain as the first ingredient.
    b. Try to purchase breads with 1 to 2 grams of fibre per slice.
    c. Look for bread that is dark coloured. The darker it is, the greater the chance that it has lots of good-quality fibre in its recipe.
    d. All of the above.

Answers

1. *False:* There is usually little difference, depending on how produce is handled and how quickly it reaches your supermarket. Canned and frozen produce is typically picked at its peak and may contain more nutrients than fresh produce that was picked overripe or too early, sat in a warehouse, spent days in transit, or sat at improper temperatures for prolonged periods. However, canned or frozen fruits and vegetables may have added salt or sugar, so check labels carefully. Whenever possible, buy local produce fresh from the fields or neighbouring areas.
2. *True:* As a general rule, milk, meat, and other perishables that have been left at room temperature for more than 2 hours have a significant risk of conveying a foodborne illness. Be sure to factor in the time that you spend driving home from the store or running other errands. Start your shopping in the canned and non-refrigerated sections of the store, and save your meat and dairy products and frozen foods until last. Run your other errands before you shop for food, and if you know it will take time to get home, bring a cooler with ice.
3. *False:* Even if fruit juice is an actual ingredient (often it is not), most fruit drinks consist primarily of water and high fructose corn syrup or other sweeteners, colourings, and fruit flavouring. It is always better to eat the whole fruit, because you will get added fibre, more nutrients, and other benefits. Next best are 100 percent fruit juices, preferably with added vitamin C. Lowest on the nutrient quality list are the sweetened, flavoured fruit drinks.
4. *True:* Unfortunately, we'd probably be better off with a sweet potato or apple instead of substituting baked potatoes for fries if we are trying to keep our blood sugar levels down or control diabetes. For more information, check the glycemic index reference books available at most bookstores, or use the handy guide found at www.diabetesnet.com/diabetes_food_diet/glycemic_index.php.
5. *False:* It's not when you eat but what you eat that makes a difference in weight gain. If you ate a 500-calorie salad at 10 PM and it was your only meal, you wouldn't gain weight. However, a 5000 calorie pizza for breakfast, followed by a big lunch and dinner would provide enough total calories to put more than muscle on the hips, buttocks, and waist.
6. *True:* Although they are high in fat, nuts contain mostly unsaturated (good) fat and are good sources of protein, magnesium, and the antioxidants vitamin E and selenium. Moderation is the key.
7. *False:* No foods can burn fat. Some foods with caffeine may speed up your metabolism for a short time, but they do not cause weight loss. One of the best ways to boost your metabolism is to increase your muscle mass through weight training and exercise—not by eating specific foods.
8. *d:* There is no fibre in animal foods. Fibre is found only in plants and plant-based foods such as fruits, beans, whole grains, and vegetables.
9. *d:* Although the other responses are all contributors to obesity, the greatest single predictor of obesity is low socioeconomic status. Although related factors such as education play a role, the poor nutritional quality of foods commonly eaten when people are forced to stretch their food budget—high-fat meats, hot dogs, inexpensive white breads and pastries, and other high-calorie, low-fibre foods—often increases the risk of obesity.
10. *b:* It takes about 20 minutes for your brain to get the message that you are full. To make sure you don't gorge yourself, eat slowly, talk with others, put your fork down after taking a bite, take a drink of water, or do other things to delay your meal. Let your brain catch up to your fork, and slow it down!
11. *a:* The bad news is that in a recent government study of bacterial levels found in domestic produce, green onions, cantaloupe, and cilantro scored the highest in positive tests for two common bacteria: *Salmonella* and *Shigella.* The good news is that out of nearly 1100 samples, only 2 to 3 percent were contaminated, but washing your produce (even the bagged and washed variety) is still a must; run a heavy stream of water over the produce while rubbing the outside under the water.
12. *b:* One-half cup of kidney beans provides 4.5 grams of fibre; the medium banana has 2 grams of fibre; strawberries and popcorn each have 1 gram of fibre per serving.
13. *a:* Antioxidants, particularly vitamins C and E, the mineral selenium, and plant pigments known as carotenoids (which include beta-carotene) are found in green leafy vegetables and orange, yellow, and red vegetables and fruit. Eating several servings of these per day may help avoid risks from selected health problems.
14. *d:* Olive oil does lose nutrients over time, with one year being the general guesstimate of "use by" time. Keeping it in the refrigerator helps prolong shelf life. If the oil smells rancid or if you note mould or other discolouration, discard the bottle.
15. *a:* A true whole-grain bread clearly says so on the label (for example, "100 percent whole wheat" or "100 percent stone-ground whole wheat"). If all the ingredients aren't whole grain, then it's not a true whole-grain bread. The more fibre in each slice, the better; look for a minimum of 3 grams per slice. Colour is not a good indicator of nutrient value. Dyes and colouring may make even the whitest white bread brown.

SCORING

If you answered all of the above correctly, congratulations! You clearly have a good sense of some of the current issues and facts surrounding dietary choices. If you missed one or more questions, read the corresponding section of this chapter to find out more. Don't despair. Nutrition information changes rapidly, and there is a wealth of information available. Check with your instructor for courses you can take to increase your nutritional knowledge. Review the resources that are recommended, and work hard to stay current.

EATING WELL WITH CANADA'S FOOD GUIDE

In July 1942, the Official Food Rules, Canada's first food guide, was introduced.[2] The main objectives of the Official Food Rules were to promote healthy eating, prevent nutritional deficiencies, and improve the health of Canadians while recognizing the impact of wartime food rationing. Although the food guide has been transformed many times, it has never wavered from its original purpose of guiding food selection and promoting the health of Canadians. In addition to new looks and formats, the title of Canada's food guide has changed over time: from Canada's Official Food Rules (1942), to Canada's Food Rules (1944, 1949), to Canada's Food Guide (1961, 1977, 1982), to Canada's Food Guide to Healthy Eating (1992), and now to Eating Well with Canada's Food Guide (2007).

Canada's most recent Food Guide was created because it was important to ensure that it (1) promoted a pattern of eating to meet nutrient needs, (2) promoted health, and (3) minimized the risk of nutrition-related chronic disease. In revising this Food Guide, Health Canada worked closely with three advisory groups; (1) an external group called the Food Guide Advisory Committee, which included 12 individuals representing public health, health policy, nutrition education, disease prevention, industry, and communication; (2) an Interdepartmental Working Group of 13 representatives from several federal departments for which changes to the Food Guide would have an impact; and (3) an Expert Advisory Committee on Dietary Reference Intakes consisting of 11 appointed members.[3] Also part of the process was a stakeholders meeting held in January 2004, followed by a number of meetings throughout the country to update key stakeholders on proposed directions and to seek feedback on the planned approach, tools, and resources available. Finally, a national consultation was launched in Ottawa in November 2005, at which the proposed content and draft design of the new Food Guide were shared, with input sought using an online questionnaire (February to March 2006) and regional meetings in St. John's, Halifax, Montreal, Toronto, Winnipeg, Regina, Calgary, and Vancouver in April 2006.

It takes knowledge, resources, and planning to make healthy food choices, whether eating out, in the dining hall, or cooking meals at home.

The newest version of the Food Guide is intended to help a broader age range of Canadians, since it can be applied to anyone 2 years of age and older. Specifically, the objectives of the new Food Guide are to[4]

- describe a pattern of eating sufficient to meet nutrient needs;
- describe a pattern of eating that reduces risk of nutrition-related health problems;
- describe a pattern of eating that supports the achievement and maintenance of a healthy body weight;
- describe a pattern of eating that reflects the diversity of foods available to Canadians;
- support Canadians' awareness and understanding of what constitutes a pattern of healthy eating; and
- emphasize that healthy eating and regular physical activity are important for health.

Figure 5.1 shows Eating Well with Canada's Food Guide (2007), including recommended sex-specific servings for children, teens, and adults. Examples of one serving from each of the major food groups are also depicted.

The newest version of the Food Guide[5] continues to incorporate a rainbow approach in its presentation. This use of the "rainbow" is consistent with Canada's Physical Activity Guide (see Chapter 4) and visually depicts that we need some foods in amounts greater than others. New to the latest Food Guide are age- and sex-specific recommendations for children, teens, and adults for each of the four food groups (vegetables and fruit, grain products, milk and alternatives, meat and alternatives). Also new to the Food Guide is a specific recommendation to include a small amount of unsaturated fat each day (that is, 30–45 millilitres or 2–3 tablespoons.). The Food Guide continues to advocate for variety, balance, and moderation in your food intake. It is recommended that you eat as many different foods from each food group as possible to obtain variety. Generally, focusing on having lots of "colour" on your plate helps to achieve variety. In

terms of balance, it is recommended that you obtain the minimum number of servings from each food group *before* eating "extras" or "others" (that is, foods that do not fit into a food group, such as chips, soft drinks, chocolate bars, etc.). Finally, moderation refers to total calorie consumption as well as consumption of individual foods. In other words, moderate consumption meets your caloric needs and does not involve excessive consumption, nor does it involve an excessive consumption of one particular food (that is, a whole box of crackers or pint of ice cream). Something else to be remembered is that all foods can be part of healthy eating; some, like "extras" or "others" we simply need to eat less of.

what do you THINK?

Do you use the Food Guide? Why or why not? Examine the current version of the Food Guide (Figure 5.1). Of which food groups are you most likely to eat the recommended amounts? Which ones are you most likely to skimp on? Why? Do you meet the principles of variety, balance, and moderation? What are some simple changes that you could make right now to help you eat better?

THE DIGESTIVE PROCESS

Food provides the chemicals we need for physical activity and body maintenance. Because our bodies cannot synthesize or produce certain essential nutrients, we must get them from the foods we eat. Nutrients are the elements of food that physiologically sustain us, and, as mentioned, these include water, protein, carbohydrates, fats, vitamins, and minerals. Before foods can be utilized, the digestive system must break them down into smaller, more usable forms. The process by which foods are broken down and absorbed or excreted by the body is known as the **digestive process**.

Even before you take your first bite, your body has already begun a series of complex digestive responses. Your mouth prepares for the food by increasing saliva production. **Saliva** contains mostly water, which aids in chewing and swallowing, but it also contains important enzymes that begin the process of food breakdown. One such enzyme, amylase, initiates the digestive process for carbohydrates. From your mouth, food passes down your **esophagus**, a 23- to 25-centimetre tube that connects the mouth to the stomach. A series of contractions and relaxations by the muscles lining your esophagus gently moves food to the next digestive organ, the **stomach**. Here, food mixes with enzymes and stomach acids. Hydrochloric acid works in combination with pepsin, another enzyme, to break down proteins. In most people, the stomach secretes enough mucus to protect the stomach lining from these harsh digestive juices. In others, there are problems with the lining that result in ulcers or other gastric problems.

Further digestive activity takes place in your **small intestine**, an 8-metre-long coiled tube containing three sections: the duodenum, the jejunum, and the ileum. Each section secretes digestive enzymes that, when combined with enzymes from the liver and the pancreas, contributes to the breakdown of proteins, fats, and carbohydrates. Once broken down, these nutrients are absorbed into the bloodstream and supply body cells with energy. The liver is the major organ that determines whether nutrients are stored, sent to cells or organs, or excreted. Solid wastes consisting of fibre, water, and salts are dumped into the large intestine, where most of the water and salts are reabsorbed into the system and the fibre is passed out through the anus. The entire digestive process takes approximately 24 hours (see Figure 5.2).

Dietary Reference Intake vs. Recommended Nutrient Intake

Scientists in Canada and the United States collaborated to develop new, common recommendations for nutrient intake. Canada previously used Recommended Nutrient Intake (RNI) while the United States utilized the Recommended Dietary Allowance (RDA), with slight variations between the two. The new recommendations, called Dietary Reference Intakes (DRIs), are based on the amount of water, proteins, carbohydrates, fats, vitamins, and minerals we need to avoid deficiencies and reduce risk for chronic diseases while attempting to avoid overconsumption.[6] The RDA is now a reference standard within the DRIs and represents the average nutrient

Digestive process: The process by which foods are broken down and absorbed or excreted by the body.

Saliva: Fluid secreted by the salivary glands that contains enzymes that assist in the digestion of some foods.

Esophagus: Tube that transports food from the mouth to the stomach.

Stomach: Large muscular organ that temporarily stores, mixes, and digests foods.

Small intestine: Muscular, coiled digestive organ; consists of the duodenum, jejunum, and ileum.

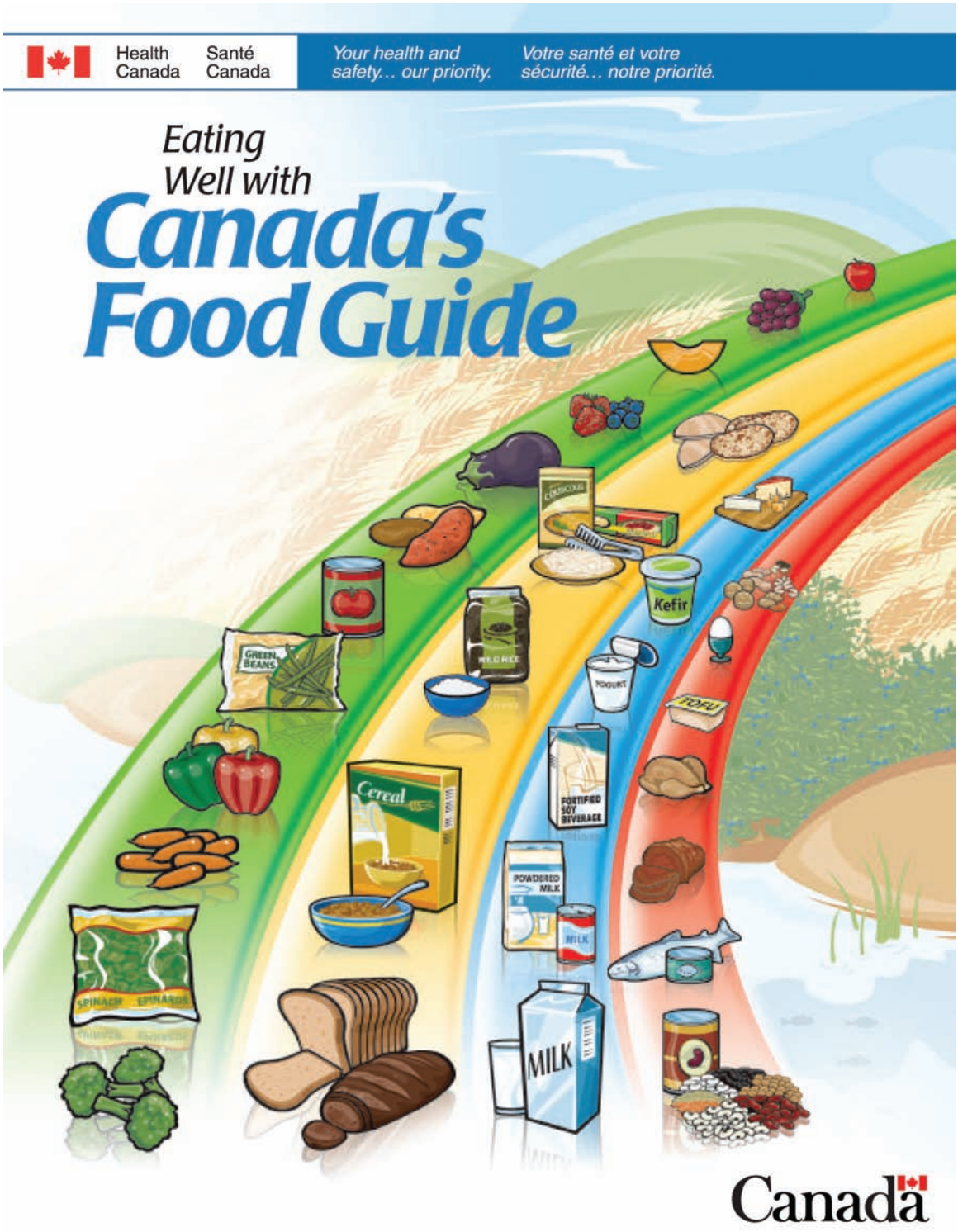


FIGURE 5.1

Eating Well with Canada's Food Guide

Source: Eating Well with Canada's Food Guide, www.hc-sc.gc.ca/fn-an/alt_formats/hpfb-dgpsa/pdf/food-guide-aliment/print_eatwell_bienmang-eng.pdf, Health Canada, 2007. Reproduced with the permission of the Minister of Public Works and Government Services Canada, 2007.

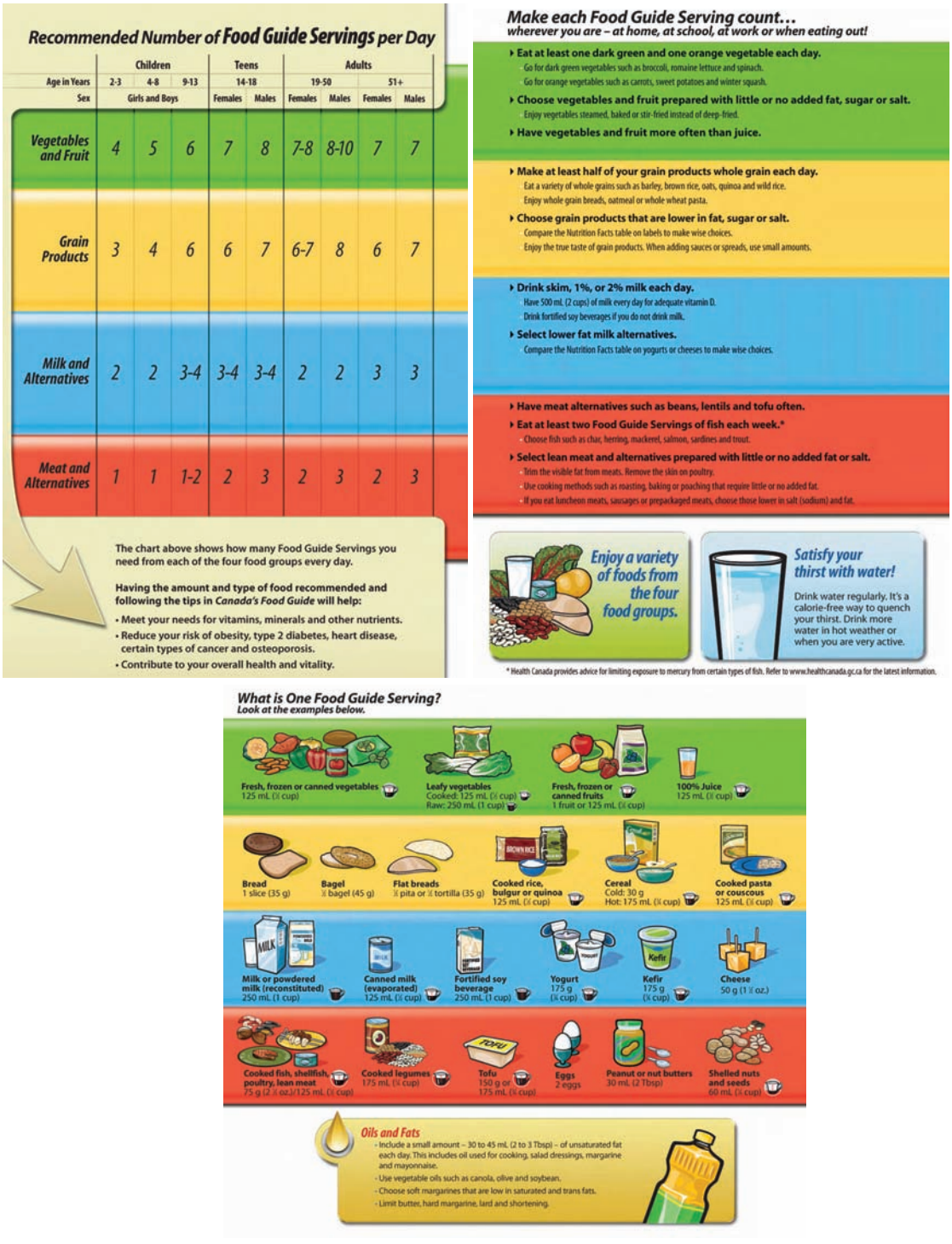


FIGURE 5.1 (continued)
Eating Well with Canada's Food Guide

FOCUS ON CANADA

Vitamin D: Many Canadians May Not Be Getting Enough

A May 25, 2006 news release from the Dietitians of Canada, the national professional association of dietitians, suggested many Canadians may not be getting enough vitamin D.

Why is there concern about vitamin D?

In addition to playing a vital role in bone health for people of all ages, vitamin D may have a positive effect on some types of cancers, in particular colorectal cancer, and other immune-related diseases.

We normally obtain vitamin D in one of two ways: (1) from the sun via UVB radiation absorbed through our skin, and (2) through our dietary intake, most often from fortified cows' milk.

Who is at greatest risk for inadequate vitamin D?

All Canadians–and anyone else who lives above 370° latitude–may be at risk in the winter months when there is insufficient UVB radiation from the sun, partly because of the reduced daylight hours and partly because of the level of the solstice. Other groups particularly at risk include:

- The elderly–because they produce less vitamin D in their bodies as a result of aging. Other contributing factors include an inadequate dietary intake, and limited exposure to the sunlight because the elderly are more likely to be housebound.
- Individuals with dark skin–because the darker one's skin, the lower the production of vitamin D.
- Exclusively breast-fed infants–because the vitamin D content of breast milk is not sufficient.
- Individuals who wear clothing covering the majority of their body when outside–because there is no exposed skin to absorb vitamin D from the sun and its UVB radiation.
- Individuals with low dietary intakes of vitamin D.

Can diet alone provide enough vitamin D?

As mentioned previously, most of the vitamin D obtained via dietary intake comes from fortified cows' milk. Other dietary sources include fatty fish, such as salmon and sardines, infant formulas, meal replacements, and nutritional supplements.

The dietary reference intakes (DRIs), the new dietary standard for Canada and the United States, recommend that adults up to the age of 50 obtain 200 IU each day, those between the ages of 51 and 70 require 400 IU per day, and individuals over the age of 71 need 600 IU per day. Further, the Osteoporosis Society of Canada recommends that adults over the age of 50 and at risk for osteoporosis obtain 800 IU of vitamin D or the equivalent of 750 mL of milk (around three glasses) per day.

Are vitamin D supplements recommended, and if so how much should one take?

Health Canada and the Canadian Paediatric Society currently recommend that exclusively breast-fed infants receive a daily supplement of 400 IU vitamin D per day.

If children and adults are able to have regular, brief, unprotected daily exposure to the sun and follow Eating Well with Canada's Food Guide, they should obtain sufficient vitamin D. However, adults over the age of 50 at risk of osteoporosis may need to supplement. These individuals should consult their physician and have their dietary intake evaluated by a registered dietitian. A blanket recommendation should not be made for everyone.

STUDY QUESTIONS

1. How much vitamin D do you need?
2. Where do you get your vitamin D from?
3. What can you do to ensure an adequate vitamin D intake?
4. Are vitamin D supplements an essential part of healthy living? Why or why not?

Source: Adapted from Dietitians of Canada News Releases, May 25, 2006, "Vitamin D–Many Canadians May Not Be Getting Enough." Retrieved on May 25, 2006, from www.dietitians.ca/news/media.

intake that meets the requirements of 97 to 98 percent of healthy males and females at a particular age.[7] Another term to become familiar with in regard to nutrient consumption is *adequateintake* (AI). AI refers to the recommended average daily nutrient intake based on observed or experimentally determined estimates of nutrient intake for a group of healthy people.

These estimates are used when an RDA cannot be established and are assumed to be adequate.[8]

OBTAINING ESSENTIAL NUTRIENTS

Water

Most of us are aware that we could survive much longer without food than without water. Even in severe conditions, the average person can go for weeks without certain vitamins and minerals before experiencing

While you may not be conscious of your body's need for water, it is actually the most necessary nutrient.

serious deficiency symptoms. However, **dehydration** (abnormal depletion of body fluids) can cause serious health-related issues within hours, and death after a few days.

Just what function does water serve in the body? Between 50 and 60 percent of our total body weight is water. The water in our system bathes cells, aids in fluid and electrolyte balance, maintains pH balance, and transports molecules and cells throughout the body. Water is the major component of blood, which carries oxygen and nutrients to the tissues and is responsible for maintaining cells in working order.

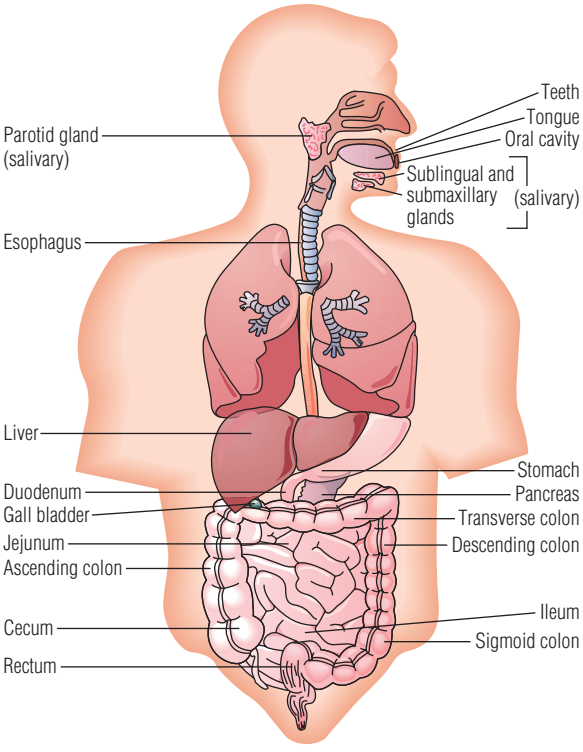


FIGURE 5.2
The Digestive System

How much water do you need? Most experts believe that six to eight glasses of water per day are necessary. Because of high concentrations of water in most foods we consume, the actual number of glasses needed each day is somewhat less than this for the average person. The DRIs are somewhat greater than this recommendation, at approximately 13 cups of beverages for men and nine for women. More specifically, the DRI for men between the ages of 19 and 50 years is 3.7 litres of total water per day (includes 3.0 litres of beverages) while the recommendation for women (ages 19 to 50 years) is 2.7 litres (includes 2.2 litres of beverages). Individual needs vary according to dietary factors, age, size, environmental temperature and humidity levels, physical activity, and the effectiveness of the individual's system. It is not unusual for athletes to lose 1 to 2 litres of fluid per hour in hot, humid weather when exercising. To maintain hydration levels, athletes should weigh themselves before and after their workouts and drink one litre of fluid for every kilogram of weight lost. Thirst is not a good indicator of your need for fluids. In fact, if you wait until you are thirsty to replenish your fluids, you have waited too long. The best method of ensuring that your body is adequately hydrated is to monitor the colour of your urine. If it is a pale yellow, your body is sufficiently hydrated; if it is a darker yellow, your body needs fluids.

Are sports drinks necessary? Not likely as often as they are consumed. Most sport drinks are absorbed as effectively as water, and some are absorbed better than juice. In terms of hydration, it is important to note that people are likely to drink more fluid when it is flavoured. The intent of sport drinks is to replenish electrolytes lost through perspiration. They are also

Dehydration: Abnormal depletion of body fluids.

used to replenish glycogen or energy stores. Thus, when your perspiration is profuse for 60 minutes or longer, a sports drink may be necessary. However, for physical activity of shorter duration or that is not accompanied by heavy sweating, a sports drink is not needed; water can adequately meet your needs.

Recently, interest has been given to milk and its potential to hydrate the body and replenish nutrients.[9] Milk is a liquid that not only hydrates but also is a rich source of carbohydrates for energy as well as a rich source of protein, which is vital for muscle repair. Milk also contains the electrolytes sodium and potassium, which are involved in the body's hydration process—and with which sports drinks are often fortified.

Proteins

Next to water, proteins are the most abundant substances in the human body. **Proteins** are major components of nearly every cell and are often referred to as "building blocks" because of their role in the development and repair of bone, muscle, skin, and blood cells. Proteins are also the key elements of the antibodies that protect us from disease, of enzymes that control chemical activities in the body, and of hormones that regulate bodily functions. Moreover, proteins aid in the transport of iron, oxygen, and nutrients to the body's cells. Finally, proteins are also involved in fluid, electrolyte, and acid–base balance (pH). Normally proteins are not a source of energy, but can be broken down to supply energy if carbohydrates and fat are not available. Proteins provide 4 calories of energy per gram of intake.

Most Canadians consume more protein than needed. In particular, they consume too much protein in the form of meat and high-fat dairy products, which are associated with higher blood cholesterol levels.[10] The recommended protein intake for the average person is 0.8 gram per kilogram of body weight per day, equivalent to about 12 to 20 percent of total energy intake.[11] The excess is stored, like other extra calories, as fat.

Proteins are made up of smaller molecules known as **amino acids**. Amino acids are composed of chains that link together like beads on a necklace in differing combinations. More than 22 different amino acids are found in animal tissue, and humans cannot synthesize all of them. The eight amino acids that the adult body cannot make adequately are referred to as **essential amino acids**. They must be obtained from the foods we eat.

Complete (high-quality) proteins are found in foods that naturally contain the eight essential amino acids together. If we consume a food deficient in an essential amino acid, the total amount of protein that can be synthesized by the other amino acids is limited by the missing amino acid(s). It is important to remember that the fact that essential amino acids are present in a food does not guarantee that they will be synthesized. The quality of protein depends on the presence of amino acids in digestible form and in amounts proportional to body requirements.

The most common sources of dietary protein in Canada are meats, poultry, seafood, dairy products, eggs, soy products, legumes, whole grains, and nuts. In addition to providing high-quality proteins, some of these foods (that is, meats, poultry, high-fat dairy products, and eggs) also contain high levels of saturated fat. Selecting leaner cuts of meat, removing the fat and skin from poultry, and choosing low-fat dairy products enables you to get high-quality proteins with less fat.

What about plant sources of protein? Proteins from plant sources are **incomplete proteins** in that they are missing one or two essential amino acids. It is relatively easy for the non–meat eater to combine plant foods effectively and eat complementary sources of plant protein. An excellent example is eating peanut butter on whole-grain bread. Although separately peanut butter and whole wheat bread are deficient in essential amino acids, eating them together provides high-quality protein because all amino acids are eaten at the same time.

As illustrated in Figure 5.3, plant sources of protein fall into four general categories: legumes (beans, peas, peanuts, and soy products), grains (whole grains, corn, and pasta products), nuts and seeds, and other vegetables, such as leafy greens and broccoli. Mixing two or

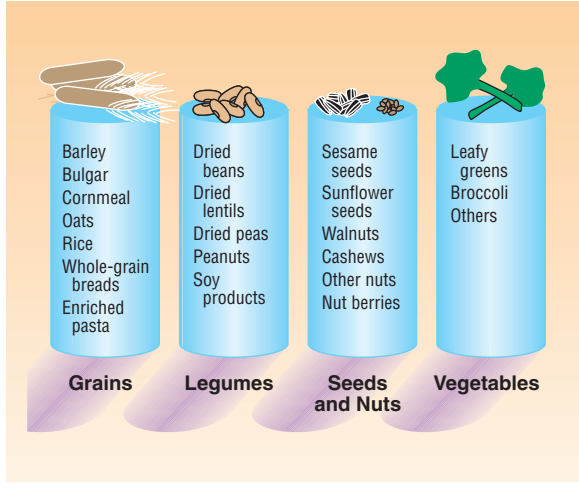


FIGURE 5.3
Complementary Proteins

Source: Adapted by permission from page 205 of *Nutrition Concepts and Controversies,* 6th ed., by Eva Hamilton, Eleanor Whitney, and Frances Sizer. Copyright 1994 by West Publishing Company. All rights reserved.

more foods from each of these categories at the same meal provides all the essential amino acids necessary to ensure adequate protein absorption. People not interested in obtaining all their protein from plants can combine incomplete plant proteins with complete low-fat animal proteins such as poultry, seafood, and lean cuts of pork or beef. Further, low-fat cottage cheese, skim milk, egg whites, and nonfat dry milk provide high-quality proteins, few calories, and little dietary fat.

Carbohydrates

Carbohydrates supply us with the energy (4 calories per gram) needed to sustain normal daily activity. Long maligned by weight-conscious people, carbohydrates are often metabolized more quickly and efficiently than proteins. Carbohydrates are a quick source of energy for the body, easily converted to glucose, a fuel for the body's cells. Carbohydrates are actually the preferred fuel for red blood and nerve cells—including those in the brain.[12] Carbohydrates also play an important role in the functioning of the internal organs, the nervous system, and the muscles. They are the best source of energy for endurance athletes because they provide an immediate and a time-released energy source as they are digested easily and continuously metabolized in the bloodstream.

There are two major types of carbohydrates: **simple carbohydrates**, found primarily in fruits, and **complex carbohydrates**, found mostly in grains, cereals, dark green leafy vegetables, yellow fruits and vegetables (carrots, yams), cruciferous vegetables (such as broccoli, cabbage, and cauliflower), and root vegetables, such as potatoes. Most Canadians do not eat enough complex carbohydrates and, in particular, not enough fibre (this will be discussed in greater detail later).

Canadians typically consume a lot of simple sugars. A high intake of simple sugars is linked to consumption of soft drinks (also high in children and youth). The most common form is glucose. The human body converts all simple sugars to glucose to provide energy to cells. In its natural form, glucose is sweet and obtained from foods such as corn syrup, honey, molasses, vegetables, and fruits. Fructose is another simple sugar found in fruits and berries. Glucose and fructose are classified as **monosaccharides** because they contain only one molecule of sugar.

Disaccharides are combinations of two monosaccharides or two molecules of simple sugar. Perhaps the best-known disaccharide is table sugar (known as sucrose), which is made of fructose and glucose. Lactose, found in milk and milk products, is also a disaccharide, formed by the combination of glucose and galactose. Disaccharides must be broken down into simple sugars before they can be used by the body.

Polysaccharides are complex carbohydrates formed from the combination of long chains of saccharides. Like disaccharides, they must be broken down into simple sugars before they can be utilized by the body.

The World Health Organization (WHO) recommends an intake of free sugars of less than 10 percent of total caloric intake.[13] Free sugars refer to the monosaccharides and disaccharides added to foods by the manufacturer, food preparer, or consumer as well as sugar naturally occurring in honey, syrups, and fruit juices. A limit of free sugars is recommended because they (1) contribute to the overall density of dietary intake, (2) promote a positive energy balance, and (3) reduce appetite control. Of particular interest regarding the last point is the reduced compensatory decrease in food intake that follows the consumption of high-sugar drinks, like soft drinks, compared to when the equivalent number of calories are consumed in food.

There are two major forms of complex carbohydrates: starches and **fibre**. Starches make up the majority of the complex carbohydrates. We obtain dietary starches from flours, breads, pasta, potatoes, and related foods. Starches are stored in the muscles and liver in a polysaccharide form called **glycogen**. When the body requires a sudden burst of energy, it breaks down glycogen into glucose.

Proteins: An essential constituent of nearly all body cells, necessary for the development and repair of bone, muscle, skin, and blood, and key elements of antibodies, enzymes, and hormones.

Amino acids: The building blocks of protein.

Essential amino acids: Eight of the basic nitrogen-containing building blocks of protein.

Complete (high-quality) proteins: Proteins that contain all eight essential amino acids.

Incomplete proteins: Proteins lacking in one or more essential amino acids.

Carbohydrates: Basic nutrients that supply the body with energy (4 kcal/gram).

Simple carbohydrates: Found primarily in fruits; are quickly digested.

Complex carbohydrates: Found in grains, cereals, and vegetables; require more time to be digested.

Monosaccharide: A simple carbohydrate that contains only one molecule of sugar.

Disaccharide: A combination of two monosaccharides.

Polysaccharide: A complex carbohydrate formed by the combination of long chains of saccharides.

Fibre: Refers to the non-digestible part of plants.

Glycogen: The polysaccharide form in which glucose is stored in the liver.

Carbohydrates and Athletic Performance

Many athletes and/or fitness enthusiasts view carbohydrates as their "health foods." Some of these individuals consume concentrated sugary foods or drinks before or during athletic activity, thinking that the sugars will provide extra energy. However, this practice may actually be counterproductive.[14] One possible problem involves the gastrointestinal tract. If your intestines react to physical activity (or the nervousness before competition) by moving material through the small intestine more rapidly than usual, undigested disaccharides or unabsorbed monosaccharides will reach the colon, which can result in an inopportune bout of diarrhea.[15]

In an attempt to improve performance, endurance athletes often attempt to increase stores of glycogen in their body through a process known as carbohydrate loading, glycogen loading, or glycogen supercompensation.[16] Although a variety of strategies— which vary in duration, dietary manipulation, and the amount and intensity of training—can be used to effectively increase muscle glycogen stores, a common process involves modifying these variables, usually a week or so before competition. Athletes train very hard several days before the competition while eating only a small amount of carbohydrates. Then, the day before competition, they dramatically increase their intake of carbohydrates. This depletion and repletion of carbohydrates forces the body to store increased levels of glycogen, which are presumably then used in the later stages of endurance activities (such as the last kilometre or so of a marathon). There are a variety of techniques to carbohydrate load, with most research on its effectiveness done on men. Canadian researcher, Mark Tarnopolsky and associates[17] reported no significant increase in glycogen stores or performance in women, however. This team of researchers suggested that women's lower total energy requirements (compared to men) may limit their ability to carbohydrate load effectively.[18] Further speculation indicates that the menstrual cycle may also play a role. More research is needed on this topic with women.

Carbo-loading before an endurance event is a strategy used by many athletes to build energy reserves for the last few kilometres.

Carbohydrates and Weight Loss

As previously mentioned, carbohydrates have often been given a bad "rap" when it comes to weight control. As a result, many individuals interested in weight loss often reduce the amount of carbohydrates they consume. Examples of low-carbohydrate diets include (but are not limited to) the Atkins Diet, Protein Power, The Zone, and the South Beach Diet. Although it may seem that a low-carbohydrate dietary intake reduces body weight (at least in the short term), the long-term negative health effects have serious implications. See Chapter 6 for more details.

what do you THINK?

Do you eat enough carbohydrates? Do you eat sufficient complex carbohydrates? What easy changes could you make now to eat better?

Fibre

Fibre is often referred to as "bulk" or "roughage." It is the indigestible portion of plant foods that helps move foods through the digestive system and softens stools by absorbing water. Fibre has a number of definitions: dietary, functional, and total.[19] Dietary fibre refers to the nondigestible parts of plants, such as leaves, stems, and seeds. Functional fibre refers to the nondigestible forms of carbohydrates with health benefits that are extracted from plants or manufactured.

Total fibre refers to the combination of dietary and functional fibre. Although the terms *dietary fibre*, *functional fibre*, and *total fibre* provide the most recent scientific definitions and distinctions for fibre, most people prefer to describe it according to its physical properties—that is, solubility.[20] Insoluble fibres are associated with gastrointestinal benefits and reduce the risk for several forms of cancer. Specifically, insoluble fibres attract water by clinging to it, thus facilitating passage of the contents of the large intestine for excretion. The main insoluble fibres are lignin (found in vegetables), cellulose (found in wheat), and hemicellulose (found in cereals and vegetables).[21] Soluble fibres absorb water and swell to form gels that trap nutrients such as glucose and slow their absorption in the blood. Food then stays longer in the small intestine, providing a feeling of "fullness," which may assist in the regulation of blood sugars and weight control. Sources of soluble fibre include oat bran, oatmeal, barley, and legumes, as well as naturally occurring pectins in some fruits (apples, bananas, grapefruits, oranges, and strawberries).

The best way to increase your intake of dietary fibre is to eat more complex carbohydrates, such as whole grains, fruits, vegetables, dried peas and beans, nuts, and seeds. A few years ago, fibre was thought to be the remedy for just about everything. Current research supports its function in the following:[22]

- protection against colorectal cancer
- protection against breast cancer
- protection against constipation
- protection against diverticulosis
- protection against heart disease
- protection against diabetes
- enhanced weight control

The AI for fibre is 25 grams per day for women and 38 grams per day for men—or an amount equivalent to 14 grams of fibre for every 1000 calories consumed.[23] Most Canadians do not eat sufficient fibre; thus, to increase your dietary intake of fibre, the following steps are recommended:

- Select breads and cereals made with whole grains such as wheat, oats, barley, and rye.
- Choose foods with at least 2 to 3 grams of fibre per serving.
- Choose fresh fruits and vegetables whenever possible. When appropriate, eat the peel or skin of fresh fruits and vegetables (potatoes, pears, apples, mangoes, and kiwi fruit).
- Eat legumes frequently—every day, if possible.
- Drink plenty of fluids.

Fats

Fats (or lipids), another basic nutrient, are perhaps the most misunderstood of the body's required energy sources. Most of us do not realize that fat is a source of essential fatty acids (omega-3 and omega-6) and plays a vital role in the maintenance of healthy skin and hair, insulation of the body organs against shock, maintenance of body temperature, and the proper functioning of the cells themselves. Fats help our food taste better, provide texture to food, and carry the fat-soluble vitamins A, D, E, and K to the cells. They also provide a concentrated form of energy at 9 calories per gram. If fats perform all these functions, why are we frequently reminded to reduce our intake?

Although a moderate consumption of fats is essential to health, overconsumption can be dangerous. The most common form of fat circulating in the blood is the **triglyceride**, which makes up about 95 percent of total body fat. When we consume too many calories, the excess is converted into triglycerides in the liver, which are stored in obvious places on our bodies. The remaining five percent of body fat is composed of substances such as **cholesterol**, which can accumulate on the inner walls of arteries, causing a narrowing of the channel through which blood flows. This buildup, "plaque," is a major cause of arteriosclerosis (discussed in detail in Chapter 11).

Fat cells consist of chains of carbon and hydrogen atoms. Those not able to hold any more hydrogen in their chemical structure are labelled **saturated fats**. These generally come from animal sources, such as meats and dairy products, and are solid at room temperature. **Unsaturated fats**, which come from plants and most vegetable oils, are generally liquid at room temperature and have room for additional hydrogen atoms in their chemical structure. The terms *monounsaturated fat* and *polyunsaturated fat* refer to the relative number of hydrogen atoms missing. Peanut and olive oils are high in monounsaturated fats, whereas corn, sunflower, and safflower oils are high in polyunsaturated fats.

Fats: Basic nutrients that provide taste and texture to food, absorb vitamins A, D, E, and K, and are needed for the proper functioning of cells, insulation of body organs against shock, maintenance of body temperature, and healthy skin and hair.

Triglyceride: The most common form of fat in the body.

Cholesterol: A form of fat circulating in the blood that can accumulate on the inner walls of arteries.

Saturated fats: Fats that are unable to hold any more hydrogen in their chemical structure; derived mostly from animal sources; solid at room temperature.

Unsaturated fats: Fats that have room for more hydrogen in their chemical structure; derived mostly from plants; liquid at room temperature.

Reducing Fat in Your Daily Dietary Intake

The small choices you make daily add up to make a tremendous difference in the amount of fat you eat over time. Trimming just 5 mL (1 tsp.) of fat each day can cut more than 2 kg from your dietary intake in one year—without removing great-tasting foods or causing noticeable changes. Consider the following:

1. "Butter" your toast, muffins, or bagels with "fruit-only" jams instead of butter, margarine, cream cheese, or other high-fat spreads.
   - 15 mL butter or margarine — 108 calories — 12 g fat
   - 15 mL sugarless jam — 8 calories — 0 g fat
   - Savings — 90 calories — 12 g fat
2. Sauté or stir fry meat and vegetables in chicken broth or wine (most of which burns off during cooking) rather than oil.
   - 15 mL oil — 240 calories — 27 g fat
   - wine or broth — 0 calories — 0 g fat
   - Savings — 240 calories — 27 g fat
3. Remove the skin from chicken before cooking.
   - 100 g breast — 193 calories — 8 g fat
   - 100 g skinless breast — 142 calories — 3 g fat
   - Savings — 51 calories — 5 g fat
4. Use low-fat or no-fat salad dressings on your sandwiches and salads.
   - 15 mL mayonnaise — 100 calories — 11 g fat
   - 15 mL low-fat dressing — 7 calories — 0 g fat
   - Savings — 93 calories — 11 g fat
5. Choose nonfat frozen yogurt instead of ice cream.
   - 125 mL ice cream — 400 calories — 25 g fat
   - 125 mL nonfat yogurt — 120 calories — 0 g fat
   - Savings — 280 calories — 25 g fat
6. Mix in a blender three parts low-fat cottage cheese with one part nonfat yogurt and use as a delicious dip, spread, or topping.
   - 30 mL cream cheese — 99 calories — 10 g fat
   - 30 mL mock cream cheese — 20 calories — 0 g fat
   - Savings — 79 calories — 10 g fat
7. Eat broth-based rather than cream-based soups.
   - 250 mL cream of chicken soup — 191 calories — 15 g fat
   - 250 mL chicken noodle soup — 75 calories — 2 g fat
   - Savings — 116 calories — 13 g fat
8. Eat seafood at least twice per week.
   - 85 g top round beef — 162 calories — 5 g fat
   - 100 g skinless chicken breast — 142 calories — 3 g fat
   - 85 g cod — 70 calories — 0.5 g fat
   - Savings — 164 calories — 7.0 g fat
9. Substitute two egg whites for one whole egg in recipes or omelettes.
   - 1 whole egg — 79 calories — 6 g fat
   - 2 egg whites — 32 calories — 0 g fat
   - Savings — 47 calories — 6 g fat
10. Choose meatless entrées such as lentil soup or vegetarian chili.
    - 270 g beef chili — 256 calories — 6 g fat
    - 270 g lentil soup — 164 calories — 1 g fat
    - Savings — 92 calories — 5 g fat

GENERAL ADVICE

Read food labels carefully and select products that contain no more than 3 grams of fat for every 100 calories,

List the small changes that you can make this week to reduce fat from your dietary intake:

1.
2.
3.
4.
5.

What other things can you do to help reduce your overall fat consumption?

Source: Adapted by permission of the author from Evelyn Tribole, "24 Ways to Trim Fat," *Shape,* July 1990, 92–93.

Healthier fats contain polyunsaturated and monounsaturated fatty acids (found in vegetable oils—canola, soybean, olive—soft non-hydrogenated margarines, nuts, seeds, avocados, olives, and fatty fish;[24] it is recommended that we include approximately 45 millilitres (2–3 tablespoons) in our daily dietary intake of these fats).[25] Part of our fat intake should include omega-3 and omega-6, which are polyunsaturated fatty acids. Canadians typically ingest sufficient omega-6 fats in the form of polyunsaturated margarines and sunflower, corn, and sesame oil. However, our intake of omega-3 fatty acids tends to be low. As such, we need to increase our intake of fish, flaxseed, walnuts, canola, and soybean oil.[26]

Another group of fats we need to be aware of are **trans fatty acids** or trans fat. Trans fats are fatty acids produced by adding hydrogen molecules to liquid oil to make the oil solid. Unlike regular fats and oils, these "partially hydrogenated" fats stay solid or semisolid at room temperature. They change into irregular shapes at the molecular level, priming them to clog arteries. Trans fats are used in margarines, commercially baked goods, and many restaurant deep fryers. Trans fats are more harmful than saturated fats because they increase LDL levels and decrease HDL levels in the bloodstream. In other words, they increase our "bad" cholesterol and decrease our "good" cholesterol.[27] Canada was the first country in the world to include trans fat on food labels: starting in December 2005 all prepackaged food sold in Canada had to include the trans fat content. In regard to food labelling, "trans fat free" or "0 trans fat" can be used only if the stated serving amount contains less than 0.2 grams of trans fat or if the total amount of saturated and trans fat in a stated serving is 2 grams or less.[28]

Reducing Fat in Your Diet

Finding the best ways to reduce fat in your dietary intake is largely dependent on your determining what does and does not work for you and your lifestyle. The following basic guidelines are a place to start:

- Know what you are putting in your mouth. Read food labels. No more than 10 percent of your total calories should come from saturated and/or trans fat, and no more than 30 percent should come from all forms of fat combined.
- Choose fat-free or low-fat versions of foods whenever possible.
- Use olive oil for baking, stir frying, and sautéing.
- Whenever possible, use liquid, diet, or whipped margarine: these forms have far less trans fat than solid fat.
- Choose lean meats, seafood, or poultry. Remove skin and visible fat. Broil or bake whenever possible. In general, the more well-done the meat, the fewer the calories from fat. Drain fat after cooking.
- Limit intake of cold cuts, bacon, sausage, hot dogs, and organ meats.
- Select nonfat or low-fat dairy products whenever possible.
- When cooking, substitute chicken broth, wine, vinegar, low-fat/no-fat dressings and low-fat/no-fat sour cream for butter, margarine, oils, regular fat sour cream, mayonnaise, and salad dressings.
- Remember to think of your food intake as an average over a day or several days. If you have a high-fat breakfast or lunch, have a low-fat dinner to balance it out.

For more specific ways to reduce fat in your dietary intake, see the Skills for Behaviour Change box.

Vitamins

Although they do not provide energy (that is, calories), **vitamins** are potent, essential, organic compounds that promote growth and help maintain life and health. Every minute of every day, vitamins help maintain your nerves and skin, produce blood cells, build bones and teeth, heal wounds, and convert food energy to body energy.

Age, heat, and other environmental conditions can destroy vitamins in food. Vitamins are classified as either fat-soluble, meaning that they are absorbed through the intestinal tract with the help of fats, or water-soluble, meaning that they are easily dissolved in water. Vitamins A, D, E, and K are fat-soluble; B-complex vitamins and vitamin C are water-soluble. Fat-soluble vitamins tend to be stored in the body, and toxicity can occur if too much is consumed. Water-soluble vitamins are generally excreted and cause few toxicity problems. Table 5.1 provides a list of vitamins, the recommended dietary intake, best sources, and major functions in the body, as well as the symptoms of deficiency and toxicity.

Despite all media suggestions to the contrary, few Canadians suffer from vitamin deficiencies if they consume the recommended number of servings from each of the food groups most days of the week.

Nevertheless, Canadians continue to purchase and consume large quantities of vitamin supplements. For the most part, vitamin supplements are unnecessary and in certain instances may even be harmful. See also the Health in the Media box.

what do you THINK?

Of all of the nutrients discussed in this chapter, which one do you worry most about not getting enough of? Why? Are there any nutrients you consume too much of? What actions do you plan to make sure your daily dietary intake is adequate?

Trans-fatty acids: Fatty acids produced when polyunsaturated oils are hydrogenated to make them more solid.

Vitamins: Essential organic compounds that promote growth and reproduction and maintain life and health.

TABLE 5.1

A Guide to Vitamins

Vitamin	Best Sources	Chief Functions in the Body	Deficiency Symptoms	Toxicity Symptoms
Water-Soluble Vitamins				
Vitamin B1 (thiamine) 1.5 mg (RDA & RDI)	Meat, pork, liver, fish, poultry, whole-grain and enriched breads, cereals, pasta, nuts, legumes, wheat germ, oats	Helps carbohydrate convert to energy; supports normal appetite and nervous system function	Beriberi, edema, heart irregularity, mental confusion, muscle weakness, low morale, impaired growth	Rapid pulse, weakness, headaches, insomnia, irritability
Vitamin B2 (riboflavin) 1.7 mg (RDA & RDI)	Milk, dark green vegetables, yogurt, cottage cheese, liver, meat, whole-grain or enriched breads and cereals	Helps carbohydrates, fat, and protein convert to energy; promotes healthy skin and normal vision	Eye problems, skin disorders around nose and mouth	None reported, but an excess of any of the B vitamins can cause a deficiency of the others
Niacin 20 mg NE (RDA & RDI)	Meat, eggs, poultry, fish, milk, whole-grain and enriched breads and cereals, nuts, legumes, peanuts, nutritional yeast, all protein foods	Helps convert nutrients to energy; promotes health of skin, nerves, and digestive system	Pellagra: skin rash on parts exposed to sun, loss of appetite, dizziness, weakness, irritability, fatigue, mental confusion, indigestion	Flushing, nausea, headaches, cramps, ulcer irritation, heartburn, abnormal liver function, low blood pressure
Vitamin B6 (pyridoxine) 2.0 mg (RDA & RDI)	Meat, poultry, fish, shellfish, legumes, whole-grain products, green leafy vegetables, bananas	Protein and fat metabolism; formation of antibodies and red blood cells; helps convert tryptophan to niacin	Nervous disorders, skin rash, muscle weakness, anemia, convulsions, kidney stones	Depression, fatigue, irritability, headaches, numbness, damage to nerves, difficulty walking
Folate 400 μg (DFE & RDA)	Green leafy vegetables, liver, legumes, seeds	Red blood cell formation; protein metabolism; new cell division; prevents neural tube birth defects	Anemia, heartburn, diarrhea, smooth tongue, depression, poor growth	Diarrhea, insomnia, irritability, may mask a vitamin B12 deficiency
Vitamin B12 (cobalamin) 2.4 mg (RDA)	Meat, fish, poultry, shellfish, milk, cheese, eggs, nutritional yeast	Maintenance of nerve cells; red blood cell formation; synthesis of genetic material	Anemia, smooth tongue, fatigue, nerve degeneration progressing to paralysis	None reported
Pantothenic acid 5–7 mg (AI)	Widespread in foods	Coenzyme in energy metabolism	Rare; sleep disturbances, nausea, fatigue	Occasional diarrhea
Biotin 30 μg (AI)	Widespread in foods	Coenzyme in energy metabolism; fat synthesis; glycogen formation	Loss of appetite, nausea, depression, muscle pain, weakness, fatigue, rash	None reported
Vitamin C (ascorbic acid) 60 mg (RDI & RDA)	Citrus fruits, cabbage-type vegetables, tomatoes, potatoes, dark green vegetables, peppers, lettuce, cantaloupe, strawberries	Heals wounds, maintains bones and teeth, strengthens blood vessels; antioxidant; strengthens resistance to infection; aids iron absorption	Scurvy, anemia, depression, frequent infections, bleeding gums, loosened teeth, muscle degeneration, rough skin, bone fragility, poor wound healing	Nausea, abdominal cramps, diarrhea, breakdown of red blood cells in persons with certain genetic disorders; deficiency symptoms may appear at first on withdrawal of high doses

TABLE 5.1 (Continued)
A Guide to Vitamins

Vitamin	Best Sources	Chief Functions in the Body	Deficiency Symptoms	Toxicity Symptoms
Fat-Soluble Vitamins				
Vitamin A 5000 IU	Fortified milk and margarine, cream, cheese, butter, eggs, liver, spinach, and other dark leafy greens, broccoli, deep orange fruits and vegetables (carrots, sweet potatoes, peaches)	Vision; growth and repair of body tissues; reproduction; bone and tooth formation; immunity; cancer protection; hormone synthesis	Night blindness, rough skin, susceptibility to infection, impaired bone growth, vision problems	Nosebleeds, abdominal cramps, nausea, diarrhea, weight loss, blurred vision, irritability, bone pain, rashes, cessation of menstruation, growth retardation
Vitamin D 400–600 IU (RDA & RDI)	Self-synthesis with sunlight; fortified milk, fortified margarine, eggs, liver, fish	Calcium and phosphorus metabolism (bone and tooth formation); aids body's absorption of calcium	Rickets in children; osteomalacia in adults; abnormal growth, joint pain, soft bones	Raised blood calcium, constipation, weight loss, irritability, weakness, nausea, kidney stones, mental and physical retardation
Vitamin E 30 IU (RDA & RDI)	Vegetable oils, green leafy vegetables, wheat germ, whole-grain products, butter, liver, egg yolk, milk fat, nuts, seeds	Protects red blood cells; antioxidant; stabilization of cell membranes	Muscle wasting, weakness, red blood cell breakage, anemia, hemorrhaging, fibrocystic breast disease	Interference with anticlotting medication, general discomfort
Vitamin K 70–140 μg	Liver, green leafy and cabbage-type vegetables; milk	Bacterial synthesis in digestive tract; synthesis of blood-clotting proteins and a blood protein that regulates blood calcium	Hemorrhaging	Interference with anticlotting medication; may cause jaundice

Source: From J. Thompson and M. Manore, *Nutrition: An Applied Approach*. Copyright © 2005. Reprinted by permission of Pearson Education, Inc.

Minerals

Minerals are the inorganic, indestructible elements that aid physiological processes in the body. Without minerals, vitamins could not be absorbed. Minerals are readily excreted and usually not toxic. Macrominerals are minerals that the body needs in fairly large amounts: sodium, calcium, phosphorus, magnesium, potassium, sulphur, and chloride. Trace minerals include iron, zinc, manganese, copper, iodine, and cobalt, so-called because only trace amounts of these minerals are needed. Serious problems may result if excesses or deficiencies occur. Specific types of minerals, the recommended dietary intake, best sources, and their major functions in the body, as well as symptoms of deficiency and toxicity are listed in Table 5.2. Although minerals are necessary for body function, there are limits on how much of them we should consume.

Sodium

Sodium is necessary for the regulation of blood and body fluids, for the transmission of nerve impulses, for heart activity, for muscle contraction, and for other metabolic functions. Sodium also enhances flavour, balances the bitterness of some foods, acts as a preservative, and tenderizes meat. Although vital to our survival—and to the good taste of food—we tend to consume much more sodium than we need. The AI for sodium is 1500 mg per day for the average adult,[29] yet the average Canadian consumes at least 12 times this amount. The most common source of sodium for Canadians is table salt (that is, sodium chloride, which is about 40 percent sodium and 60 percent chloride by weight).[30] The remainder of dietary sodium comes from the water we drink and highly processed foods such as pickles, salty snack foods, processed cheeses, many breads and bakery products, smoked meats and sausages, many fast-food entrées, and soft drinks.

Many experts believe there is a link between excessive sodium intake and hypertension (high blood pressure). As a result, many organizations recommend

Minerals: Inorganic, indestructible elements that aid physiological processes.

TABLE 5.2

A Guide to Minerals

Mineral	Significant Sources	Chief Functions in the Body	Deficiency Symptoms	Toxicity Symptoms
Calcium AI: 1000 mg/day (men and women aged 19 to 50); 1200 mg/day (men and women over 50)	Milk and milk products, small fish (with bones), tofu, greens, legumes	Principal mineral of bones and teeth; involved in muscle contraction and relaxation, nerve function, blood clotting, blood pressure	Stunted growth in children; bone loss (osteoporosis) in adults	Excess calcium is excreted except in hormonal imbalance states
Phosphorus RDA = 700 mg/day	All animal tissues	Part of every cell; involved in acid-base balance	Unknown	Can create relative deficiency of calcium
Magnesium RDA = 400 mg/day (men); 310 mg/day (women)	Nuts, legumes, whole grains, dark green vegetables, seafood, chocolate, cocoa	Involved in bone mineralization, protein synthesis, enzyme action, normal muscular contraction, nerve transmission	Weakness, confusion, depressed pancreatic hormone secretion, growth failure, behavioural disturbances, muscle spasms	Pharmacological overuse can cause nausea, cramps, dehydration
Sodium AI: 1.5 g/day	Salt, soy sauce; processed foods; cured, canned, and pickled foods	Helps maintain normal fluid and acid-base balance	Muscle cramps, mental apathy, loss of appetite	Hypertension (in salt-sensitive persons)
Chloride AI: 2.3 g/day	Salt, soy sauce; processed foods	Part of stomach acid, necessary for proper digestion, fluid balance	Growth failure in children, muscle cramps, mental apathy, loss of appetite	Normally harmless (different from poisonous chlorine gas); disturbed acid-base balance; vomiting
Potassium AI: 4.7 g/day	All whole foods: meats, milk, fruits, vegetables, grains, legumes	Facilitates many reactions including protein synthesis, fluid balance, nerve transmission, and contraction of muscles	Muscle weakness, paralysis, confusion; can cause death, accompanies dehydration	Causes muscular weakness; triggers vomiting; if given into a vein, can stop the heart
Iodine RDA = 150 μg	Iodized salt, seafood	Part of thyroxine, which regulates metabolism	Goitre, cretinism	Very high intakes depress thyroid activity
Iron RDA = 8 mg/day (men; women over 51); 18 mg/day (women aged 19 to 50)	Beef, fish, poultry, shellfish, eggs, legumes, dried fruits	Hemoglobin formation; part of myoglobin; energy use	Anemia: weakness, pallor, headaches, reduced resistance to infection, inability to concentrate	Nausea, vomiting, dizziness, damage to organs, death
Zinc RDA = 11 mg/day (men); 8 mg/day (women)	Protein-containing foods: meats, fish, poultry, grains, vegetables	Part of many enzymes; present in insulin; involved in making genetic material and proteins, immunity, vitamin A transport, taste, wound healing, sperm creation, normal fetal development	Growth failure in children, delayed development of sexual organs, loss of taste, poor wound healing	Fever, nausea, vomiting, diarrhea
Fluoride AI: 3 to 4 mg/day	Drinking water (if naturally fluoride-containing or fluoridated), tea, seafood	Formation of bones and teeth; helps make teeth resistant to decay and bones resistant to mineral loss	Susceptibility to tooth decay and bone loss	Fluorosis (discolouration of teeth)
Selenium RDA = 55 μg	Seafood, meats, grains	Helps protect body compounds from oxidation	Impaired immune function, depression, muscle pain	Vomiting, nausea, rash, brittle hair and nails

Source: From J. Thompson and M. Manore, *Nutrition: An Applied Approach*. Copyright © 2005. Reprinted by permission of Pearson Education, Inc.

The Continuing Debate on the Benefits and Risks of Supplemental Vitamins and Minerals

In August 2008, Dietitians of Canada released a report on the benefits and risks of vitamin and mineral supplements.

Given the controversial media attention given to nutritional intake, it is often difficult for consumers to decide what is good or not good for them. Specific to vitamin and mineral supplementation, the difficulty in understanding their importance and relationship to health increased with a flurry of media attention paid to the issue in April 2008. Three articles all surfaced around the same time:

1. A Cochrane review (a database that compiles and reviews large numbers of existing research studies) of the use of antioxidants,
2. the Maclean's cover story titled "Vitamins Are Hazardous to Your Health", and
3. a news item that appeared on internet health sites regarding a Harvard newsletter story titled "No One Needs to Take a Multivitamin".

What is a safe dose of vitamins and minerals and is supplementation–general and specific–recommended? Canadian researchers Whiting and Adolphe considered these questions in their recent report published by Dietitians of Canada.

When the DRIs were set, the benefits of vitamins and minerals beyond preventing deficiency diseases were not clearly established. Thus, Whiting and Adolphe conducted a review of recent research to clarify the risks and benefits of high supplemental doses of vitamins and minerals. These authors concluded that both too little and too much of a single nutrient can potentially cause harm. Further, it is important to take into account an individual's dietary habits and lifestyle when making decisions about the appropriateness of recommending vitamin and/or mineral supplements. It was also suggested as a Dietitian Practice Point that "until further research confirms a benefit of high intakes, it is best to keep intake from supplements within the boundaries set by the RDA/AI and the UL. However, risks and benefits of vitamin and mineral intakes with respect to chronic disease risk reduction should be communicated to clients."

Readers may be interested to learn more about Canada's Natural Health Products and their Regulations at: www.hc-sc.gc.ca/dhp-mps/prodnatur/about-apropos/index-eng.php.

Source: Adapted from S.J. Whiting and J. Adolphe. "The Continuing Debate on the Benefits and Risks of Supplemental Vitamins and Minerals." *Current Issues: The Inside Story* August (2008). Retrieved on September 11, 2008 from www.dietitians.ca/news/media/asp.

that Canadians cut back on sodium consumption to reduce their risk for cardiovascular diseases, debilitating bone fractures, and other health problems.[31]

what do you THINK?

Do you use salt frequently? Pay attention to how often you use a salt shaker over the next few days. Do you "salt" your food prior to tasting? Why? Can you get by without salting your food? Have you tried salt-free herbs and spices? Why or why not?

Calcium

The issue of calcium consumption has gained national attention with the rising incidence of osteoporosis (see Chapter 16) among the elderly, particularly among older women. Although calcium plays a vital role in building strong bones and teeth, contracting muscles, clotting blood, transmitting nerve impulses, regulating heartbeat, and balancing fluid within cells, most adult Canadians between ages 19 and 50 do not consume the recommended 1000 milligrams of calcium per day, with particularly inadequate intakes in older

try it NOW!

Shake your salt habit! Did you know that the average Canadian consumes 1150 mg per 1000 calories eaten (or 2900 mg for 2500 calories)?[32] Extra salt can be found in almost everything from cereal to snack foods. Take simple steps today to reduce your overall sodium intake: read food labels and choose products labelled as low sodium (containing fewer than 500 mg per serving) or sodium/salt-free. Order your popcorn without salt, and, when dining out, ask the chef to cook with low-sodium products. Switch to kosher salt, it contains 25 percent less sodium than regular table salt. Instead of adding salt to food you prepare, use fresh or dried herbs for seasonings. Train yourself to taste the natural flavours of food. Once you reduce your sodium intake, you will taste the difference the next time you eat a sodium-laden product. Check out the following website for more information: www.sodium101.ca/

Canadians (>50 years), who are advised to consume 1200 milligrams of calcium per day.[33] Another reason to ensure adequate calcium intake relates to obesity prevention. Recent research suggests a positive relationship between calcium intake and healthy weight maintenance (or in other words, people who do not consume sufficient calcium are more likely to be overweight or obese).[34] Of equal importance is to evaluate the trend toward choosing soft drinks instead of milk. Soft drinks not only contain a high percentage of free sugars but also do not provide the necessary nutrients found in milk.

Increasing Your Dietary Calcium Intake

Because calcium intake is so important throughout your life, it is critical that you consume the minimum required each day. More than half our calcium intake usually comes from milk, one of the best sources of dietary calcium. Although many green, leafy vegetables are sources of calcium, some contain oxalic acid, which makes their calcium harder to absorb. Spinach, chard, and beet greens are not particularly valuable sources of calcium, whereas broccoli, cauliflower, and many peas and beans (pinto beans and soybeans) are a source of calcium. Many nuts, particularly almonds, Brazil nuts, and hazelnuts, and seeds such as sunflower and sesame contain calcium as well. Molasses is a source of calcium, as are canned salmon (if you eat the bones) and sardines. Some fruits—such as citrus, figs, raisins, and dried apricots—have moderate amounts.

Of interest to those who drink carbonated soft drinks is that the added phosphoric acid (phosphate) in these drinks can cause you to excrete calcium. Calcium and phosphorus imbalances may lead to kidney stones and other calcification problems, as well as to increased arteriosclerotic plaque.[35]

Vitamin D improves absorption of calcium; thus, exposure to sunlight is like having an extra calcium source. (See also the Focus on Canada box earlier in this chapter.) Stress, on the other hand, contributes to calcium depletion. Although calcium supplements are available, the best way to meet your needs is to consume calcium as part of a balanced, varied dietary intake throughout the day in foods containing protein, vitamin D, and vitamin C for optimum absorption.

Iron

Iron deficiency is the most common nutrient deficiency worldwide, affecting more than 2 billion people or about one third of the population. Although less prevalent an issue in Canada, it is still the most common nutrient deficiency. Females aged 19 to 50 require 18 milligrams of iron per day, and males aged 19 to 50 about 8 milligrams per day.[36] After the age of 50 (postmenopausal for women), men and women each require about 8 milligrams of iron per day.[37] Pregnant women require 27 milligrams of iron per day.[38] Iron deficiencies can lead to **anemia**, a problem resulting from the body's inability to produce hemoglobin, the bright red, oxygen-carrying component of the blood. When this occurs, body cells receive less oxygen, and carbon dioxide wastes are removed less efficiently, resulting in a person feeling tired and run down. Another problem with iron deficiency is that the immune system becomes less effective, which can lead to increased risk of illness. A less common problem, iron toxicity, is caused by too much iron in the blood. Women are more likely than men to suffer from iron deficiency problems, partly because they typically eat less than men and because of blood loss from menstrual flows.

Sex Differences in Nutritional Needs

Men and women differ in body size, body composition, and overall metabolic rates. These differences result in distinctive requirements for most nutrients throughout the life cycle and mean that men and women face unique challenges in meeting their dietary goals. Some of these differences have already been discussed. However, there are some dietary factors that need further consideration. One factor is that women have a lower ratio of lean body mass to adipose (fatty) tissue at all ages, particularly after puberty. Also, after puberty, metabolism is higher in men, meaning that they require more calories than women to do the same things.

Different Cycles, Different Needs

Women also have many more "landmark" times in their lives when their nutritional needs vary significantly. From menarche to menopause, women undergo cyclical physiological changes that can have dramatic effects on metabolism, nutrition needs, and efforts to maintain a nutrition plan. For example, during pregnancy and lactation, nutrition requirements increase substantially for women. Those unable to follow the dietary recommendations may gain more weight during pregnancy and retain it afterward. During the menstrual cycle, many women report significant food cravings that result in overeating. At menopause, nutrition needs change again rather dramatically. With the hormone estrogen reduced, the body needs more calcium to combat losses in bone mineral density.

Eating Too Much Meat!

Although men do not have the same cyclical patterns and dietary needs as women, they often have dietary excesses or habits resistant to change. Consider the following:

- Men who eat red meat as a main dish five or more times a week are four times more at risk of colorectal cancer than men who eat red meat less than once a month.
- Heavy-red-meat-eaters are more than twice as likely to get prostate cancer and nearly five times as likely to get colorectal cancer.
- For every three servings of vegetables or fruits consumed per day, men can expect a 22 percent lower risk of stroke.
- High vegetable and fruit dietary intakes may lower the risk of lung cancer in smokers, from 20 times the risk of nonsmokers to "only" 10 times the risk. They may also protect against oral, throat, pancreas, and bladder cancers, all of which are more common in smokers.
- While obesity seems to be a factor in cancer of the esophagus, an increasingly common malignancy among men, consumption of vegetables and fruits can help protect against it.

Meals like this vegetable and tofu stir-fry provide a vegan with essential vitamins, minerals, and protein. Adding a whole grain, such as brown rice or whole wheat bread/rolls would further enhance this meal by making use of complementary plant proteins.

what do you THINK?

Think about women you know who have difficulty maintaining their weight. What are their ages? What factors may influence them to have more (or less) difficulty than you have? What advantages, if any, do men have in managing their eating behaviours and their weight? How can you help these men and women in their efforts to maintain their weight?

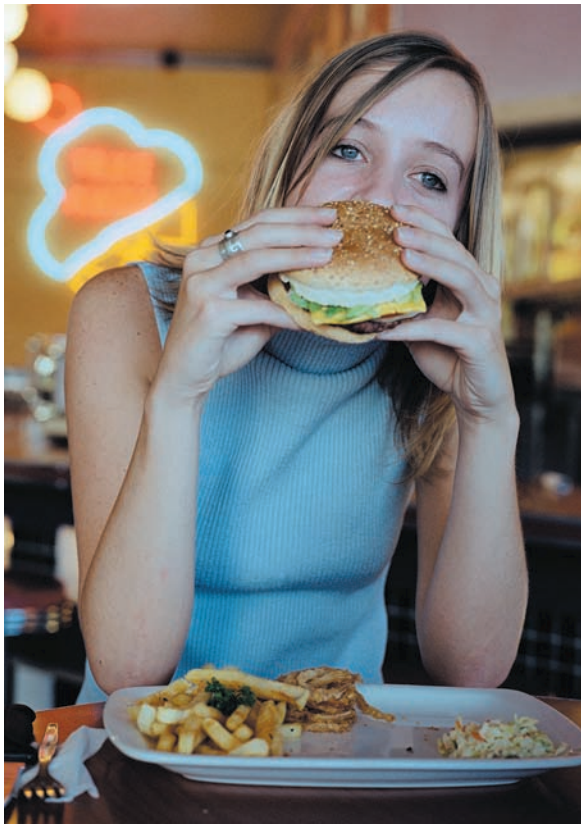
VEGETARIANISM

For a variety of reasons, some people choose not to eat meat; approximately 4 percent of Canadians are identified as **vegetarian**.[39] Vegetarianism can provide a positive alternative to the typical high-fat, high-calorie, meat-based cuisine of most Canadians. However, without knowledge and careful food selection, vegetarians can have several dietary problems.

The term *vegetarian* means different things to different people. Strict vegetarians, or vegans, avoid all foods of animal origin, including dairy products and eggs. The people who fall into this category must carefully plan their dietary intake to ensure they obtain the necessary nutrients. Far more common are people who are lacto-vegetarians. These people eat dairy products but avoid flesh foods; as a result, their diet is often low in fat and cholesterol, but only if they consume skim milk and other low-fat or nonfat dairy products. Ovo-vegetarians add eggs to their diet, while lacto-ovo-vegetarians eat dairy products and eggs. Pesco-vegetarians eat seafood, dairy products, and eggs, while semi-vegetarians eat poultry, seafood, dairy products, and eggs. Some people in the semi-vegetarian category prefer to call themselves non–red meat eaters.

Anemia: Iron-deficiency disease that results from the body's inability to produce hemoglobin.

Vegetarian: A term with a variety of meanings: vegans avoid all foods of animal origin; lacto-vegetarians avoid flesh foods and eat dairy products; ovo-vegetarians avoid flesh foods and eat eggs; lacto-ovo-vegetarians avoid flesh foods and eat dairy products and eggs; pesco-vegetarians avoid meat but eat seafood, dairy products, and eggs; semi-vegetarians eat chicken, seafood, dairy products, and eggs.



Maintaining a healthy dietary intake can be a challenge for post-secondary students, particularly with fast-food chains on most campuses.

Generally, people who follow a vegetarian diet weigh less, have better cholesterol levels, fewer problems with irregular bowel movements (constipation and diarrhea), and a lower risk of heart disease than nonvegetarians. Preliminary evidence suggests that vegetarians may also have a reduced risk for colorectal and breast cancer. Whether these lower risks are due to the vegetarian diet per se or to a combination of lifestyle variables remains unclear.

The modern vegetarian is usually adept at combining the right types of foods to ensure proper nutrient intake. People who eat dairy products and small amounts of poultry or seafood are seldom nutrient-deficient; in fact, while vegans typically get 50 to 60 grams of protein per day, lacto-ovo-vegetarians normally consume between 70 and 90 grams per day, well beyond the DRIs. Vegan diets may be deficient in vitamins B2 (riboflavin), B12, and D. See Table 5.1 for "best sources" of these vitamins. Vegans are also at risk for calcium, iron, zinc, and other mineral deficiencies, but these nutrients can be obtained from supplements. Strict vegans have to pay much more attention to what they eat than the average person, but by eating complementary combinations of plant products (as shown previously in Figure 5.3) they can obtain an adequate amount of essential amino acids.

what do you THINK?

Have you ever considered becoming or are you currently a vegetarian? What would be (or is) your reason for making this choice? Do you find it difficult to select vegetarian foods in restaurants or other eating places on your campus? What actions can you take to obtain more vegetarian choices?

EATING WELL AS A STUDENT

Post-secondary students face unique challenges when trying to maintain a healthy dietary intake. Some students live in residence and eat at university or college food services where food choices may be limited. Further, most students who live in residences do not have their own—or have limited—cooking or refrigeration equipment. Others live in crowded apartments where roommates forage in the refrigerator for everyone else's food. Most students also have time constraints that make buying and preparing food a difficult task. In addition, many lack the financial resources needed to buy some of the foods that their parents purchased while they lived at home. What's a student to do? We offer suggestions that may help to make healthy eating the easier and more frequent choice.

Fast Foods: Eating on the Run

Most campuses include an array of fast-food options that fit students' desires for a quick bite of food at a relatively reasonable price. Most of us know that many fast foods are high in fat and sodium—so is it possible to eat well and consume them? Yes. Not all fast foods are created equal and not all of them are "bad" for you. Keep in mind, as well, that all foods can be part of a healthy dietary intake; some simply in lesser quantities and less often than others. Many fast-food places offer "healthy eating" options for the discriminating consumer. The key word is *discriminating*. It is possible to eat well at fast-food chains if you follow the suggestions

Tips for Choosing Fast Foods Wisely

While some restaurants offer hints for health-conscious diners, you are on your own most of the time. To help you order wisely, this box includes lower-fat options and high-fat pitfalls. "Best" options contain fewer than 30 grams of fat. "Worst" options have up to 100 grams of fat. Keep in mind the portions often served; adjust your daily intake accordingly.

FAST FOOD

Best Grilled chicken sandwich; roast beef sandwich; single hamburger; salad with light vinaigrette

Worst Bacon burger; double cheeseburger; french fries; onion rings

Tips Order sandwiches without mayo or special sauce. Limit deep-fried items like fish fillets, chicken nuggets, and french fries.

ITALIAN

Best Pasta with red or white clam sauce; spaghetti with marinara or tomato-and-meat sauce

Worst Eggplant parmigiana; fettuccine alfredo; fried calamari; lasagna

Tips Stick with plain bread instead of garlic bread made with butter or oil. Ask for the server's help in avoiding cream- or egg-based sauces. Try vegetarian pizza—without extra cheese.

MEXICAN

Best Bean burrito (no cheese); chicken fajitas

Worst Beef chimichanga; chile relleno; quesadilla; refried beans

Tips Choose soft tortillas (not fried) with fresh salsa, not guacamole. Special-order grilled shrimp, fish, or chicken. Ask for beans made without lard or fat and for cheeses and sour cream provided on the side. Ask for low-fat or no-fat varieties.

CHINESE

Best Hot-and-sour soup; stir-fried vegetables; shrimp with garlic sauce; Szechuan shrimp; wonton soup

Worst Crispy chicken; kung pao chicken; moo shu pork; sweet-and-sour pork

Tips Share a stir-fry; help yourself to steamed rice. Ask for vegetables steamed or stirfried with less oil. Order moo shu vegetables instead of pork. Limit fried rice, breaded dishes, egg rolls, spring rolls, and items loaded with nuts. Limit high-sodium sauces.

JAPANESE

Best Steamed rice and vegetables; tofu as a substitute for meat; broiled or steamed chicken and fish

Worst Fried rice dishes; miso (very high in sodium); tempura

Tips Limit soy sauces. Use caution in eating sashimi and sushi (raw fish) dishes to reduce risk of bacteria or parasites.

THAI

Best Clear broth soups; stir-fried chicken and vegetables; grilled meats

Worst Coconut milk; peanut sauces; deep-fried dishes

Tips Limit coconut-based curries. Ask for steamed, not fried, rice.

BREAKFAST

Best Hot or cold cereal with 1 percent or skim milk; pancakes or French toast with syrup; scrambled eggs with whole wheat toast

Worst Belgian waffle with sausage; sausage and eggs with biscuits and gravy; ham-and-cheese omelette with hash browns and toast

Tips Ask for whole-grain cereal or shredded wheat with 1 percent or skim milk or whole wheat toast without butter or margarine. Order omelettes without cheese, and fried eggs without bacon or sausage.

SANDWICHES

Best Ham and Swiss cheese; roast beef; turkey; vegetarian

WorsT Tuna salad; Reuben; salami, pepperoni

Tips Ask for mustard; hold the mayo, cheese, and salt. See if turkey-ham is available, and load up on the veggies.

SEAFOOD

Best Broiled bass, halibut, or snapper; grilled scallops; steamed crab or lobster

Worst Fried fish, fried seafood platter; blackened catfish

Tips Order fish broiled, baked, grilled, or steamed—not pan-fried, sautéed, or breaded and deep fried. Ask for fresh lemon instead of tartar sauce. Limit creamy and buttery sauces.

Sources: American Dietetic Association, 2002, www.eatright.org; *Health* 10 (November/December 1996): 79.

below and those found in the Skills for Behaviour Change box:

- Ask for nutritional analyses of items on the menu.
- Order it "your way"—limit mayonnaise or sauces and other add-ons. Some places have fat-free or reduced fat mayonnaise, so ask.
- Order single, small burgers. Put on your own ketchup in moderation.
- Order salads, and use the dressing with moderation. Try vinegar and oil or low-fat/no-fat alternative dressings. Limit high-fat add-ons such as bacon bits, croutons, and parmesan cheese.
- Check to see what type of oil is used to cook fries if you have them. Avoid lard-based or other saturated-fat products.
- Order whole-wheat buns and bread and ask them to hold/reduce the butter or margarine.
- Limit fried foods in general, including hot apple pies and other crust-based fried foods.
- Choose broiled rather than fried.
- Choose low-fat skim milk or water instead of soft drinks.

When Funds Are Short

Balancing the need for adequate nutrition with the many other activities that are part of college or university life can become a difficult task. However, if you take the time to plan a healthy dietary intake, you may find that you are eating better, enjoying eating more, and saving money. Understanding the terminology used by the food industry may also help you eat more healthily. The Building Communication Skills box reviews some of these pertinent terms. Figure 5.4 shows an example of a Nutrition Facts label.

In addition, you can take these steps to help ensure a quality diet:

- Do not shop when hungry; hunger influences the quantity and quality of what you buy.
- Buy fruits and vegetables in season for lower cost and higher nutrient quality. Out-of-season, flash-frozen varieties are available at a reasonable price and are a high-nutrient-quality choice, if you have the capacity to store frozen foods.
- Check out the flyers before shopping. Use coupons and specials for price reductions.
- Shop whenever possible at discount warehouse food chains; capitalize on volume discounts and no-frills products.
- Plan ahead to get the most for your dollar and limit extra trips to the store. Make a menu and grocery list and then stick to it.
- Purchase meats and other products in volume, freezing portions for future needs (again if you have the capacity to do so). Or purchase small amounts of meats and other expensive proteins and combine them with beans and plant proteins for reduced total cost, calories, and fat.
- Cook large meals and freeze smaller portions for later use, if you have the capacity to do so.
- If you find that you have no/limited money for food, check with the local food bank or social service department. Assistance may also be available on your campus.

Healthy Eating in Residence

Some university or college food services have responded positively to new guidelines for low-fat,

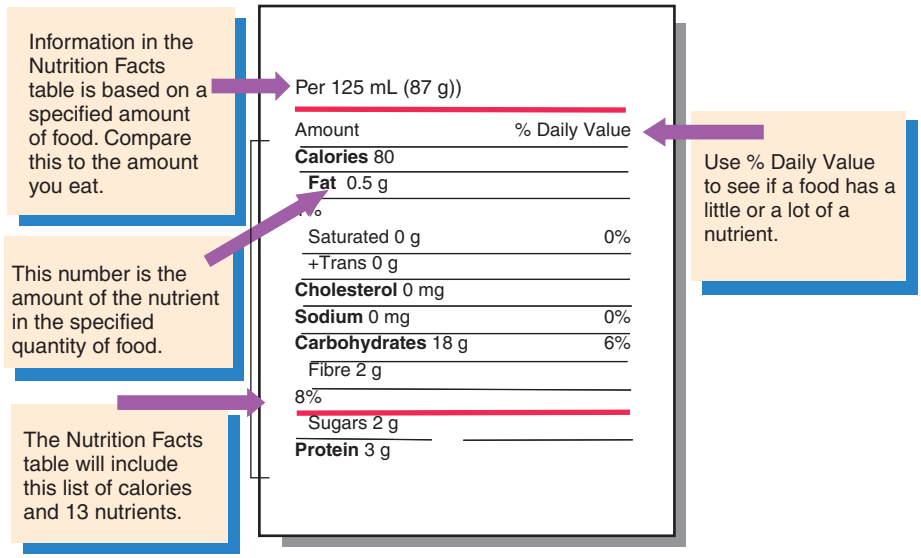


FIGURE 5.4
The Nutrition Facts Label

Source: "Nutrition Labelling," Health Canada website, Health Canada, 2003. Reproduced with the permission of the Minister of Public Works and Government Services Canada, 2003.

Understanding Nutrition and Health Claims

Nutritional labelling regulations became mandatory for packaged foods distributed from larger businesses on December 12, 2005 and for smaller businesses on December 12, 2007. These regulations require pre-packaged food labels to carry a Nutrition Facts table that lists calories and 13 key nutrients in a specified amount of food (that is, a usual serving). The regulations were introduced in 2003, with many food distributors adapting their food labels to meet the regulations prior to the mandatory dates.

In addition to the labelling regulations, Health Canada updated the requirements of more than 40 nutrient content claims and decided to allow only certain health claims (re: the diet–health relationships) on food labels or in advertisements. It is up to the manufacturer whether to include a nutrition content or diet–health claim on the label or in the advertisement of the food. Often the claims are made–and done so attractively–because they positively influence consumers purchasing habits.

EXAMPLES OF NUTRIENT CONTENT CLAIMS:

Source of fibre–the food must contain at least 2 grams of dietary fibre in the amount of food specified as a serving in the Nutrition Facts table.

Low fat–the food contains no more than 3 grams of fat in the amount of food specified as a serving in the Nutrition Facts table.

Trans fat free – the food contains less than 0.2 grams of trans fat in the amount of food specified or the total amount of saturated and trans fat add up to 2 grams or less per specified serving in the Nutrition Facts table.

Cholesterol-free–the food has a negligible amount of cholesterol (less than 2 mg) in the amount of food specified as a serving in the Nutrition Facts table. The food must also be low in saturated and trans fat.

Sodium-free–the food contains less than 5 mg of sodium in the amount of food specified as a serving in the Nutrition Facts table.

Reduced in calories–the food has at least 25 percent fewer calories than the food it is compared to.

Light–in regard to the nutritional characteristics of a product, "light" is allowed on foods reduced in fat or reduced in calories. "Light" may also be used to describe sensory characteristics associated with a particular food–so long as that characteristic is clearly identified with the claim (for example, light tasting, light coloured).

WHAT DO THE WORDS IN NUTRIENT CONTENT CLAIMS MEAN?

Free–none or hardly any

Low–a small amount

Reduced–at least 25 percent less than in a similar product

Light–allowed only on labels reduced in fat or reduced in calories. If used in reference to the characteristic of the food, the characteristic must accompany the claim.

Source–contains a useful amount

High or good source–contains a high amount

Very high or excellent source–contains a very high amount

WHAT ARE HEALTH CLAIMS?

Only the following diet–health claims can be made:

1. A healthy diet low in saturated and trans fat may reduce the risk of heart disease.
2. A healthy diet with adequate calcium and vitamin D, and regular physical activity, helps to achieve strong bones and may reduce the risk of osteoporosis.
3. A healthy diet rich in a variety of vegetables and fruit may help reduce the risk of some types of cancer.
4. 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.

Source: Adapted from Health Canada: Food and Nutrition, "Interactive Nutrition Label: Get the Facts," retrieved on May 25, 2006, from www.hc-sc.gc.ca and S. Conrad"s. "Current Perspectives on Understanding Fat," retrieved on September 11, 2008 from www.cfcn.ca/in_action/fact_sheets.asp.

high-carbohydrate eating. Many offer vegetarian entrées, choices among broiled, baked, or fried foods, skim and other reduced-fat milks, nonfat yogurts, and full-service salad and pasta bars. Unfortunately, others have not changed and offer only limited choices for students, providing a limited selection of foods with primarily high- and higher-fat choices. If you find that your institution provides health-conscious food services, the guidelines and tips provided throughout this chapter should be helpful (see also Table 5.3). If not, the following are some actions you might take to help them change their food offerings and cooking practices:

- Ask if anyone has ever done a nutrient analysis of menu items at the food service or residence. If they have, find out what happened to the information obtained. If not, find out what you can do to get one done. Your student health service, health class, nutrition department, or local hospital may be a good resource.

TABLE 5.3

Eating Well in the Dining Hall

Choose lean meats, grilled chicken, seafood, or vegetable dishes. Limit fried chicken, fatty cuts of red meat, and dishes smothered in creamy or oily sauce.
Hit the salad bar and load up on leafy greens, beans, tuna, or tofu. Choose items such as avocado or nuts for a little "good" fat, and go easy on the dressing.
Get creative: Choose items such as a baked potato with salsa, or add a grilled chicken breast to your salad. Toast some bread, and top it with veggies, hummus, or grilled chicken or tuna.
When choosing foods from a made-to-order food station, ask the preparer to hold the butter or oil, mayonnaise, sour cream, or cheese or cream-based sauce. Ask for extra servings of veggies and lean meats.
Limit going back for seconds and consuming large portions. Many colleges and universities limit the number of visits you make each day to the dining hall; do not view this as a reason to overeat.
If there is something you would like but you do not see it in your dining hall, or you are vegetarian and feel like your food options are limited, speak to your food services manager and provide suggestions.
Limit high-calorie, low-nutrient rich foods such as sugary cereals, soft-serve ice cream, waffles, and other sweet treats. Choose fruit or low-fat yogurt to satisfy your sweet tooth.

- Once you've identified the nutrient content of these meals, take your findings to the food service provider so that changes can be made. If action does not result, contact your student newspaper and the student government to find someone willing to push for food service reform.
- If you are dissatisfied with cafeteria foods, make your complaints known in writing to the director of student services or the food service administrator. Be sure to include practical recommendations for improvements.
- Find out what is being done on other campuses in your province and throughout the country. Competition among universities and colleges often goes beyond the sports field. You may spur someone to action.
- Use the suggestion box provided in the cafeteria. If there isn't one, try to get one.
- Be positive in your approach. More support is gained by providing suggestions for change than by simply criticizing current practice.

what do you THINK?

What causes you the most difficulty when you try to eat better? Are these problems in your family, too, or are they unique to your current situation as a student? What actions can you take that would help improve your current eating attitudes and behaviours?

FOOD SAFETY CONCERNS

Food-Borne Illness

Most of us have experienced the characteristic symptoms of diarrhea, nausea, cramping, and vomiting that prompted us to say, "It must be something I ate." The number of cases of food poisoning in Canada has been growing (there are 10 000 reported cases per year; for every reported case, there are many more unreported cases). Symptoms of food-borne illness vary according to the type of organism and the amount of contaminant eaten. These symptoms may appear as early as a half hour after eating, or take several days or weeks to develop. In most people, they come on five to eight hours after eating and last only a day or two. In others, such as the very old, the very young, and those with a compromised immune system, food-borne illness can be life-threatening.

Several factors may be contributing to the increase in food-borne illnesses. One factor is the move away from a traditional meat-and-potato dietary intake to "heart-healthy" eating—increased consumption of fruits, vegetables, and grains—because it has spurred demand for fresh foods not in season most of the year.[40] This results in greater imports of fresh vegetables and fruits, thus putting ourselves at risk for ingesting exotic pathogens. Although we are told when we travel to developing countries to "boil it, peel it, or don't eat it," we bring these foods into our kitchens and eat them, often without washing them.[41] Food can also become contaminated by being watered with contaminated water, fertilized with "organic" fertilizers (animal

Learning to shop carefully for fresh, high-quality foods can help ensure that your food is safe and help you to attain nutritional health.

manure), or not subjected to the same rigorous pesticide regulations as Canadian-raised produce. To give you an idea of the implications, studies have shown that *Escherichia coli* (a lethal bacterial pathogen) can survive in cow manure for up to 70 days and multiply in foods grown with manure unless heat or additives such as salt or preservatives are used to kill them.[42] There are essentially no regulations that prohibit farmers from using animal manure to fertilize crops.

Other key factors associated with the increasing spread of food-borne diseases include inadvertent introduction of pathogens into new geographic regions and insufficient education about food safety.[43]

Part of the responsibility for preventing food-borne illness lies with consumers: more than 30 percent of such illnesses result from unsafe handling of food at home. The following are actions you can take to minimize your risk:[44]

- When shopping, pick up your packaged and canned foods first and frozen foods and perishables such as dairy products, meat, poultry, and seafood at the end.
- Check for cleanliness and food safety at the salad bar, meat, and seafood counters. Cooked shrimp, crab, or lobster lying on the same bed of ice as raw seafood can become contaminated.
- When shopping for seafood, buy from markets that get their supplies from approved sources.
- Most fresh meat, seafood, and poultry should be kept in the refrigerator no more than one or two days. Check the shelf life of all products before buying.
- Leftovers should be eaten within three days.
- Use a thermometer to ensure that meats are completely cooked. Beef and lamb steaks and roasts should be cooked to at least 63°C, ground meat, pork chops, ribs, and egg dishes to 71°C, chicken and poultry breasts to 77°C, and chicken and turkey legs, thighs, and whole birds to 82°C.
- Fish is done when the thickest part becomes opaque and the fish flakes easily.
- Cooked food should never be left standing on the stove or table for more than two hours. Keep hot foods hot and cold foods cold.
- Never thaw frozen foods at room temperature. Put in the refrigerator for a day to thaw, or thaw in cold water, changing the water every 30 minutes.
- Wash your hands with soap and water before, during, and after food preparations, particularly after handling meat, seafood, or poultry. Wash the countertop and all utensils thoroughly and with a bacteria-killing cleanser before using them for other foods.
- When freezing raw foods, in particular meat, make sure juices cannot spill into ice cubes or other areas of the refrigerator.
- When packing lunch for school, ensure appropriate temperatures are maintained.

Food Additives

Additives are substances added to food to reduce the risk of food-borne illness, prevent spoilage, and enhance the look and taste. Additives can also enhance the nutrient value; for example, the fortification of milk with Vitamin D and of grain products with folate. Although Health Canada regulates additives according to effectiveness, safety and ability to detect them in foods, questions are often raised about their safety—in particular because some additives

interact with medications. Generally, the fewer the chemicals, colorants, and preservatives, the better.

Examples of common additives include

- antimicrobial agents: substances such as salt, sugar, nitrites, and others that tend to make foods less hospitable for microbes
- antioxidants: substances that preserve colour and flavour by reducing loss due to oxygen exposure. Vitamins C and E as well as the additives BHA and HHT are common antioxidants.
- artificial colours, nutrient additions, and flavour enhancers such as MSG (monosodium glutamate)
- sulfites: used to preserve vegetable colour
- dioxins: found in coffee filters, milk containers, and frozen foods
- methylene chloride: found in decaffeinated coffee
- hormones: bovine growth hormone found in animal meat and milk

Food Allergies

Up to 8 percent of children, and a smaller proportion of adults, are allergic to at least one food. True **food allergies** occur when the body overreacts to normally harmless proteins, perceiving them as allergens. The body then produces antibodies that activate immune cells known as histamines, triggering a variety of allergic symptoms. Such allergic reactions vary tremendously and range from a case of hives or a body rash to swelling of certain body parts (especially the lips), to pain, itchiness, diarrhea, nausea, or vomiting. In more severe cases, irregularities in breathing and heartbeat are experienced, along with blood pressure fluctuations, shock, and, if untreated, death. Symptoms may occur within minutes or over a two- to three-hour period.

The most common culprits are soybeans, legumes (including peanuts), nuts, shellfish, eggs, wheat, and milk. People are often allergic to a whole family of foods; this is called "cross-reactivity." Unlike many other allergies, food allergies do not appear to be inherited. Individuals breast-fed as infants seem to have fewer food allergies. If you think you have a food allergy, get tested by a trained allergist.

Some common reactions to food that may imitate allergies but do not involve the immune system are listed below.[45]

- **Food intolerance** occurs in people who lack certain digestive enzymes and suffer adverse effects when they consume substances they are intolerant to. One of the most common examples is lactose intolerance, experienced by people without the digestive enzymes needed to digest the lactose in milk.
- Reactions to food additives, such as sulphites and MSG.
- Reactions to substances occurring naturally in some foods, such as tyramine in cheese, phenylethylamine in chocolate, caffeine in coffee, and some compounds in alcohol.
- Unknown reactions in people who have adverse symptoms that they attribute to foods and that may actually go away when treated as allergies but for which there is no physiological basis.

Organic Foods

Due to mounting concerns about food safety, many people refuse to buy processed foods and mass-produced agricultural products. Instead, they purchase foods **organically grown**—foods reported to be pesticide- and chemical-free. Not that long ago, buying organic foods meant going to a specialty store and paying premium prices for produce that was likely wilted, wormy, and smaller than its nonorganic alternative. Further, there was no guarantee that these products were really grown in an organic environment. People who bought these foods did so out of the desire to eat healthier produce and to avoid potentially harmful chemicals, and to support the environment.

Enter the organics of the twenty-first century—larger, more attractive, and fresher looking but still often carrying a heavier price tag. Another difficulty is in ensuring that what you buy as organic does not have "second-hand" pesticides or chemicals on it. Currently, Canadian farms can be certified as organic so long as they do not use chemicals themselves regardless of the chemicals used on neighbouring farms.

Is buying organic really better for you? Perhaps if we could put a group of people in a pristine environment and ensure that they never ate, drank, or were exposed to chemicals, we could test this hypothesis. In real life, however, it is almost impossible to assess the health impact of organic versus non-organic produce. Nevertheless, the market for organic products continues to increase each year, particularly as people's concern for the environment increases. In addition to purchasing organically grown produce, people are interested in purchasing locally grown produce—produce that does not have to travel a great distance to get to them—which is an environmentally sound approach as well.

Food allergies: Overreaction by the body to normally harmless proteins perceived as allergens. In response, the body produces antibodies, triggering allergic symptoms.

Food intolerance: Adverse effects resulting when people who lack the digestive chemicals needed to break down certain substances eat those substances.

Organically grown: Foods grown without pesticides or chemicals.

Managing Your Nutrition

Let's face it, eating well is not easy. It takes knowledge, careful thought and analysis, and the ability to put it all together to make the best decisions for your lifestyle and personal goals within your budgetary limits. By focusing on the issue, reading, seeking help from reputable, trained professionals, and planning ahead, you can improve your nutrition health. The following recommendations may also help.

MAKING DECISIONS FOR YOU

1. List the four biggest improvements to your current dietary intake you want to make. Be specific.
2. Prioritize the items in the above list. Determine when you want to accomplish each item and outline a plan of action for accomplishing each goal.
3. List the little actions that you can take that may make a difference in your overall plan. List the big changes that you can make to accomplish your overall goals.
4. On the basis of your past history of trying to change these behaviours, what techniques do you think may most likely work for you? Indicate what you will use from these past attempts and what you will do differently.

CHECKLIST FOR CHANGE: MAKING PERSONAL CHOICES

- *Eat lower on the food chain.* Try to substitute vegetables, fruits, nuts, or grains for animal products at least once a day.
- *Eat seasonal foods whenever possible.* By eating foods at the peak of harvest, you are most apt to avoid nutrient losses incurred by storage, freezing, canning, and so on—and are likely to obtain a lower-cost option.
- *Eat lean.* The evidence against high-fat foods mounts daily. Pay attention to labels, assess your food intake, and balance high-fat with low-fat choices. Choose leaner cuts of meat and bake, grill, boil, or broil whenever possible.
- *Eat more colour.* Generally, the more vibrant the colours in the vegetable or fruit, the more nutrients available. In particular, eat more dark greens and oranges. Try a new vegetable or fruit each week.
- *Increase your consumption of vegetables and fruits.* Use the real thing instead of juices and get more for your money.
- *Practise responsible consumer safety.* Avoid unnecessary chemicals and buy, prepare, and store foods prudently to avoid food-borne illness.
- *Eat in moderation.* Learn to separate true hunger feelings from the food cravings that come from boredom. Recognize when your body is signalling that it is getting full, and stop eating. Moderate your caloric consumption and reduce your consumption of sugars and other dietary "extras."
- *Keep your systems functioning well.* Even the best plans are doomed to fail if life problems are dragging your systems down, particularly your digestive system.
- *Balance your dietary intake.* Consume appropriate amounts of water, proteins, carbohydrates, fats, vitamins, and minerals.
- *Pay attention to changing nutrient needs.* Various factors in your life, such as pregnancy or illness, may require adjustments to your nutrition intake. Prepare for these changes and remain informed about reputable sources of information concerning nutrient benefits and risks.

CHECKLIST FOR CHANGE: MAKING COMMUNITY CHOICES

- Evaluate the types of eating establishments available on your campus. If you don't have the options you think you should, take action. Involve your student newspaper and student organizations, talk with food service representatives, involve your student health service, and solicit the support of key campus representatives.
- Assess your elected officials' priorities regarding nutrition as it pertains to the elderly, pregnant women, and the homeless. Are they supporting actions to ensure adequate nutrition for high-risk groups? If not, why not? Write letters asking for clarification of their positions. Seek alternative candidates if these individuals do not represent your views.
- If you patronize certain food establishments, review the food options. Tell them when they are doing a good job and request other options when they are not.
- Find out about government-subsidized foods. Who is eligible for these programs? What is their purpose? What are their limitations? Strengths? Be informed about these programs. Support or refute them on the basis of sound information rather than on emotional reactions.
- Be informed about key nutritional concepts. Speak up when you see information that is false or misleading. Demand accuracy in reported claims. Give advice only when you have taken the time to read and study the issues. Read reliable nutrition sources. When in doubt, seek help from professors or experts in the community.

CRITICAL THINKING

You and your best friend chose to move into an apartment off campus this year and you have decided to make your meals together. You were raised on meals where meat was the focal point; your best friend/roommate is a lacto-ovo vegetarian. Using the DECIDE model described in Chapter 1, decide how you two will come up with a menu that works for you both.

myhealthlab Go to MyHealthLab at **www.pearsoned.ca/myhealthlab.** here, you will find self-assessments, case studies, links to health on the net, and much more.

DISCUSSION QUESTIONS

1. What factors influence the dietary patterns, attitudes, and behaviours of the typical university or college student? Which of these factors has the greatest influence on your eating attitudes and behaviours? Why is it important that you know about your dietary influences as you think about changing your eating patterns, attitudes, and behaviours?
2. What are the four food groups in Eating Well with Canada's Food Guide? How many servings do you need of each? What groups might you find it difficult to get enough servings from? What food group do you get too many servings from? What can you do to increase or decrease your intake of selected food groups? How can you remember the four food groups?
3. What other recommendations are made in Eating Well with Canada's Food Guide (other than servings from each food group)? Are these recommendations difficult to follow, particularly as a university or college student? Why or why not?
4. What are the major types of nutrients that you should be getting from the foods you eat? What happens if you do not get enough of one or more of these nutrients? Are vitamin and mineral supplements necessary for you individually? Why or why not?
5. Distinguish between the different types of vegetarianism. Which types are most likely to lead to nutrient deficiencies? What can be done to ensure that even the strictest vegetarian gets sufficient nutrients?
6. What are the problems many post-secondary students face when trying to eat well? List five ways you could improve your dietary intake now.
7. What are the major risks for food-borne illnesses and what can you do to protect yourself at school? At home? Why are additives added to food? What are the potential risks of these additives? How are food illnesses and food allergies different?

APPLICATION EXERCISE

Reread the "Consider This . . ." scenario at the beginning of the chapter and respond to the following:

1. Critique Ahmed's eating habits. What suggestions could you make to help him? How can you make these suggestions in a way that does not offend him?
2. Is there anything Ahmed can do to improve his eating situation? Imagine Ahmed attends your university or college; is the food available really that unhealthy or does he need more knowledge and motivation to make better choices? What specific suggestions would you make?

MYSEARCHLAB EXERCISE

1. Log on to www.MySearchLab.com.
2. Retrieve article AN 31384794, "You're Not Sick, You're Thirsty: Drink Up!" by Joey Shulman.
3. Read the article, then respond to the following questions:
   a. What health conditions may result when chronically dehydrated?
   b. How much water should you drink?
   c. Why do older people need more water?
   d. What other suggestions would you make to assist in consuming sufficient water/fluids on a daily basis?