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After studying the material in this chapter, you should be able to

- Identify macronutrients and micronutrients, their sources, chief functions, and signs of deficiency/excess.
- Describe the key themes of the USDA MyPlate Food Guidance System.
- Name the digestive organs and describe their role in the process of digestion.
- Illustrate how consumers can use the nutritional information provided on food labels to make healthy food purchases.
- Describe steps that can be taken to reduce foodborne illness.
- List three specific dietary changes that you could incorporate into your daily life to achieve or maintain a healthy nutritional status.
The freshmen on the fifth floor of a university dormitory decided to test a dubious premise: that man—and woman—can live on pizza alone. For a month, they vowed to eat nothing but pizza in all its savory varieties—mushroom, pepperoni, sausage, anchovies, extra cheese, thin crust, double crust. “In less than a week,” said one coed, “most of us cringed at the very sight of a cardboard delivery box.” It wasn’t just the boredom of having the same meal that got to them. Some felt bloated. Others had stomachaches. A few complained of headaches and fatigue. One was convinced she had scurvy, a vitamin deficiency disease caused by a lack of fruit and vegetables. None of them managed to stick with pizza for an entire month.

As these students discovered, we are indeed what we eat—and it shows in everything from our stamina and strength to the sheen in our hair and the glow in our cheeks. Eating well helps us live and feel well.

As demonstrated by the science of nutrition, the field that explores the connections between our bodies and the foods we eat, our daily diet affects how long and how well we live. Sensible eating can provide energy for our daily tasks, can protect us from many chronic illnesses, and may even extend longevity. A high-quality diet also enhances day-to-day vitality, energy, and sense of well-being.

This chapter can help you make healthy food choices. It translates the latest scientific research and government dietary guidelines into specific advice designed both to promote health and to prevent chronic disease. By learning more about nutrients, food groups, eating patterns, nutrition labels, and safety practices, you can nourish your body with foods that not only taste good but also are good for you.

### What You Need To Know about Nutrients

Every day your body needs certain essential nutrients that it cannot manufacture for itself. They provide energy, build and repair body tissues, and regulate body functions. The six classes of essential nutrients, which are discussed in this section, are water, protein, carbohydrates, fats, vitamins, and minerals (Figure 6.1).

Water makes up about 60 percent of the body and is essential for health and survival. Besides water, we also need energy to live, and we...
Six Categories of Nutrients

1. **CARBOHYDRATES** are substances in food that consist of a single sugar molecule, or of multiple sugar molecules in various forms. They provide the body with energy.

   Simple sugars are the most basic type of carbohydrates. Examples include glucose (blood sugar), sucrose (table sugar), and lactose (milk sugar). Starches are complex carbohydrates consisting primarily of long, interlocking chains of glucose units. Dietary fiber consists of complex carbohydrates found principally in plant cell walls. Dietary fiber cannot be broken down by human digestive enzymes.

2. **PROTEINS** are substances in food that are composed of amino acids. Amino acids are specific chemical substances from which proteins are made. Of the 20 amino acids, 9 are "essential," or a required part of our diet.

3. **FATS** are substances in food that are soluble in fat, not water.

   Saturated fats are found primarily in animal products, such as meat, butter, and cheese, and in palm and coconut oils. Diets high in saturated fat may elevate blood cholesterol levels. Unsaturated fats are found primarily in plant products, such as vegetable oil, nuts, and seeds, and in fish. Unsaturated fats tend to lower blood cholesterol levels. Essential fatty acids are two specific types of unsaturated fats that are required in the diet. Trans fats are a type of unsaturated fat present in hydrogenated oil, margarine, shortening, pastries, and some cooking oils that increase the risk of heart disease. Cholesterol is a fat-soluble, colorless liquid primarily found in animals. It can be manufactured by the liver.

4. **VITAMINS** are chemical substances found in food that perform specific functions in the body. Humans require 13 different vitamins in their diet.

5. **MINERALS** are chemical substances that make up the "ash" that remains when food is completely burned. Humans require 15 different minerals in their diet.

6. **WATER** is essential for life. Most adults need about 11–15 cups of water each day from food and fluids.

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**macronutrients** Nutrients required by the human body in the greatest amounts, including water, carbohydrates, proteins, and fats.

**calorie** The amount of energy required to raise the temperature of 1 gram of water by 1 degree Celsius. In everyday usage related to the energy content of foods and the energy expended in activities, a calorie is actually the equivalent of a thousand such calories, or a kilocalorie.

**micronutrients** Vitamins and minerals needed by the body in very small amounts.

Receive our energy from the carbohydrates, proteins, and fats in the foods we eat. The digestive system (Figure 6.2) breaks down food into these macronutrients. They are the nutrients required by the human body in the greatest amounts. The amount of energy that can be derived from the macronutrients is measured in calories. There are 9 calories in every gram of fat and 4 calories in every gram of protein or carbohydrate. The other two essential nutrients—the vitamins and minerals—are called micronutrients because our bodies need them in only very small amounts.

Your need for macronutrients depends on how much energy you expend. Because fats, carbohydrates, and protein can all serve as sources of energy, they can, to some extent, substitute for one another in providing calories. Adults, according to federal standards, should get 45 to 65 percent of calories from carbohydrates, 20 to 35 percent from fat, and 10 to 35 percent from protein. Children’s fat intake should be slightly higher: 25 to 40 percent of their caloric intake.

To eat well without overeating, choose foods that are “nutrient-dense”—that is, foods that provide the most nutritional value. For example, both a cup of nonfat milk and an ounce and a half of cheddar cheese provide about 300 mg of calcium, but the milk offers the same amount of calcium for half the calories. Foods that are extremely low in nutrient density—such as potato chips, candy, and soft drinks—deliver only calories. Fruits and vegetables are nutrient-dense foods that provide many health benefits. (Take the Self Survey: How Healthy Is Your Diet? on pages 190–191 to evaluate how healthy your diet is.)
Calories
Calories are the measure of the amount of energy that can be derived from food. How many calories you need depends on your gender, age, body-frame size, weight, percentage of body fat, and your basal metabolic rate (BMR)—the number of calories needed to sustain your body at rest. Your activity level also affects your calorie requirements. Regardless of whether you consume fat, protein, or carbohydrates, if you take in more calories than required to maintain your size and don’t work them off in some sort of physical activity, your body will convert the excess to fat (see Chapter 7). On average, daily calorie needs are:

- Most women, some older adults, children ages 2 to 6: 1,600
- Average adult: 2,000
- Most men, active women, teenage girls, older children: 2,200
- Active men, teenage boys: 2,800

(See Table 6.1.)
Table 6.1 Estimated Calorie Needs per Day by Age, Gender, and Physical Activity Level

Estimated amounts of calories needed to maintain calorie balance for various gender and age groups at three different levels of physical activity. The estimates are rounded to the nearest 200 calories. An individual’s calorie needs may be higher or lower than these average estimates.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age (years)</th>
<th>Physical Activity Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sedentary</td>
</tr>
<tr>
<td>Female</td>
<td>19–30</td>
<td>1,800–2,000</td>
</tr>
<tr>
<td></td>
<td>31–50</td>
<td>1,800</td>
</tr>
<tr>
<td></td>
<td>51+</td>
<td>1,600</td>
</tr>
<tr>
<td>Male</td>
<td>19–30</td>
<td>2,400–2,600</td>
</tr>
<tr>
<td></td>
<td>31–50</td>
<td>2,200–2,400</td>
</tr>
<tr>
<td></td>
<td>51+</td>
<td>2,000–2,200</td>
</tr>
</tbody>
</table>

Water

Water, which makes up 85 percent of blood, 70 percent of muscles, and about 75 percent of the brain, performs many essential functions: It carries nutrients, maintains temperature, lubricates joints, helps with digestion, rids the body of waste through urine, and contributes to the production of sweat, which evaporates from the skin to cool the body. Research has correlated high fluid intake with a lower risk of kidney stones, colon cancer, and bladder cancer. (See Chapter 19 for a discussion of bottled water.)

You lose about 64 to 80 ounces of water a day—the equivalent of eight to ten 8-ounce glasses—through perspiration, urination, bowel movements, and normal exhalation. You lose water more rapidly if you exercise, live in a dry climate or at a high altitude, drink a lot of caffeine or alcohol (which increases urination), skip a meal, or become ill. To ensure adequate water intake, nutritionists advise drinking enough so that your urine is not dark in color. Healthy individuals can get adequate hydration from beverages other than plain water, including juice.

Protein

Every living cell in the body contains protein. Critical for growth and repair, proteins form the basic framework for our muscles, bones, blood, hair, and fingernails.

- Twenty different amino acids join together to make all types of protein. Nine of these amino acids cannot be made by our bodies. These are known as essential amino acids that we must get from our diets. Dietary protein sources are categorized according to how many of the essential amino acids they provide:
  - A complete or high-quality protein source provides all the essential amino acids. Animal-based foods such as meat, poultry, fish, milk, eggs, and cheese are considered complete protein sources.
  - An incomplete protein source is low in one or more of the essential amino acids.
  - Complementary proteins are two or more incomplete protein sources that together provide adequate amounts of all the essential amino acids. Two good examples are rice and dry beans, which together can provide adequate amounts of all the essential amino acids the body needs.

You need to eat protein every day, because your body doesn’t store it the way it stores fats or carbohydrates. The average person needs 50 to 65 grams of protein daily. This is the amount in four ounces of meat plus a cup of cottage cheese.

Protein is found in the following foods:

- meats, poultry, and fish
- legumes (dry beans and peas)
- tofu
- eggs
- nuts and seeds
- milk and milk products
- grains, some vegetables, and some fruits (only small amounts relative to other sources)

Most people eat more protein than they need without harmful effects. However, protein contributes to calorie intake, so if you eat too much, your overall calorie intake could be greater than your calorie needs, and you can gain weight. Animal proteins also are sources of saturated fat, which has been linked to elevated low-density lipoprotein (LDL) cholesterol, a risk factor for cardiovascular disease.

Because some vegetarians avoid eating all (or most) animal foods, they must rely on plant-based sources of protein to meet their protein needs.
needs. With some planning, a vegetarian diet can easily meet the recommended protein needs (see page 174).

**Carbohydrates**

Carbohydrates are organic compounds that provide our brains and bodies with glucose, their basic fuel. The major sources of carbohydrates are plants—including grains, vegetables, fruits, and beans—and milk. There are two types: simple carbohydrates (sugars) and complex carbohydrates (starches and fiber). All provide 4 calories per gram. Both adults and children should consume at least 130 grams of carbohydrates each day, the minimum needed to produce enough glucose for the brain to function.

**Forms of Carbohydrates**  Simple carbohydrates include natural sugars, such as the lactose in milk and the fructose in fruit, and added sugars that are found in candy, soft drinks, fruit drinks, pastries, and other sweets. Those whose diets are higher in added sugars typically have lower intakes of other essential nutrients.

On average Americans consume more than 20 teaspoons of sweet calories a day. Some come from the teaspoons of sucrose (simple sugar) you add to coffee or tea. But many come from high-fructose corn syrup, a common sweetener and preservative made by changing the sugar glucose in cornstarch to fructose. Because it extends the shelf life of processed foods and is cheaper than sugar, high-fructose corn syrup has become a popular ingredient in many sodas, fruit-flavored drinks, and other processed foods.

High-fructose corn syrup isn’t intrinsically less healthy than other sweeteners. However, it makes beverages very sweet, which may increase consumption and contribute to obesity and other health problems.

Complex carbohydrates include grains, cereals, vegetables, beans, and nuts. Americans get most of their complex carbohydrates from refined grains, which have been stripped of fiber and many nutrients, in breads and desserts.

Far more nutritious are whole grains, which are made up of all components of the grain: the bran (or fiber-rich outer layer), the endosperm (middle...
layer), and the germ (the nutrient-packed inner layer). Whole grains have proven effective in lowering the risk of diabetes and heart disease. Yet only 8 percent of American adults consume three or more servings of whole grains; 42 percent eat no whole grains on a given day. One excellent source: popcorn. Popcorn eaters have higher intakes of fiber and other nutrients.

Low-Carb Foods  The popularity of diets that restrict carbohydrate intake, discussed in Chapter 7, prompted an explosion in products touted as “low-carb.” You can get low-carb versions of everything from beer to bread. However, the Food and Drug Administration (FDA), which regulates health claims on food labels in the United States, hasn’t defined what “low-carb” means. Words like “low-carb,” “carb-wise,” or “carb-free” are marketing terms created by manufacturers to sell their products.

Although many people may buy low-carb foods because they believe that they’re healthier, that isn’t necessarily the case. A low-carb nutrition bar, for instance, may be high in saturated fat and calories. Some low-carb food products cause digestive symptoms because food companies often replace the carbohydrates in a cookie or cracker with substances such as the sweetener sorbitol, which can cause diarrhea or stomach cramps.

Dieters often buy low-carb products in order to lose weight. According to proponents of low-carb diets, if carbohydrates raise blood sugar and insulin levels and cause weight gain, a decrease in carbs should result in lower blood sugar and insulin levels—and weight loss. With limited carbohydrates in the diet, the body would break down fat to provide needed energy.

Some people do lose weight when they switch to low-carb foods, but the reasons are probably that they consume fewer calories, lose water weight, and have decreased appetite because of a buildup of ketones (a by-product of fat metabolism) in the blood. As discussed in Chapter 7, a low-carb diet can lead to fairly rapid weight loss but is no easier to maintain over the long run than any other diet.

Fiber  Dietary fiber is the nondigestible form of complex carbohydrates occurring naturally in plant foods, such as leaves, stems, skins, seeds, and hulls. Functional fiber consists of isolated, nondigestible carbohydrates that may be added to foods and that provide beneficial effects in humans. Total fiber is the sum of both.

The various forms of fiber enhance health in different ways: They slow the emptying of the stomach, which creates a feeling of fullness and aids weight control. They interfere with absorption of dietary fat and cholesterol, which lowers the risk of heart disease and stroke in both middle-aged and elderly individuals. In addition, fiber helps prevent constipation, diverticulosis (a painful inflammation of the bowel), and diabetes. The link between fiber and colon cancer is complex. Some studies have indicated that increased fiber intake reduces risk; others found no such correlation.

Fiber may also contribute to a longer lifespan. In a recent study of almost 400,000 people ages 50 to 71, those who ate a diet rich in whole grains, fruits, and vegetables (up to 29 grams of fiber per day for men and 26 grams for women) were significantly less likely to die of cardiovascular disease, infectious illnesses, and respiratory disorders over a nine-year period. A high-fiber diet also was associated with fewer cancer deaths in men, but not in women.1

The Institute of Medicine has set recommendations for daily intake levels of total fiber (dietary plus functional fiber): 38 grams of total fiber for men and 25 grams for women. For men and women over 50 years of age, who consume less food, the recommendations are, respectively, 30 and 21 grams. The American Dietetic Association recommends 25 to 35 grams of dietary fiber a day, much more than the amount Americans typically consume.

Good fiber sources include wheat and corn bran (the outer layer); leafy greens; the skins of fruits and root vegetables; oats, beans, and barley; and the pulp, skin, and seeds of many vegetables and fruits, such as apples and strawberries (see Table 6.2). Because sudden increases in fiber can cause symptoms like bloating and gas, experts recommend gradually adding more fiber to your diet with an additional serving or two of vegetables, fruit, or whole-wheat bread.

Glycemic Index and Glycemic Load  The glycemic index is a ranking of carbohydrates, gram for gram, based on their immediate effect on blood glucose (sugar) levels.
Chapter 6  Personal Nutrition

Table 6.2 High-Fiber Foods

<table>
<thead>
<tr>
<th>Grains</th>
<th>Whole-grain products provide about 1 to 2 grams (or more) of fiber per serving:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 1 slice whole-wheat, pumpernickel, rye bread</td>
<td></td>
</tr>
<tr>
<td>• 1 oz ready-to-eat cereal (100% bran cereals contain 10 grams or more)</td>
<td></td>
</tr>
<tr>
<td>• ½ cup cooked barley, bulgur, grits, oatmeal, brown rice, quinoa</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vegetables</th>
<th>Most vegetables contain about 2 to 3 grams of fiber per serving:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 1 cup raw bean sprouts</td>
<td></td>
</tr>
<tr>
<td>• ½ cup cooked broccoli, brussels sprouts, cabbage, carrots, cauliflower, collards, corn, eggplant, green beans, green peas, kale, mushrooms, okra, parsnips, potatoes, pumpkin, spinach, sweet potatoes, swiss chard, winter squash</td>
<td></td>
</tr>
<tr>
<td>• ½ cup chopped raw carrots, peppers</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fruits</th>
<th>Fresh, frozen, and dried fruits have about 2 grams of fiber per serving:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 1 medium apple, banana, kiwi, nectarine, orange, pear</td>
<td></td>
</tr>
<tr>
<td>• ½ cup applesauce, blackberries, blueberries, raspberries, strawberries</td>
<td></td>
</tr>
</tbody>
</table>

Fruit juices contain very little fiber.

<table>
<thead>
<tr>
<th>Legumes</th>
<th>Many legumes provide about 6 to 8 grams of fiber per serving:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ½ cup cooked baked beans, black beans, black-eyed peas, kidney beans, navy beans, pinto beans</td>
<td></td>
</tr>
</tbody>
</table>

Some legumes provide about 5 grams of fiber per serving:

• ½ cup cooked garbanzo beans, great northern beans, lentils, lima beans, split peas

Carbohydrates that break down quickly during digestion and trigger a fast, high glucose response have the highest glycemic index rating. Those that break down slowly, releasing glucose gradually into the bloodstream, have low glycemic index ratings. Potatoes, which raise blood sugar higher and faster than apples, for instance, earn a higher glycemic index rating than apples. Glycemic index does not account for the amount of food you typically eat in a serving.

Glycemic load is a measure of how much a typical serving size of a particular food raises blood glucose. For example, the glycemic index of table sugar is high, but you use so little to sweeten your coffee or tea that its glycemic load is low.

Fats

Fats carry the fat-soluble vitamins A, D, E, and K; aid in their absorption in the intestine; protect organs from injury; regulate body temperature; and play an important role in growth and development. They provide 9 calories per gram—more than twice the amount in carbohydrates or proteins.

Both high- and low-fat diets can be unhealthy. When people eat very low levels of fat and very high levels of carbohydrates, their levels of high-density lipoprotein, the so-called good cholesterol, decline. On the other hand, high-fat diets can lead to obesity and its related health dangers, discussed in Chapter 7.

Forms of Fat  Saturated fats and unsaturated fats are distinguished by the type of fatty acids in their chemical structures. Unsaturated fats can be divided into monounsaturated or polyunsaturated, again depending on their chemical structure. All dietary fats are a mix of saturated and unsaturated fats but are predominantly one or the other. Unsaturated fats, like oils, are likely to be liquid at room temperature and saturated fats, like butter, are likely to be solid. In general, vegetable and fish oils are unsaturated, and animal fats are saturated. Table 6.3 lists the major sources of healthful monounsaturated and polyunsaturated fats.

saturated fats A chemical term indicating that a fat molecule contains as many hydrogen atoms as its carbon skeleton can hold. These fats are normally solid at room temperature.

unsaturated fats A chemical term indicating that a fat molecule contains fewer hydrogen atoms than its carbon skeleton can hold. These fats are normally liquid at room temperature.
Some fish, such as mackerel, shark, tilefish, tuna, and swordfish, contain potentially harmful levels of mercury. To balance the benefits and risks of eating fish, the American Heart Association recommends two servings of fish a week, although even a single fish meal a month may be beneficial. Nutritionists do not advise fish oil supplements as a source of omega-3 fatty acids because high intake may increase bleeding time, interfere with wound healing, and suppress immune function.

Saturated fats can increase the risk of heart disease and should be avoided as much as possible. In response to consumer and health professionals’ demand for less saturated fat in the food supply, many manufacturers switched to partially hydrogenated oils. The process of hydrogenation creates unsaturated fatty acids called trans fat. They are found in some margarine products and most foods made with partially hydrogenated oils.
such as baked goods and fried foods. Even though trans fats are unsaturated, they have an even more harmful effect on cholesterol than saturated fats because they increase harmful LDL and, in large amounts, decrease helpful HDL. Epidemiological studies have suggested a possible link between cardiovascular disease risk and high intakes of trans fats, and researchers have concluded that they are, gram for gram, twice as damaging as saturated fats. There is no safe level for trans fats, which occur naturally in meats as well as in foods prepared with partially hydrogenated vegetable oils.

Some food manufacturers have reduced or eliminated trans fats in snacks and other products. Cities and communities across the country have banned trans fats in restaurants. Some campuses also have stopped using trans fats in their dining halls and food outlets.

To cut down on both saturated and trans fats, choose oils such as soybean, canola, corn, olive, safflower, and sunflower, which are naturally free of trans fats and lower in saturated fats—see Table 6.3. Look for reduced-fat, low-fat, fat-free, and trans-fat-free versions of baked goods, snacks, and other processed foods. Some choices—such as butter versus margarine—are more difficult to make (see Figure 6.3).

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**Figure 6.3 Butter or Margarine?**

Most of the fat in butter is saturated fat. Most of the fat in margarine is unsaturated, but the trans fats are twice as damaging as saturated fats. The closer “partially hydrogenated oil” is to the beginning of the ingredients list, the more trans fat the product contains. There are a handful of margarine alternatives that do not contain trans fats.
**Vitamins and Minerals**

**Vitamins**, which help put proteins, fats, and carbohydrates to use, are essential to regulating growth, maintaining tissue, and releasing energy from foods. Together with the enzymes in the body, they help produce the right chemical reactions at the right times. They’re also involved in the manufacture of blood cells, hormones, and other compounds.

The body produces some vitamins, such as vitamin D, which is manufactured in the skin after exposure to sunlight. Other vitamins must be ingested.

Vitamins A, D, E, and K are fat-soluble; they are absorbed through the intestinal membranes and stored in the body.

The B vitamins and vitamin C are water-soluble; they are absorbed directly into the blood and then used up or washed out of the body in urine and sweat. They must be replaced daily. Table 6.4 on pages 167–168 summarizes key information about the vitamins.

**Vitamin D** This vitamin is essential for bone health, cognitive function, pain control, and many other processes within the body. It comes in two forms: vitamin D, which comes from plants (that have been exposed to sunlight) and foods fortified with vitamin D, such as milk, cheese, bread, and juice; and vitamin D3, which is formed in the skin after exposure to the sun’s ultraviolet rays and ingested from animal sources, including some fish.

Sunshine stimulates the production of vitamin D in the body, and many people can get a sufficient amount by spending five to ten minutes outside without sunscreen. (More unprotected time can cause sunburn and skin cancer.) During the winter months, Americans living north of an imaginary line stretching from San Francisco to St. Louis to Richmond, Virginia, may not be able to get an adequate amount of ultraviolet light simply by being outdoors.

Vitamin D, which we can also get from fortified milk, eggs, salmon, tuna, and sardines, aids in the absorption of calcium and helps to form and maintain strong bones. Other benefits include:

- **Lower risk of heart disease.** Calcium deposits that stiffen the arteries are more likely to develop in people with low levels of vitamin D. In one study, men low in vitamin D were twice as likely to develop heart disease.
- **Decreased blood pressure.** Vitamin D lowers the kidneys’ production of rennin, a hormone that boosts blood pressure. Several studies suggest that getting more of the vitamin can help control blood pressure.
- **Protection against infection.** Adequate amounts of vitamin D can help the body fight off the flu, tuberculosis, and infections of the upper respiratory tract.

Too little vitamin D can contribute to heart disease, falls and broken bones, breast cancer, prostate cancer, depression, and memory loss. Low vitamin D levels also have been linked with Parkinson’s disease, stroke risk, and exacerbation of multiple sclerosis.

Vitamin D may play a role in regulating weight and muscle strength. In one study of college-age young women (average age 19), those with too little vitamin D were heavier, weighing about 16 pounds more than those with adequate vitamin D intake. In recent years health officials have warned that most Americans might be deficient in calcium and vitamin D. However, an authoritative report by the Institute of Medicine (IOM) has determined that these claims were exaggerated. For the first time, the IOM has established a recommended dietary allowance (RDA) for both nutrients: 600 IU for vitamin D—a threefold increase for some age groups over previous suggested levels—and 1000 mg for calcium (discussed on page 156).

Although extra vitamin D has been linked with prevention of cancer, heart disease, and diabetes, the report concluded that the scientific evidence is too weak to support its use for this purpose. Very large quantities, or megadoses, of vitamin D are not effective and could be harmful. The report also cautioned against spending more time in the sun to promote synthesis of vitamin D in the skin through ultraviolet rays. Many physicians remain convinced that the evidence for vitamin D’s benefits, particularly to protect against cardiovascular disease, cancer, and premature death, will continue to accumulate. Until the findings are conclusive, ask your doctor to test your vitamin D level. If it is low,
discuss the relative benefits and risks of taking a supplement.

**Antioxidants**

Antioxidants prevent the harmful effects caused by oxidation within the body. They include vitamins C, E, and beta-carotene (a form of vitamin A), as well as compounds like carotenoids and flavonoids. All share a common enemy: renegade oxygen cells called free radicals released by normal metabolism as well as by pollution, smoking, radiation, and stress.

Diets high in antioxidant-rich fruits and vegetables have been linked with lower rates of esophageal, lung, colon, and stomach cancer. Nevertheless, scientific studies have not proved conclusively that any specific antioxidant, particularly in supplement form, can prevent cancer.

**Minerals**

Carbon, oxygen, hydrogen, and nitrogen make up 96 percent of our body weight. The other 4 percent consists of minerals that help build bones and teeth, aid in muscle function, and help our nervous systems transmit messages. Every day we need about a tenth of a gram (100 milligrams) or more of the major minerals: sodium, potassium chloride, calcium, phosphorus, magnesium, and sulfur. We also need about a hundredth of a gram (10 milligrams) or less of each of the trace minerals: iron (although young women need more, particularly if they are physically active), zinc, selenium, molybdenum, iodine, copper, manganese, fluoride, and chromium. (See Table 6.5 on pages 162–163 for key information on minerals.)

**Calcium**

Calcium, the most abundant mineral in the body, builds strong bone tissue throughout life and plays a vital role in blood clotting and muscle and nerve functioning. Pregnant or nursing women need more calcium to meet the additional needs of their babies’ bodies. Calcium may also help control high blood pressure, prevent colon cancer in adults, and promote weight loss. Adequate calcium and vitamin D in—take during childhood, adolescence, and young adulthood is crucial to prevent osteoporosis, the bone-weakening disease that strikes one of every four women over the age of 60.

Most individuals can get adequate amounts of calcium from their diet, according to an Institute of Medicine report on this mineral and vitamin. However, girls between ages 9 and 18 may fall short of getting the recommended 1300 mg for their age group. For women ages 19 to 50 and men ages 19 to 70, the recommended daily intake is 1000 mg. The recommended allowance for women older than 50 and men over 70 is 1200 mg. Amounts greater than 2000 mg can cause constipation and kidney stones and put individuals at risk for calcification within their blood vessels and other serious health threats.

Because fresh vegetables are rich in antioxidants, a salad can be a nutritious meal choice.
### Table 6.4 Key Information about Vitamins

#### Fat-Soluble Vitamins

<table>
<thead>
<tr>
<th>Vitamin/Recommended Intake per Day</th>
<th>Significant Sources</th>
<th>Chief Functions</th>
<th>Signs of Severe, Prolonged Deficiency</th>
<th>Signs of Extreme Excess</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vitamin A</strong></td>
<td>Fortified milk, cheese, cream, butter, fortified margarine, eggs, liver, spinach and other dark leafy greens, broccoli, deep orange fruits (apricots, cantaloupes), and vegetables (carrots, sweet potatoes, pumpkins)</td>
<td>Antioxidant; needed for vision, health of cornea, epithelial cells, mucous membranes, skin health, bone and tooth growth, reproduction, immunity, regulation of gene expression</td>
<td>Cracks in teeth, tendency toward tooth decay, night blindness, keratinization, corneal degeneration</td>
<td>Overstimulated cell division, skin rashes, hair loss, hemorrhage, bone abnormalities, birth defects, fractures, liver failure, death</td>
</tr>
<tr>
<td>Adults 19–50: 5 µg</td>
<td><strong>Males 51–70 years: 10 µg</strong></td>
<td>Mineralization of bones and teeth (promotes calcium and phosphorus absorption)</td>
<td>Abnormal growth, misshapen bones (bowing of legs), soft bones, joint pain, malformed teeth, muscle spasms</td>
<td>Raised blood calcium, excessive thirst, headaches, irritability, weakness, nausea, kidney stones, deposits in arteries</td>
</tr>
<tr>
<td>&gt;70 years: 15 µg</td>
<td><strong>Females 19–50: 700 µg RAE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vitamin D</strong></td>
<td>Exposure to sunlight; fortified milk or margarine, eggs, liver, sardines</td>
<td>Mineralization of cell membranes, regulation of oxidation reactions</td>
<td>Abnormal growth, misshapen bones (bowing of legs), soft bones, joint pain, malformed teeth, muscle spasms</td>
<td>Red blood cell breakage, anemia, muscle degeneration, difficulty walking, leg cramps, nerve damage</td>
</tr>
<tr>
<td>Adults 19–50: 5 µg</td>
<td><strong>Males 51–70 years: 10 µg</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51–70 years: 10 µg</td>
<td><strong>Females &gt;70 years: 15 µg</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;70 years: 15 µg</td>
<td><strong>Females 19–50: 700 µg RAE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vitamin E</strong></td>
<td>Polyunsaturated plant oils (margarine, salad dressings, shortenings), green and leafy vegetables, wheat germ, whole-grain products, nuts, seeds</td>
<td>Antioxidant; needed for stabilization of cell membranes, regulation of oxidation reactions</td>
<td>Red blood cell breakage, anemia, muscle degeneration, difficulty walking, leg cramps, nerve damage</td>
<td>Augments the effects of anticoagulation medication; general discomfort; blurred vision</td>
</tr>
<tr>
<td><strong>Males 19–50: 15 mg</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Females 19–50: 15 mg</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>Vitamin K</strong></td>
<td>Green leafy vegetables, cabbage-type vegetables, soybeans, vegetable oils</td>
<td>Synthesis of blood-clotting proteins and proteins important in bone mineralization</td>
<td>Hemorrhage, abnormal bone formation</td>
<td>Interference with anticoagulation medication</td>
</tr>
<tr>
<td><strong>Males 19–50: 120 µg</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Females 19–50: 90 µg</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Water-Soluble Vitamins</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vitamin B&lt;sub&gt;6&lt;/sub&gt;</strong></td>
<td>Meats, fish, poultry, liver, legumes, fruits, whole grains, potatoes, soy products</td>
<td>Part of a coenzyme used in amino acid and fatty acid metabolism, helps make red blood cells</td>
<td>Anemia, depression, abnormal brain wave pattern, convulsions, skin rashes</td>
<td>Impaired memory, depression, irritability, headaches, numbness, damage to nerves, difficulty walking, loss of reflexes</td>
</tr>
<tr>
<td><strong>Males 19–50: 1.3 mg</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Females 19–50: 1.3 mg</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Thiamin</strong></td>
<td>Pork, ham, bacon, liver, whole grains, legumes, nuts; occurs in all nutritious foods in moderate amounts</td>
<td>Part of a coenzyme used in energy metabolism, supports normal appetite and nervous system function</td>
<td>Beriberi, edema, enlarged heart, nervous/muscular system degeneration, difficulty walking, loss of reflexes, mental confusion</td>
<td>None reported</td>
</tr>
<tr>
<td><strong>Males 19–50: 1.2 mg</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Females 19–50: 1.1 mg</strong></td>
<td></td>
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</tr>
</tbody>
</table>

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### Table 6.4 Key Information about Vitamins (continued)

<table>
<thead>
<tr>
<th>Vitamin/Recommended Intake per Day</th>
<th>Significant Sources</th>
<th>Chief Functions</th>
<th>Signs of Severe, Prolonged Deficiency</th>
<th>Signs of Extreme Excess</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Riboflavin</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males 19–50: 1.3 mg</td>
<td>Milk, yogurt, cottage cheese, meat, leafy green vegetables, whole-grain or enriched breads and cereals</td>
<td>Part of a coenzyme used in energy metabolism, supports normal vision and skin health</td>
<td>Cracks at corner of mouth, magenta tongue, hypersensitivity to light, reddening of cornea, skin rash, sore throat</td>
<td>None reported</td>
</tr>
<tr>
<td>Females 19–50: 1.1 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Niacin</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males 19–50: 16 mg NE</td>
<td>Meat, poultry, fish, whole-grain and enriched breads and cereals, nuts, and all protein-containing foods</td>
<td>Part of a coenzyme used in energy metabolism</td>
<td>Diarrhea, black smooth tongue, irritability, loss of appetite, weakness, dizziness, mental confusion, flaky skin rash on areas exposed to sun</td>
<td>Nausea, vomiting, painful flush and rash, sweating, liver damage, blurred vision, impaired glucose tolerance</td>
</tr>
<tr>
<td>Females 19–50: 14 mg NE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Folate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males 19–50: 400 μg</td>
<td>Leafy green vegeta-</td>
<td>Part of a coenzyme</td>
<td>Anemia, heartburn, frequent infections, smooth red tongue, depression, mental confusion</td>
<td>Masks vitamin B&lt;sub&gt;12&lt;/sub&gt; deficiency</td>
</tr>
<tr>
<td>Females 19–50: 400 μg</td>
<td>bles, legumes, seeds, liver, enriched breads, cereal, pasta, and grains</td>
<td>needed for new cell synthesis</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pantothenic acid</strong></td>
<td>Widespread in foods</td>
<td>Part of a coenzyme used in energy metabolism</td>
<td>Vomiting, intestinal distress, insomnia, fatigue, increased sensitivity to insulin</td>
<td>None reported</td>
</tr>
<tr>
<td>Males 19–50: 5 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females 19–50: 5 mg</td>
<td>Widespread in foods</td>
<td>Used in energy metabolism, fat synthesis, amino acid metabolism, and glycogen synthesis</td>
<td>Abnormal heart action, loss of appetite, nausea, depression, muscle pain, drying of facial skin</td>
<td>None reported</td>
</tr>
<tr>
<td><strong>Biotin</strong></td>
<td>Widespread in foods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males 19–50: 30 μg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females 19–50: 30 μg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


### Table 6.5 Key Information about Minerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Significant Sources</th>
<th>Chief Functions</th>
<th>Signs of Severe, Prolonged Deficiency</th>
<th>Signs of Extreme Excess</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sodium</strong></td>
<td>Salt, soy sauce, processed foods</td>
<td>Needed to maintain fluid balance and acid-base balance in body cells; critical to nerve impulse transmission</td>
<td>Mental apathy, poor appetite, muscle cramps</td>
<td>High blood pressure, edema</td>
</tr>
<tr>
<td><strong>Potassium</strong></td>
<td>All whole foods: meats, milk, fruits, vegetables, grains, legumes</td>
<td>Needed to maintain fluid balance and acid-base balance in body cells; needed for muscle and nerve activity</td>
<td>Muscle weakness, mental confusion, paralysis</td>
<td>Muscle weakness, irregular heartbeat, heart attacks, vomiting</td>
</tr>
<tr>
<td><strong>Chloride</strong></td>
<td>Salt, soy sauce, processed foods</td>
<td>Aids in digestion; needed to maintain fluid balance and acid-base balance in body cells</td>
<td>Does not occur under normal circumstances</td>
<td>Vomiting</td>
</tr>
<tr>
<td><strong>Calcium</strong></td>
<td>Milk and milk products, oysters, small fish (with bones), tofu, greens, legumes</td>
<td>Component of bones and teeth, needed for muscle and nerve activity, blood clotting</td>
<td>Stunted growth and weak bones in children, adult bone loss (osteoporosis)</td>
<td>Constipation; calcium deposits in kidneys, liver; decreased absorption of other minerals</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Mineral</th>
<th>Significant Sources</th>
<th>Chief Functions</th>
<th>Signs of Severe, Prolonged Deficiency</th>
<th>Signs of Extreme Excess</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphorus</td>
<td>All animal tissues, milk and milk products, legumes</td>
<td>Component of bones and teeth, energy metabolism, needed to maintain cell membranes</td>
<td>Muscle weakness, impaired growth, bone pain</td>
<td>Calcification of soft tissue, particularly the kidneys</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Nuts, legumes, whole grains, dark green vegetables, seafoods, chocolate, cocoa</td>
<td>Component of bones and teeth, nerve activity, energy and protein formation, immune function</td>
<td>Stunted growth in children, weakness, muscle spasms, personality changes, hallucinations</td>
<td>From nonfood sources: diarrhea, dehydration, pH imbalance</td>
</tr>
<tr>
<td>Sulfate</td>
<td>All protein-containing foods</td>
<td>Component of certain amino acids; stabilizes protein shape</td>
<td>None known; protein deficiency would occur first</td>
<td>None reported</td>
</tr>
<tr>
<td>Trace Minerals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>Red meats, fish, poultry, shellfish, eggs, legumes, dried fruits</td>
<td>Aids in transport of oxygen, component of myoglobin, energy metabolism</td>
<td>Anemia, weakness, fatigue, pale appearance, reduced attention span, developmental delays in children</td>
<td>Vomiting, abdominal pain, blue coloration of skin, shock, organ damage</td>
</tr>
<tr>
<td>Zinc</td>
<td>Protein-containing foods: fish, shellfish, poultry, grains, vegetables</td>
<td>Protein reproduction, component of insulin, activates many enzymes, transport of vitamin A</td>
<td>Growth failure, delayed sexual maturation, slow wound healing</td>
<td>Loss of appetite, impaired immunity, reduced copper and iron absorption, fatigue, metallic taste in mouth</td>
</tr>
<tr>
<td>Selenium</td>
<td>Meats and seafood, eggs, grains</td>
<td>Acts as an antioxidant in conjunction with vitamin E, regulates thyroid hormone</td>
<td>Anemia, heart failure</td>
<td>Hair and fingernail loss, weakness, skin rash, garlic or metallic breath</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>Dried beans, grains, dark green vegetables, liver, milk and milk products</td>
<td>Aids in oxygen transfer from one molecule to another</td>
<td>Unknown</td>
<td>None reported</td>
</tr>
<tr>
<td>Iodine</td>
<td>Iodized salt, seaweed, seafood, bread</td>
<td>Component of thyroid hormones that helps regulate energy production and growth</td>
<td>Goiter, cretinism in newborns (mental retardation, hearing loss, growth failure)</td>
<td>Pimples, goiter, decreased thyroid function</td>
</tr>
<tr>
<td>Copper</td>
<td>Organ meats, whole grains, nuts and seeds, seafood, drinking water</td>
<td>Helps to form hemoglobin and collagen, component of enzymes involved in the body’s utilization of iron and oxygen</td>
<td>Anemia, nerve and bone abnormalities in children, growth retardation</td>
<td>From nonfood sources: vomiting, diarrhea, liver disease</td>
</tr>
<tr>
<td>Manganese</td>
<td>Whole grains, coffee, tea, dried beans, nuts</td>
<td>Formation of body fat and bone</td>
<td>Rare</td>
<td>Infertility in men, disruptions in the nervous system, muscle spasms</td>
</tr>
<tr>
<td>Fluoride</td>
<td>Fluoridated water, foods, and beverages; tea; shrimp; crab</td>
<td>Component of bones and teeth (enamel), confers decay resistance on teeth</td>
<td>Tooth decay and other dental diseases</td>
<td>Fluorosis, brittle bones, mottled teeth, vomiting, diarrhea, chest pain</td>
</tr>
<tr>
<td>Chromium</td>
<td>Whole grains, liver, meat, beer, wine</td>
<td>Glucose utilization</td>
<td>Poor blood glucose control, weight loss</td>
<td>None reported</td>
</tr>
</tbody>
</table>

Phytochemicals such as indoles, coumarins, and capsaicin, which exist naturally in plants and have disease-fighting properties.

Table 6.6 Color-Coding Your Vegetables and Fruits

<table>
<thead>
<tr>
<th>Color</th>
<th>Phytochemical Antioxidant</th>
<th>Vegetable and Fruit Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Lycopene (<strong>lie-co-peon</strong>)</td>
<td>Tomatoes, red raspberries, watermelon, strawberries, red peppers</td>
</tr>
<tr>
<td>Yellow-green</td>
<td>Lutein zeaxanthin (<strong>lu-te-in, ze-ah-zan-thun</strong>)</td>
<td>Leafy greens, avocado, honey dew melon, kiwi fruit</td>
</tr>
<tr>
<td>Red-purple</td>
<td>Anthocyanins (<strong>antho-sigh-ah-nin</strong>)</td>
<td>Grapes, berries, wine, red apples, plums, prunes</td>
</tr>
<tr>
<td>Orange</td>
<td>Beta-carotene</td>
<td>Carrots, mangos, papayas, apricots, pumpkins, yams</td>
</tr>
<tr>
<td>Orange-yellow</td>
<td>Flavonoids (<strong>fla-von-oids</strong>)</td>
<td>Oranges, tangerines, lemons, plums, peaches, cantaloupe</td>
</tr>
<tr>
<td>Green</td>
<td>Glucosinolates (<strong>glu-co-sin-oh-lates</strong>)</td>
<td>Broccoli, brussels sprouts, kale, cabbage</td>
</tr>
<tr>
<td>White-green</td>
<td>Allyl sulfides (<strong>al-lill sulf-ides</strong>)</td>
<td>Onions, leeks, garlic</td>
</tr>
</tbody>
</table>

Calcium is a special concern for African Americans who, as a group, have a higher risk for high blood pressure and obesity than the rest of the population but, on average, consume less than one serving of dairy foods a day. In fact, more than 80 percent of African Americans fail to get their daily recommended amount of calcium.

National health organizations are promoting greater calcium consumption among college students, particularly women, to increase bone density and safeguard against osteoporosis. In both men and women, bone mass peaks between the ages of 25 and 35. Over the next 10 to 15 years, bone mass remains fairly stable. At about age 40, bone loss equivalent to 0.3 to 0.5 percent per year begins in both men and women. Women may experience greater bone loss, at a rate of 3 to 5 percent, at the time of menopause. This decline continues for approximately five to seven years and is the primary factor leading to postmenopausal osteoporosis.

The higher an individual’s peak bone mass, the longer it takes for age- and menopause-related bone loss to increase the risk of fractures. Osteoporosis is less common in groups with higher peak bone mass—men versus women, blacks versus whites.

**Sodium**  Sodium helps maintain proper fluid balance, regulates blood pressure, transmits muscle impulses, and relaxes muscles. For those who are sodium-sensitive—as many as 30 percent of the population—too much sodium contributes to high blood pressure. African Americans, who have higher rates of high blood pressure and diseases related to hypertension, such as stroke and kidney failure, tend to be more sensitive to salt. (See the discussion of sodium on pages 167–168.)

The average daily intake of sodium in the United States exceeds 4 grams (4000 mg). The National Heart, Lung, and Blood Institute recommends less than 2.4 grams (2400 mg) of sodium a day, the equivalent of about one tablespoon of table salt a day. For someone with high blood pressure, a daily intake of less than 1500 mg of sodium is better for lowering blood pressure. However, because individuals vary greatly in how they respond to sodium, some experts are dubious of the need for and potential benefits of uniform restrictions on dietary salt.

**Phytochemicals**  Phytochemicals, compounds that exist naturally in plants, serve many functions, including helping a plant protect itself from bacteria and disease. Some phytochemicals such as solanine, an insect-repelling chemical found in the leaves and stalks of potato plants, are natural toxins, but many are beneficial to humans.

Phytochemicals give tomatoes their red color and hot peppers their “fire.” In the body, they act as antioxidants, mimic hormones, and reduce the risk of various illnesses, including cancer and heart disease (see Table 6.6). Broccoli may contain as many as 10,000 different phytochemicals, each capable of influencing some action or organ in the body. Tomatoes provide lycopene, a powerful antioxidant that seems to offer protection against cancers of the esophagus, lungs, prostate, and stomach. Soybeans, a rich source of an array of phytochemicals, appear to slow the growth of breast and prostate cancer.
Americans get adequate amounts of most nutrients. However, the Advisory Committee for Dietary Guidelines reported that intakes of several nutrients are low enough to be of concern.

- For adults: vitamins A, C, and E, calcium, magnesium, potassium, and fiber.
- For children: vitamin E, calcium, magnesium, potassium, and fiber.

Are you getting enough of these nutrients?

Among the groups at highest risk of nutritional deficiencies are:

- Teenage girls.
- Women of child-bearing age (iron and folic acid).
- Persons over age 50 (vitamin B₁₂).
- The elderly, persons with dark skin, and those who do not get adequate exposure to sunshine (vitamin D).

### Dietary Supplements

About two out of five Americans take a vitamin or mineral supplement regularly. Should you be among them? Or are you getting enough of the vitamins and minerals you need from your food? Despite intensive marketing of a host of supplements, large-scale studies have cast doubts on the benefits of many, especially antioxidants.

Multivitamin supplements, long believed to be beneficial, did not prevent cancer or heart disease in a recent eight-year study of more than 160,000 postmenopausal women. After controlling for age, physical activity, family history of cancer, and many other factors, supplements had no effect on the risk of breast cancer, colorectal cancer, endometrial cancer, lung cancer, ovarian cancer, heart attack, stroke, blood clots, or mortality. Individuals who are less well nourished than the study participants may benefit from supplements, but there is no convincing scientific evidence to justify routine use of dietary supplements by the general population. The bottom-line recommendation: Buying more fruits and vegetables might be a better choice than spending money on multivitamins.

In another study, supplements of vitamins C and E and beta-carotene had no impact on the cancer risk of middle-aged women, but vitamin C supplements may protect against gallstones. Selenium and vitamin E also failed to protect men from prostate cancer.

Yet certain supplements may have an impact on the risk for certain conditions. Women over age 40 who took folic acid, vitamin B₆, and vitamin B₁₂ were less likely than a control group to develop a severe visual disorder called age-related macular degeneration.

High doses of vitamins carry potential risks. Certain antioxidants can interfere with the efficacy of cholesterol-lowering medications. High doses of vitamin E may increase the chances of earlier death. In cancer patients, those taking large doses had an increased risk of a new cancer.

In particular, the fat-soluble vitamins, primarily A and D, can build up in our bodies and cause serious complications, such as damage to the kidneys, liver, or bones. Large doses of water-soluble vitamins, including the B vitamins, may also be harmful. Excessive intake of vitamin B₆ (pyridoxine), often used to relieve premenstrual bloating, can cause neurological damage, such as numbness in the mouth and tingling in the hands. (An excessive amount in this case is 250 to 300 times the recommended dose.) High doses of vitamin C can produce stomachaches and diarrhea. Niacin, often taken in high doses to lower cholesterol, can cause jaundice, liver damage, and irregular heartbeats as well as severe, uncomfortable flushing of the skin.

If you do feel a need for vitamins, be sure not to exceed the recommended doses listed in Tables 6.4 and 6.5.

### Dietary Guidelines for Americans

Every five years the federal government reviews and updates its recommendations for healthy eating. Its most recent report, *Dietary Guidelines for Americans, 2010* (published in 2011), notes that poor diet and physical inactivity are contributing to an epidemic of overweight and obesity in men, women, and children in the United States, as well as to increased rates of illness and
Diet-related chronic diseases include cardiovascular disease, hypertension, diabetes, cancer, and osteoporosis.

The key recommendations of the most recent Dietary Guidelines encompass two overarching concepts:

- **The key to achieving and sustaining a healthy weight is to maintain calorie balance.** People with healthy weights consume only enough calories from foods and beverages to meet their needs and expend excess calories through physical activity. (Weight control is discussed in depth in Chapter 7.)
- **Americans should focus on consuming nutrient-dense foods and beverages.** Rather than getting calories from solid fats, added sugars, and refined grains, we should limit such foods and increase our intake of foods that pack more nutritional power, such as vegetables, fruits, whole grains, non-fat or low-fat milk and milk products, seafood, lean meats and poultry, eggs, beans and peas, and nuts and seeds.

### Balancing Calories to Manage Weight

**Calorie balance** refers to the relationship between calories consumed from foods and beverages and calories expended in normal body functions and through physical activity. You cannot control the calories your body burns to maintain temperature and other basic processes. However, you can control what you eat and drink and how many calories you use in physical activity. (See Health in the Headlines: Nutrition and Health.)

You must expend as much energy (calories) as you take in to stay at the same weight. Among the best ways to balance this energy equation are limiting portion sizes (discussed later in this chapter), substituting nutrient-dense foods (such as raw vegetables or low-fat soups) for nutrient-poor foods (such as candy and cake), and limiting added sugars, solid fats, and alcoholic beverages.

As discussed in Chapter 8, regular physical activity helps maintain a healthy weight and reduces risk for several chronic diseases. While 30 minutes of moderate physical activity (such as walking at a pace of three or four miles an hour) on most days provides important benefits, exercising more often and more intensely yields additional health dividends. Many adults need up to 60 minutes of moderate to vigorous physical activity—the equivalent of 150 to 200 calories, depending on body size—daily to prevent unhealthy weight gain. Men and women who have lost weight may need 60 to 90 minutes to keep off excess pounds. Children and teenagers require at least 60 minutes of moderate physical activity every day.

### Foods and Food Components to Reduce

The Dietary Guidelines do not identify any single food as “bad” or “bad for you” but emphasize that excessive amounts of certain foods and food components—sodium, solid fats (major sources of saturated and trans-fatty acids), added sugars, refined grains, cholesterol, and alcohol—may increase the risks to your health. Because they add excess and often “empty” calories to a daily diet, they contribute to overweight and obesity. But even in normal-weight individuals, these foods can increase the risk of some of the most common chronic diseases in the United States.

**Sodium** Virtually all Americans consume more sodium (primarily in the form of salt) than they need. The average intake for Americans over age 2 is about 3400 mg per day—much higher than the 1500 mg that the Institute of Medicine has set as the “adequate intake” for individuals ages 9 to 50 and its “tolerable upper limit” of 2300 mg for adolescents over age 14 and all adults.

On average, the higher the sodium intake, the higher an individual’s blood pressure. Conversely, reducing sodium can lower blood pressure. The Dietary Guidelines recommend that all Americans consume no more than 2300 mg per day. African Americans; individuals with hypertension, diabetes, or chronic kidney disease; and those older than age 51 should cut back to 1500 mg a day. However, because so many foods contain hidden sodium, only an estimated 15 percent of Americans currently meet this recommendation.

Salt added at the table and in cooking provides only a small proportion of the sodium as recorded on food labels. Thus, look for foods labeled low in sodium. You can also choose foods that are naturally low in sodium, such as raw vegetables or low-fat soups, and substitute nutrient-dense foods for ent-poor foods (such as candy and cake), and limit such foods and increase our intake of foods that pack more nutritional power, such as vegetables, fruits, whole grains, non-fat or low-fat milk and milk products, seafood, lean meats and poultry, eggs, beans and peas, and nuts and seeds.
Americans consume. Most comes from salt added during food processing (see Figure 6.4). Here is what you can do to lower your sodium intake:

- **Look for labels that say “low sodium.”** They contain 140 mg or less of sodium per serving.
- **Learn to use spices and herbs** rather than salt to enhance the flavor of food.
- **Go easy on condiments** such as soy sauce, pickles, olives, ketchup, and mustard, which can add a lot of salt to your food.
- **Always check the amount of sodium in processed foods,** such as frozen dinners, packaged mixes, cereals, salad dressings, and sauces. The amount in different types and brands can vary widely.

**Fats** The Dietary Guidelines call for reducing the number of calories from solid fats, which are abundant in the diets of Americans and contribute significantly to excess calorie intake. Solid fats make up an average of 19 percent of the total calories in the average daily diet, but contribute few essential nutrients and no dietary fiber. Reducing solid fats, most commonly consumed in grain-based desserts, pizza, regular cheese, processed meat products, and fried potatoes, can reduce intake of extra calories, saturated fats, trans-fatty acids, and cholesterol.

**Saturated Fats** According to the Institute of Medicine, the total fat intake of adults over age 19 should not exceed 20 to 35 percent of their daily calories. However, the types of fatty acid consumed are more important in influencing the risk of cardiovascular disease than is the total amount of fat in the diet.

![Figure 6.4](https://example.com/figure6.4.png) **Less Food, Soda, and Salt**

**More of This, Less of That** Americans do not eat enough nutritious foods and eat too many fats, sugars, and refined grains, the government says. Here is how the average American diet compares to recommended levels.

<table>
<thead>
<tr>
<th>Percentage of recommended levels eaten</th>
<th>100% of Recommended Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole grains</td>
<td>15%</td>
</tr>
<tr>
<td>Vegetables</td>
<td>59%</td>
</tr>
<tr>
<td>Fruits</td>
<td>42%</td>
</tr>
<tr>
<td>Dairy</td>
<td>52%</td>
</tr>
<tr>
<td>Seafood</td>
<td>44%</td>
</tr>
<tr>
<td>Oils</td>
<td>61%</td>
</tr>
<tr>
<td>Fiber</td>
<td>40%</td>
</tr>
<tr>
<td>Potassium</td>
<td>56%</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>28%</td>
</tr>
<tr>
<td>Calcium</td>
<td>75%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percentage over the recommended limit eaten</th>
<th>100% of Recommended Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid fats and added sugars</td>
<td>180%</td>
</tr>
<tr>
<td>Refined grains</td>
<td>100%</td>
</tr>
<tr>
<td>Sodium</td>
<td>49%</td>
</tr>
<tr>
<td>Saturated fat</td>
<td>10%</td>
</tr>
</tbody>
</table>
As discussed earlier in this chapter, animal fats tend to have a higher proportion of saturated fatty acids (the major exception is seafood), and plant foods tend to have a higher proportion of monounsaturated or polyunsaturated fatty acids or both.

The body makes adequate amounts of saturated fatty acids, and people have no dietary need for more. The Dietary Guidelines recommend consuming less than 10 percent of calories from saturated fatty acids and replacing them with monounsaturated or polyunsaturated fatty acids or both. Lowering saturated fats even more—to 7 percent of total calories—can further reduce the risk of cardiovascular disease.

To reduce your saturated fat intake:

- **Cut back on the major sources of saturated fats** in your diet: regular (full-fat) cheese, pizza, grain-based desserts (cakes, cookies, pies, sweet rolls, pastries, doughnuts, etc.), dairy-based desserts (ice cream, frozen yogurt, milkshakes, pudding, etc.), sausages, franks, bacon, and ribs.

- **Switch to nonfat or low-fat milk and dairy products.**

- **When preparing or ordering fish, choose grilled, baked, broiled, or poached fish,** not fried. Fried fish at fast food restaurants is often low in omega-3 fatty acids and high in trans and saturated fats.

- **Trim all visible fat from meat.**

- **Use oils that are rich in monounsaturated fatty acids,** such as canola, olive, and safflower oils, or polyunsaturated fatty acids, such as soybean, corn, and cottonseed oils.

**Trans-Fatty Acids** These substances, found naturally in some foods and formed during food processing, are not essential in the diet. An increased intake of trans-fatty acids has been linked with higher levels of LDL (low-density lipoprotein) and heart-harming cholesterol and greater danger of cardiovascular disease. Check nutrition labels, and avoid products high in trans-fatty acids.

**Cholesterol** The body makes more cholesterol than it uses, and people do not need additional amounts. Men are more likely than women to consume more than the recommended level of no more than 300 mg per day. The main sources of cholesterol, which is found only in animal foods, include eggs, chicken, beef, and all types of burgers.

**Added Sugars** The majority of sugars that Americans consume are added to foods during processing, during preparation, or at the table. These “added sugars” contribute an average of 16 percent of the total calories in American diets. They include high fructose corn syrup, white sugar, brown sugar, corn syrup and solids, raw sugar, malt sugar, maple and pancake syrup, fructose sweetener, liquid fructose, honey, molasses, anhydrous dextrose, and crystal dextrose. As a percentage of calories from total added sugars, the major sources of added sugars are soda, energy drinks, and sports drinks; grain-based desserts; sugar-sweetened fruit drinks; dairy-based desserts; and candy.

The Dietary Guidelines recommend reducing consumption of products with added sugars to lower your daily calorie intake. For most people, no more than 5 to 15 percent of their daily calories should come from solid fats and added sugars.

**Refined Grains** The refining of whole grains involves a process that removes vitamins, minerals, and fiber. Although most refined grains are enriched with iron, thiamin, riboflavin, niacin, and folic acid before being used as food ingredients, not all of the vitamins and minerals and none of the dietary fiber are routinely added back. Many refined grain products, such as cookies and cake, also are high in solid fats and added sugars.

On average Americans consume the equivalent of 6.3 ounces of refined grains per day. The recommended amount is no more than 3 ounce-equivalents. The Dietary Guidelines urge replacing refined grains with whole grains so that at least half of all the grains you consume are whole.

**Alcohol** As discussed in Chapter 13, about half of Americans regularly drink alcohol. Depending on the amount consumed, age, and other factors, alcohol can have harmful or beneficial effects. However, there is no nutritional need for alcohol. The Dietary Guidelines note that no one should begin drinking or drink more frequently on the basis of potential health benefits because moderate alcohol consumption, though associated with a lower risk of cardiovascular disease, also is linked with an increased risk of breast cancer, violence, drowning, and injuries from falls and motor vehicle crashes.
Foods and Nutrients to Increase

Even though many Americans have been consuming more calories, they are not getting enough of certain foods, including vegetables, fruits, whole grains, dairy products, and oils, and several nutrients, including potassium, dietary fiber, calcium, and vitamin D.

**Vegetables and Fruits**  The *Dietary Guidelines* recommend eating more vegetables and fruits for three reasons: They provide many nutrients that are underconsumed by many Americans. They lower the risk of many chronic illnesses and of cardiovascular disease (including heart attack and stroke) and may protect against certain types of cancer. And, when prepared without added fats or sugars, most are relatively low in calories.

Americans between the ages of 19 and 30 consume more than half of their fruit intake as juice. Juice labeled “100 percent” juice (not sweetened products with minimal juice content) can be part of a healthful diet, but it lacks fiber and can contribute extra calories. The *Dietary Guidelines* recommend whole fruits, including fresh, canned (in juice rather than syrup), frozen, and dried forms.

Fewer than a third of American adults eat the recommended amounts of fruits and vegetables. College-age young adults between ages 18 and 24 eat the fewest vegetables. Nearly four-fifths of this group don’t put vegetables on their plates—or scrape them to the side if they do.

Greater consumption of fruits and vegetables (5 to 13 servings or 2½ to 6½ cups per day, depending on how many calories you burn) may reduce the risk of stroke, certain cancers, and type 2 diabetes (vegetables more so than fruit) as well as helping reach and maintain a healthy weight. There is an inverse relationship between fruit and vegetable consumption and the risk factors for cardiorespiratory disease. Plant-based foods also reduce the risk of rectal cancer in both men and women. To increase the fruits and vegetables in your diet, fill half of your plate with them. (See How Do You Compare? Are You Eating Your Veggies?)

Among the ways to increase your fruit and vegetable intake:

- **Toss fruit into a green salad** for extra flavor, variety, color, and crunch.
- **Start the day with a daily double**: a glass of juice and a banana or other fruit on cereal.
- **Buy pre-cut vegetables** for snacking or dipping (instead of chips).
- **Make or order sandwiches** with extra tomatoes or other vegetable toppings.

**Whole Grains**  Less than 5 percent of Americans consume the minimum recommended amount of whole grains—about 3 ounce-equivalents a day—which can reduce the risk of diabetes and cardiovascular disease. Half of the grains you consume every day should be whole grains. To get more grains in your diet:

- **Check labels of rolls and bread**, and choose those with at least 2 to 3 grams of fiber per slice.
Walnuts, almonds, and pistachios—reduce risk factors for cardiovascular disease but, because they are high in calories, should be eaten only in small amounts.

The 2010 Dietary Guidelines include a new quantitative recommendation for seafood: 8 or more ounces a week or about 20 percent of total protein intake. Currently Americans consume about 3.5 ounces of seafood every week. Because it is rich in omega-3 fatty acids, seafood has been linked with fewer cardiac deaths among individuals with or without cardiovascular disease. These benefits outweigh the risks associated with methyl mercury, a heavy metal found in varying levels in different types of seafood. The types of seafood that are generally lower in mercury include salmon, anchovies, herring, sardines, Pacific oysters, trout, and Atlantic and Pacific mackerel (not king mackerel, which is high in mercury).

Oils

As discussed previously, fats with a high percentage of monounsaturated and polyunsaturated fatty acids are usually liquid at room temperature and so are referred to as oils. The Dietary Guidelines recommend replacing some solid fats with oils in order to lower cholesterol and promote heart health. However, because oils are high in calories, you should use them in small amounts. Some easy ways to replace solid fats are:

- **Add brown rice or barley** to soups.
- **Choose whole-grain**, ready-to-eat cereals.
- **Have a whole-grain cereal for breakfast**. According to a recent study, people who eat breakfast cereal generally eat less total fat, saturated fat, and sugar than those who do not and have better intakes of protein and important micronutrients, such as iron, vitamins, and calcium, throughout the day.†

**Milk and Milk Products** Dairy products provide many nutrients, including calcium, vitamin D, and potassium, and may improve bone health, lower blood pressure, and reduce the risk of cardiovascular disease and type 2 diabetes. The Dietary Guidelines recommend three cups a day or the equivalent for adults—ideally from no-fat or low-fat dairy products. Soy beverages fortified with calcium and vitamins A and D are considered part of the dairy product food group.

**Protein Foods** These include seafood (both fish and shellfish), meat, poultry, eggs, beans and peas, soy products, and nuts. In addition to protein, these foods provide B vitamins, vitamin E, iron, zinc, and magnesium. Meat, poultry, and eggs are the most commonly consumed protein foods. The Dietary Guidelines recommend a balanced variety of protein sources to get more nutrients and health benefits. Certain nuts—peanuts, walnuts, almonds, and pistachios—reduce risk factors for cardiovascular disease but, because they are high in calories, should be eaten only in small amounts.

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with liquid fats are to use vegetable oils instead of butter for cooking and to use a soft margarine rather than stick margarine or butter. (See Figure 6.4.)

Nutrients of Concern The Dietary Guidelines also recommend that Americans get adequate levels of several key nutrients, including potassium (discussed on page 163), dietary fiber (page 156), vitamin D (page 160), vitamin B₁₂, calcium (page 166), iron (page 161), and folate (page 163).

Building Healthy Eating Patterns

There is no one “right” way to eat. As the Dietary Guidelines note, a healthy eating pattern is not a rigid prescription but an array of options that can accommodate cultural, ethnic, traditional, and personal preferences as well as food costs and availability.

Although healthy eating patterns vary around the world, most share common elements: They are abundant in vegetables and fruits. Many emphasize whole grains. They include moderate amounts and a variety of foods high in protein (seafood, beans and peas, nuts, seeds, soy products, meat, poultry, and eggs). They include only limited amounts of food high in added sugars and may include more oils than solid fats. Most are low in full-fat dairy products, although some include substantial amounts of low-fat milk and milk products. Compared to typical American diets, these patterns tend to have a high unsaturated to saturated fat ratio and a high dietary fiber and potassium content. Some are also relatively low in sodium compared to current American intake.

Among the research-based healthy eating patterns are the United States Department of Agriculture (USDA) Food Patterns, the Dietary Approaches to Stop Hypertension (DASH) Plan, and the Mediterranean Diet.

MyPlate

In 2011 the USDA introduced a new food pattern icon: MyPlate. Rather than providing specific directives, it serves as a visual reminder for healthy eating. (See Figure 6.5.) The general messages it conveys reflect the key themes of the most recent Dietary Guidelines:

Your Strategies for Change

Creating a Healthy Eating Pattern

- Limit calorie intake to the amount needed to attain or maintain a healthy weight.
- Consume foods from all food groups in nutrient-dense forms and in recommended amounts.
- Reduce intake of solid fats.
- Replace solid fats with oils.
- Reduce intake of added sugars.
- Reduce intake of refined grains and replace some refined grains with whole grains.
- Reduce intake of sodium.
- If consumed, limit alcohol intake to moderate levels.
- Increase intake of vegetables and fruits.
- Increase intake of whole grains.
- Increase intake of milk and milk products and replace whole milk and full-fat milk products with fat-free or low-fat choices to reduce solid fat intake.
- Increase seafood intake by replacing some meat or poultry with seafood.

Balancing Calories

- Enjoy your food, but eat less.
- Avoid oversized portions.

Foods to Increase

- Make half your plate fruits and vegetables.
- Make at least half your grains whole grains.
- Switch to fat-free or low-fat (1%) milk.

Foods to Reduce

- Compare sodium in foods like soup, bread, and frozen meals, and choose those with lower numbers.
- Drink water instead of sugary drinks.

MyPlate vs. the MyPyramid System

The MyPyramid Food Guidance System, developed in 2005, presented several key themes:

- Variety. Eating foods from all food groups and subgroups.
The most recent food pattern from the USDA reminds Americans to balance calories, increase foods such as fruits and vegetables, and drink fat-free or low-fat milk.

- **Proportionality.** Eating more of some foods (fruits, vegetables, whole grains, fat-free or low-fat milk products) and less of others (foods high in saturated or trans fats, added sugars, cholesterol, salt, and alcohol).

- **Moderation.** Choosing forms of foods that limit intake of saturated or trans fats, added sugars, cholesterol, salt, and alcohol.

- **Activity.** Being physically active every day.

Critics of the MyPyramid System charged that it did not go far enough in urging Americans to cut back on harmful fats and simple carbohydrates and also lumped together various protein sources (red meat, poultry, fish, and beans) as equally healthy. MyPlate is designed to address these and other issues.

**The USDA Food Patterns.** These approaches identify daily amounts of foods to eat from five major food groups and subgroups: vegetables, fruits and juices, grains, milk and milk products, and protein foods. (See Table 6.7). They also include an allowance for oils and limits on the maximum number of calories that should be consumed from solid fats and added sugars. Amounts and limits are given at different calorie levels, ranging from 1,000 to 3,200. All the USDA Food Patterns emphasize selection of...
a variety of foods in nutrient-dense forms—that is, with little or no solid fats and added sugars—from each food group.

The USDA Food Patterns include a vegan pattern, which consists of only plant foods and substitutes calcium-fortified beverages and foods for dairy products, and a lacto-ovo-vegetarian pattern, which includes milk, milk products, and eggs.

**The DASH Eating Plan** DASH emphasizes vegetables, fruits, and low-fat milk and milk products; includes whole grains, poultry, seafood, and nuts; and is lower in sodium, red and processed meats, sweets, and sugar-containing beverages than typical intakes in the United States. In research studies, DASH approaches have proven to lower blood pressure, improve blood lipids, and reduce the risk of cardiovascular disease.

**The Mediterranean Diet** Because many cultures and agricultural patterns exist in the countries that border the Mediterranean Sea, the “Mediterranean diet” is not one set way of eating but an eating pattern that emphasizes vegetables, fruits and nuts, olive oil, and grains (often whole grains), with only small amounts of meats and full-fat milk and milk products.

Scientists have identified antioxidants in red wine and olive oil that may account for the beneficial effects on the heart of the Mediterranean diet, which features lots of fruits and vegetables, legumes, nuts, and grains (see Figure 6.6). The Mediterranean diet also has beneficial effects on the lungs, reducing the risk of asthma and progressive lung disease as well as cardiovascular disease. The more closely individuals adhere to the diet, the greater the benefits to their hearts’ health.

**Vegetarian Diets** Not all vegetarians avoid all meats. Some, who call themselves **lacto-ovo-pesco-vegetarians**, eat dairy products, eggs, and fish but not red meat. **Lacto-vegetarians** eat dairy products as well as grains, fruits, and vegetables; **ovo-lacto-vegetarians** also eat eggs. Pure vegetarians, called **vegans**, eat only plant foods; often they take vitamin B₁₂ supplements because that vitamin is normally found only in animal products. If they select their food with care, vegetarians can get sufficient amounts of protein, vitamin B₁₂, iron, and calcium without supplements.
The key to getting sufficient protein from a vegetarian diet is understanding the concept of complementary proteins. Recall that meat, poultry, fish, eggs, and dairy products are complete proteins that provide the nine essential amino acids—substances that the human body cannot produce itself. Incomplete proteins, such as legumes or nuts, may have relatively low levels of one or two essential amino acids but fairly high levels of others. By combining complementary protein sources, vegetarians can make sure their bodies make the most of the nonanimal proteins they eat. Many cultures rely heavily on complementary foods for protein. In Middle Eastern cooking, sesame seeds and chickpeas are a popular combination; in Latin American dishes, beans and rice, or beans and tortillas; in Chinese cuisine, soy and rice.

According to the Dietary Guidelines, vegetarians can best meet their nutrient needs by paying special attention to protein, iron, vitamin B₁₂, calcium, and vitamin D. Instead of a 6-ounce serving of meat, they can substitute one egg, 1.5 ounces of nuts, or two-thirds cup of legumes. Those who avoid milk because of its lactose content may obtain all the nutrients of milk by using lactose-reduced milk or eating other calcium-rich foods, such as broccoli, calcium-fortified orange juice, and fortified soy milk.

Vegetarian diets have proven health benefits. Studies show that vegetarians’ cholesterol levels are low, and vegetarians are seldom overweight. As a result, they’re less apt to be candidates for heart disease than those who consume large quantities of meat. Vegetarians also have lower incidences of breast, colon, and prostate cancer; high blood pressure; and osteoporosis.

The Way We Eat

Your ethnic background and family makeup influenced the way you ate as a child. In college, you probably will find yourself eating in different—and not necessarily better—ways. Because the United States is so diverse, you also will have the opportunity to sample the cuisines of many cultures. However, in this country and others, many do not have enough to eat.

His Plate, Her Plate: Gender and Nutrition

Men and women do not need to eat different foods, but their nutritional needs are different. Because most men are bigger and taller than most women, they consume more calories. On average, a moderately active 125-pound woman needs 2,000 calories a day; a 175-pound man with a similar exercise pattern needs 2,800 calories. Eating more means it’s easier for men to get the nutrients they need, even though many don’t make the wisest food choices.

Women, particularly those who restrict their caloric intake or are chronically dieting, are more likely to develop specific deficiencies. Calcium is one example. Many teenage girls and young women under age 30 do not consume the recommended 800 to 1200 milligrams of calcium daily and may be at increased risk of bone-weakening osteoporosis.

Many women also get too little iron. Even in adolescence, girls are more prone to iron deficiency than boys; some suffer memory and learning impairments as a result. In adult women, menstrual blood loss and poor eating habits can lead to low iron stores, which puts them at risk for anemia. According to U.S. Department of Agriculture research, most women consume only 60 percent of the recommended 18 milligrams of iron per day. (The recommendation for men is 8 milligrams.) Regular blood tests can monitor a woman’s iron status.

Both genders should increase their fruit and vegetable intake to ensure that they are getting adequate amounts of vitamins and fiber in their daily diet.

Here are some gender-specific strategies for better nutrition:

- **Men should cut back on fat and meat** in their diets, two things they eat too much.
- **Women should increase their iron intake** by eating meat (iron from animal sources is absorbed better than that from vegetable sources) or a combination of meat and vegetable iron sources together (for example, a meat and bean burrito). Those with iron deficiencies should consult a physician. Because large doses of iron can be toxic, iron supplements should be taken only with medical supervision.

Health in Action

Make Small Healthy Changes

You don’t have to change everything you eat all at once to improve your diet. Even small changes can make a big difference. Here are some starting steps:

**Do**

- Choose a healthy snack: an apple, peanut butter on whole-wheat crackers, or a small handful of nuts, sunflower seeds, and dried fruit instead of a bag of chips.
- Add a salad to your lunch or dinner (use low-fat dressing!).
- At one meal (or more) a day, drink water or skim milk.

**Don’t**

- Supersize your fries.
- Eat when you are feeling lonely or sad.
- Choose a candy bar at the vending machine; choose trail mix instead.

In your online journal, keep track of ways you are changing your food choices on a calendar. At the end of every week, look back at what you’re doing differently. At the end of the month, tally up the healthy choices you’ve made.

lacto-vegetarians People who eat dairy products as well as fruits and vegetables (but not meat, poultry, or fish).

ovo-lacto-vegetarians People who eat eggs, dairy products, and fruits and vegetables (but not meat, poultry, or fish).

vegans People who eat only plant foods.
Section II  Healthy Lifestyles

Campus Cuisine: How College Students Eat

Often on their own for the first time, college students typically change their usual eating patterns. In one survey, 59 percent of freshmen said their diet had changed since they began college. When they are making meal choices, the top two influences on students are price and convenience, with nutrition coming in third. However, eating right doesn’t have to cost more. (See Health on a Budget.)

According to various national samples, many students do not consume adequate amounts of fruits and vegetables and consume too many fried and fast foods. In one study that followed students through their freshman and sophomore years, more than half remained in the precontemplation stage for adopting healthier eating behaviors throughout this time. Only 30 percent of the students consumed at least five fruits and vegetables daily; more than half reported eating high-fat fried or fast foods at least three times during the previous week.

The proportion of 18- to 24-year-olds who eat the recommended amounts of fruits and vegetables is generally lower than in the population as a whole. College men eat fewer fruits and vegetables than women do; Caucasian and Asian students eat more than African American undergraduates. Both African American and Hispanic students consume less than multiracial or other racial/ethnic groups.

Student fruit-and-veggie eaters differ in other ways. According to an analysis of data from the ACHA-NCHA survey, they are more likely to exercise, use sunscreen, wear seatbelts and helmets, get more sleep, examine their breasts or testicles, report better health—and get better grades. They also are less likely to smoke, drink (and drink and drive), and feel hopeless. Researchers have found an association between higher fruit and vegetable consumption and lower BMI.

Time pressures often affect students’ food choices. More than half say they tend to eat on the run, and they consume more soft drinks, fast food, total fat, and saturated fat. A significant number of undergraduates—35 percent of men...
and 42 percent of women—feel they don’t have time to sit down and share a meal with friends or family. Yet students who take time for a social meal make better food choices, including eating more fruits and vegetables.15

Some colleges are doing their part to improve student nutrition. Many post nutritional information in dining halls; some have expanded their offerings to include more salads, fewer fried foods, and more ethnic dishes. On some campuses, students are taking the lead in demanding more healthful, fresher, and more varied dishes in their dining halls. (See Health in Action: Make Small Healthy Changes.)

**Fast Food: Nutrition on the Run**

On any given day, about 25 percent of adults in the United States go to a fast-food restaurant. The typical American consumes three hamburgers and four orders of french fries every week. Many fast foods are high in calories, sugar, salt, and fat and low in beneficial nutrients (see Consumer Alert on page 178). A Burger King Whopper with cheese contains 760 calories and 47 grams of fat, 16 grams from saturated fat. A McDonald’s Sausage McMuffin with egg has 450 calories and 27 grams of fat, 10 grams from saturated fat. Many fast-food chains have switched from beef tallow or lard to unsaturated vegetable oils for frying, but the total fat content of the foods remains the same.

When provided with nutrition information on fast-food choices, college women chose meals significantly lower in calories than women who did not get such information. However, information on calories and nutrition had no effect on men’s choices.16

**You Are What You Drink**

About 20 percent of the calories consumed by Americans over age 2 come from sweetened beverages, predominantly soft drinks and fruit drinks. The consumption of sweetened beverages has surged in recent decades. Calories from these drinks, which some call “liquid candy,” account for half the rise in caloric intake by Americans since the 1970s.

According to a national survey, two-thirds of adults drink sugar-sweetened beverages, averaging 28 ounces per drink and almost 300 calories daily (15 percent of recommended total calories). Young adults, particularly those with lower incomes and education, consume the most soda.

Frugal Food Choices

Many people feeling a budget squeeze opt for the cheapest foods they can find, even if they’re high in fat and calories and low in nutrients. Such short-term choices can lead to long-term health problems. Here are some ways to eat healthfully for less.

- **Drink tap water.** It’s cheaper than bottled and just as safe. Don’t waste money on fortified drinks, which offer no proven additional nutritional value. Sugar-sweetened drinks add extra calories as well as extra costs.

- **Consider the cost of convenience.** Prepackaged grab-and-go items such as individual packets of baby carrots or crackers and cheese may be handy but cost more. Buy larger bags or boxes and create your own easy-carry single servings with small reusable containers.

- **Avoid fad fruits.** Pomegranates and other exotic fruits are indeed rich in antioxidants but are much cheaper oranges and seasonal berries.

- **Freeze.** If you have access to a freezer, take advantage of grocery store sales and stock up on frozen fruits and vegetables, which—thanks to advances in preservation and freezing methods—provide plenty of nutrients.

- **Bulk up.** Join with your roommates or friends and check for low prices on large quantities at the local co-op as well as national mega-stores.

- **Eat seasonally.** Take advantage of the low prices on watermelon in summer or apples in autumn.

- **Look for an Asian grocery store,** if you’re a vegan and eat a lot of ramen dishes. Ramen usually costs much less at such stores, but be sure to ask for vegetarian ramen.

**Health on a Budget**

**Frugal Food Choices**

Water—tap or bottled, sparkling or still, chilled or room temperature—is the medical experts’ beverage of choice. But don’t think that “fortified” or “enriched” water is better. There is no evidence that nutrients added to water confer any health benefits. Consumers who assume they’re getting vitamins in their drinks may think they don’t need to eat healthful foods and could end up shortchanging themselves of vital nutrients.

**Soft Drinks** According to a national survey, two-thirds of adults drink sugar-sweetened beverages, averaging 28 ounces per drink and almost 300 calories daily (15 percent of recommended total calories). Young adults, particularly those with lower incomes and education, consume the most soda.
Many dining halls are providing nutritional information and more healthful food options for students.

These beverages can add five pounds every year. Cutting 300 liquid calories from your daily intake by cutting out sweetened beverages would translate into a 2.5-pound loss every month. In a recent review of 88 studies, researchers linked soft drinks with increased calorie intake, higher body weight, lower consumption of calcium and other nutrients, and greater risk of other medical problems, such as diabetes. Women who consume two or more cans of soda daily are almost twice as likely as other women to show early evidence of kidney disease. No one knows if the culprit is the amount of sugar they consume or the type. Some samples of the high-fructose syrup used to make and preserve soda have contained mercury, which is toxic to the kidneys.

Researchers also have found a strong association between soft drink consumption and greater risk of heart disease. A single daily soft drink, either diet or regular, also increases the likelihood of metabolic syndrome. Sweetened iced tea and many carbonated beverages can damage tooth enamel, especially when not consumed with food. Drinking regular and diet cola has been linked with the thinning of hip bones in women. People who consume a lot of soft drinks generally take in more calories than others—and not just from the beverages. Instead of satisfying a sweet tooth, soft drinks seem to do the opposite. Although researchers cannot explain exactly why, soft drinks may increase hunger or decrease feelings of satiety or fullness. Even diet drinks made with artificial sweeteners may “condition” people to eat more sweets.

College students say they consume sugar-sweetened beverages—including soft drinks, energy drinks, and fruit-based drinks—on social occasions, sometimes mixed with alcohol. Some think of these drinks as part of the enjoyment

CONSUMER ALERT

More Healthful Fast-Food Choices

Facts to Know
Fast-food restaurants may be the cheapest option, but unfortunately, they are not usually the most healthful one.

• Eating just one fast-food meal can pack enough calories, sodium, and fat for an entire day.
• Just two or more high-fat fast-food meals a week have been linked to increased risk of diabetes.
• Seemingly healthful choices, such as a “Mac Snack Wrap,” can be low in calories (330) but extremely high in fat (19 grams).

Steps to Take
• Drink water instead of soda. One 32-ounce Big Gulp with regular cola packs about 425 calories.
• Eat your food naked. Avoid calorie- and fat-packed spreads, cheese, sour cream, and so on. If you sample the salad bar, steer clear of mayonnaise, bacon bits, oily vegetable salads, and rich dressings.
• Choose small portions. Since an average fast-food meal can run as high as 1,000 calories or more, don’t supersize anything. A single serving often provides enough for two meals. Take half home or divide with a friend.
• Hold the salt. Fast-food restaurant food tends to be very high in sodium, so don’t add any more.

See the table on the following page for some specific choices.
A Fast-Food Nutrition Survival Guide

<table>
<thead>
<tr>
<th><strong>Less Healthful Choices</strong></th>
<th><strong>More Healthful Choices</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Burger Chains</strong></td>
<td></td>
</tr>
<tr>
<td>Double-patty hamburger with cheese, mayo, special sauce, and bacon</td>
<td>Regular, single-patty hamburger without mayo or cheese</td>
</tr>
<tr>
<td>Fried chicken sandwich</td>
<td>Grilled chicken sandwich</td>
</tr>
<tr>
<td>Fried fish sandwich</td>
<td>Veggie burger</td>
</tr>
<tr>
<td>Salad with toppings such as bacon, cheese, and ranch dressing</td>
<td>Garden salad with grilled chicken and low-fat dressing</td>
</tr>
<tr>
<td>Breakfast burrito with steak</td>
<td>Egg on a muffin</td>
</tr>
<tr>
<td>French fries</td>
<td>Baked potato or a side salad</td>
</tr>
<tr>
<td>Milkshake</td>
<td>Yogurt parfait</td>
</tr>
<tr>
<td>Chicken “nuggets” or tenders</td>
<td>Grilled chicken strips</td>
</tr>
<tr>
<td>Adding cheese, extra mayo, and special sauces</td>
<td>Limiting cheese, mayo, and special sauces</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Fried Chicken Chains</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fried chicken, original or extra-crispy</td>
<td>Skinless chicken breast without breading</td>
</tr>
<tr>
<td>Teriyaki wings or popcorn chicken</td>
<td>Honey BBQ chicken sandwich</td>
</tr>
<tr>
<td>Caesar salad</td>
<td>Garden salad</td>
</tr>
<tr>
<td>Chicken and biscuit “bowl”</td>
<td>Mashed potatoes</td>
</tr>
<tr>
<td>Adding extra gravy and sauces</td>
<td>Limiting gravy and sauces</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Taco Chains</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Crispy shell chicken taco</td>
<td>Grilled chicken soft taco</td>
</tr>
<tr>
<td>Refried beans</td>
<td>Black beans</td>
</tr>
<tr>
<td>Steak chalupa</td>
<td>Shrimp ensalada</td>
</tr>
<tr>
<td>Crunch wraps or gordita-type burritos</td>
<td>Grilled “fresco”-style steak burrito</td>
</tr>
<tr>
<td>Nachos with refried beans</td>
<td>Veggie and bean burrito</td>
</tr>
<tr>
<td>Adding sour cream or cheese</td>
<td>Limiting sour cream or cheese</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sub, Sandwich, and Deli Choices</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Foot-long sub</td>
<td>Six-inch sub</td>
</tr>
<tr>
<td>High-fat meat such as ham, tuna salad, bacon, meatballs, or steak</td>
<td>Lean meat (roast beef, chicken breast, lean ham) or veggies</td>
</tr>
<tr>
<td>The “normal” amount of higher-fat (cheddar, American) cheese</td>
<td>One or two slices of lower-fat cheese (Swiss or mozzarella)</td>
</tr>
<tr>
<td>Adding mayo and special sauces</td>
<td>Low-fat dressing or mustard instead of mayo</td>
</tr>
<tr>
<td>An “as is” sub with all the toppings</td>
<td>Extra veggie toppings</td>
</tr>
<tr>
<td>White bread or “wraps,” which are often higher in fat than normal bread</td>
<td>Choosing whole-grain bread or taking the top slice off your sub and eating it open-faced</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Asian Food Choices</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fried egg rolls, spare ribs, tempura</td>
<td>Egg drop, miso, wonton, or hot and sour soup</td>
</tr>
<tr>
<td>Battered or deep-fried dishes (sweet and sour pork, General Tso’s chicken)</td>
<td>Stir-fried, steamed, roasted, or broiled entrées (shrimp chow mein, chop suey)</td>
</tr>
<tr>
<td>Deep-fried tofu</td>
<td>Steamed or baked tofu</td>
</tr>
<tr>
<td>Coconut milk, sweet and sour sauce, regular soy sauce</td>
<td>Sauces such as ponzu, rice-wine vinegar, wasabi, ginger, and low-sodium soy sauce</td>
</tr>
<tr>
<td>Fried rice</td>
<td>Steamed brown rice</td>
</tr>
<tr>
<td>Salads with fried or crispy noodles</td>
<td>Edamame, cucumber salad, stir-fried veggies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Italian and Pizza Restaurant Choices</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Thick-crust pizza with extra cheese and meat toppings</td>
<td>Thin-crust pizza with half the cheese and extra veggies</td>
</tr>
<tr>
<td>Garlic bread</td>
<td>Plain rolls or breadsticks</td>
</tr>
<tr>
<td>Antipasto with meat</td>
<td>Antipasto with vegetables</td>
</tr>
<tr>
<td>Pasta with cream or butter-based sauce</td>
<td>Pasta with tomato sauce and veggies</td>
</tr>
<tr>
<td>Entrée with side of pasta</td>
<td>Entrée with side of veggies</td>
</tr>
<tr>
<td>Fried (“frito”) dishes</td>
<td>Grilled (“griglia”) dishes</td>
</tr>
</tbody>
</table>
of going to a movie or hanging out with friends; others drink more caffeinated beverages at exam times. Even when aware of negative health consequences, most do not feel these consequences pertain to them.

**Energy Drinks** Coffee and tea, which both contain caffeine, are the classic “pick-me-up” beverages. As discussed in Chapter 12, regular coffee consumption may reduce the risk of several serious illnesses—including type 2 diabetes, colon cancer, and Parkinson’s disease—and may protect against age-related memory and thinking defects. However, in adolescents and young adults, caffeine has been linked to elevated blood pressure and impaired sleep.

![Image](image_url)

The practice of mixing energy drinks with alcohol (discussed in Chapter 12) is especially dangerous. The FDA has identified caffeine as an unsafe food additive to alcoholic beverages and banned sale of pre-mixed alcoholic energy drinks. However, many college students add alcohol to energy drinks and assume that the caffeine counteracts the adverse effects of alcohol. In fact, caffeine may reduce sleepiness, but it leads to a state some call “wide-awake drunkenness,” in which drinkers cannot fully assess their true level of impairment and are more likely to engage in risky behaviors, such as driving while intoxicated.17

Consumption of energy drinks such as Red Bull and Rockstar has more than doubled in the last three years, particularly among young people. The main ingredient in these drinks, including diet brands, is caffeine, sometimes in doses that can cause physical and psychological complications, including disrupted sleep, exaggerated stress response, heart palpitations, and increased risk of high blood pressure.

Red Bull, for instance, contains nearly 80 mg of caffeine per can, about the same amount of caffeine as a cup of brewed coffee and twice the caffeine of a cup of tea. Other energy drinks contain several times this amount—see Table 6.8.

<table>
<thead>
<tr>
<th>Type of Drink</th>
<th>Amount of Caffeine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular cola (12-oz can)</td>
<td>40 mg</td>
</tr>
<tr>
<td>Red Bull (8.3-oz can)</td>
<td>75 mg</td>
</tr>
<tr>
<td>Coffee (standard 8-oz cup)</td>
<td>95 mg</td>
</tr>
<tr>
<td>Monster (16-oz container)</td>
<td>140 mg</td>
</tr>
<tr>
<td>Rockstar (16-oz container)</td>
<td>240 mg</td>
</tr>
</tbody>
</table>

The drink formulations vary widely, and manufacturers make many different claims about their effects. Some brands contain fruit juices, teas, and dietary supplements such as ginseng and glucuronolactone. One can of Red Bull contains 1000 mg of taurine, a substance that plays an important role in muscle contraction (especially in the heart) and the nervous system.

Some energy drinks contain guarana, a South American herbal caffeine source that could pose additional risks. We know very little about the effects of such combinations of ingredients, which may work synergistically with caffeine to boost its stimulant power.

Millions of college students consume energy drinks for the jolt provided or because they believe the drinks enhance sports performance or sexual function. Yet health experts warn that these sugar- and caffeine-laden drinks pose serious health risks, including dehydration, accidents, and alcohol poisoning.

**Ethnic Cuisines**

Whatever your cultural heritage, you have probably sampled Chinese, Mexican, Indian, Italian, and Japanese foods. If you belong to any of these ethnic groups, you may eat these cuisines regularly. Each type of ethnic cooking has its own nutritional benefits and potential drawbacks.

The cuisine served in Mexico features rice, corn, and beans, which are low in fat and high in nutrients. However, the dishes Americans think of as Mexican are far less healthy. Burritos, especially when topped with cheese and sour cream, are very high in fat. Although guacamole has a high fat content, it contains mostly monounsaturated fatty acids, a better form of fat.

African American cuisine traces some of its roots to food preferences from west Africa (for example, peanuts, okra, and black-eyed peas), as well as to traditional American foods, such as fish, game, greens, and sweet potatoes. It uses many nutritious vegetables, such as collard greens and sweet potatoes, as well as legumes. However, some dishes include high-fat food products such as peanuts and pecans or involve frying, sometimes in saturated fat.

The mainland Chinese diet, which is plant-based, high in carbohydrates, and low in fats and animal protein, is considered one of the most healthful in the world. However, Chinese restaurants in the United States serve more meat and sauces than are generally eaten in China. According to laboratory tests of typical take-out dishes from Chinese restaurants, many have more fats and cholesterol than hamburger or egg dishes from fast-food outlets.
Table 6.9 summarizes some of the ethnic food choices by food group.

<table>
<thead>
<tr>
<th>Ethnic Food Choices</th>
<th>Grains</th>
<th>Vegetables</th>
<th>Fruits</th>
<th>Meats and Legumes</th>
<th>Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian</td>
<td>Rice, noodles, millet</td>
<td>Amaranth, baby corn, bamboo shoots, chayote, bok choy, mung bean sprouts, sugar peas, straw mushrooms, water chestnuts, kelp</td>
<td>Carambola, guava, kumquat, lychee, persimmon, melons, mandarin orange</td>
<td>Soybeans and soy products such as soy milk and tofu, squid, duck eggs, pork, poultry, fish and other seafood, peanuts, cashews</td>
<td>Usually excluded</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>Pita pocket bread, pastas, rice, couscous, polenta, bulgur, focaccia, Italian bread</td>
<td>Eggplant, tomatoes, peppers, cucumbers, grape leaves</td>
<td>Olives, grapes, figs</td>
<td>Fish and other seafood, gyros, lamb, chicken, beef, pork, sausage, lentils, fava beans</td>
<td>Ricotta, provolone, parmesan, feta, mozzarella, and goat cheeses; yogurt</td>
</tr>
<tr>
<td>Mexican</td>
<td>Tortillas (corn or flour), taco shells, rice</td>
<td>Chayote, corn, jicama, tomato salsa, cactus, cassava, tomatoes, yams, chilies</td>
<td>Guava, mango, papaya, avocado, plantain, bananas, oranges</td>
<td>Refried beans, fish, chicken, chorizo, beef, eggs</td>
<td>Cheese, custard</td>
</tr>
</tbody>
</table>

Traditional French cuisine, which includes rich, high-fat sauces and dishes, has never been considered healthful. Yet, nutritionists have been stumped to explain the so-called French paradox. Despite a diet high in saturated fats, the French have had one of the lowest rates of coronary artery disease in the world. The French diet increasingly resembles the American diet, but French portions tend to be one-third to one-half the size of American portions.

Many Indian dishes highlight healthful ingredients such as vegetables and legumes (beans and peas). However, many also use ghee (a form of butter) or coconut oil; both are rich in harmful saturated fats. The best advice in an Indian restaurant is to ask how each dish is prepared. Good choices include dal or dal (lentils), karbi or karni (chickpea soup), and chapati (tortilla-like bread).

The traditional Japanese diet is very low in fat, which may account for the low incidence of heart disease in Japan. Dietary staples include soybean products, fish, vegetables, noodles, and rice. A variety of fruits and vegetables are also included in many dishes. However, Japanese cuisine is high in salted, smoked, and pickled foods. Watch out for deep-fried dishes such as tempura and salty soups and sauces.

Table 6.9 summarizes some of the ethnic food choices by food group.

**Taking Charge of What You Eat**

You can’t control what you don’t know. Because of the Nutrition Labeling and Education Act, food manufacturers must provide information about fat, calories, and ingredients in large type on packaged food labels, and they must show how a food item fits into a daily diet of 2,000 calories. The law also restricts nutritional claims for terms such as healthy, low-fat, and high-fiber.

A growing number of cities and states are mandating calorie-posting by fast-food restaurants. Some national health reform proposals would require restaurant chains to post the number of calories, grams of saturated fat, and milligrams of sodium next to menu items, although menu labeling has not proven to affect dietary choices. Often the problem is not a lack of information, health officials note, but a lack of self-control. You can find detailed nutritional...
information for restaurants of all price levels at www.healthydiningfinder.com.

In evaluating food labels and product claims, keep in mind that while individual foods vary in their nutritional value, what matters is your total diet. If you eat too much of any one food—regardless of what its label states—you may not be getting the variety and balance of nutrients that you need.

**Portions and Servings**

Consumers often are confused by what a serving actually is, especially since many American restaurants have supersized the amount of food they put on their customers’ plates. The average bagel has doubled in size in the last 10 to 15 years. A standard fast-food serving of french fries is larger in the United States than in the United Kingdom.

A food-label serving is a specific amount of food that contains the quantity of nutrients described on the Nutrition Facts label. A portion is the amount of a specific food that an individual eats at one time. Portions can be bigger or smaller than the servings on food labels. According to nutritionists, “marketplace portions”—the actual amounts served to customers—are two to eight times larger than the standard serving sizes defined by the USDA. In fast-food chains, today’s portions are two to five times larger than the original sizes. As studies have shown, people presented with larger portions eat 30 to 50 percent more than they otherwise would.

If you are trying to balance your diet or control your weight, it’s important to keep track of the size of your portions so that you do not exceed recommended servings. For instance, a 3-ounce serving of meat is about the size of a pack of playing cards—see Figure 6.7. If you eat a larger amount, count it as more than one serving. (See “Mind over Platter” in Making Change Happen and in Labs for IPC for more on developing greater awareness of what and how you eat.)

**How to Read Nutrition Labels**

The Nutrition Facts label on food products presents a wealth of information—if you know what to look for (Figure 6.8). The label focuses on those nutrients most clearly associated with disease risk and health: total fat, saturated fat, cholesterol, sodium, total carbohydrate, dietary fiber, sugar, and protein.

- **Calories.** Calories are the measure of the amount of energy that can be derived from food. Scientists define a calorie as the amount of energy required to raise the temperature of 1 gram of water by 1 degree Celsius. In the laboratory, the caloric content of food is measured in 1,000-calorie units called kilocalories. The calorie referred to in everyday usage is actually the equivalent of the laboratory kilocalorie.

The Nutrition Facts label lists two numbers for calories: calories per serving and calories from fat per serving. This allows consumers to calculate how many calories they’ll consume and to determine the percentage of fat in an item.

**Figure 6.7  Portion Sizes**

Quick and easy estimates of portion sizes
• **Serving size.** Rather than the tiny portions manufacturers sometimes used in the past to keep down the number of calories per serving, the new labels reflect more realistic portions. Serving sizes, which have been defined for approximately 150 food categories, must be the same for similar products (for example, different brands of potato chips) and for similar products (for example, snack foods such as pretzels, potato chips, and popcorn). This makes it easier to compare the nutritional content of foods.

• **Daily Values (DVs).** DVs refer to the total amount of a nutrient that the average adult should aim to get or not exceed on a daily basis. The DVs for cholesterol, sodium, vitamins, and minerals are the same for all adults. The DVs for total fat, saturated fat, carbohydrate, fiber, and protein are based on a 2,000-calorie daily diet—the amount of food ingested by many American men and active women, and trans fat numbers deserve special attention because of their link to several diseases.

• **Percent Daily Values (%DVs).** The goal for a full day’s diet is to select foods that together add up to 100 percent of the DVs. The %DVs show how a particular food’s nutrient content fits into a 2,000-calorie diet. Individuals who consume (or should consume) fewer than 2,000 total calories a day have to lower their DVs for total fat, saturated fat, and carbohydrates. For example, if their caloric intake is 10 percent less than 2,000 calories, they would lower the DV by 10 percent. Similarly, those who consume more than 2,000 calories should adjust the DVs upward.

• **Calories per gram.** The bottom of the food label lists the number of calories per gram for fat, carbohydrates, and protein.

People zero in on different figures on the food label—for example, calories if they’re watching their weight, specific ingredients if they have food allergies.

• **Calories from fat.** Get into the habit of calculating the percentage of fat calories in a food before buying or eating it.

Watch out for statements such as “97 percent fat-free.” All this means is that the product is 3 percent fat by weight, which has nothing to do with the percentage of fat calories per serving. A product that’s 97 percent fat-free may have as much as 30 percent of its calories from fat. See Table 6.10 for a list of the fat content of common food sources of fat including candy.

You can also figure out the percentage of fat with some simple calculations: Suppose that a slice of cherry pie provides 350 calories and 15 grams of fat. To calculate the percentage of fat calories, multiply 15 grams by 9 (the number of calories in each gram of fat), divide the result by 350 calories, and then multiply this result by 100:

\[ \text{15 grams fat } \times 9 \text{ calories/gram} = 135 \text{ calories from fat} \]
\[ \frac{135 \text{ calories}}{350 \text{ calories}} = 0.39 \]
\[ 0.39 \times 100 = 39\% \text{ of total calories from fat} \]
### Table 6.10 The Fat Content of Some Foods

<table>
<thead>
<tr>
<th>Food</th>
<th>Amount</th>
<th>Grams</th>
<th>Percentage of Total Calories from Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fat and oils</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butter</td>
<td>1 tsp</td>
<td>4.0</td>
<td>100%</td>
</tr>
<tr>
<td>Margarine</td>
<td>1 tsp</td>
<td>4.0</td>
<td>100%</td>
</tr>
<tr>
<td>Oil</td>
<td>1 tsp</td>
<td>4.7</td>
<td>100%</td>
</tr>
<tr>
<td>Mayonnaise</td>
<td>1 tbs</td>
<td>11.0</td>
<td>99%</td>
</tr>
<tr>
<td>Heavy cream</td>
<td>1 tbs</td>
<td>5.5</td>
<td>93%</td>
</tr>
<tr>
<td>Salad dressing</td>
<td>1 tbs</td>
<td>6.0</td>
<td>83%</td>
</tr>
<tr>
<td><strong>Meats and fish</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot dog</td>
<td>1 (2 oz)</td>
<td>17.0</td>
<td>83%</td>
</tr>
<tr>
<td>Bologna</td>
<td>1 oz</td>
<td>8.0</td>
<td>80%</td>
</tr>
<tr>
<td>Sausage</td>
<td>4 links</td>
<td>18.0</td>
<td>77%</td>
</tr>
<tr>
<td>Bacon</td>
<td>3 pieces</td>
<td>9.0</td>
<td>74%</td>
</tr>
<tr>
<td>Salami</td>
<td>2 oz</td>
<td>11.0</td>
<td>68%</td>
</tr>
<tr>
<td>Hamburger, regular (20% fat)</td>
<td>3 oz</td>
<td>16.5</td>
<td>62%</td>
</tr>
<tr>
<td>Chicken, fried with skin</td>
<td>3 oz</td>
<td>14.0</td>
<td>53%</td>
</tr>
<tr>
<td>Steak (rib eye)</td>
<td>3 oz</td>
<td>9.9</td>
<td>47%</td>
</tr>
<tr>
<td>Veggie pita</td>
<td>1</td>
<td>17.0</td>
<td>38%</td>
</tr>
<tr>
<td>Chicken, baked without skin</td>
<td>3 oz</td>
<td>4.0</td>
<td>25%</td>
</tr>
<tr>
<td>Flounder, baked</td>
<td>3 oz</td>
<td>1.0</td>
<td>13%</td>
</tr>
<tr>
<td>Shrimp, boiled</td>
<td>3 oz</td>
<td>1.0</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Milk and milk products</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheddar cheese</td>
<td>1 oz</td>
<td>9.5</td>
<td>74%</td>
</tr>
<tr>
<td>American cheese</td>
<td>1 oz</td>
<td>6.0</td>
<td>66%</td>
</tr>
<tr>
<td>Milk, whole</td>
<td>1 cup</td>
<td>8.5</td>
<td>49%</td>
</tr>
<tr>
<td>Cottage cheese, regular</td>
<td>1/2 cup</td>
<td>5.1</td>
<td>39%</td>
</tr>
<tr>
<td>Milk, 2%</td>
<td>1 cup</td>
<td>5.0</td>
<td>32%</td>
</tr>
<tr>
<td>Milk, 1%</td>
<td>1 cup</td>
<td>2.7</td>
<td>24%</td>
</tr>
<tr>
<td>Cottage cheese, 1% fat</td>
<td>1/2 cup</td>
<td>1.2</td>
<td>13%</td>
</tr>
<tr>
<td>Milk, skim</td>
<td>1 cup</td>
<td>0.4</td>
<td>4%</td>
</tr>
<tr>
<td>Yogurt, frozen</td>
<td>3/4 cup</td>
<td>0.0–6.6</td>
<td>0–3</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olives</td>
<td>4 medium</td>
<td>1.5</td>
<td>90%</td>
</tr>
<tr>
<td>Avocado</td>
<td>1/2</td>
<td>15.0</td>
<td>84%</td>
</tr>
<tr>
<td>Almonds</td>
<td>1 oz</td>
<td>15.0</td>
<td>80%</td>
</tr>
<tr>
<td>Sunflower seeds</td>
<td>1/4 cup</td>
<td>17.0</td>
<td>77%</td>
</tr>
<tr>
<td>Peanuts</td>
<td>1/4 cup</td>
<td>17.5</td>
<td>75%</td>
</tr>
<tr>
<td>Cashews</td>
<td>1 oz</td>
<td>13.2</td>
<td>73%</td>
</tr>
<tr>
<td>Egg</td>
<td>1</td>
<td>6.0</td>
<td>61%</td>
</tr>
<tr>
<td>Potato chips</td>
<td>1 oz (13 chips)</td>
<td>11.0</td>
<td>61%</td>
</tr>
<tr>
<td>French fries</td>
<td>20 fries</td>
<td>20.0</td>
<td>49%</td>
</tr>
<tr>
<td>Taco chips</td>
<td>1 oz (10 chips)</td>
<td>6.2</td>
<td>41%</td>
</tr>
<tr>
<td><strong>Candy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peanut butter cups, 2 regular</td>
<td>1.6 oz</td>
<td>15.0</td>
<td>54%</td>
</tr>
<tr>
<td>Milk chocolate</td>
<td>1.6 oz</td>
<td>14.0</td>
<td>53%</td>
</tr>
<tr>
<td>Almond Joy</td>
<td>1.8 oz</td>
<td>14.0</td>
<td>50%</td>
</tr>
<tr>
<td>Kit Kat</td>
<td>1.5 oz</td>
<td>12.0</td>
<td>47%</td>
</tr>
<tr>
<td>M &amp; M’s, peanut</td>
<td>1.7 oz</td>
<td>13.0</td>
<td>47%</td>
</tr>
</tbody>
</table>


- **Total fat.** Since the average person munches on 15 to 20 food items a day, it’s easy to overload on fat. Saturated fat and trans fat numbers deserve special attention because of their link to several diseases.

- **Cholesterol.** Cholesterol is made by animals and contained in products of animal origin only. Many high-fat products, such as potato chips, contain 0 percent cholesterol because they’re made from plants and are cooked in vegetable fats. However, if the vegetable fats are hydrogenated, the resulting trans fat is more harmful to the heart than cholesterol.

- **Sugars.** There is no Daily Value for sugars because health experts have yet to agree on a daily limit. The figure on the label includes naturally present sugars, such as lactose in milk and fructose in fruit, as well as those added to the food, such as table sugar, corn syrup, or dextrose.

- **Fiber.** A “high-fiber” food has 5 or more grams of fiber per serving. A “good” source of fiber provides at least 2.5 grams. “More” or “added” fiber means at least 2.5 grams more per serving than similar foods—10 percent more of the DV for fiber.

- **Calcium.** “High” equals 200 mg or more per serving. “Good” means at least 100 mg, while “more” indicates that the food contains at least 100 mg more calcium—10 percent more of the DV—than the item usually would have.

- **Sodium.** Most of us routinely get more sodium than we need. Read labels carefully to avoid excess sodium, which can be a health threat.

- **Vitamins.** A Daily Value of 10 percent of any vitamin makes a food a “good” source; 20 percent qualifies it as “high” in a certain vitamin.

### What Is Organic?

Foods certified as organic by the USDA must meet strict criteria, including:

- Processing or preservation only with substances approved by the USDA for organic foods.
- Processing without genetic modification or ionizing radiation.
• No use of most synthetic chemicals, such as pesticides, herbicides, or fertilizers.
• Fertilization without sewage sludge.
• Food-producing animals grown without medication such as antibiotics or hormones, provided with living conditions similar to their natural habitat, and fed organic feed.

The primary consumers of organic food are women ages 30 to 45 who have children at home and who are environmentally conscious. College students who are informed about organic products are more likely to choose them. In a recent study, more than half of undergraduates said they would support and purchase organic products on campus.

Are organic foods better for you? There has been limited research as to whether organic foods are nutritionally superior to conventional foods. Some studies have shown higher levels of specific nutrients, such as flavonoids, in organic produce, but no one knows if this translates into specific health benefits. However, you can avoid exposure to pesticides and other chemicals by opting for organic foods.

**Functional Foods**

As the American Dietetic Association has noted, all foods are functional at some physiological level. However, the term *functional* generally applies to a food specifically created to have health-promoting benefits. The International Food Information Council defines functional foods as those “that provide health benefits beyond basic nutrition.”

Some manufacturers are adding biologically active components such as beta-carotene to food products and promoting them as functional foods. However, the amounts added are often too low to have any effect, and many such foods are high-sugared drinks and snack foods. More research is needed to evaluate their claims of health benefits.

**Choosing Healthful Snacks**

Snacking has become more widespread on campuses, as in other places. College students snack primarily “to satisfy hunger”; the second most common reason is “no time for meals.” Other reasons for munching between meals: “for energy,” “to be sociable,” and “to relieve stress.” One-third snack at 9:00 p.m. or later.

In response to consumer demands for smart snack choices, food manufacturers are offering “better-for-you” options that are lower in salt and sugar or free of trans fat and artificial colors. Some new snack items promoted as healthful options, such as sugar-free chocolate or organic potato chips, offer little nutritional value. Meat-based snacks, increasingly popular among young men, also can be high in fat and sodium. Read labels carefully, and be sure to check total calories and fat.

A best-for-you option is fruit such as bananas, apples, or berries—rich in vitamins, low in calories, and packed with fiber. Other nutritious snacks include nuts, trail mix, granola bars, yogurt, sunflower seeds, soy nuts, and dried fruit (such as cranberries). If you enjoy fruit juice, buy 100 percent fruit juice without added sugar. Limit yourself to one serving of these calorie-rich beverages a day.

If you rely on snacks to keep you energized throughout the day, take time to plan in advance so you have choices other than the nearest vending machine. Try to prepare snacks from different food groups: low- or no-fat milk and a few graham crackers, for instance, or celery sticks with peanut butter and raisins. Save part of one meal—half of your breakfast bagel or lunch sandwich—to eat a few hours later. If you’re trying to add fiber to your diet, eat high-fiber snacks, such as prunes, popcorn, or sunflower seeds.

**Food Safety**

Foodborne infections cause an estimated 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths in the United States every year. Three organisms—Salmonella, Listeria, and Toxoplasma—are responsible for more than 75 percent of these deaths. Although most foodborne infections cause mild illness, severe infections and serious complications—including death—do occur.

Scares about tainted food have led to massive recalls of such popular foods as peanut butter, jalapenos, lettuce, spinach, and tomatoes. As a result, consumers are more aware of potential food hazards, and food companies are more diligent about food safety. Food manufacturers are seeking ways to cut back on the use of artificial flavors and preservatives and are using such innovative technologies as ultraviolet light to disinfect processing equipment. By promoting safer food processing and handling, food companies can help keep consumers healthy and satisfied.
result, consumer advocates, as well as manufacturers and trade associations, are calling for stricter regulations.

What can you do to protect yourself? Pay attention when you hear that a food or product is under suspicion. Make note of the brands, the production dates, and the manufacturer[s] involved. Check the labels of the foods in your pantry and refrigerator, and throw out any that may be contaminated.

Fight BAC!

To improve food safety awareness and practices, government and private agencies have developed the Fight BAC! campaign, which identifies four key culprits in foodborne illness:

- Improper cooling
- Improper hand washing
- Inadequate cooking
- Failure to avoid cross-contamination

Avoiding E. coli Infection

Eating unwashed produce, such as spinach or lettuce, or undercooked beef, especially hamburger, can increase your risk of infection with *Escherichia coli* (*E.* coli) bacteria. These bacteria, which live in the intestinal tract of healthy people and animals, are usually harmless. However, infection with the strain *E. coli* O157:H7 produces symptoms that can range from mild to life-threatening. This strain has made its way into hamburger in fast-food chains and into packaged spinach. *E. coli* can cause severe bloody diarrhea, kidney failure, and even death. Symptoms usually develop within two to ten days and can include severe stomach cramps, vomiting, mild fever, and bloody diarrhea. Most people recover within seven to ten days. Others—especially older adults, children under the age of 5, and those with weakened immune systems—may develop complications that lead to kidney failure.

Proper handling and cooking of food can practically eliminate infection from meat. Especially if grilled, meat is likely to brown before it’s completely cooked, so a meat thermometer should be used to ensure that meat is heated to at least 160°F at its thickest point. If a thermometer is not available, ground meat should be cooked until no pink shows in the center.

Food Poisoning

*Salmonella* is a bacterium that contaminates many foods, particularly undercooked chicken, eggs, and sometimes processed meat. Eating contaminated food can result in salmonella poisoning, which causes diarrhea and vomiting. The Centers for Disease Control and Prevention (CDC) estimates 40,000 reported cases of salmonella poisoning a year; the actual number of cases could be anywhere from 400,000 to 4 million. The FDA has warned consumers about the dangers of unpasteurized orange juice because of the risk of salmonella contamination.

Your Strategies for Prevention

How to Protect Yourself from Food Poisoning

- Always wash your hands with liquid or clean bar soap before handling food. Rub your hands vigorously together for 10 to 15 seconds; the soap combined with the scrubbing action dislodges and removes germs.
- When preparing fresh fruits and vegetables, discard outer leaves, wash under running water, and when possible, scrub with a clean brush or hands. Do not wash meat or poultry.
- To avoid the spread of bacteria to other foods, utensils, or surfaces, do not allow liquids to touch or drip onto other items. Wipe up all spills immediately.
- Clean out your refrigerator regularly. Throw out any leftovers stored for three or four days.
- To kill bacteria and viruses, sterilize wet kitchen sponges by putting them in a microwave for two minutes. Make sure they are completely wet to guard against the risk of fire.
Another bacterium, *Campylobacter jejuni*, may cause even more stomach infections than salmonella. Found in water, milk, and some foods, campylobacter poisoning causes severe diarrhea and has been implicated in the growth of stomach ulcers.

Bacteria can also cause illness by producing toxins in food. *Staphylococcus aureus* is the most common culprit. When cooked foods are cross-contaminated with the bacteria from raw foods and not stored properly, staph infections can result, causing nausea and abdominal pain anywhere from 30 minutes to eight hours after ingestion.

An uncommon but sometimes fatal form of food poisoning is botulism, caused by the *Clostridium botulinum* organism. Improper home-canning procedures are the most common cause of this potentially fatal problem.

Even many healthful foods can pose dangers. The FDA has urged consumers to avoid eating raw sprouts because of the risk of getting sick. Sprouts, particularly alfalfa and clover, can be contaminated by *Salmonella* or *E. coli* bacteria. The FDA advises people to either cook sprouts before eating them or request that they be left off sandwiches and other food ordered in restaurants. Home-grown sprouts can also present a risk if they come from contaminated seeds.

There have been several outbreaks of listeriosis, caused by the bacterium *Listeria*, commonly found in deli meats, hot dogs, soft cheeses, raw meat, and unpasteurized milk. Although rare, listeriosis can be life-threatening. At greatest risk are pregnant women, infants, and those with weakened immune systems. You can reduce your risk by cooking meats and leftovers thoroughly and by washing everything that may come into contact with raw meat.

**Pesticides**

Plants and animals naturally produce compounds that act as pesticides to aid in their survival. The vast majority of the pesticides we consume are therefore natural, not added by farmers or food processors. *Commercial pesticides* save billions of dollars of valuable crops from pests, but they also may endanger human health and life. Fearful of potential risks in pesticides, many consumers are purchasing organic foods.

**Food Allergies**

Food allergies, which affect about 5 percent of young children and 4 percent of teens and adults, are much less common than many assume. As many as 50 to 90 percent of presumed food allergies are not allergic reactions.20

The National Institute of Allergy and Infectious Diseases has released the first comprehensive guidelines for diagnosing and treating a food allergy, which is defined as “an adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food.”21

Physicians disagree as to which foods are the most common triggers of food allergies. Cow’s milk, eggs, seafood, wheat, soybeans, nuts, seeds, and chocolate have all been identified as culprits. The symptoms they provoke vary. One person might sneeze if exposed to an irritating food; another might vomit or develop diarrhea; others might suffer headaches, dizziness, hives, or a rapid heartbeat. Symptoms may not develop for up to 72 hours, making it hard to pinpoint which food was responsible.

If you suspect that you have a food allergy, see a physician with specialized training in allergy diagnosis. Medical opinion about the merits of many treatments for food allergies is divided. Once you’ve identified the culprit, the wisest and sometimes simplest course is to avoid it.

**Nutritional Quackery**

The American Dietetic Association describes nutritional quackery as a growing problem for unsuspecting consumers. Because so much nutritional nonsense is garbed in scientific-sounding terms, it can be hard to recognize bad advice when you get it. One basic rule: If the promises of a nutritional claim sound too good to be true, they probably are (see Figure 6.9).

If you seek the advice of a nutrition consultant, carefully check his or her credentials and professional associations. Because licensing isn’t required in all states, almost anyone can use the label “nutritionist,” regardless of qualifications. Be wary of diplomas from obscure schools and organizations that allow anyone who pays dues to join. (One physician obtained a membership...
A registered dietitian (R.D.), who has a bachelor’s degree and specialized training (including an internship) and who passed a certification examination, is usually a member of the American Dietetic Association (ADA), which sets the standard for quality in diets. A nutrition expert with an M.D. or Ph.D. generally belongs to the ADA, the American Institute of Nutrition, or the American Society of Clinical Nutrition; all have stringent membership requirements.

**Steps to Take**

- Before you try any new nutritional approach, check with your doctor or a registered dietitian or call the American Dietetic Association’s consumer hotline, (800) 366-1655.
- Don’t believe ads or advisers basing their nutritional recommendations on hair analysis, which is not accurate in detecting nutritional deficiencies.
- Question personal testimonies about the powers of some magical pill or powder, and be wary of “scientific articles” in journals that aren’t reviewed by health professionals.

**Nutritional supplements sold in health stores or through health and body-building magazines may contain ingredients that have not been tested and proven safe.**

- Be wary of anyone who recommends megadoses of vitamins or nutritional supplements, which can be dangerous. High doses of vitamin A, which some people take to clear up acne, can be toxic.
- A quick way to spot a bad nutrition self-help book is to look in the index for a diet to prevent or treat rheumatoid arthritis (none exists). If you find one, don’t buy the book.

**Facts to Know**

- Marketers may make generous promises, but consumers won’t be able to collect on them.
- No one product can possibly treat such a diverse array of conditions.
- Such findings would be widely publicized and accepted by health professionals.
- And this product’s company doesn’t want money? At least the drug company has scientific research proving the safety and effectiveness of its products.
- Even proven treatments take time to be effective.

**Quick and easy fixes**

- Even proven treatments take time to be effective.
- Hearsay is the weakest form of evidence.
- Phony terms hide the lack of scientific proof.

**Natural**

- Natural is not necessarily better or safer; any product that is strong enough to be effective is strong enough to cause side effects.

**Satisfaction guaranteed**

- Marketers may make generous promises, but consumers won’t be able to collect on them.
- Such findings would be widely publicized and accepted by health professionals.

**One product does it all**

- No one product can possibly treat such a diverse array of conditions.
- And this product’s company doesn’t want money? At least the drug company has scientific research proving the safety and effectiveness of its products.

**Time tested**

- Such findings would be widely publicized and accepted by health professionals.
- And this product’s company doesn’t want money? At least the drug company has scientific research proving the safety and effectiveness of its products.

**Paranoid accusations**

- And this product’s company doesn’t want money? At least the drug company has scientific research proving the safety and effectiveness of its products.

**Personal testimonials**

- Hearsay is the weakest form of evidence.
- Phony terms hide the lack of scientific proof.

for his dog! A registered dietitian (R.D.), who has a bachelor’s degree and specialized training (including an internship) and who passed a certification examination, is usually a member of the American Dietetic Association (ADA), which sets the standard for quality in diets. A nutrition expert with an M.D. or Ph.D. generally belongs to the ADA, the American Institute of Nutrition, or the American Society of Clinical Nutrition; all have stringent membership requirements.

**Meaningless medical jargon**

- Phony terms hide the lack of scientific proof.
As nutritional knowledge expands and evolves, it’s easy to be confused by changing advice on which foods to avoid and which to eat. But even though research may challenge or change thinking on a specific food, some basic principles always apply. Which of the following do you practice most days of the week?

____ Eat breakfast. Easy-to-prepare breakfasts include cold cereal with fruit and low-fat milk, whole-wheat toast with peanut butter, yogurt with fruit, or whole-grain waffles.

____ Don’t eat too much of one thing. Your body needs protein, carbohydrates, fat, and many different vitamins and minerals, such as vitamins C and A, iron, and calcium, from a variety of foods.

____ Eat more grains, fruits, and vegetables. These foods give you carbohydrates for energy, plus vitamins, minerals, and fiber. Try breads such as whole-wheat, bagels, and pita. Spaghetti and oatmeal are also in the grain group.

____ Don’t ban any food. Fit in a higher-fat food, like pepperoni pizza, at dinner by choosing lower-fat foods at other meals. And don’t forget about moderation. If two pieces of pizza fill you up, don’t eat a third.

____ Make every calorie count. Load up on nutrients, not on big portions. Choosing foods that are nutrient dense will help protect against disease and keep you healthy.

____ Eat five servings of fruits and vegetables per day. For breakfast, have 100% fruit juice or add raisins, berries, or sliced fruit to cereal, pancakes, or waffles. For lunch, have vegetable soup or salad with your meal or pile vegetables on your sandwich. For dinner, choose vegetables that are green, orange (such as carrots or squash), and red (such as tomatoes or bell peppers).

____ Include three servings of whole-grain foods every day. To identify whole-grain products, check the ingredient list. The first ingredient should be a whole-grain, such as “whole-grain oats,” “whole-grain wheat,” or “whole wheat.”

____ Consume a calcium-rich food at each meal. Good options include low-fat and nonfat milk, cheese, or yogurt; tofu; broccoli; dried beans; spinach; and fortified soy milk.

____ Eat less meat. Rather than making meat the heart of a meal, think of it as a flavoring ingredient.

____ Avoid high-fat fast foods. Hot dogs, fried foods, packaged snack foods, and pastries are most likely to be laden with fat.

____ Check the numbers. When buying prepared foods, choose items that contain no more than 3 grams of fat per 100 calories.

____ Think small. A dinner-size serving of meat should be about the size of a deck of cards; half a cup is the size of a woman’s fist; a pancake is the diameter of a CD.

____ Read labels carefully. Remember that “cholesterol-free” doesn’t necessarily mean fat-free. Avoid products that contain saturated coconut oil, palm oil, lard, or hydrogenated fats.

____ Switch to low-fat and nonfat dairy products. Rather than buying whole-fat dairy products, choose skim milk, fat-free sour cream, and low- or nonfat yogurt.

____ The brighter the better. When selecting fruits and vegetables, choose the most intense color. A bright orange carrot has more beta-carotene than a pale one. Dark green lettuce leaves have more vitamins than lighter ones. Orange sweet potatoes pack more vitamin A than yellow ones.
## How Healthful Is Your Diet?

**STEP 1**
Keep a food diary for a week, writing down everything you eat and drink for meals and snacks. Include the approximate amount eaten (for example, 1/2 cup, 1 large, 12-oz can, and so on).

<table>
<thead>
<tr>
<th></th>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruits</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Milk, yogurt, cheese</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat, poultry, dry beans, eggs, nuts</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Fats, oil, sweets</td>
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</tr>
</tbody>
</table>

**STEP 2: Are You Getting Enough Vegetables, Fruits, and Grains?**

<table>
<thead>
<tr>
<th>How often do you eat:</th>
<th>Seldom/ Never</th>
<th>1–2 times a week</th>
<th>3–5 times a week</th>
<th>Almost daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>At least three servings of vegetables a day?</td>
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<tr>
<td>Starchy vegetables like potatoes, corn, or peas?</td>
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<tr>
<td>Foods made with dry beans, lentils, or peas?</td>
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<tr>
<td>Dark green or deep yellow vegetables (broccoli, spinach, collards, carrots, sweet potatoes, squash)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At least two servings of fruit a day?</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Citrus fruits and 100% fruit juices (oranges, grapefruit, tangerines)?</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Whole fruit with skin or seeds (berries, apples, pears)?</td>
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<td></td>
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<tr>
<td>At least six servings of breads, cereals, pasta, or rice a day?</td>
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</tbody>
</table>

The best answer for each is “almost daily.” Use your food diary to see which foods you should be eating more often.
### STEP 3: Are You Getting Too Much Fat?

<table>
<thead>
<tr>
<th>How often do you eat:</th>
<th>Seldom/Never</th>
<th>1–2 times a week</th>
<th>3–5 times a week</th>
<th>Almost daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fried, deep-fat fried, or breaded food?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatty meats, such as sausages, luncheon meat, fatty steaks or roasts?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole milk, high-fat cheeses, ice cream?</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pies, pastries, rich cakes?</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Rich cream sauces and gravies?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oily salad dressings or mayonnaise?</td>
<td></td>
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<td></td>
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<tr>
<td>Butter or margarine on vegetables, rolls, bread, or toast?</td>
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</tr>
</tbody>
</table>

Ideally, you should be eating these foods no more than one or two times a week. If your food diary indicates that you’re eating them more frequently, your fat intake may well be too high.

### STEP 4: Are You Getting Too Much Sodium?

<table>
<thead>
<tr>
<th>How often do you eat:</th>
<th>Seldom/Never</th>
<th>1–2 times a week</th>
<th>3–5 times a week</th>
<th>Almost daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cured or processed meats, such as ham, sausage, frankfurters, or luncheon meats?</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Canned vegetables or frozen vegetables with sauce?</td>
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<tr>
<td>Frozen TV dinners, entrées, or canned or dehydrated soups?</td>
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<tr>
<td>Salted nuts, popcorn, pretzels, corn chips, or potato chips?</td>
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<td></td>
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<tr>
<td>Seasoning mixes or sauces containing salt?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Processed cheese?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salt added to table foods before you taste them?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ideally, you should be eating these high-sodium items no more than one or two times a week. If your food diary indicates that you’re eating them more frequently, your sodium intake may well be too high.
Making Change Happen

Mind over Platter

If you want to transform your three daily meals from mundane chores to life-enhancing experiences, you have to learn to eat with your mind as well as your mouth. When you bring your mind to the table, you are practicing basic principles of personal change: You are making conscious choices. You are doing what’s best for you. You are taking control of your care and feeding. And you are adding another dimension of pleasure to your life.

Whatever your eating circumstances, you always have choices. Maybe you eat in the dining hall every day. Maybe you commute home for meals with your family. Maybe you’re rushing to and from a job and wolfing down the fastest food you can find. Even when you feel you can’t completely control what you eat, you can control how you eat. By working through “Mind over Platter” in Labs for IPC, you can learn to bring to your meals a sense of awareness and appreciation that can transform even an ordinary doughnut into something worth savoring. Here’s a preview.

Get Real
Among other activities in this stage, you will monitor what you put in your mouth for three days (including one weekend day) and record what you eat as well as when, where, and how (standing by a vending machine, sitting at the kitchen table with your husband, lying on your bed and watching a game, etc.). Include coffee, soda, the nibbles you took from your friend’s dessert. You will analyze your food diary by answering several questions, including:

• If we are what we eat, what does your food log say about you?
• Are you a junk food junkie? A nonstop grazer? A breakfast skipper? A speed eater? A nocturnal noshes?

Get Ready
In this preparatory stage, you will plan and purchase specific foods and find time and a place to eat them. If your idea of a meal is inhaling some ramen noodles at your desk or munching on a pita on the way to class, you will need to make meals more of a time priority . . .

Get Going
The action stage of this lab includes activities on building bite awareness, mastering the mindful bite, and taste testing, as well as the exercises we call “The Mindful Doughnut” and “The Mindful Meal.” However, our favorite is “Mindful Indulgence.” Rather than banishing a particular food from your plate, you limit the amount you eat to four bites, which can deliver the maximum taste sensation.

If you’re a chocoholic, for instance, mindful eating can take you to a new level of appreciation. Here’s how:

• Go for quality. Buy a piece or two of handmade or gourmet chocolate rather than the biggest chocolate bar the supermarket sells.
• Set aside time to savor the chocolate. Enjoy the anticipation . . . Don’t multitask or even watch television while you’re eating it.
• Don’t chew the chocolate. Put a piece in your mouth, and let it melt. Make each piece last at least 90 seconds . . .

Lock It In
In this stage, you will learn how to maintain mindfulness by exercises such as trying one new taste every week. The reason: When people try a new food, they generally “sample” the food by taking a very small piece and chewing it slowly but shallowly. This natural taste testing engages all the senses because . . .
Review Questions

1. An example of an unhealthy saturated fat would be
   a. olive oil.
   b. canola oil.
   c. corn oil.
   d. coconut oil.

2. The Dietary Guidelines 2010 for Americans include:
   a. Maintain intake of added sugars.
   b. Decrease consumption of olive oil.
   c. Control calorie intake to manage body weight.
   d. Eat dessert no more than three days a week.

3. Common causes of foodborne infections include which of the following?
   a. the influenza virus
   b. Salmonella and E. coli bacteria
   c. avian flu virus
   d. pesticides

4. The classes of essential nutrients include which of the following?
   a. amino acids, antioxidants, fiber, and cholesterol
   b. proteins, calcium, calories, and folic acid
   c. carbohydrates, minerals, fat, and water
   d. iron, whole grains, fruits, and vegetables

5. Some vegetarians may
   a. include fish in their diets.
   b. avoid vitamin B12 supplements if they eat only plant foods.
   c. eat only legumes or nuts because these provide complete proteins.
   d. have high cholesterol levels because of the saturated fats in fruits and vegetables.

6. Which nutrient has the greatest number of calories?
   a. protein
   b. carbohydrate
   c. vitamins
   d. fats

7. Because Sam plays poker, it’s been easy for him to remember that a recommended serving of 3 ounces of meat means a piece of meat about the size of
   a. one deck of cards.
   b. eight poker chips.
   c. two decks of cards.
   d. a roll of quarters.

8. It is recommended that no greater than 30% of a healthy diet come from
   a. fats.
   b. sugars.
   c. starches.
   d. protein.

9. Food labels on packaged foods include all of the following except
   a. total weight of the package.
   b. total amount of nutrients contained in the food.
   c. the percent of nutrient Daily Values provided in the food.
   d. serving size.

10. Antioxidants
    a. are nutrients important in the production of hemoglobin.
    b. are substances added to foods to make them more flavorful or physically appealing.
    c. are suspected triggers of food allergies.
    d. are substances that prevent the harmful effects of free radicals.

Answers to these questions can be found on page 672.
Critical Thinking

1. Which alternative or ethnic diet do you think has the best tasting food? Which is the most healthy? Why?

2. Is it possible to meet nutritional requirements on a limited budget? Have you ever been in this situation? What would you recommend to someone who wanted to eat healthfully on $30 a week?

3. Consider the number of times a week you eat fast food. How much money would you have saved if you had eaten home-prepared meals? Which fast foods could you have selected that would have provided more nutritional value?

Media Menu

Visit www.cengagebrain.com to access course materials and companion resources for this text that will:

• Help you evaluate your knowledge of the material.
• Allow you to prepare for exams with interactive quizzing.
• Use the CengageNOW product to develop a Personalized Learning Plan targeting resources that address areas you should study.

• Coach you through identifying target goals for behavioral change and creating and monitoring your personal change plan throughout the semester using the Behavior Change Planner available in the CengageNOW resource.

Internet Connections

www.nal.usda.gov/fnic
This comprehensive governmental website features reports and scientific studies on a variety of nutrition information, including the USDA Dietary Guidelines 2010, MyPlate, dietary supplements, dietary assessment, food composition searchable databases, educational brochures, historical food guides, and a topics “A–Z” section.

www.choosemyplate.gov
This interactive site features the MyPlate Plan, which provides suggestions for applying the most recent Dietary Guidelines.
Key Terms

The terms listed are used on the page indicated. Definitions of the terms are in the Glossary at the end of the book.

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6. Ibid.

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11. Ibid.
12. Ibid.
13. Ibid.