CHAPTER OBJECTIVES Chapter 2 is designed to allow you to:

1. Develop a healthy eating plan.
2. Outline the ABCDEs of nutrition assessment: anthropometric, biochemical, clinical, dietary, and economic.
3. Describe what the Recommended Dietary Allowances (RDAs) and other dietary standards represent.
4. Learn the food groupings used in MyPyramid.
5. List the Dietary Guidelines and the diseases these guidelines are designed to prevent or minimize.
6. Describe what a nutrition label currently consists of and the various health claims and label descriptors that are allowed.
7. Understand the basis of the scientific method as it is used in developing hypotheses and theories in the field of nutrition.
8. Identify reliable sources of nutrition information.

CHAPTER OUTLINE

Chapter Objectives
Refresh Your Memory
A Food Philosophy That Works
States of Nutritional Health
How Can Your Nutritional State Be Measured?
Recommendations for Food Choice

Specific Nutrient Standards and Recommendations
Using the Scientific Method to Determine Nutrient Needs
What Do Food Labels Have to Offer in Diet Planning?
Nutrition and Your Health: Evaluating Nutrition Claims and Advice

Case Study: Dietary Supplements
Epilogue
Summary/Study Questions/Check Your Knowledge/Further Readings
Rate Your Plate

HOW MANY TIMES HAVE YOU HEARD WILD CLAIMS ABOUT HOW HEALTHFUL CERTAIN FOODS ARE FOR YOU? As consumers focus more on diet and disease, food manufacturers are asserting that their products have all sorts of health benefits. Supermarket shelves have begun to look like an 1800s medicine show. “Take fish oil capsules to avoid a heart attack.” “Eat more olive oil and oat bran to lower blood cholesterol.” Hearing these claims, you would think that food manufacturers have solutions to all of our health problems.

Advertising aside, nutrient intakes that are out of balance with our needs—such as excess calories, saturated fat, cholesterol, trans fat, salt, alcohol, and sugar intakes—are linked to many leading causes of death in North America, including obesity, hypertension, cardiovascular disease, cancer, liver disease, and type 2 diabetes. Physical inactivity is also too common. In Chapter 2, you will explore the components of a healthy diet and lifestyle—an approach that will minimize your risks of developing nutrition-related diseases. The goal is to provide you with a firm understanding of these concepts before you study the nutrients in detail.
On what do nutrition experts generally agree regarding a healthy food or diet? Why is a diet rich in fiber that includes some fish and is low in fried foods and animal fat emphasized, along with at least 30 minutes or more of physical activity on most or all days of the week? Are North Americans generally following this plan? What are the potential consequences for those who do not? Chapter 2 provides some answers.

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of foods is best because no one food meets all your nutrient needs. Meat provides protein and iron but little calcium and no vitamin C. Eggs also provide protein but little calcium because the calcium is mostly in the shell. Cow’s milk contains calcium, but very little iron. None of these foods contains fiber. Thus you need a variety of foods in your diet because the required nutrients are scattered among many foods. For example, carrots—a rich source of a pigment that forms vitamin A—may be your favorite vegetable; however, if you choose carrots every day as your only vegetable source, you may miss out on the vitamin folate. Other vegetables, such as broccoli and asparagus, are rich sources of this nutrient. This concept is true of all classes of foods: fruits, vegetables, grains, and so on. Different foods within each class vary somewhat in the nutrients they contain, but they generally provide similar types of nutrients.

An added bonus of variety in the diet, especially within the fruit and vegetable groups, is the inclusion of a rich supply of the **phytochemicals**. Recall from Chapter 1 that the phytochemicals were discussed along with the nutrient classes. Many of these substances provide significant health benefits. Considerable research attention is focused on various phytochemicals in reducing the risk for certain diseases (e.g., cancer). You can’t just buy a bottle of phytochemicals—they are generally available only within whole foods. Current multivitamin and mineral supplements contain few or none of these beneficial plant chemicals.

Numerous population studies show reduced cancer risk among people who regularly consume fruits and vegetables. Researchers suspect that some phytochemicals present in the fruits and vegetables block the cancer process. The cancer process and the specific roles of some phytochemicals in this regard are described in the “Nutrition and Your Health” section in Chapter 16. Some phytochemicals also have been linked to a reduced risk of cardiovascular disease. Could it be that, because humans evolved on a wide variety of plant-based foods, the body developed with a need for these phytochemicals, along with the various nutrients present, to maintain optimal health?

It will likely take many years for scientists to unravel the important effects of the myriad of phytochemicals in foods, and it is unlikely that all will ever be available or effective in supplement form. For this reason, leading nutrition and medical experts suggest that a diet rich in fruits, vegetables, and whole-grain breads and cereals is the most reliable way to obtain the potential benefits of phytochemicals. Some research suggests that increasing variety in a diet can lead to overeating. Thus, as one incorporates a wide variety of foods in a diet, attention to total calorie intake is also important to consider. Table 2-1 provides a number of suggestions for including more phytochemicals in your diet, as do the websites [www.fruitsandveggiesmorematters.org](http://www.fruitsandveggiesmorematters.org) and [www.fruitsandveggiesmatter.gov](http://www.fruitsandveggiesmatter.gov).

### Balance Means Not Overconsuming Any Single Type of Food

One way to balance your diet as you consume a variety of foods is to select foods from the six major food groups every day:

- Grains
- Vegetables
- Fruits
- Milk
- Meat & Beans
- Oils

A dinner consisting of a bean burrito, lettuce and tomato salad with oil and vinegar dressing, a glass of milk, and an apple covers all groups.

### Moderation Refers Mostly to Portion Size

Although eating moderate (i.e., small) portion sizes is a good practice, eating in moderation also requires planning your entire day’s diet so that you don’t overconsume any nutrients. For example, if you eat a bacon cheeseburger, relatively high in fat, salt,
and calories, you should eat foods such as fruits and salad greens, that are less concentrated sources of these nutrients at other meals that same day. This helps balance your diet. If you prefer whole milk to low-fat or fat-free milk, reduce the fat elsewhere in your meals. Try low-fat salad dressings, or use jam rather than butter or margarine on toast. Overall, strive to moderate serving sizes of some foods rather than eliminating these foods.

As noted in Chapter 1, many nutrition experts agree that there are no exclusively “good” or “bad” foods. Even so, many North Americans have diets that lack the foundations of a healthy food plan—variety, balance, and moderation. Consuming diets overloaded with foods high in fatty meats, fried foods, sugared

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**TABLE 2-1** Tips for Boosting the Phytochemical Content of a Diet

<table>
<thead>
<tr>
<th>Tip</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Include vegetables in main and side dishes. Add these to rice, omelets, potato salad, and pastas. Try broccoli or cauliflower florets, mushrooms, peas, carrots, corn, or peppers.</td>
<td></td>
</tr>
<tr>
<td>Look for quick-to-fix grain side dishes in the supermarket. Pilafs, couscous, rice mixes, and tabbouleh are just a few that you’ll find.</td>
<td></td>
</tr>
<tr>
<td>Choose fruit-filled cookies, such as fig bars, instead of sugar-rich cookies. Use fresh or canned fruit as a topping for puddings, hot or cold cereal, pancakes, and frozen desserts.</td>
<td></td>
</tr>
<tr>
<td>Put raisins, grapes, apple chunks, pineapples, grated carrots, zucchini, or cucumber into coleslaw, chicken salad, or tuna salad.</td>
<td></td>
</tr>
<tr>
<td>Be creative at the salad bar: Try fresh spinach, leaf lettuce, red cabbage, zucchini, yellow squash, cauliflower, peas, mushrooms, or red or yellow peppers.</td>
<td></td>
</tr>
<tr>
<td>Pack fresh or dried fruit for snacks away from home instead of grabbing a candy bar or going hungry.</td>
<td></td>
</tr>
<tr>
<td>Add slices of cucumber, zucchini, spinach, or carrot slivers to the lettuce and tomato on your sandwiches.</td>
<td></td>
</tr>
<tr>
<td>Each week try one or two vegetarian meals, such as beans and rice or pasta, Chinese vegetable stir fry, or spaghetti and tomato sauce.</td>
<td></td>
</tr>
<tr>
<td>If your daily protein intake exceeds the recommended amounts, reduce the meat, fish, or poultry in casseroles, stews, and soups by one-third to one-half and add more vegetables and legumes.</td>
<td></td>
</tr>
<tr>
<td>Keep a bowl of fresh vegetables in the refrigerator for snacks.</td>
<td></td>
</tr>
<tr>
<td>Choose fruit or vegetable juices instead of soft drinks, and preferably 100% juice varieties.</td>
<td></td>
</tr>
<tr>
<td>Substitute tea for coffee or soft drinks on a regular basis.</td>
<td></td>
</tr>
<tr>
<td>Have a bowl of fruit on hand.</td>
<td></td>
</tr>
<tr>
<td>Switch from crisphead lettuce to leaf lettuce, such as romaine.</td>
<td></td>
</tr>
<tr>
<td>Use salsa as a dip for chips in place of creamy dips.</td>
<td></td>
</tr>
<tr>
<td>Choose whole-grain breakfast cereals, breads, and crackers.</td>
<td></td>
</tr>
<tr>
<td>Add flavor to your plate with ginger, rosemary, basil, thyme, garlic, onions, parsley, and chives in place of salt.</td>
<td></td>
</tr>
<tr>
<td>Incorporate soy products, such as tofu, soy milk, soy protein isolate, and roasted soybeans into your meals (see Chapter 6).</td>
<td></td>
</tr>
</tbody>
</table>

---

**CRITICAL THINKING**

Andy would benefit from more variety in his diet. What are some practical tips he can use to increase his fruit and vegetable intake?

Choosing whole-grain cereals is an excellent way to increase the nutrient content of a diet. Ideally, the cereal should have at least 3 grams of fiber per serving.
soft drinks, and refined starches can result in substantial risk for nutrition-related chronic diseases.

**Nutrient Density Focuses on Nutrient Content**

The nutrient density of a food is a characteristic used to determine its nutritional quality. Nutrient density of a food is determined by comparing its vitamin or mineral content with the amount of calories it provides. A food is said to be nutrient dense if it provides a large amount of a nutrient for a relatively small amount of calories when compared with other food sources. The higher a food’s nutrient density, the better it is as a nutrient source. Comparing the nutrient density of different foods is an easy way to estimate their relative nutritional quality. Generally, nutrient density is determined with respect to individual nutrients. For example, many fruits and vegetables have a high content of vitamin C compared with their modest calorie content: That is, they are nutrient-dense foods for vitamin C. Figure 2-1 shows that fat-free milk is much more nutrient dense than sugared soft drinks for many nutrients, especially protein, vitamin A, riboflavin, and calcium.

As noted previously, menu planning should focus mainly on the total diet—not on the selection of one critical food as the key to an adequate diet. Nutrient-dense foods—such as fat-free and low-fat milk, lean meats, legumes (beans), oranges, carrots, broccoli, whole-wheat bread, and whole-grain breakfast cereals—do help balance less nutrient-dense foods—such as cookies and potato chips—which many people like to eat. The latter are often called empty-calorie foods because they tend to be high in sugar and/or fat but few other nutrients.

Eating nutrient-dense foods is especially important for people who tend to consume diets relatively low in calories. This includes some older people and those following weight-loss diets.

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**Percent Contribution to Adolescent Female RDAs**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Sugared soft drink (1 cup)</th>
<th>Fat-free milk (1 cup)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>Protein</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>Thiamin</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Niacin</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>Calcium</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Iron</td>
<td>40%</td>
<td>30%</td>
</tr>
</tbody>
</table>

**FIGURE 2-1** Comparison of the nutrient density of a sugared soft drink with that of fat-free (i.e., nonfat or skim) milk. Choosing a glass of fat-free milk makes a significantly greater contribution to nutrient intake than does a sugared soft drink. An easy way to determine nutrient density from this chart is to compare the lengths of the bars indicating vitamin or mineral contribution with the bar that represents calorie contribution. For the soft drink, no nutrient surpasses calorie content. Fat-free milk, in contrast, has longer nutrient bars for protein, vitamin A, the vitamins thiamin and riboflavin, and the mineral calcium than it does for calories. Including many nutrient-dense foods in your diet is a lower calorie way to meet nutrient needs.
ENERGY (KCAL) DENSITY AFFECTS CALORIE INTAKE

Energy density is a measurement that best describes the calorie content of a food. Energy density of a food is determined by comparing the calorie (kcal) content with the weight of food. A food rich in calories but that weighs relatively little is considered energy dense. Examples include nuts; cookies; fried foods in general; and fat-free snacks, such as fat-free pretzels. Foods with low energy density include fruits, vegetables, and any food that incorporates lots of water during cooking, such as oatmeal (Table 2-2).

Researchers have shown that eating a meal with many foods of low energy density promotes satiety without contributing many calories. This is probably because we consume a constant weight of food at a meal, rather than a constant number of calories. How this constant weight of food is regulated is not known, but careful laboratory studies show that people consume fewer calories in a meal if most of the food choices are low in energy density, compared with foods high in energy density. Eating a diet low in energy density can aid in losing (or maintaining) weight.

Overall, foods with lots of water and fiber provide a low-energy-density contribution to a meal and help one feel full, whereas foods with high energy density must be eaten in greater amounts to contribute to fullness. This is one more reason to support a diet rich in fruits, vegetables, and whole-grain breads and cereals, a pattern that also is typical of many ethnic diets throughout rural areas of the world.

Still, favorite foods, even if they are high in energy density, can have a place in your dietary pattern, but you will have to plan for them. For example, chocolate is a very energy-dense food, but a small portion at the end of a meal can supply a satisfying finale. In addition, foods with high energy density can help people with poor appetites, such as some older people, to maintain or gain weight.

MAKING DECISIONS

Some people would like to live mostly on French fries. What is the nutrient content of French fries? Check the food composition supplement for the vitamin C content of French fries. How many servings would you need to eat to meet vitamin C needs (75 to 95 milligrams)?

(Answer: 4 to 5 servings)

<table>
<thead>
<tr>
<th>TABLE 2-2 Energy Density of Common Foods (Listed in Relative Order)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Very Low Energy Density</strong></td>
</tr>
<tr>
<td>(less than 0.6 kcal per gram)</td>
</tr>
<tr>
<td>Lettuce</td>
</tr>
<tr>
<td>Tomatoes</td>
</tr>
<tr>
<td>Strawberries</td>
</tr>
<tr>
<td>Broccoli</td>
</tr>
<tr>
<td>Salsa</td>
</tr>
<tr>
<td>Grapefruit</td>
</tr>
<tr>
<td>Fat-free milk</td>
</tr>
<tr>
<td>Carrots</td>
</tr>
<tr>
<td>Vegetable soup</td>
</tr>
<tr>
<td>Plain baked potato</td>
</tr>
<tr>
<td>Cooked rice</td>
</tr>
<tr>
<td>Spaghetti noodles</td>
</tr>
</tbody>
</table>

The following sections of Chapter 2 describe various states of nutritional health and provide tools and nutrient guidelines for planning healthy diets to support overall health.

**CONCEPT CHECK**

Basic diet-planning concepts include consuming a variety of foods, balancing a diet by consuming foods from each of the five food groups, and moderating portion size with each food choice, so that the diet is not excessive in calories. Choosing nutrient-dense foods, such as fat-free milk, fruits, vegetables, and whole-grain breads and cereals, helps supply a diet with many nutrients but not excessive calories. Many of these foods are also rich sources of phytochemicals, supplying an even greater health benefit to the diet. Consuming foods of low energy density, such as fruits and vegetables, may also help in weight control, in that these provide satiety after a meal because of their large weight but relatively few calories.

**STATES OF NUTRITIONAL HEALTH**

The body’s nutritional health is determined by considering the nutritional state of each needed nutrient. Three general categories of nutritional status are recognized: desirable nutrition, undernutrition, and overnutrition. The amount of each nutrient needed to maintain a state of desirable nutrition is the basis for published dietary intake recommendations. The diet plans to meet those needs are discussed later in Chapter 2. The common term malnutrition can refer to either overnutrition or undernutrition. Neither state is conducive to good health.

**Desirable Nutrition**

The nutritional state for a particular nutrient is desirable when body tissues have enough of the nutrient to support normal metabolic functions as well as surplus stores that can be used in times of increased need. A desirable nutritional state can be achieved by obtaining essential nutrients from a variety of foods.

**Undernutrition**

Undernutrition occurs when nutrient intake does not meet nutrient needs. Any surpluses are then put to use and health begins to decline. Many nutrients are in high demand due to the constant cell loss and regeneration in the body, such as in the gastrointestinal tract. For this reason the stores of certain nutrients, including many of the B vitamins, are exhausted rapidly and therefore require a regular intake. In addition, some women in North America do not consume sufficient iron to meet monthly losses and eventually deplete their iron stores (Fig. 2-2).

Once availability of a nutrient falls sufficiently low, biochemical evidence indicates that the body’s metabolic processes have slowed or stopped. At this state of deficiency there are no outward symptoms, thus it is termed a subclinical deficiency. A subclinical deficiency can go on for some time before clinicians are able to detect its effects. Eventually clinical symptoms will develop. Clinical evidence of a nutritional deficiency; perhaps in the skin, hair, nails, tongue, or eyes, sometimes takes many years. Often, clinicians do not detect a problem until a deficiency produces outward symptoms, such as small areas of bruising on the skin from a vitamin C deficiency.

**Overnutrition**

Prolonged consumption of more nutrients than the body needs can lead to overnutrition. In the short run (e.g., 1 to 2 weeks), overnutrition may cause only a few symptoms, such as stomach distress from excess iron intake. But if an excess...
intake continues, some nutrients may accumulate to toxic amounts, which can lead to serious disease. For example, too much vitamin A during pregnancy can cause birth defects.

The most common type of overnutrition in developed nations is an excess intake of calories often leading to obesity. In the long run, outcomes of obesity include other serious diseases, such as type 2 diabetes and certain forms of cancer. Use the website shapeup.org to learn more about the importance of lifelong weight control.

For most vitamins and minerals, the gap between desirable intake and overnutrition is wide. Therefore, even if people take a typical balanced multivitamin and mineral supplement daily, they probably won’t receive a harmful dose of any nutrient. The difference between desirable intake and overnutrition is smallest for vitamin A and the minerals calcium, iron, and copper. Thus, if you take nutrient supplements, keep a close eye on your total vitamin and mineral intake from both food and supplements to avoid toxicity (see Chapter 8 for further advice on use of nutrient supplements).

HOW CAN YOUR NUTRITIONAL STATE BE MEASURED?

To find out how nutritionally fit you are, a nutritional assessment—either whole or in part—needs to be performed (Table 2-3). Generally, this is performed by a physician, often with the aid of a registered dietitian.

Analyzing Background Factors

Since family health history plays an important role in determining nutritional and health status, it must be carefully recorded and critically analyzed as part of a nutritional assessment. Other related background information includes: (1) a medical history, especially for any disease states or treatments that could decrease nutrient absorption or ultimate use; (2) a list of medications taken; (3) a social history (e.g., marital status, living conditions); (4) level of education to determine the degree of complexity that can be used in written materials and oral discussions; and (5) economic status to determine the ability to purchase, transport, and cook food.
TABLE 2-3 Conducting an Evaluation of Nutritional Health

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Example</th>
</tr>
</thead>
</table>
| Background | Medical history (e.g., current diseases, past surgeries, current weight, weight history, and current medications)  
Social history (marital status, living conditions)  
Family health history  
Education attainment  
Economic status |
| Nutritional | Anthropometric assessment: height, weight, skinfold thickness, arm muscle circumference, and other parameters  
Biochemical (laboratory) assessment of blood and urine: enzyme activities, concentrations of nutrients or their by-products  
Clinical assessment (physical examination): general appearance of skin, eyes, and tongue; rapid hair loss; sense of touch; ability to walk  
Dietary assessment: usual intake or record of previous days’ meals |

Evaluating the ABCDEs

In addition to background factors, four nutritional assessment categories complete the picture of nutritional status. *Anthropometric* measurements of height, weight (and weight changes), skinfold thicknesses, and body circumferences provide information about the current state of nutrition. Measures of body composition are easy to obtain and are generally reliable. However, an in-depth examination of nutritional health is impossible without the more expensive process of *biochemical assessment*. This involves the measurement of the concentrations of nutrients and nutrient by-products in the blood, urine, and feces and of specific blood enzyme activities.

A *clinical assessment* would follow, during which a health professional would search for any physical evidence (e.g., high blood pressure) of diet-related diseases or deficiencies. Then, a close look at the person’s diet (*dietary assessment*), including a record of at least the previous few days’ food intake, would determine any possible problem areas. Finally, adding the *economic assessment* (from the background analysis) provides further details about the ability to purchase and prepare foods needed to maintain health. Now the true nutritional state of a person emerges. Taken together, these five assessments form the ABCDEs of nutritional assessment: anthropometric, biochemical, clinical, dietary, and economic (Fig. 2-3).

**MAKING DECISIONS**

**Nutritional Assessment**

A practical example using the ABCDEs for evaluating nutritional state can be illustrated in a person who chronically abuses alcohol. Upon evaluation, the physician notes:

(A) Low weight-for-height, recent 10 pound weight loss, muscle wasting in the upper body
(B) Low amounts of the vitamins thiamin and folate in the blood
(C) Psychological confusion, facial sores, and uncoordinated movement
(D) Dietary intake of little more than wine and hamburgers for the last week
(E) Currently residing in a homeless shelter; $35.00 in wallet; unemployed

Evaluation: This person needs medical attention, including nutrient repletion.

**Recognizing the Limitations of Nutritional Assessment**

A long time may elapse between the initial development of poor nutritional health and the first clinical evidence of a problem. Recall that a diet high in saturated (typically solid) fat often increases blood cholesterol, but without producing any...
clinical evidence for years. However, when the blood vessels become sufficiently blocked by cholesterol and other materials, chest pain during physical activity or a heart attack may occur. An active area of nutrition research is the development of better methods for early detection of nutrition-related problems such as heart attack risk.

Another example of a serious health condition with delayed symptoms is low bone density resulting from a calcium deficiency—a particularly relevant issue for adolescent and young adult females. Many young women do not consume the needed amount of calcium but suffer no obvious effects in their younger years. However, the bone structures of these women with low calcium intakes do not reach full potential during the years of growth, making osteoporosis more likely later in life.
Furthermore, clinical symptoms of some nutritional deficiencies—diarrhea, an inability to walk normally, and facial sores—are not very specific. These may have different causes. The long time it takes for symptoms to develop and their potential to be vague often make it difficult to establish a link between an individual’s current diet and nutritional state.

**Concern About the State of Your Nutritional Health Is Important**

Table 1-7 in Chapter 1 portrayed the close relationship between nutrition and health. The good news is that people who focus on maintaining nutritional health are apt to enjoy a long, vigorous life. For example, a recent study found that women with a healthy lifestyle had a decreased risk for heart attacks (80% reduction) compared to women without such healthy practices. The healthy habits included:

- Consumed a healthy diet
- Varied
- Rich in fiber
- Included some fish
- Low in animal fat and trans fat
- Maintained a healthy weight
- Occasionally consumed alcohol in small amounts
- Exercised for at least 30 minutes daily
- Avoided use of tobacco

Should all adults follow this example (with optional use of alcohol)?

**CONCEPT CHECK**

A desirable nutritional state results when the body has enough nutrients to function fully and contains stores to use in times of increased needs. When nutrient intake fails to meet body needs, undernutrition develops. Symptoms of such an inadequate nutrient intake can take months or years to develop. Overloading the body with nutrients, leading to overnutrition, is another potential problem to avoid. Nutritional state can be assessed by using anthropometric, biochemical, clinical, dietary, and economic assessments (ABCDEs).

**RECOMMENDATIONS FOR FOOD CHOICE**

The following sections of Chapter 2 will describe various guidelines for planning healthy diets.

**MyPyramid—A Menu-Planning Tool**

Since the early twentieth century, researchers have worked to translate the science of nutrition into practical terms, so that people with no special training could estimate whether their nutritional needs were being met. The United States Department of Agriculture (USDA) simplified the recommendation by the mid-1950s to a four food-group plan: a milk group, a meat group, a fruit and vegetable group, and a bread and cereal group. In 1992 this plan was illustrated using a pyramid shape (i.e., Food Guide Pyramid).

In April 2005, USDA unveiled their latest food guide plan, MyPyramid. Entitled “Steps to a Healthier You,” MyPyramid replaces the Food Guide Pyramid and provides a more individualized approach to improving diet and lifestyle than previous food guides. Its goal is to provide advice that will help us live longer, better, and healthier lives.
The MyPyramid symbol represents the recommended proportion of foods from each food group to create a healthy diet. Physical activity is a new element in the pyramid. To get the individualized advice that is the hallmark of the plan, however, consumers need to use the website, MyPyramid.gov.

MyPyramid is designed to illustrate personalization, gradual improvement, activity, variety, proportionality, and moderation. These concepts are explained in Figure 2-4. Consumer messages have also been developed to help us navigate MyPyramid (Fig. 2-5).

An innovative aspect of MyPyramid is the interactive technology found on MyPyramid.gov. This includes:

**MyPyramid Plan**—providing a quick estimate of what and how much food the individual should eat from the different food groups based on age, gender, and activity level.

**Inside MyPyramid**—providing in-depth information for every food group, including recommended daily amounts in commonly used measures, such as cups and ounces, with examples and everyday tips. The section also includes recommendations for choosing healthy oils, discretionary calories, and physical activity. See Making Decisions for an estimation of discretionary calories. This refers to the calories allowed from food choices rich in added sugars or solid fat. The overall intent is not to exceed the discretionary calorie allowance from the combination of calories from foods and beverages with calories from alcohol, added sugars, or added fats. For most of us very few discretionary calories are available in daily diet planning.

**MyPyramid Tracker**—allows the user to select from 8000 foods and 600 activities and provides more detailed information on diet quality and physical activity status by comparing a day’s worth of foods eaten to the guidance provided by MyPyramid. Nutrition and physical activity messages are based on the need to maintain current weight or to lose weight.

**Start Today**—provides tips and resources that include downloadable suggestions on all the food groups and physical activity and a worksheet to track one’s diet.

### MAKING DECISIONS

#### Discretionary Calories

Discretionary calories are estimated as follows:

<table>
<thead>
<tr>
<th>Calorie Intake (kcal)</th>
<th>Discretionary Calories (kcal)</th>
<th>Calorie Intake (kcal)</th>
<th>Discretionary Calories (kcal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>165*</td>
<td>2200</td>
<td>290</td>
</tr>
<tr>
<td>1200</td>
<td>171*</td>
<td>2400</td>
<td>362</td>
</tr>
<tr>
<td>1400</td>
<td>171*</td>
<td>2600</td>
<td>410</td>
</tr>
<tr>
<td>1600</td>
<td>132</td>
<td>2800</td>
<td>426</td>
</tr>
<tr>
<td>1800</td>
<td>196</td>
<td>3000</td>
<td>512</td>
</tr>
<tr>
<td>2000</td>
<td>267</td>
<td>3200</td>
<td>648</td>
</tr>
</tbody>
</table>

*The amount of discretionary calories is higher for 1000–1400 kcal diets than for a 1600 kcal diet because these lower calorie diets are intended for children 2–8 years of age. Adult calorie recommendations typically start at 1600 kcal.

#### Putting MyPyramid into Action

To put MyPyramid into action, first you need to estimate your calorie needs (the website helps you calculate this). Figure 2-6 provides a rough guide. Overall, MyPyramid translates the latest nutrition advice into twelve separate pyramids based on calorie needs (1000 to 3200 kcal).
FIGURE 2-4  The anatomy of MyPyramid. USDA’s MyPyramid symbolizes a personalized approach to healthy eating and physical activity. The symbol was designed to be simple. It was developed to remind consumers to make healthy food choices and to be active every day. In this figure, the different parts of the symbol are described.

FIGURE 2-5  These consumer messages have been developed by the USDA to help you navigate MyPyramid. The amounts shown for each food group are for a 2000 kcal diet. The amounts for other diets are shown in Table 2-4.
Once you have determined the calorie allowance appropriate for you, you can use Table 2-4 to discover how that calorie allowance corresponds to the recommended number of servings from each food group.

What Counts as One Serving?
MyPyramid provides serving sizes of foods for the various food groups in household units. Pay close attention to the stated serving size for each choice when following MyPyramid. This helps control total calorie intake. See Figure 2-7 for a convenient guide to estimating common serving size measurements.

- **Grains**: 1 slice of bread; 1 cup of ready-to-eat breakfast cereal, or ½ cup cooked rice, pasta, or cereal counts as a 1-ounce equivalent.
- **Vegetables**: 1 cup of raw or cooked vegetables or vegetable juice or 2 cups of raw leafy greens.
- **Fruits**: 1 cup of fruit or 100% fruit juice or ½ cup of dried fruit.
- **Milk**: 1 cup of milk or yogurt, 1.5 ounces of natural cheese, or 2 ounces of processed cheese.
- **Meat & Beans**: 1 ounce of meat, poultry, or fish; 1 egg; 1 tablespoon of peanut butter; ½ cup cooked dry beans, or ½ ounce of nuts or seeds are all 1-ounce equivalents.
- **Oils**: A teaspoon of any oil from plants or fish that is liquid at room temperature counts as a serving, as do such servings of foods rich in oils (e.g., mayonnaise and soft margarine).

### TABLE 2-4
MyPyramid Recommendations for Daily Food Consumption Based on Calorie Needs and Resulting in Twelve Separate Pyramids

<table>
<thead>
<tr>
<th>Daily Amount of Food From Each Group</th>
<th>Calorie Level</th>
<th>1000</th>
<th>1200</th>
<th>1400</th>
<th>1600</th>
<th>1800</th>
<th>2000</th>
<th>2200</th>
<th>2400</th>
<th>2600</th>
<th>2800</th>
<th>3000</th>
<th>3200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits</td>
<td>1 cup</td>
<td>1 cup</td>
<td>1.5 cups</td>
<td>1.5 cups</td>
<td>1.5 cups</td>
<td>2 cups</td>
<td>2 cups</td>
<td>2 cups</td>
<td>2 cups</td>
<td>2.5 cups</td>
<td>2.5 cups</td>
<td>2.5 cups</td>
<td></td>
</tr>
<tr>
<td>Vegetables1,2</td>
<td>1 cup</td>
<td>1.5 cups</td>
<td>1.5 cups</td>
<td>2 cups</td>
<td>2.5 cups</td>
<td>2.5 cups</td>
<td>3 cups</td>
<td>3 cups</td>
<td>3.5 cups</td>
<td>3.5 cups</td>
<td>4 cups</td>
<td>4 cups</td>
<td></td>
</tr>
<tr>
<td>Grains3</td>
<td>3 oz-eq</td>
<td>4 oz-eq</td>
<td>5 oz-eq</td>
<td>6 oz-eq</td>
<td>6 oz-eq</td>
<td>7 oz-eq</td>
<td>8 oz-eq</td>
<td>9 oz-eq</td>
<td>10 oz-eq</td>
<td>10 oz-eq</td>
<td>10 oz-eq</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat &amp; Beans</td>
<td>2 oz-eq</td>
<td>3 oz-eq</td>
<td>4 oz-eq</td>
<td>5 oz-eq</td>
<td>5 oz-eq</td>
<td>5.5 oz-eq</td>
<td>6 oz-eq</td>
<td>6.5 oz-eq</td>
<td>6 oz-eq</td>
<td>7 oz-eq</td>
<td>7 oz-eq</td>
<td>7 oz-eq</td>
<td></td>
</tr>
<tr>
<td>Milk4</td>
<td>2 cups</td>
<td>2 cups</td>
<td>2 cups</td>
<td>3 cups</td>
<td>3 cups</td>
<td>3 cups</td>
<td>3 cups</td>
<td>3 cups</td>
<td>3 cups</td>
<td>3 cups</td>
<td>3 cups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oils5</td>
<td>3 tsp</td>
<td>4 tsp</td>
<td>4 tsp</td>
<td>5 tsp</td>
<td>5 tsp</td>
<td>6 tsp</td>
<td>6 tsp</td>
<td>7 tsp</td>
<td>8 tsp</td>
<td>8 tsp</td>
<td>10 tsp</td>
<td>11 tsp</td>
<td></td>
</tr>
</tbody>
</table>

| Discretionary calorie allowance6     | 165          | 171 | 171 | 132 | 195 | 267 | 290 | 362 | 410 | 426 | 512 | 648 |

oz-eq stands for ounce equivalent; tsp stands for teaspoon

1Vegetables are divided into five subgroups (dark green, orange, legumes, starchy, and other). Over a week’s time, a variety of vegetables should be eaten, especially green and orange vegetables.

2Dry beans and peas can be counted either as vegetables (dry beans and peas subgroup), or in the meat & beans group. Generally, individuals who regularly eat meat, poultry, and fish would count dry beans and peas in the vegetable group. Individuals who seldom eat meat, poultry, or fish (vegetarians) would consume more dry beans and peas and count some of them in the meat & beans group until enough servings from that group are chosen for the day.

3At least half of the grain servings should be whole-grain varieties.

4Most of the milk servings should be fat-free or low-fat.

5Limit solid fats such as butter, stick margarine, shortening, and meat fat, as well as foods that contain these.

6Discretionary calories refers to food choices rich in added sugars or solid fat.
### Chapter 2: Guidelines for Designing a Healthy Diet

#### FIGURE 2-7

A yo-yo, baseball, tennis ball, golf ball, dice, and deck of cards make convenient guides to judge MyPyramid serving sizes. Additional handy guides include:

- Matchbox = 1 oz of meat
- Bar of soap = 3 oz of meat
- Computer mouse = ½ cup of chopped foods
- 1 ice cream scoop = ½ cup
- Ping-pong ball = 2 tbsp
- 4 golf balls = 1 cup of dry cereal

<table>
<thead>
<tr>
<th>Category</th>
<th>Serving Size</th>
<th>Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grains</strong></td>
<td>2 ounces</td>
<td>Bagel or English muffin</td>
</tr>
<tr>
<td><strong>Vegetables</strong></td>
<td>1 cup</td>
<td>Green beans</td>
</tr>
<tr>
<td><strong>Fruits</strong></td>
<td>½ to 2/3 cup</td>
<td>Medium/small apple</td>
</tr>
<tr>
<td><strong>Oils</strong></td>
<td>2 tbsp</td>
<td>Salad dressing, peanut butter, margarine, etc.</td>
</tr>
<tr>
<td><strong>Milk</strong></td>
<td>1 ounce</td>
<td>Cheese</td>
</tr>
<tr>
<td><strong>Meat &amp; Beans</strong></td>
<td>3 ounces</td>
<td>Meat, chicken or fish</td>
</tr>
</tbody>
</table>

- 1 yo-yo
- 1 baseball
- 1 tennis ball
- 1 golf ball
- 4 dice
- 1 deck of cards
Menu Planning with MyPyramid

Remember the following points when using MyPyramid to plan your daily menus:

1. The guide does not apply to infants or children under 2 years of age.
2. No one food is absolutely essential to good nutrition. Each food is rich in some nutrients, but deficient in at least one essential nutrient (Table 2-5).
3. No one food group provides all essential nutrients in adequate amounts. Each food group makes an important, distinctive contribution to nutritional intake.
4. Variety is the key to success of MyPyramid and is first guaranteed by choosing foods from all the groups. Furthermore, one should consume a variety of foods within each group, except possibly in the milk, yogurt, and cheese group.
5. The foods within a group may vary widely with respect to nutrients and calories. For example, the calorie content of 3 ounces of baked potato is 98 kcal, whereas that of 3 ounces of potato chips is 470 kcal. Compare an orange and an apple with respect to vitamin C using the food composition table in the supplement.

Overall, MyPyramid incorporates the foundations of a healthy diet: variety, balance, and moderation. The nutritional adequacy of diets planned using this tool, however, depends on selection of a variety of foods (Table 2-6). In addition, vitamin E, vitamin B-6, magnesium, and zinc are nutrients sometimes low in diets based on this plan. To ensure enough of these nutrients, consider the following advice:

1. Choose primarily low-fat and fat-free items from the milk group. By reducing calorie intake in this way, you can select more items from other food groups. If milk causes intestinal gas and bloating, emphasize yogurt and cheese (see Chapter 4 for details on the problem of lactose malabsorption and lactose intolerance).

<table>
<thead>
<tr>
<th>Food Category</th>
<th>Major Nutrient Contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains</td>
<td>Carbohydrate, Vitamins such as thiamin, Minerals such as iron, Fiber*</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Carbohydrate, Vitamins such as plant pigments that form vitamin A, Minerals such as magnesium, Fiber</td>
</tr>
<tr>
<td>Fruits</td>
<td>Carbohydrate, Vitamins such as folate and vitamin C, Minerals such as potassium, Fiber</td>
</tr>
<tr>
<td>Oils</td>
<td>Fat, Essential fatty acids, Vitamins such as vitamin E</td>
</tr>
<tr>
<td>Milk</td>
<td>Carbohydrate, Protein, Vitamins such as vitamin D, Minerals such as calcium and phosphorus</td>
</tr>
<tr>
<td>Meat &amp; Beans</td>
<td>Protein, Vitamins such as vitamin B-6, Minerals such as iron and zinc</td>
</tr>
</tbody>
</table>

*Whole-grain varieties
### TABLE 2-6 Putting the MyPyramid into Practice

This menu meets nutrient needs for all vitamins and minerals for an average adult that needs 1800 kcal. For adolescents, teenagers, and older adults add one additional serving of milk or other calcium-rich sources.

<table>
<thead>
<tr>
<th>Meal</th>
<th>Food Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Breakfast</strong></td>
<td></td>
</tr>
<tr>
<td>1 small orange</td>
<td>Fruits</td>
</tr>
<tr>
<td>¾ cup Healthy Choice Low-fat Granola with ½ cup fat-free milk</td>
<td>Grains, Milk</td>
</tr>
<tr>
<td>½ toasted, small raisin bagel with 1 tsp soft margarine</td>
<td>Grains, Oils</td>
</tr>
<tr>
<td>Optional: coffee or tea</td>
<td></td>
</tr>
<tr>
<td><strong>Lunch</strong></td>
<td></td>
</tr>
<tr>
<td>Turkey sandwich</td>
<td>Grains, Meat &amp; Beans</td>
</tr>
<tr>
<td>2 slices whole-wheat bread</td>
<td>Grains</td>
</tr>
<tr>
<td>2 oz turkey</td>
<td>Meat &amp; Beans</td>
</tr>
<tr>
<td>2 tsp mustard</td>
<td></td>
</tr>
<tr>
<td>1 small apple</td>
<td>Fruits</td>
</tr>
<tr>
<td>2 oatmeal-raisin cookies (small)</td>
<td>Discretionary calories</td>
</tr>
<tr>
<td>Optional: diet soft drink</td>
<td></td>
</tr>
<tr>
<td><strong>3 P.M. Study Break</strong></td>
<td></td>
</tr>
<tr>
<td>6 whole-wheat crackers</td>
<td>Grains</td>
</tr>
<tr>
<td>1 tbsp peanut butter</td>
<td>Meat &amp; Beans</td>
</tr>
<tr>
<td>½ cup fat-free milk</td>
<td>Milk</td>
</tr>
<tr>
<td><strong>Dinner</strong></td>
<td></td>
</tr>
<tr>
<td>Tossed salad</td>
<td>Vegetables</td>
</tr>
<tr>
<td>1 cup romaine lettuce</td>
<td>Vegetables</td>
</tr>
<tr>
<td>½ cup sliced tomatoes</td>
<td></td>
</tr>
<tr>
<td>1½ tbsp Italian dressing</td>
<td>Oils</td>
</tr>
<tr>
<td>½ carrot, grated</td>
<td>Vegetables</td>
</tr>
<tr>
<td>3 oz broiled salmon</td>
<td>Meat &amp; Beans</td>
</tr>
<tr>
<td>½ cup rice</td>
<td>Grains</td>
</tr>
<tr>
<td>½ cup green beans with 1 tsp soft margarine</td>
<td>Vegetables, Oils</td>
</tr>
<tr>
<td>Optional: coffee or tea</td>
<td></td>
</tr>
<tr>
<td><strong>Late-Night Snack</strong></td>
<td>Milk</td>
</tr>
<tr>
<td>1 cup “light” fruit yogurt</td>
<td></td>
</tr>
</tbody>
</table>

### Nutrient Breakdown

- **1800 kcal**
  - Carbohydrate: 56% of kcal
  - Protein: 18% of kcal
  - Fat: 26% of kcal
2. Include plant foods that are good sources of proteins, such as beans and nuts, at least several times a week because many are rich in vitamins (such as vitamin E), minerals (such as magnesium), and fiber.

3. For vegetables and fruits, try to include a dark green vegetable for vitamin A and a vitamin C–rich fruit, such as an orange, every day. Don’t focus primarily on potatoes (e.g., French fries) for your vegetable choices. Surveys show that fewer than 5% of adults eat a full serving of a dark green vegetable on any given day. Increased consumption of these foods is important because they contribute vitamins, minerals, fiber, and phytochemicals.

4. Choose whole-grain varieties of breads, cereals, rice, and pasta because they contribute vitamin E and fiber. A plate about two-thirds covered by grains, fruits, and vegetables and one-third or less covered by protein-rich foods promotes this diet advice. A daily serving of a whole-grain, ready-to-eat breakfast cereal is an excellent choice because the vitamins (such as vitamin B-6) and minerals (such as zinc) typically added to it, along with fiber, help fill in the potential gaps listed earlier.

5. Include some plant oils on a daily basis, such as those in salad dressing, and eat fish at least twice a week. This supplies you with health-promoting essential fatty acids.

**MAKING DECISIONS**

**Household Units**

Common household units are listed here with their metric equivalents. Ounces and fluid ounces differ. Ounces are a measure of weight, while fluid ounces are a measure of volume. Fluid ounces are based on the corresponding volume of water as the standard; 1 ounce of water by weight equals one fluid ounce. Any fluid more or less dense than water will yield a different number of fluid ounces per ounce of material.

- 3 teaspoons = 1 tablespoon = 15 grams
- 4 tablespoons = ¼ cup = 60 grams
- 5 ½ tablespoons = ½ cup = 80 grams
- 8 tablespoons = ⅛ cup = 120 grams
- 10 ¾ tablespoons = ⅓ cup = 160 grams
- 16 tablespoons = ¼ cup = 240 grams
- 1 tablespoon = ½ fluid ounce = 15 milliliters
- 1 cup = 8 fluid ounces = 240 milliliters
- 1 cup = ¾ pint = 240 grams
- 2 cups = 1 pint = 480 grams
- 4 cups = 1 quart = 960 grams = 1 liter
- 2 pints = 1 quart = 960 grams = 1 liter
- 4 quarts = 1 gallon = 3840 grams = 4 liters

**How Does Your Current Diet Rate?**

Regularly comparing your daily food intake with MyPyramid recommendations for your age, gender, and degree of physical activity, is a relatively simple way to evaluate your overall diet. Strive to meet the recommendations. (The diets of most adults fail in this evaluation, especially with respect to milk, vegetables, fruits, and whole-grain breads and cereals.) If that is not possible, identify the nutrients that are low in your diet based on the nutrients found in each food group (review Table 2-5). For example, if you do not consume enough servings from the milk group, your calcium intake is most likely too low. You need to then find foods that you enjoy that supply calcium, such as calcium-fortified orange juice. Customizing MyPyramid to accommodate your food habits may seem a daunting task, but it is not difficult once you gain some additional nutrition knowledge.
Get Going

Start putting MyPyramid into practice and use the MyTracker feature to follow your progress. Implementing even small diet and exercise changes can have positive results. Better health will likely follow as you strive to meet your nutrient needs and balance your physical activity and calorie allowance. In addition, follow the guidance from the 2005 Dietary Guidelines for Americans regarding alcohol and sodium intake and safe food preparation.

CONCEPT CHECK

MyPyramid translates the general needs for carbohydrate, protein, fat, vitamins, and minerals into the recommended number of daily servings from each of five major food groups and oils. It is a convenient and valuable tool for planning daily menus.

Dietary Guidelines—Another Tool for Menu Planning

MyPyramid was designed to help meet nutritional needs for carbohydrate, protein, fat, vitamins, and minerals. However, most of the major chronic “killer” diseases in North America, such as cardiovascular disease, cancer, and alcoholism, are not primarily associated with deficiencies of these nutrients. Deficiency diseases such as scurvy (vitamin C deficiency) and pellagra (niacin deficiency) are no longer common. For many North Americans, the primary dietary culprit is an overconsumption of one or more of the following: calories, saturated fat, cholesterol, trans fat, alcohol, and sodium (salt). Underconsumption of calcium, iron, folate and other B-vitamins, vitamin C, vitamin D, vitamin E, potassium, magnesium, and fiber is also a problem for some people.

In response to concerns regarding these killer disease patterns and poor dietary habits, the USDA and U.S. Department of Health and Human Services (DHHS) have published Dietary Guidelines for Americans (Dietary Guidelines for short) since 1980 to aid diet planning.

The latest version of the Dietary Guidelines was published in 2005 and compared to past reports, places stronger emphasis on monitoring one’s calorie intake and increasing physical activity. This is because more of us are becoming overweight each year.

The 2005 report identifies 41 key recommendations, of which 23 are for the general public and 18 are for special populations. They are grouped into nine general topics:

- Adequate Nutrient Intake Within Calorie Needs
- Weight Management
- Physical Activity
- Specific Food Groups to Encourage
- Fats
- Carbohydrates
- Sodium and Potassium
- Alcoholic Beverages
- Food Safety

Figure 2-8 lists the key recommendations for the general public within each general topic. The advice provided refers to people two years and older.

A basic premise of the Dietary Guidelines is that nutrient needs should be met primarily through consuming foods. Foods provide an array of nutrients and other compounds that may have beneficial effects on health. Fortified foods and dietary supplements, however, are especially important for people whose typical food choices cannot meet one or more nutrient recommendations, such as for vitamin E or calcium. However, dietary supplements are not a substitute for a healthful diet.
Consume a variety of nutrient-dense foods and beverages within and among the basic food groups while choosing foods that limit the intake of saturated and trans fats, cholesterol, added sugars, salt, and alcohol. Meet recommended intakes within energy needs by adopting a balanced eating pattern, such as MyPyramid.

Key Recommendations for Specific Population Groups are listed in Chapters 14 and 16.

To maintain body weight in a healthy range, balance energy intake from foods and beverages with energy expended.

To prevent gradual weight gain over time, make small decreases in energy intake from food and beverages and increase physical activity.

Key Recommendations for Specific Population Groups are listed in Chapters 7, 14, 15, and 16.

FIGURE 2-8 Key Recommendations for the general public within each general topic from the latest Dietary Guidelines for Americans.

The 2005 Dietary Guidelines for Americans (and the consumer brochure) are available at [www.healthierus.gov/dietaryguidelines](http://www.healthierus.gov/dietaryguidelines). In general the Dietary Guidelines recommend that we:

- Consume a variety of nutrient-dense foods and beverages within and among the basic food groups of MyPyramid, while choosing foods that limit the intake of saturated and trans fats, cholesterol, added sugars, salt, and alcohol (if used).
FOOD GROUPS TO ENCOURAGE

- Consume a sufficient amount of fruits and vegetables while staying within energy needs. Two cups of fruit and 2 1/2 cups of vegetables per day are recommended for a reference 2000 kcal intake, with higher or lower amounts depending on one’s energy needs.
- Choose a variety of fruits and vegetables each day. In particular, select from all five vegetable subgroups (dark green vegetables, orange vegetables, legumes, starchy vegetables, and other vegetables) several times a week.
- Consume 3 or more ounce-equivalents of whole-grain products per day, with the rest of the recommended grains coming from enriched or whole-grain products. In general, at least half the grains should come from whole grains.
- Consume 3 cups per day of fat-free or low-fat milk or equivalent milk products.

Key Recommendations for Specific Population Groups are listed in Chapter 15.

FATS

- Consume less than 10 percent of energy intake from saturated fatty acids and less than 300 mg per day of cholesterol, and keep trans fatty acid consumption as low as possible.
- Keep total fat intake between 20 to 35% of energy intake, with most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as fish, nuts, and vegetable oils.
- When selecting and preparing meat, poultry, dry beans, and milk or milk products, make choices that are lean, low-fat, or fat-free.
- Limit intake of fats and oils high in saturated and/or trans fatty acids, and choose products low in such fats and oils.

Key Recommendations for Specific Population Groups are listed in Chapter 15.

CARBOHYDRATES

- Choose fiber-rich fruits, vegetables, and whole grains often.
- Choose and prepare foods and beverages with little added sugars or caloric sweeteners, such as amounts suggested by MyPyramid.
- Reduce the incidence of dental caries by practicing good oral hygiene and consuming sugar- and starch-containing foods and beverages less frequently.

Foods to emphasize are vegetables, fruits, legumes (beans), whole grains, and fat-free or low-fat milk or equivalent milk products.
- Maintain body weight in a healthy range by balancing calorie intake from foods and beverages with calories expended. For the latter, engage in at least 30 minutes of moderate-intensity physical activity, above usual activity, at work or home on most days of the week.
- Practice safe food handling when preparing food. This includes cleaning hands, food contact surfaces, and fruits and vegetables before preparation and cooking foods to a safe temperature to kill microorganisms.
Practical Use of the Dietary Guidelines

The Dietary Guidelines are designed to meet nutrient needs while reducing the risk of obesity, hypertension, cardiovascular disease, type 2 diabetes, alcoholism, and food-borne illness.

The Dietary Guidelines are not difficult to implement (Table 2-7). Despite popular misconceptions, this overall diet approach is not especially expensive. Fruits, vegetables, and low-fat and fat-free milk are no more expensive than the chips, cookies, and sugared soft drinks they should in part replace.

Diet recommendations for adults have been issued by other scientific groups, such as the American Heart Association, U.S. Surgeon General, National Academy of Sciences, American Cancer Society, Canadian Ministries of Health (see Appendix C), and...
### TABLE 2-7 Recommended Diet Changes Based on the Dietary Guidelines

<table>
<thead>
<tr>
<th>If You Usually Eat This,</th>
<th>Try This Instead</th>
<th>Benefit</th>
</tr>
</thead>
</table>
| White bread                    | Whole-wheat bread                 | • Higher nutrient density, due to less processing  
|                                |                                   | • More fiber                                                             |
| Sugary breakfast cereal        | Low-sugar, high-fiber cereal      | • Higher nutrient density  
|                                | with fresh fruit                  | • More fiber  
|                                |                                   | • More phytochemicals                                                   |
| Cheeseburger with              | Hamburger and baked beans         | • Less saturated fat and trans fat  
| French fries                   |                                   | • Less cholesterol  
|                                |                                   | • More fiber  
|                                |                                   | • More phytochemicals                                                   |
| Potato salad                   | Three-bean salad                  | • More fiber  
|                                |                                   | • More phytochemicals                                                   |
| Doughnuts                      | Bran muffin/bagel with light      | • More fiber  
|                                | cream cheese                      | • Less fat                                                             |
| Regular soft drinks            | Diet soft drinks                  | • Fewer calories                                                        |
| Boiled vegetables              | Steamed vegetables                | • Higher nutrient density, due to reduced loss of water-soluble vitamins |
| Canned vegetables              | Fresh or frozen vegetables        | • Higher nutrient density, due to reduced loss of heat-sensitive vitamins  
|                                |                                   | • Lower in sodium                                                       |
| Fried meats                    | Broiled meats                     | • Less saturated fat                                                    |
| Fatty meats, such as ribs or   | Lean meats, such as ground round,| • Less saturated fat                                                    |
| bacon                          | chicken, or fish                  |                                                                         |
| Whole milk                     | Low-fat or fat-free milk          | • Less saturated fat  
|                                |                                   | • Fewer calories  
|                                |                                   | • More calcium                                                          |
| Ice cream                      | Sherbet or frozen yogurt          | • Less saturated fat  
|                                |                                   | • Fewer calories                                                        |
| Mayonnaise or sour cream       | Oil and vinegar dressings or      | • Less saturated fat  
| salad dressing                 | light creamy dressings            | • Less cholesterol  
|                                |                                   | • Fewer calories                                                        |
| Cookies                        | Popcorn (air popped with minimal | • Fewer calories and trans fat                                           |
|                                | margarine or butter)              |                                                                         |
| Heavily salted foods           | Foods flavored primarily with     | • Lower in sodium                                                       |
|                                | herbs, spices, lemon juice        |                                                                         |
| Chips                          | Pretzels                          | • Less fat                                                              |

Choose low-sugar, high-fiber cereal with fresh fruit instead of sugary breakfast cereal.

Choose popcorn and pretzels instead of cookies and chips.
Advice from the American Dietetic Association suggests five basic principles with regard to diet and health.

- Be realistic, making small changes over time.
- Be adventurous, trying new foods regularly.
- Be flexible, balancing some sweet and fatty foods with physical activity.
- Be sensible, including favorite foods in smaller portions.
- Finally, be active, including physical activity in daily life.

World Health Organization. All are consistent with the spirit of the Dietary Guidelines. These groups encourage people to modify their eating behavior in ways that are both healthful and pleasurable.

**The Dietary Guidelines and You**

When using the Dietary Guidelines, you should consider your state of health. Make specific changes and see whether they are effective. Results are sometimes disappointing, even when you are following a diet change very closely. Some people can eat a lot of saturated fat and still keep blood cholesterol under control. Other people, unfortunately, have high blood cholesterol even if they eat a diet low in saturated fat. Differences in genetic background are a key reason for these different responses, as you will learn in Chapter 3. Thus, we have different individual nutritional needs and risks of developing certain diseases. One’s diet should be planned with this individuality in mind, taking into account when possible, one’s current health status and family history for specific diseases. However, tailoring a unique nutrition program for every North American citizen is currently unrealistic. MyPyramid and the 2005 Dietary Guidelines provide typical adults with simple advice, which can be actively practiced by anyone willing to take a step toward good health.

There is no “optimal” diet. Instead, there are numerous healthful diets. Visit the website of the International Food Information Council (www.ific.org). This site is a great resource for current nutrition information.

**SPECIFIC NUTRIENT STANDARDS AND RECOMMENDATIONS**

The overarching goal of any healthy diet plan is to meet nutrient needs. To begin, we must determine what amount of each essential nutrient is needed to maintain health. The standards that have been developed for such nutrient needs—DRI, RDA, AI, EER, and UL—can often seem like an alphabet soup of abbreviations. However, you can more easily sift through these nutrient standards if you have a knowledge base about their development and use (Table 2-8).

Does everyone in this photo have the same nutrient needs?
### TABLE 2-8 Recommendations within the Dietary Reference Intakes

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDA</td>
<td>Recommended Dietary Allowance. Use to evaluate your current intake for a specific nutrient. The further you stay above or below this value, the greater your chances of developing nutritional problems.</td>
</tr>
<tr>
<td>AI</td>
<td>Adequate Intake. Use to evaluate your current intake of nutrients, but realize that an AI designation implies that further research is required before scientists can establish a more definitive recommendation.</td>
</tr>
<tr>
<td>EER</td>
<td>Estimated Energy Requirement. Use to estimate calorie needs of the average person within a specific height, weight, gender, age, and physical activity pattern.</td>
</tr>
<tr>
<td>UL</td>
<td>Upper Level. Use to evaluate the highest amount of daily nutrient intake unlikely to cause adverse health effects in the long run in almost all people (97% to 98%) in a population. This number applies to chronic use and is set to protect even very susceptible people in the healthy general population. As intake increases above the Upper Level, the potential for adverse effects generally increases.</td>
</tr>
<tr>
<td>DV</td>
<td>Daily Value. Use as a rough guide for comparing the nutrient content of a food to approximate human needs. Typically, the Daily Value used on food labels refers to ages 4 years through adulthood. It is based on a 2000 kcal diet. Some Daily Values also increase slightly with higher calorie intakes (see Fig. 2-12 in the following section on food labeling).</td>
</tr>
</tbody>
</table>

Most of the terms that describe nutrient needs fall under one umbrella term—Dietary Reference Intakes (DRIs). The development of DRIs is an ongoing, collaborative effort between the Food and Nutrition Board of the Institute of Medicine in the United States and Health Canada. Included under the DRI umbrella are Recommended Dietary Allowances (RDAs), Adequate Intakes (AIs), Estimated Energy Requirements (EERs), and Tolerable Upper Intake Levels (Upper Levels or ULs).

### RECOMMENDED DIETARY ALLOWANCE

A Recommended Dietary Allowance (RDA) is the recommended amount of a nutrient based on meeting the needs of nearly all individuals (about 97%) in a particular age and gender group. A person can compare his or her individual intake of specific nutrients to the RDA. Although an intake slightly above or below the RDA for a particular nutrient is no reason for concern, a significant deviation below (about 70%) or above (about three times or more for some nutrients) the RDA over an extended time can eventually result in a deficiency or toxicity of that nutrient, respectively.

### Adequate Intake

An RDA can be set for a nutrient only if there is sufficient information on the human needs for that particular nutrient. Today, there is not enough information on some nutrients, such as calcium, to set such a precise standard as an RDA. For this and other nutrients, the DRIs include a category called an Adequate Intake (AI). This standard is derived from the dietary intakes of people that appear to be maintaining nutritional health. That amount of intake is assumed to be adequate, as no evidence of a nutritional deficiency is apparent.

### Estimated Energy Requirement

For calorie needs, we use the Estimated Energy Requirement (EER) instead of an RDA or AI. As described, the RDAs are set somewhat higher than the average needs for nutrients. This is fine for nutrients rather than calories because a slight excess of vitamins and
minerals is not harmful. However, a long-term excess of calories will lead to weight gain. Therefore, the calculation of EER needs to be more specific, taking into account age, gender, height, weight, and physical activity (e.g., sedentary or moderately active). In some cases, the additional calorie needs for growth and lactation are also included (see Chapters 7, 14, and 15 for the specific formulas used). The EER also is based on the “average” person. Thus it can only serve as a starting point for estimating calorie needs.

Tolerable Upper Intake Level

A Tolerable Upper Intake Level (Upper Level or UL) has been set for some vitamins and minerals (see the inside cover). The UL is the highest amount of a nutrient unlikely to cause adverse health effects in the long run. As intake exceeds the UL, the risk of ill effects increases. These amounts generally should not be exceeded day after day, as toxicity could develop. For people eating a varied diet and/or using a balanced multivitamin and mineral supplement, exceeding the UL is unusual. Problems are more likely to arise with diets that promote excessive intakes of a limited variety of foods or with the use of many fortified foods or excessive doses of individual vitamins or minerals.

Daily Value

A nutrition standard more relevant to everyday life is the Daily Value (DV). This is a generic standard used on food labels. It is applicable to both genders from 4 years of age through adulthood, and is based on a 2000 kcal diet. DVs are mostly set at or close to the highest RDA value or related nutrient standard seen in the various age and gender categories for a specific nutrient (see Appendix B). DVs have been set for vitamins, minerals, protein, and other dietary components. DVs allow consumers to compare their intake from a specific food to desirable (or maximum) intakes.

CONCEPT CHECK

Dietary Guidelines for Americans have been set by government organizations. These guidelines are designed to reduce the risk of developing obesity, hypertension, type 2 diabetes, cardiovascular disease, alcoholism, and foodborne illness. In general, they recommend eating a variety of foods, fostered by following MyPyramid. They also recommend performing regular physical activity, aiming for a healthy weight, and moderating total fat, saturated fat, trans fat, salt, sugar, and alcohol intake, while focusing more on fruits, vegetables, and whole-grain products in daily menu planning. Safe food preparation and storage are also highlighted. All of the specific dietary standards are included in the broad category of Dietary Reference Intakes (DRIs). The Recommended Dietary Allowances (RDAs) are the amounts of each nutrient that will meet the needs of healthy individuals within specific gender and age categories. If not enough information is available to set an RDA, an Adequate Intake (AI) value is used. Tolerable Upper Intake Levels (ULs) are the highest amounts of a nutrient unlikely to cause adverse health effects. ULs have been set for some vitamins and minerals.

HOW SHOULD THESE NUTRIENT STANDARDS BE USED?

To sum up the acronyms described so far, the type of standard set for nutrients depends on the quality of available evidence. A nutrient recommendation backed by lots of experimental research will have an RDA. For a nutrient that still requires more research, only an AI is presented. We use the EER as a starting point for determining
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periodically, new DRIs become available as expert committees review and interpret the available research.

RDAs and related standards are intended mainly for diet planning. Specifically, a diet plan should aim to meet the RDA or AI as appropriate and not to exceed the UL over the long term (Fig. 2-9). Specific RDA, AI, EER, and UL standards are printed on the inside cover of this book. To learn more about these nutrient standards, visit the link for the Food and Nutrition Board on the Institute of Medicine’s web page (www.iom.edu).

FIGURE 2-9 ▶ Dietary Reference Intakes (DRIs). At intakes between the RDA and the UL, the risk of either an inadequate diet or adverse effects from the nutrient in question is close to 0. The UL is then the highest level of nutrient intake likely to pose no risks of adverse health effects to almost all individuals in the general population. At intakes above the UL, the margin of safety to protect against adverse effects is reduced. The AI is set for some nutrients instead of an RDA. In determining the AI for a nutrient, it is expected that the amount exceeds the RDA for that nutrient, if an RDA were known. Thus, the AI should cover the needs of more than 97% to 98% of individuals. The actual degree to which the AI exceeds the RDA is likely to differ among the various nutrients and population groups. The Food and Nutrition Board states that there is no established benefit for healthy individuals if they consume nutrient intakes above the RDA or AI.

USING THE SCIENTIFIC METHOD TO DETERMINE NUTRIENT NEEDS

How do we know what we know about nutrient needs? In a word, research. Like other sciences, the research that sets the foundation for nutrition knowledge has developed through the use of the scientific method, a testing procedure designed to detect and eliminate error.

The first step of the scientific method is the observation of a natural phenomenon. Scientists then suggest possible explanations, called hypotheses, about its cause. At times, historical events can provide clues to important relationships in nutrition science, such as the link between vitamin C and scurvy (see Chapter 8). In a related calorie needs. Some nutrients also have a UL if information on toxicity is available. Periodically, new DRIs become available as expert committees review and interpret the available research.

hypotheses Tentative explanations by a scientist to explain a phenomenon.

scurvy The deficiency disease that results after a few weeks to months of consuming a diet that lacks vitamin C; pinpoint sites of bleeding on the skin are an early sign.
approach, scientists may study the dietary and disease patterns among various populations, a research method called epidemiology.

Historical and epidemiological findings can suggest hypotheses about the role of diet in various health problems. Proving the role of particular dietary components, however, requires controlled experiments. The data gathered from experiments may either support or refute each hypothesis. If the results of many experiments support a hypothesis, the hypothesis becomes generally accepted by scientists and can be called a theory (such as the theory of gravity). Often, the results from one experiment suggest a new set of questions (Fig 2-10).

The most rigorous type of controlled experiment follows a randomized, double-blind, placebo-controlled study design. In this type of study, a group of participants—
the experimental group—follows a specific protocol (e.g., consuming a certain food or nutrient), and participants in a corresponding **control group** follow their normal habits or consume a **placebo**. People are randomly assigned to each group, such as by the flip of a coin. Scientists then observe the experimental group over time to see if there is any effect not found in the control group.

Human experiments provide the most convincing evidence about relationships between nutrients and health, but they are often not practical or ethical. Thus, much of what we know about human nutritional needs and functions has been generated from animal experiments. The use of animal experiments to study the role of nutrition in certain human diseases depends on the availability of an **animal model**—a disease in laboratory animals that closely mimics a particular human disease. Often, however, if no animal model is available and human experiments are ruled out, scientific knowledge cannot advance beyond what can be learned from epidemiological studies.

Once an experiment is complete, scientists summarize the findings and seek to publish the results in scientific journals. Generally, before articles are published in scientific journals, they are critically reviewed by other scientists familiar with the subject, which helps to ensure that only high-quality, objective research findings are published.

Keep in mind, one experiment is never enough to prove a particular hypothesis or provide a basis for nutritional recommendations. Rather, through follow-up studies, the results obtained in one laboratory must be confirmed by experiments conducted in other laboratories, and possibly under varying circumstances. Only then can we really trust and use the results. The more lines of evidence available to support an idea, the more likely it is to be true (Fig 2-11).

**FIGURE 2-11** Data from a variety of sources can come together to support a research hypothesis. For example, epidemiological studies show that type 2 diabetes is characteristically found in obese populations, compared with leaner populations. Physicians notice in clinical practice that type 2 diabetes is much more likely in their obese patients, compared with their leaner patients. Laboratory animal studies show that overfeeding that eventually leads to obesity often leads to the development of type 2 diabetes. **Case-control studies** show that obese patients are much more likely to have type 2 diabetes than the leaner comparison group matched for other characteristics. Finally, human intervention trials show that weight loss can correct type 2 diabetes in many people. Laboratory researchers also show that the enlarged adipose cells associated with excess fat deposition and obesity are much less responsive to the hormonal signals involved in blood glucose regulation. All of these lines of data come together with biological plausibility from various laboratory studies to support the research hypothesis that obesity can lead to type 2 diabetes.

**control group** Participants in an experiment who are not given the treatment being tested.

**placebo** Generally a fake medicine used to disguise the treatments given to the participants in an experiment.

**animal model** Study of disease in animals that duplicates human disease. This can be used to understand more about human disease.

**case-control study** Individuals who have the condition in question, such as lung cancer, are compared with individuals who do not have the condition.
MAKING DECISIONS

Research on Stomach Ulcers

Overall, the scientific method requires a skeptical attitude. A recent example of this need for skepticism involves stomach ulcers. Not so many years ago, everyone “knew” that stomach ulcers were caused by a stressful lifestyle and a poor diet. Then, in 1983, an Australian physician, Dr. Barry Marshall, reported in a respected medical journal that ulcers are usually caused by a common microorganism called *Helicobacter pylori*. Furthermore, he stated that a cure is possible using antibiotics. At first, other physicians were skeptical about this finding and continued to prescribe medications such as antacids that reduce stomach acid. But, as more studies were published demonstrating that patients using antibiotics were cured of ulcers, the medical profession eventually accepted the findings. Today, ulcers are managed for the most part by medications that destroy the microorganism. (We will discuss the treatment of stomach ulcers in more detail in Chapter 3.) Sound scientific discoveries will always be subject to challenge and change.

Epidemiological studies may suggest hypotheses, but controlled experiments are needed to rigorously test hypotheses before nutrition recommendations can be made. Recently, epidemiologists found that smokers who regularly consumed fruits and vegetables had a lower risk for lung cancer than smokers who ate few fruits and vegetables. Some scientists proposed that beta-carotene, a pigment present in many fruits and vegetables, may be responsible for reducing the damage that tobacco smoke creates in the lungs. However, in double-blind studies involving heavy smokers, the risk of lung cancer was found to be higher for those who took beta-carotene supplements than for those who did not (this is not true for the small amount of beta-carotene found naturally in foods). Soon after these results were reported, the U.S. federal agency supporting two other large ongoing studies that employed beta-carotene supplements called a halt to the research, stating that these supplements are ineffective in preventing both lung cancer and cardiovascular disease.

WHAT DO FOOD LABELS HAVE TO OFFER IN DIET PLANNING?

Today, nearly all foods sold in stores must be in a package that has a label containing the following information: the product name, name and address of the manufacturer, amount of product in the package, and ingredients listed in descending order by weight. This food and beverage labeling is monitored in North America by government agencies such as the Food and Drug Administration (FDA) in the United States. The listing of certain food constituents also is required—specifically, on a Nutrition Facts panel (Fig. 2-12). Use the information in the Nutrition Facts panel to learn more about what you eat. The following components must be listed: total calories (kcal), calories from fat, total fat, saturated fat, trans fat, cholesterol, sodium, total carbohydrate, fiber, sugars, protein, vitamin A, vitamin C, calcium, and iron. In addition to these required components, manufacturers can choose to list polyunsaturated and monounsaturated fat, potassium, and others. Listing these components becomes required if a claim is made about the health benefits of the specific nutrient (see the upcoming section in Chapter 2 entitled “Health Claims on Food Labels”) or if the food is fortified with that nutrient.
Remember that the Daily Value is a generic standard used on the food label. The percentage of the Daily Value (% Daily Value or % DV) is usually given for each nutrient per serving. These percentages are based on a 2000 kcal diet. In other words, they are not as applicable to people who require considerably more or less than 2000 kcal per day with respect to fat and carbohydrate intake. DVs are mostly set at or close to the highest RDA value or related nutrient standard seen in the various age and gender categories for a specific nutrient.
Serving sizes on the Nutrition Facts panel must be consistent among similar foods. This means that all brands of ice cream, for example, must use the same serving size on their label. (These serving sizes may differ from those of MyPyramid because those of food labels are based on typical serving sizes.) In addition, food claims made on packages must follow legal definitions (Table 2-9). For example, if a product claims to be “low sodium,” it must have 140 milligrams of sodium or less per serving.

Many manufacturers list the Daily Values set for dietary components such as fat, cholesterol, and carbohydrate on the Nutrition Facts panel. This can be useful as a reference point. As noted, they are based on 2000 kcal; if the label is large enough, amounts based on 2500 kcal are listed as well for total fat, saturated fat, carbohydrate, and other components. As mentioned, DVs allow consumers to compare their intake from a specific food to desirable (or maximum) intakes.

Exceptions to Food Labeling

Foods such as fresh fruits and vegetables, fish, meats, and poultry currently are not required to have Nutrition Facts labels. However, many grocers and some meat packers have voluntarily chosen to provide their customers with information about these products. Nutrition Facts labels on meat products will likely be required in the coming years. The next time you are at the grocery store, ask where you might find information on the fresh products that do not have a Nutrition Facts panel. You will likely find a poster or pamphlet near the product; often, these pamphlets contain recipes that use your favorite fruit, vegetable, or cut of meat. They may even assist you in your endeavor to improve your diet.

Protein deficiency is not a public health concern in the United States, so declaration of the % Daily Value for protein is not mandatory on foods for people over 4 years of age. If the % Daily Value for protein is given on a label, FDA requires that the product be analyzed for protein quality. This procedure is expensive and time-consuming, so many companies opt not to list a % Daily Value for protein. However, labels on food for infants and children under 4 years of age must include the % Daily Value for protein, as must the labels on any food carrying a claim about protein content (see Chapter 15).
### TABLE 2-9 Definitions for Comparative and Absolute Nutrient Claims on Food Labels

<table>
<thead>
<tr>
<th>Sugar</th>
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</thead>
<tbody>
<tr>
<td>• Sugar free: less than 0.5 grams (g) per serving.</td>
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<table>
<thead>
<tr>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Calorie free: fewer than 5 kcal per serving</td>
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<tr>
<td></td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Fiber</th>
</tr>
</thead>
<tbody>
<tr>
<td>• High fiber: 5 g or more per serving. (Foods making high-fiber claims must meet the definition for low fat, or the level of total fat must appear next to the high-fiber claim.)</td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fat free: less than 0.5 g of fat per serving</td>
</tr>
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<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Cholesterol</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cholesterol free: less than 2 milligrams (mg) of cholesterol and 2 g or less of saturated fat per serving</td>
</tr>
<tr>
<td>• Low cholesterol: 20 mg or less cholesterol and 2 g or less of saturated fat per serving and, if the serving is 30 g or less or 2 tablespoons or less, per 50 g of the food</td>
</tr>
<tr>
<td>• Reduced or less cholesterol: at least 25% less cholesterol and 2 g or less of saturated fat per serving than reference food</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sodium</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sodium free: less than 5 mg per serving</td>
</tr>
<tr>
<td>• Very low sodium: 35 mg or less per serving and, if the serving is 30 g or less or 2 tablespoons or less, per 50 g of the food</td>
</tr>
<tr>
<td>• Low sodium: 140 mg or less per serving and, if the serving is 30 g or less or 2 tablespoons or less, per 50 g of the food</td>
</tr>
<tr>
<td>• Light in sodium: at least 50% less per serving than reference food</td>
</tr>
<tr>
<td>• Reduced or less sodium: at least 25% less per serving than reference food</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fortified or enriched: Vitamins and/or minerals have been added to the product in amounts in excess of at least 10% of that normally present in the usual product. Enriched generally refers to replacing nutrients lost in processing, whereas fortified refers to adding nutrients not originally present in the specific food.</td>
</tr>
<tr>
<td>• Healthy: An individual food that is low fat and low saturated fat and has no more than 360 to 480 mg of sodium or 60 mg of cholesterol per serving can be labeled “healthy” if it provides at least 10% of the Daily Value for vitamin A, vitamin C, protein, calcium, iron, or fiber.</td>
</tr>
<tr>
<td>• Light or lite: The descriptor light or lite can mean two things: first, that a nutritionally altered product contains one-third fewer kcal or half the fat of reference food (if the food derives 50% or more of its kcal from fat, the reduction must be 50% of the fat) and, second, that the sodium content of a low-calorie, low-fat food has been reduced by 50%. In addition, “light in sodium” may be used for foods in which the sodium content has been reduced by at least 50%. The term light may still be used to describe such properties as texture and color, as long as the label explains the intent—for example, “light brown sugar” and “light and fluffy.”</td>
</tr>
</tbody>
</table>

Diet: A food may be labeled with terms such as diet, dietetic, artificially sweetened, or sweetened with nonnutritive sweetener only if the claim is not false or misleading. The food can also be labeled low calorie or reduced calorie.

**Good source:** Good source means that a serving of the food contains 10% to 19% of the Daily Value for a particular nutrient. If 5% or less it is a **low source**.

**High:** High means that a serving of the food contains 20% or more of the Daily Value for a particular nutrient.

**Organic:** Federal standards for organic foods allow claims when much of the ingredients do not use chemical fertilizers or pesticides, genetic engineering, sewage sludge, antibiotics, or irradiation in their production. At least 95% of ingredients (by weight) must meet these guidelines to be labeled “organic” on the front of the package. If the front label instead says “made with organic ingredients,” only 70% of the ingredients must be organic. For animal products, the animals must graze outdoors, be fed organic feed, and cannot be exposed to large amounts of antibiotics or growth hormones.

**Natural:** The food must be free of food colors, synthetic flavors, or any other synthetic substance.

**The following terms apply only to meat and poultry products regulated by USDA.**

**Extra lean:** less than 5 g of fat, 2 g of saturated fat, and 95 mg of cholesterol per serving (or 100 g of an individual food)

**Lean:** less than 10 g of fat, 4.5 g of saturated fat, and 95 mg of cholesterol per serving (or 100 g of an individual food)

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Many definitions are from FDA’s Dictionary of Terms, as established in conjunction with the 1990 Nutrition Education and Labeling Act (NELA).

<table>
<thead>
<tr>
<th>g</th>
<th>grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>mg</td>
<td>milligrams</td>
</tr>
</tbody>
</table>
Health Claims on Food Labels

As a marketing tool directed toward the health-conscious consumer, food manufacturers like to claim that their products have all sorts of health benefits. The FDA has legal oversight over most food products and permits some health claims with certain restrictions.

Table 2-9 lists the definitions for nutrient claims on food labels. Currently, FDA limits the use of health messages to specific instances in which there is significant scientific agreement that a relationship exists between a nutrient, food, or food constituent and the disease. The claims allowed at this time may show a link between the following:

- A diet with enough calcium and a reduced risk of osteoporosis
- A diet low in total fat and a reduced risk of some cancers
- A diet low in saturated fat and cholesterol and a reduced risk of cardiovascular disease (typically referred to as heart disease on the label)
- A diet rich in fiber—containing grain products, fruits, and vegetables—and a reduced risk of some cancers
- A diet low in sodium and high in potassium and a reduced risk of hypertension and stroke
- A diet high in fruits and vegetables and a reduced risk of some cancers
- A diet adequate in the synthetic form of the vitamin folate (called folic acid) and a reduced risk of neural tube defects (a type of birth defect) (see Chapter 8)
- Use of sugarless gum and a reduced risk of tooth decay, especially when compared with foods high in sugars and starches
- A diet rich in fruits, vegetables, and grain products that contain fiber and a reduced risk of cardiovascular disease. Oats (oatmeal, oat bran, and oat flour) and psyllium are two fiber-rich ingredients that can be singled out in reducing the risk of cardiovascular disease, as long as the statement also says the diet should also be low in saturated fat and cholesterol.
- A diet rich in whole-grain foods and other plant foods, as well as low in total fat, saturated fat, and cholesterol, and a reduced risk of cardiovascular disease and certain cancers
- A diet low in saturated fat and cholesterol that also includes 25 grams of soy protein and a reduced risk of cardiovascular disease. The statement “one serving of the (name of food) provides ____ grams of soy protein” must also appear as part of the health claim.
- Fatty acids from oils present in fish and a reduced risk of cardiovascular disease
- Margarines containing plant stanol and sterols and a reduced risk of cardiovascular disease (see Chapter 5 for more details on plant stanol and sterols)

A “may” or “might” qualifier must be used in the statement.

In addition, before a health claim can be made for a food product, it must meet two general requirements. First, the food must be a “good source” (before any fortification) of fiber, protein, vitamin A, vitamin C, calcium, or iron. The legal definition of “good source” appears in Table 2-9. Second, a single serving of the food product cannot contain more than 13 grams of fat, 4 grams of saturated fat, 60 milligrams of cholesterol, or 480 milligrams of sodium. If a food exceeds any one of these requirements, no health claim can be made for it, despite its other nutritional qualities. For example, even though whole milk is high in calcium, its label can’t make the health claim about calcium and osteoporosis because whole milk contains 5 grams of saturated fat per serving. In another example, a health claim regarding fat and cancer can be made only if the product contains 3 grams or less of fat per serving, the standard for low-fat foods.
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MAKING DECISIONS

Health Claims

FDA allows the three preliminary classes of health claims shown on page 66 as long as the label qualifies the food with a disclaimer such as “this evidence is not conclusive.” These preliminary health claims haven’t shown up on many foods at this time (nuts, such as walnuts, and fish have been some of the first examples). These claims also cannot be used on foods considered unhealthy (review Table 2-9 for the definition of healthy with regard to a food).

Overall, claims on foods fall into one of four categories:

- Health claims—closely regulated by FDA
- Preliminary health claims—regulated by FDA but evidence may be scant for the claim
- Nutrient claims—closely regulated by FDA (review Table 2-9)
- Structure/function claims—as discussed in the Nutrition and Your Health section at the end of this chapter, these are not FDA approved or necessarily valid

CONCEPT CHECK

The Nutrition Facts panel on a food label provides key information for helping track one’s food intake. Nutrient quantities are compared with the Daily Values and expressed on a percentage basis (% Daily Value). This information can be used to either increase or reduce intake of specific nutrients. Health and nutrient claims on food labels are closely regulated by FDA. Fruits, vegetables, whole-grain breads and cereals, soy, and good sources of calcium are prominent among the foods that can make specific health claims.

EPILOGUE

The tools discussed in Chapter 2 greatly aid in menu planning. Menu planning can start with MyPyramid. The totality of choices made within the groups can then be evaluated using the Dietary Guidelines. Individual foods that make up a diet can be examined more closely using the Daily Values listed on the Nutrition Facts panel of the product. For the most part, these Daily Values are in line with the Recommended Dietary Allowances and related nutrient standards. The Nutrition Facts panel is especially useful in identifying nutrient-dense foods—foods high in a specific nutrient, such as the vitamin folate, but low in the relative amount of calories provided—and the energy-dense foods—foods that fill you up without providing a lot of calories. Generally speaking, the more you learn about and use these tools, the more they will benefit your diet.

Specific health claims can be made on food labels for whole-grain cereals.

Canadian food labels use a slightly different group of health claims and label descriptors (see Appendix C).

The Exchange System is a final menu-planning tool. This tool organizes foods based on calorie, protein, carbohydrate, and fat content. The result is a manageable framework for designing diets, especially for treatment of diabetes. For more information on the Exchange System see Appendix D.
The following suggestions should help you make healthful and logical nutrition decisions:

1. Apply the basic principles of nutrition as outlined in this chapter (along with the 2005 Dietary Guidelines for Americans and related resources in Chapter 2) to any nutrition claim including those on websites. Do you note any inconsistencies? Do reliable references support the claims? Beware of the following:
   - Testimonials about personal experience
   - Disreputable publication sources
   - Dramatic results (rarely true)
   - Lack of evidence from supporting studies made by other scientists

2. Examine the background and scientific credentials of the individual, organizations, or publication making the nutritional claim. Usually, a reputable author is one whose educational background or present affiliation is with a nationally recognized university or medical center that offers programs or courses in the field of nutrition, medicine, or a closely allied specialty.

3. Be wary if the answer is "Yes" to any of the following questions about a health-related nutrition claim:
   - Are only advantages discussed and possible disadvantages ignored?
   - Are claims made about "curing" disease? Do they sound too good to be true?
   - Is extreme bias against the medical community or traditional medical treatments evident? Physicians as a group strive to cure diseases in their patients, using what proven techniques are available. They do not ignore reliable cures.
   - Is the claim touted as a new or secret scientific breakthrough?

4. Note the size and duration of any study cited in support of a nutrition claim. The larger it is and the longer it went on, the more dependable its findings. Also consider the type of study: epidemiology versus case-control versus double-blind. Check out the group studied; a study of men or women in Sweden may be less relevant than one of men or women of Southern European, African, or Hispanic descent, for example. Keep in mind that "contributes to," "is linked to," or "is associated with" does not mean "causes."

5. Beware of press conferences and other hype regarding the latest findings. Much of this will not survive more detailed scientific evaluation.

6. When you meet with a nutrition professional, you should expect that he or she will do the following:
   - Ask questions about your medical history, lifestyle, and current eating habits.
   - Formulate a diet plan tailored to your needs, as opposed to simply tearing a form from a tablet that could apply to almost anyone.
   - Schedule follow-up visits to track your progress, answer any questions, and help keep you motivated.
   - Involve family members in the diet plan, when appropriate.
   - Consult directly with your physician and readily refer you back to your physician for those health problems a nutrition professional is not trained to treat.

7. Avoid practitioners who prescribe megadoses of vitamin and mineral supplements for everyone.

8. Examine product labels carefully. Be skeptical of any product promotion not clearly stated on the label. A product is not likely to do something not specifically claimed on its label or package insert (legally part of the label).

megadoses intake of a nutrient beyond estimates of needs or what would be found in a balanced diet; 2 to 10 times human needs is a starting point.
Dietary Supplements

This cautious approach to nutrition-related advice and products is even more important today because of sweeping changes in U.S. federal law passed in 1994. The Dietary Supplement Health and Education Act (DSHEA) of 1994 classified vitamins, minerals, amino acids, and herbal remedies as "foods," effectively restraining the U.S. Food and Drug Administration (FDA) from regulating them as tightly as drugs and food additives. According to this act, rather than the manufacturer having to prove a dietary supplement is safe, FDA must prove it is unsafe before preventing its sale. In contrast, the safety of food additives and drugs must be demonstrated to FDA's satisfaction before they are marketed.

Currently, a dietary supplement (or herbal product) can be marketed in the United States without FDA approval if (1) there is a history of its use or other evidence that it is expected to be reasonably safe when used under the conditions recommended or suggested in its labeling, and (2) the product is labeled as a dietary supplement. It is permissible for the labels on such products to claim a benefit related to a classic nutrient-deficiency disease, describe how a nutrient affects human body structure or function (called structure/function claims), and claim that general well-being results from consumption of the ingredient(s). Examples could be "maintains bone health" or "improves blood circulation." However, the label of products bearing such claims also must prominently display in boldface type the following disclaimer: "This statement has not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent disease" (Fig. 2-13). Despite this warning, when consumers find these products on the shelves of supermarkets, health-food stores, and pharmacies, they may mistakenly assume FDA has carefully evaluated the products.

Many of us are willing to try untested nutrition products and believe in their miraculous actions. Popular products claim to increase muscle growth, enhance sexuality, boost energy, reduce body fat, increase strength, supply missing nutrients, increase longevity, and even improve brain function. Clearly, many nutritional products commonly found in stores are not studied as well as they should be.

Recently major nutrition organizations put together 10 red flags that they consider signals for poor nutrition advice:
1. Recommendations that promise a quick fix
2. Dire warnings of dangers from a single product or regimen
3. Claims that sound too good to be true
4. Simplistic conclusions drawn from a complex study
5. Recommendations based on a single study
6. Dramatic statements refuted by reputable scientific organizations
7. Lists of "good" and "bad" foods
8. Recommendations made to help sell a product
9. Recommendations based on studies published without peer review
10. Recommendations from studies that ignore differences among individuals or groups

FDA can act if evidence accumulates showing that a product is harmful. This has been true for some herbal remedies marketed as dietary supplements, such as ephedra.
strictly regulated in terms of effectiveness and safety. The amount and potency of dietary supplements have also been in question. In June 2007, FDA issued long-awaited standards that will require supplement manufacturers to test the purity, strength, and composition of all their products. Large companies will be the first to comply (by June 2008), whereas small companies have until 2010. Until then, national brands are more reliable. Supplements are discussed further in the Nutrition and Your Health section in Chapter 8, “Dietary Supplements—Who Needs Them?”

If you embark on a self-cure by means of such products, you will probably waste money and possibly risk ill health. A better approach is to consult a physician or registered dietitian first. You can find a registered dietitian in North America by consulting the Yellow Pages in the telephone directory, contacting the local dietetic association, calling the dietary department of a local hospital, or visiting www.eatright.org/find.html or www.dietitians.ca. Make sure the person has the credentials "R.D." after his/her name ("R.D.N." is also used in Canada). This indicates the person has completed rigorous classroom and clinical training in nutrition and participates in continuing education. Appendix H also lists many reputable sources of nutrition advice for your use. Finally, the following websites can help you evaluate ongoing nutrition and health claims:

http://www.acsh.org/
American Council on Science and Health

http://www.quackwatch.org/
Quackwatch: Your Guide to Quackery, Health Fraud, and Intelligent Decisions

http://www.ncahf.org/
National Council Against Health Fraud

http://dietary-supplements.info.nih.gov/
National Institutes of Health, Office of Dietary Supplements

http://www.fda.gov/
U.S. Food and Drug Administration

Overall, nutrition is a rapidly advancing field and there are always new findings.
CASE STUDY

Dietary Supplements

While Brenda was driving to campus last week, she heard an advertisement for a supplement containing a plant substance recently imported from China. It supposedly gives people more energy and helps one cope with the stress of daily life. This advertisement caught Brenda’s attention because she has been feeling run down lately. She is taking a full-course load and has been working 30 hours a week at a local restaurant to try to make ends meet. Brenda doesn’t have a lot of extra money. Still, she likes to try new things and this recent breakthrough from China sounded almost too good to be true. After searching for more information about this supplement on the Internet, she discovered that the recommended dose would cost $60 per month. Because Brenda is looking for some help with her low energy level, she decides to order a 1-month supply.

Answer the following questions, and check your response in Appendix A.

1. Is the advertised supplement regulated by the FDA or other government agency?
2. What type of label claim is the phrase “increases energy,” and does it require government approval?
3. Can Brenda feel confident that the supplement is safe and effective?
4. Is the amount of active ingredients in supplements tightly controlled?
5. Does it make sense for Brenda to spend the extra $60 per month for this supplement?
6. What advice would you give Brenda about the fact that she has been feeling run down lately?

SUMMARY

1. Variety, balance, and moderation are three watchwords of diet planning.
2. Nutrient density is a useful concept. It reflects the nutrient content of a food in relation to its calorie content. Nutrient-dense foods are relatively rich in nutrients, in comparison with calorie content.
3. Energy density of a food is determined by comparing calorie content with the weight of food. A food rich in calories but that weighs relatively very little, such as nuts, cookies, fried foods in general, and most snack foods (including fat-free brands), is considered energy dense. Foods with low energy density include fruits, vegetables, and any food that incorporates lots of water during cooking, such as oatmeal.
4. A person’s nutritional state can be categorized as dessteable nutrition, in which the body has adequate stores for times of increased needs; undernutrition, which may be present with or without clinical symptoms; and overnutrition, which can lead to vitamin and mineral toxicities and various chronic diseases.
5. Evaluation of nutritional state involves analyzing background factors, as well as anthropometric, biochemical, clinical, dietary, and economic assessments. It is not always possible to detect nutritional inadequacies via nutrition assessment because symptoms of deficiencies are often nonspecific and may not appear for many years.
6. MyPyramid is designed to translate nutrient recommendations into a food plan that exhibits variety, balance, and moderation. The best results are obtained by using low-fat or fat-free dairy products; incorporating some vegetable proteins in the diet in addition to animal-protein foods; including citrus fruits and dark green vegetables; and emphasizing whole-grain breads and cereals.
7. Dietary Guidelines for Americans have been issued to help reduce chronic diseases. The guidelines emphasize eating a variety of foods; performing regular physical activity; maintaining or improving weight; moderating consumption of fat, trans fat, cholesterol, sugar, salt, and alcohol; eating plenty of whole-grain products, fruits, and vegetables; and safely preparing and storing foods, especially perishable foods.
8. Recommended Dietary Allowances (RDAs) are set for many nutrients. These amounts yield enough of each nutrient to meet the needs of healthy individuals within specific gender and age categories. Adequate Intake (AI) is the standard used when not enough information is available to set a more specific RDA. Estimated Energy Requirements (EERs) set calorie needs for both genders at various ages and physical activity patterns. Tolerable Upper
Intake Levels (Upper Levels or ULs) for nutrient intake have been set for some vitamins and minerals. All of the many dietary standards fall under the term Dietary Reference Intakes (DRIs). Daily Values are used as a basis for expressing the nutrient content of foods on the Nutrition Facts panel and are based for the most part on the RDAs.

9. The scientific method is the procedure for testing the validity of possible explanations of a phenomenon, called hypotheses. Experiments are conducted to either support or refute a specific hypothesis. Once we have much experimental information that supports a specific hypothesis, it then can be called a theory. All of us need to be skeptical of new ideas in the nutrition field, waiting until many lines of experimental evidence support a concept before adopting any suggested dietary practice.

10. Food labels are a useful tool to track your nutrient intake and learn more about the nutritional characteristics of the foods you eat. Any health claims listed must follow criteria set by FDA.

11. Dietary supplements can be marketed in the United States without FDA approval. Certain health claims can be made on supplement labels, although few have been thoroughly evaluated by reputable scientists.

STUDY QUESTIONS

1. Describe the philosophy underlying the creation of MyPyramid. What dietary changes would you need to make to meet the pyramid guidelines on a regular basis?

2. Trace the progression, in terms of physical results, of a person who went from an overnourished to an undernourished state.

3. How could the nutritional state of the person at each state in question 2 be evaluated?


5. Based on the discussion of the Dietary Guidelines for Americans, suggest two key dietary changes the typical North American adult should consider making.

6. How do RDAs and AIs differ from Daily Values in intention and application?

7. How would you explain the concepts of nutrient density and energy density to a fourth grade class?

8. Nutritionists encourage all people to read labels on food packages to learn more about what they eat. What four nutrients could easily be tracked in your diet if you read the Nutrition Facts panels regularly on food products?

9. Explain why consumers can have confidence in FDA-approved health claims on food packages.

10. Relate the importance of variety in a diet, especially with regard to fruit and vegetable choices, to the discovery of various phytochemicals in foods.

CHECK YOUR KNOWLEDGE

Answers to the following multiple choice questions are in Appendix A.

1. Anthropometric measurements include
   a. height, weight, skinfolds, and body circumferences.
   b. blood concentrations of nutrients.
   c. a diet history of the previous days’ intake.
   d. blood levels of enzyme activities.

2. Foods with high nutrient density offer the _______ nutrients for the _______ calories.
   a. least, lowest
   b. least, most
   c. most, lowest
   d. most, most

3. The steps on the side of the MyPyramid remind us to be physically active at least _______ minutes per day.
   a. 5
   b. 10
   c. 20
   d. 30

4. The Dietary Guidelines for Americans were recently revised in
   a. 2000
   b. 2001
   c. 2003
   d. 2005

5. The term Daily Value is used on
   a. restaurant menus.
   b. food labels.
   c. medical charts.
   d. None of the above.

6. The Tolerable Upper Intake Level, or UL, is to
   a. estimate calorie needs of the average person.
   b. evaluate the highest amount of daily nutrient intake unlikely to cause adverse health effects.
   c. evaluate your current intake for a specific nutrient.
   d. compare the nutrient content of a food to approximate human needs.

7. The current food label must list
   a. a picture of the product.
   b. a uniform and realistic serving size.
   c. the RDA for each age group.
   d. ingredients alphabetically.

8. Nutritionists encourage all people to read labels on food packages to learn more about what they eat. What four nutrients could easily be tracked in your diet if you read the Nutrition Facts panels regularly on food products?

9. Explain why consumers can have confidence in FDA-approved health claims on food packages.

10. Relate the importance of variety in a diet, especially with regard to fruit and vegetable choices, to the discovery of various phytochemicals in foods.
8. Dietary supplements are tightly regulated by the
   a. FDA.
   b. USDA.
   c. FTC.
   d. None of the above.

9. The scientific method begins with
   a. a hypothesis.
   b. research experiments.
   c. publication of research findings.
   d. observations made and questions asked.

10. The most common type of malnutrition in industrialized nations, such as
    the United States, is
    a. anorexia.
    b. protein deficiency.
    c. obesity.
    d. iron deficiency.

FURTHER READINGS

   Choosing a wide variety of foods is the best strategy for promoting optimal health and reducing the risk of chronic diseases. This paper discusses the benefits of increasing the nutrient density of foods or diets through fortification or supplementation when diets do not contain adequate amounts of vitamins and minerals.

   Much food and nutrition misinformation pervades North American society. Individuals should carefully consider the training of those who give such advice and be assured that registered dietitians are a reliable source.

   The development of the dietary reference intakes (DRIs) was a joint initiative by the United States and Canada to update and replace the former Recommended Nutrient Intakes for Canadians and the Recommended Dietary Allowances for Americans. The new DRIs are described.

   Studies in laboratory animals and cell cultures indicate a role for many components of fruits and vegetables in cancer prevention. Numerous human case-control studies have suggested that vegetable intake reduces the risk of a variety of cancers. These results have not been demonstrated for fruits. In addition, prospective studies have not supported a relationship between fruit and vegetable intake and cancer prevention. Although the relationship between fruit and vegetable intake and cancer risk is still unclear, a diet rich in fruits and vegetables is still one of the best recommendations to improve health and reduce overall chronic disease.

   An important goal of the nutrition and ingredient information on food labels is to help consumers make nutritious dietary choices. This article summarizes the results of recent quantitative and qualitative research on consumers’ use and understanding of the food label information.

   “Naturally nutrient-rich” is a consumer-friendly way to describe naturally nutrient-dense foods. The development of and potential uses for the “naturally nutrient-rich” nutrient density scoring system for foods is outlined in this article.

   Increased fruit and vegetable intake was associated with a reduced risk of both ischemic and hemorrhagic stroke. Compared to individuals who had less than 3 servings of fruit and vegetables per day, the risk was reduced for those with 3 to 5 servings per day and even more reduced for those with more than 5 servings per day.

   An exciting development in nutrition will be the ability to use a person’s genetic profile to provide more precise nutrition guidance by dietitians and other clinicians. This article discusses this possibility.

   This overview of the Internet-based MyPyramid points out several strengths of the new educational tool. These include the focus on reducing calories and increasing physical activity in an effort to address the obesity crisis. In addition, areas that the federal government still needs to address, such as access to this information by the underprivileged, are discussed.

   The interaction between genes; the environment; and lifestyle factors, especially diet and physical activity, are involved in healthy aging. The need to consider all the lifestyle and environmental factors contributing to suboptimal eating and lifestyle patterns is discussed.

   The food industry is prepared to update food labels using new nutrient recommendations. The Grocery Manufacturers Association welcomes the opportunity to coordinate nutrition information across the Dietary Guidelines for Americans 2005, MyPyramid, and the food label.

   The latest Dietary Guidelines for Americans (2005) are reviewed. The article provides practical advice to put these guidelines into action—a task too few adults are doing well.

   Cardiovascular aging is associated with an increased likelihood of developing cardiovascular diseases, such as myocardial infarction (heart attack), stroke, and congestive heart failure. Calorie restriction (1671 kcal vs. 2445 kcal) affected heart functions that typically decline with age. Eating the nutrient-rich diet of less than 2000 kcal slowed the decline in diastolic function, a well-recognized marker of cardiovascular aging in humans. The results suggest that cutting calories will lead to a longer life.

   Both the pros and cons of MyPyramid are raised by nutrition and medical experts. The biggest criticism is that the tool is practically useless.
unless a person logs on to the MyPyramid website to find out the details regarding the diet plan.

15. Pavia M and others: Association between fruit and vegetable consumption and oral cancer: A meta-analysis of observational studies. American Journal of Clinical Nutrition 83:1126, 2006. Results showed that for each portion of fruit and vegetable consumed per day, the risk of oral cancer was reduced by 49% to 50%. The lower risk of oral cancer associated with fruit consumption was influenced by the type of fruit consumed.


17. Seal CJ: Whole grains and CVD risk. Proceedings of the Nutrition Society 65:24, 2006. Evidence from population and epidemiological studies suggest a strong inverse relationship between the consumption of whole-grain foods and the risk of cardiovascular diseases (CVD). This evidence has resulted in recommendations to consume at least 3 servings of whole-grains per day. The mechanisms by which whole-grain foods have this effect on CVD, however, are poorly understood. Intervention studies are needed to support the health claims and promote whole-grain consumption.

18. Uncle Sam’s diet book. Tufts University Health & Nutrition Letter p. 1, March 2005. Implementation of the latest Dietary Guidelines for Americans is discussed. The authors suggest even small changes that conform to this plan provide health benefits.

19. Woolf SH: Weighing the evidence to formulate dietary guidelines. Journal of the American College of Nutrition 25:277S, 2006. The steps involved in dietary guideline development are discussed. These include some combination of (1) specification of the topic and the guideline development methodology; (2) systematic review of the evidence; (3) consideration of expert opinion; (4) public policy analysis; (5) drafting of the document; and (6) peer review.

I. Does Your Diet Meet MyPyramid Recommendations?

Using your food-intake record from Chapter 1, place each food item in the appropriate group of the accompanying MyPyramid chart. That is, for each food item, indicate how many servings it contributes to each group based on the amount you ate (see Food Composition Table Supplement for serving sizes). Many of your food choices may contribute to more than one group. For example, toast with soft margarine contributes to two categories: (1) the grains group; and (2) the oils group. After entering all the values, add the number of servings consumed in each group. Finally, compare your total in each food group with the recommended number of servings shown in Table 2-4 or obtained from the www.MyPyramid.gov website. Enter a minus sign (−) if your total falls below the recommendation or a plus sign (+) if it equals or exceeds the recommendation.

Indicate the number of servings from MyPyramid that each food yields:

<table>
<thead>
<tr>
<th>Food or Beverage</th>
<th>Amount Eaten</th>
<th>Milk</th>
<th>Meat &amp; Beans</th>
<th>Fruits</th>
<th>Vegetables</th>
<th>Grains</th>
<th>Oils</th>
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Group totals

Recommended servings

Shortages in numbers of servings
II. Are You Putting the Dietary Guidelines into Practice?

As noted in this chapter, the advice provided by the 2005 Dietary Guidelines for Americans can be summarized into three main points and a number of related activities. Fill out the following inventory to see to what extent you are following the basic intent of the Guidelines.

**Food Intake**

Do you:

- Y N Consume a variety of nutrient-dense foods and beverages within and among the basic food groups of MyPyramid?
- Y N Choose foods that limit the intake of:
  - Saturated fat
  - Trans fat
  - Cholesterol
  - Added sugars
  - Salt
  - Alcohol (if used)
- Y N Emphasize in your food choices:
  - Vegetables
  - Fruits
  - Legumes (beans)
  - Whole-grain breads and cereals
  - Fat-free or low-fat milk or equivalent milk products

**Body Weight**

- Y N Maintain body weight in a healthy range by balancing energy intake from foods and beverages with energy expended?
- Y N Engage in at least 30 minutes of moderate-intensity physical activity, above usual activity, at work or home on most days of the week?

**Safe Food Handling**

- Y N Clean hands, food contact surfaces, and fruits and vegetables before preparation?
- Y N Cook foods to a safe temperature to kill microorganisms?

Figure 2-8 points to other health practices that are part of the 2005 Dietary Guidelines for Americans, but this abbreviated list includes the major points to consider.
III. Applying the Nutrition Facts Label to Your Daily Food Choices

Imagine that you are at the supermarket looking for a quick meal before a busy evening. In the frozen food section, you find two brands of frozen cheese manicotti (see labels a and b). Which of the two brands would you choose? What information on the Nutrition Facts label in the figure contributed to this decision?