NUTRITION
Concepts & Controversies

Nutrition: Concepts and Controversies, 12th edition

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Food Choices and Human Health

1

DO YOU EVER . . .

- Question whether your diet can make a real difference between getting sick or staying healthy?
- Purchase supplements, believing them more powerful than food for ensuring good nutrition?
- Wonder why you prefer the foods you do?
- Become alarmed or confused by news and media reports about nutrition science?
- Try to change your diet, but fail?

Keep reading . . .

Learning Objectives

To find learning objective topics in this chapter, look for text headings with a corresponding "LO" number above the heading. After reading this chapter, you should be able to accomplish the following:

LO 1.1 Discuss how particular lifestyle choice can either positively impact or harm overall health.

LO 1.2 Define the term *nutrient* and be able to list the six major nutrients.

LO 1.3 Recognize the five characteristics of a healthy diet and give suggestions for using them.

LO 1.4 Summarize how a particular culture or circumstance can impact a person's food choices.

LO 1.5 Describe and give an example of the major types of research studies.

LO 1.6 Discuss why national nutrition survey data are important for the health of the population.

LO 1.7 List the major steps in behavior change and devise a plan for making successful long-term changes in the diet.

LO 1.8 Recognize misleading nutrition claims in advertisements for dietary supplements and in the popular media.

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When you choose foods with nutrition in mind, you can enhance your own well-being.

food medically, any substance that the body can take in and assimilate that will enable it to stay alive and to grow; the carrier of nourishment; socially, a more limited number of such substances defined as acceptable by each culture.

nutrition the study of the nutrients in foods and in the body; sometimes also the study of human behaviors related to food.

diet the foods (including beverages) a person usually eats and drinks.

nutrients components of food that are indispensable to the body's functioning. They provide energy, serve as building material, help maintain or repair body parts, and support growth. The nutrients include water, carbohydrate, fat, protein, vitamins, and minerals.

malnutrition any condition caused by excess or deficient food energy or nutrient intake or by an imbalance of nutrients. Nutrient or energy deficiencies are forms of undernutrition; nutrient or energy excesses are forms of overnutrition.

chronic diseases long-duration degenerative diseases characterized by deterioration of the body organs. Examples include heart disease, cancer, and diabetes.

genome (GEE-nome) the full complement of genetic information in the chromosomes of a cell. In human beings, the genome consists of about 35,000 genes and supporting materials. The study of genomes is *genomics*. Also defined in Controversy 11.

genes units of a cell's inheritance; sections of the larger genetic molecule DNA (deoxyribonucleic acid). Each gene directs the making of one or more of the body's proteins.

DNA an abbreviation for deoxyribonucleic (dee-OX-ee-RYE-bow-nu-CLAY-ick) acid, the threadlike molecule that encodes genetic information in its structure; DNA strands coil up densely to form the chromosomes (Chapter 3 provides more details).

If you care about your body, and if you have strong feelings about **food,** then you have much to gain from learning about **nutrition**—the science of how food nourishes the body. Nutrition is a fascinating, much talked about subject. Each day, newspapers, radio, and television present stories of new findings on nutrition and heart health or nutrition and cancer prevention, and at the same time advertisements and commercials bombard us with multicolored pictures of tempting foods—pizza, burgers, cakes, and chips. If you are like most people, when you eat you sometimes wonder, "Is this food good for me?" or you berate yourself, "I probably shouldn't be eating this."

When you study nutrition, you learn which foods serve you best, and you can work out ways of choosing foods, planning meals, and designing your **diet** wisely. Knowing the facts can enhance your health and your enjoyment of eating while relieving your feelings of guilt or worry that you aren't eating well.

This chapter addresses these "why, what, and how" questions about nutrition:

- *Why* care about nutrition? The **nutrients** interact with body tissues, adding a little or subtracting a little, day by day, and thus change the very foundations upon which the health of the body is built.
- *What* are the nutrients in foods, and what roles do they play in the body? Meet the nutrients and discover their general roles in building body tissues and maintaining health.
- *What* constitutes a nutritious diet? Can you choose foods wisely, for nutrition's sake? And what motivates your choices?
- *How* do we know what we know about nutrition? Scientific research reports provide an important foundation for understanding nutrition science.
- And *how* do people go about making changes to their diets?

Controversy 1 concludes the chapter by offering ways to distinguish between trustworthy sources of nutrition information and those that are less reliable.

LO 1.1

A Lifetime of Nourishment

If you live for 65 years or longer, you will have consumed more than 70,000 meals and your remarkable body will have disposed of 50 tons of food. The foods you choose have cumulative effects on your body. As you age, you will see and feel those effects—if you know what to look for.

Your body renews its structures continuously, and each day it builds a little muscle, bone, skin, and blood, replacing old tissues with new. It may also add a little fat if you consume excess food energy (calories) or subtract a little if you consume less than you require. Some of the food you eat today becomes part of "you" tomorrow.

The best food for you, then, is the kind that supports the growth and maintenance of strong muscles, sound bones, healthy skin, and sufficient blood to cleanse and nourish all parts of your body. This means you need food that provides not only the right amount of energy but also sufficient nutrients, that is, enough water, carbohydrates, fats, protein, vitamins, and minerals. If the foods you eat provide too little or too much of any nutrient today, your health may suffer just a little today. If the foods you eat provide too little or too much of one or more nutrients every day for years, then in later life you may suffer severe disease effects.

A well-chosen array of foods supplies enough energy and enough of each nutrient to prevent **malnutrition.** Malnutrition includes deficiencies, imbalances, and excesses of nutrients, alone or in combination, any of which can take a toll on health over time.

KEY POINT The nutrients in food support growth, maintenance, and repair of the body. Deficiencies, excesses, and imbalances of energy and nutrients bring on the diseases of malnutrition.

The Diet and Health Connection

Your choice of diet profoundly affects your health, both today and in the future. Only two common lifestyle habits are more influential: smoking and other tobacco use, and excessive drinking of alcohol. Of the leading causes of death listed in Table 1-1, four are directly related to nutrition, and another—motor vehicle and other accidents—is related to drinking alcohol.

Many older people suffer from debilitating conditions that could have been largely prevented had they known and applied the nutrition principles known today. The **chronic diseases**—heart disease, diabetes, some kinds of cancer, dental disease, and adult bone loss—all have a connection to poor diet.[1*] These diseases cannot be prevented by a good diet alone; they are to some extent determined by a person's genetic constitution, activities, and lifestyle. Within the range set by your genetic inheritance, however, the likelihood of developing these diseases is strongly influenced by your food choices.

KEY POINT Nutrition profoundly affects health.

Genetics and Individuality

Consider the role of genetics. Genetics and nutrition affect different diseases to varying degrees (see Figure 1-1). The anemia caused by sickle-cell disease, for example, is purely hereditary and thus appears at the left of Figure 1-1 as a genetic condition largely unrelated to nutrition. Nothing a person eats affects the person's chances of contracting this anemia, although nutrition therapy may help ease its course. At the other end of the spectrum, iron-deficiency anemia most often results from undernutrition. Diseases and conditions of poor health appear all along this continuum, from almost entirely genetically based to purely nutritional in origin; the more nutrition-related a disease or health condition is, the more successfully sound nutrition can prevent it.

Furthermore, some diseases, such as heart disease and cancer, are not one disease but many. Two people may both have heart disease, but not the same form; one person's cancer may be nutrition-related but another's may not be. Individual people differ genetically from each other in thousands of subtle ways, so no simple statement can be made about the extent to which diet can help any one person avoid such diseases or slow their progress.

The recent identification of the human **genome** establishes the entire sequence of the **genes** in human **DNA.** This work has, in essence, revealed the body's instructions for making all of the working parts of a human being. A new wealth of information has emerged to explain the workings of the body, and nutrition scientists are working quickly to apply this knowledge to benefit human health.[2] Later chapters expand on the emerging story of nutrition and the genes.

*Reference notes are found in Appendix F.

TABLE 1-1 Leading Causes of Death, U.S.

Blue shading indicates that a cause of death is related to nutrition; the light yellow indicates that it is related to alcohol.[a]

		Percentage of Total Deaths
1.	Heart disease	26.5%
2.	Cancers	22.8%
3.	Strokes	5.9%
4.	Chronic lung disease	5.3%
5.	Accidents	4.7%
6.	Alzheimer's disease	3.1%
7.	Diabetes mellitus	2.9%
8.	Pneumonia and influenza	2.6%
9.	Kidney disease	1.8%
10.	Blood infections	1.4%

[a]*Hypertension (high blood pressure), a nutrition-related cause of death, ranks at number 13.*

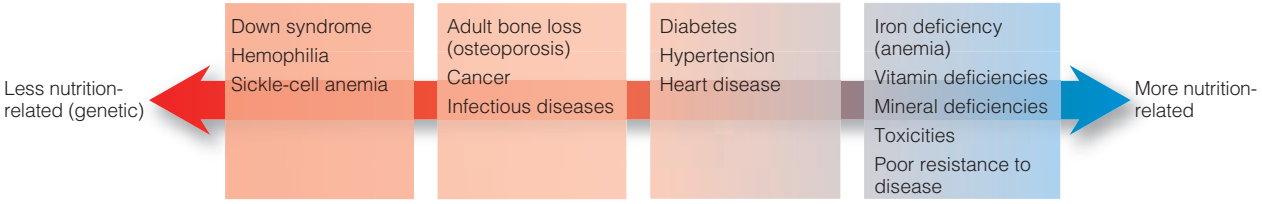
Source: National Center for Health Statistics.

Did You Know?

Anemia is a blood condition in which red blood cells, the body's oxygen carriers, are inadequate or impaired and so cannot meet the oxygen demands of the body. (More about the anemia of sickle-cell disease in Chapter 6; iron-deficiency anemia is described in Chapter 8.)

FIGURE 1-1 Nutrition and Disease

Not all diseases are equally influenced by diet. Some are almost purely genetic, like the anemia of sickle-cell disease. Some may be inherited (or the tendency to develop them may be inherited in the genes) but may be influenced by diet, like some forms of diabetes. Some are purely dietary, like the vitamin and mineral deficiency diseases.



THINK FITNESS

Why Be Physically Active?

Why should people bother to be physically active? While a person's daily food choices can powerfully affect health, the combination of nutrition and physical activity is more powerful still. People who are physically active can expect to receive at least some of the benefits listed in the margin. If even half of these benefits were yours for the asking, wouldn't you step up to claim them? In truth, they are yours to claim, at the price of including physical activity in your day. Chapter 10 explores the topics of fitness and physical activity.

START NOW

CENGAGENOW Ready to make a change? Consult the online behavior-change planner to explore a method for changing your current behaviors at **www.cengage.com/sso.**

Did You Know?

The human genome is 99.9% the same in all people; all of the normal variations such as differences in hair color, as well as variations that result in diseases such as sickle-cell anemia, lie in the 0.1% of the genome that varies.

Only about 2% of the human genome contains genes. Scientists are asking, "What does the rest do?"

- Potential benefits of physical activity include:
  - *Reduced risk of cardiovascular diseases.*
  - *Increased cardiovascular endurance.*
  - *Increased muscle strength and endurance.*
  - *Increased flexibility.*
  - *Reduced risk of some types of cancer (especially colon and breast).*
  - *Improved mental outlook and lessened likelihood of depression.*
  - *Improved mental functioning.*
  - *Feeling of vigor.*
  - *Feeling of belonging—the companionship of sports.*
  - *Strong self-image and belief in one's abilities.*
  - *Reduced body fat, increased lean tissue.*
  - *A more youthful appearance, healthy skin, and improved muscle tone.*
  - *Greater bone density and lessened risk of adult bone loss in later life.*
  - *Increased independence in the elderly.*
  - *Sound, beneficial sleep.*
  - *Faster wound healing.*
  - *Lessening or elimination of menstrual pain.*
  - *Improved resistance to infection.*

KEY POINT Choice of diet influences long-term health within the range set by genetic inheritance. Nutrition has little influence on some diseases but strongly affects others.

Other Lifestyle Choices

Besides food choices, other lifestyle choices also affect people's health. Tobacco use and alcohol and other substance abuse can destroy health. Physical activity, sleep, stress, and other environmental factors can also help prevent or reduce the severity of some diseases. Physical activity is so closely linked with nutrition in supporting health that most chapters of this book offer features called Think Fitness, such as the one above.

KEY POINT Personal life choices, such as staying physically active or using tobacco or alcohol, also affect health for the better or worse.

Healthy People 2010: Nutrition Objectives for the Nation

The U.S. Department of Health and Human Services sets 10-year health objectives to reduce disease risks for the nation in its publication *Healthy People*.[3] The nutrition-related objectives for the year 2010, listed in Table 1-2, provide a quick scan of the nutrition-related objectives set for this decade. The inclusion of nutrition and food-safety objectives shows that public health officials consider these areas to be top national priorities.

By mid-decade, the U.S. population was making progress toward meeting many of the targets of *Healthy People 2010*. Positive strides have been made toward reducing rates of certain foodborne infections and several cancers.[4] Deaths from heart disease and stroke are also declining, but on the negative side, heart disease remains the leading cause of death among adults. In addition, the numbers of overweight people and those diagnosed with diabetes are soaring. To fully meet the current *Healthy People 2010* goals, our nation must take steps to reverse current increasing trends toward overweight and diabetes.[5]

TABLE 1-2 *Healthy People 2010* Nutrition-Related Objectives

- Increase *nutrition education* among consumers and in educational settings at all levels.
- Increase the proportion of children, adolescents, and adults who are at a *healthy weight.*
- Reduce *growth retardation* among low-income children under age 5 years.
- Increase the proportion of persons aged 2 years and older who consume at least two daily servings of *fruit.*
- Increase the proportion of persons aged 2 years and older who consume at least three daily servings of *vegetables,* with at least one-third being dark green or orange vegetables.
- Increase the proportion of persons aged 2 years and older who consume at least six daily servings of *grain products,* with at least three being whole grains.
- Increase the proportion of persons aged 2 years and older who consume less than 10% of calories from *saturated fat.*
- Increase the proportion of persons aged 2 years and older who consume no more than 30% of calories from *total fat.*
- Increase the proportion of persons aged 2 years and older who consume 2,400 milligrams or less of *sodium.*
- Increase the proportion of adults with *high blood pressure* who are taking action to control their blood pressure.
- Increase the proportion of persons aged 2 years and older who meet dietary recommendations for *calcium.*
- Reduce *iron deficiency* among young children, females of childbearing age, and pregnant females.
- Reduce *anemia* among low-income pregnant females in their third trimester.
- Reduce *key vitamin and mineral deficiencies* in pregnant women.
- Increase the proportion of children and adolescents aged 6 to 19 years whose intake of *meals and snacks at school* contributes to good overall dietary quality.
- Increase the proportion of worksites that offer *nutrition or weight management classes or counseling.*
- Increase the proportion of physician office visits made by patients with a diagnosis of cardiovascular disease, diabetes, or hyperlipidemia that include *counseling or education related to diet and nutrition.*
- Reduce deaths from anaphylaxis caused by *food allergies.*
- Increase the number of consumers and retail establishments who follow key *food-safety* practices and reduce key foodborne illnesses.
- Increase *food security* among U.S. households and in so doing reduce hunger.

Source: Details about these and hundreds of other objectives are available from the U.S. Department of Health and Human Services, Healthy People 2010: Cornerstone to Prevention *(Washington, D.C.: Government Printing Office, 2000), online at www.health.gov/healthypeople or call (800) 367-4725.*

The next section shifts our focus to the nutrients at the core of nutrition science. As your course of study progresses, the individual nutrients may become like old friends, revealing more and more about themselves as you move through the chapters.

KEY POINT The U.S. Department of Health and Human Services sets nutrition objectives for the nation each decade.

LO 1.2

The Human Body and Its Food

As your body moves and works each day, it must use **energy.** The energy that fuels the body's work comes indirectly from the sun by way of plants. Plants capture and store the sun's energy in their tissues as they grow. When you eat plant-derived foods such as fruits, grains, or vegetables, you obtain and use the solar energy they have stored. Plant-eating animals obtain their energy in the same way, so when you eat animal tissues, you are eating compounds containing energy that came originally from the sun.

The body requires six kinds of nutrients—families of molecules indispensable to its functioning—and foods deliver these. Table 1-3 lists the six classes of nutrients.

energy the capacity to do work. The energy in food is chemical energy; it can be converted to mechanical, electrical, thermal, or other forms of energy in the body. Food energy is measured in calories, defined on page 7.

TABLE 1-3 Elements in the Six Classes of Nutrients

The nutrients that contain carbon are organic.

	Carbon	Oxygen	Hydrogen	Nitrogen	Minerals
Water		✓	✓		
Carbohydrate	✓	✓	✓		
Fat	✓	✓	✓		
Protein	✓	✓	✓	✓	[b]
Vitamins	✓	✓	✓	✓[a]	[b]
Minerals					✓

[a] *All of the B vitamins contain nitrogen;* amine *means nitrogen.*

[b] *Protein and some vitamins contain the mineral sulfur; vitamin B_{12} contains the mineral cobalt.*

Four of these six are **organic;** that is, the nutrients contain the element carbon derived from living things.

Meet the Nutrients

The human body and foods are made of the same materials, arranged in different ways (see Figure 1-2). When considering quantities of foods and nutrients, scientists often measure them in **grams,** units of weight.

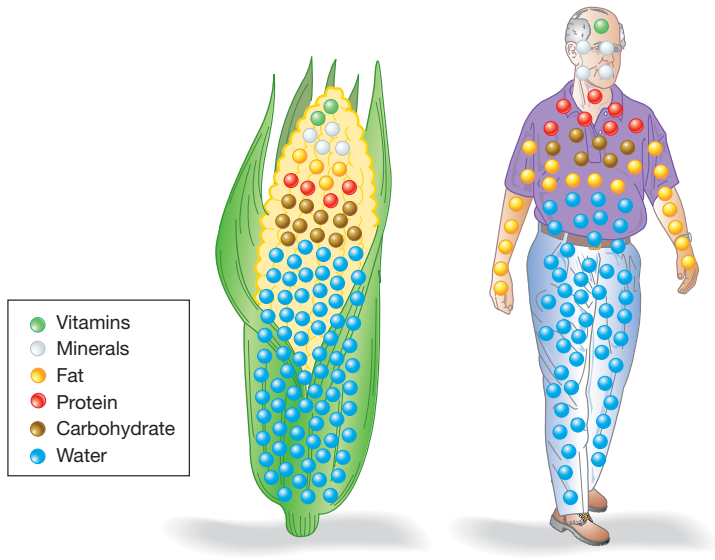
- Energy-yielding nutrients are also called *macronutrients* because they are needed in relatively large amounts in the diet.
- Vitamins and minerals are known as *micronutrients* because they are needed in only tiny amounts.

The Energy-Yielding Nutrients

Foremost among the six classes of nutrients in foods is water, which is constantly lost from the body and must constantly be replaced. Of the four organic nutrients, three are **energy-yielding nutrients,** meaning that the body can use the energy they contain. The carbohydrates and fats (fats are also called lipids) are especially important energy-yielding nutrients. As for pro-

FIGURE 1-2 Components of Food and the Human Body

Foods and the human body are made of the same materials.



organic carbon containing. Four of the six classes of nutrients are organic: carbohydrate, fat, protein, and vitamins. Strictly speaking, organic compounds include only those made by living things and do not include compounds such as carbon dioxide, diamonds, and a few carbon salts.

grams units of weight. A gram (g) is the weight of a cubic centimeter (cc) or milliliter (ml) of water under defined conditions of temperature and pressure. About 28 grams equal an ounce.

energy-yielding nutrients the nutrients the body can use for energy—carbohydrate, fat, and protein. These also may supply building blocks for body structures.

tein, it does double duty: it can yield energy, but it also provides materials that form structures and working parts of body tissues. (Alcohol yields energy, too, but it is a toxin, not a nutrient—see the note to Table 1-4.)

Vitamins and Minerals The fifth and sixth classes of nutrients are the vitamins and the minerals. These provide no energy to the body. A few minerals serve as parts of body structures (calcium and phosphorus, for example, are major constituents of bone), but all vitamins and minerals act as regulators. As regulators, the vitamins and minerals assist in all body processes: digesting food; moving muscles; disposing of wastes; growing new tissues; healing wounds; obtaining energy from carbohydrate, fat, and protein; and participating in every other process necessary to maintain life. Later chapters are devoted to these six classes of nutrients.

The Concept of Essential Nutrients When you eat food, then, you are providing your body with energy and nutrients. Furthermore, some of the nutrients are **essential nutrients,** meaning that if you do not ingest them, you will develop deficiencies; the body cannot make these nutrients for itself. Essential nutrients are found in all six classes of nutrients. Water is an essential nutrient; so is a form of carbohydrate; so are some lipids, some parts of protein, all of the vitamins, and the minerals important in human nutrition.

Calorie Values Food scientists measure food energy in kilocalories, units of heat. This book uses the common word **calories** to mean the same thing. It behooves the person who wishes to control food energy intake and body fatness to learn the calorie values of the energy nutrients, listed in Table 1-4. The most energy-rich of the nutrients is fat, which contains 9 calories in each gram. Carbohydrate and protein each contain only 4 calories in a gram (see Table 1-4).

Scientists have worked out ways to measure the energy and nutrient contents of foods. They have also calculated the amounts of energy and nutrients various types of people need—by gender, age, life stage, and activity. Thus, after studying human nutrient requirements (in Chapter 2), you will be able to state with some accuracy just what your own body needs—this much water, that much carbohydrate, so much vitamin C, and so forth. So why not simply take pills or **dietary supplements** in place of food? Because, as it turns out, food offers more than just the six basic nutrients.[6]

KEY POINT Food supplies energy and nutrients. Foremost among the nutrients is water. The energy-yielding nutrients are carbohydrates, fats (lipids), and protein. The regulator nutrients are vitamins and minerals. Food energy is measured in calories; food and nutrient quantities are often measured in grams.

Can I Live on Just Supplements?

Nutrition science can state what nutrients human beings need to survive—at least for a time. Scientists are becoming skilled at making **elemental diets**—liquid diets with a precise chemical composition that are lifesaving for people in the hospital who cannot eat ordinary food. These formulas, administered to severely ill people for days or weeks, support not only continued life but also recovery from nutrient deficiencies, infections, and wounds.

Lately, marketers have taken these liquid supplement formulas out of the medical setting and have advertised them heavily to healthy people of all ages as "meal replacers" or "insurance" against malnutrition. The truth is that a diet of real food is superior to supplements.[7] Nutrients and other food components interact with each other in the body and operate best in harmony with one another.[8] Formula diets are essential to help sick people to survive, but they do not enable people to thrive over long periods. Even in hospitals, elemental diet formulas do not support optimal growth and health, and they often lead to medical complications.[9] Although serious problems are rare and can be detected and corrected, they show that the composition of these diets is not yet perfect for all people in all settings. Healthy people

TABLE 1-4 Calorie Values of Energy Nutrients

The energy a person consumes in a day's meals comes from these three energy-yielding nutrients; alcohol, if consumed, also contributes energy.

Energy Nutrient	Energy
Carbohydrate	4 cal/g
Fat (lipid)	9 cal/g
Protein	4 cal/g

Note: Alcohol contributes 7 calories/gram that the human body can use for energy. Alcohol is not classed as a nutrient, however, because it interferes with growth, maintenance, and repair of body tissues.

CONCEPT LINK 1-1

Throughout this text, Concept Links like this one point the reader to previous concepts that underlie current discussions.

- Weight, measure, and other conversion factors needed for the study of nutrition are found in Appendix C.

essential nutrients the nutrients the body cannot make for itself (or cannot make fast enough) from other raw materials; nutrients that must be obtained from food to prevent deficiencies.

calories units of energy. In nutrition science, the unit used to measure the energy in foods is a kilocalorie (kcalorie or *Calorie*): it is the amount of heat energy necessary to raise the temperature of a kilogram (a liter) of water 1 degree Celsius. This book follows the common practice of using the lowercase term *calorie* (abbreviated *cal*) to mean the same thing.

dietary supplements pills, liquids, or powders that contain purified nutrients or other ingredients (see Controversy in Chapter 7).

elemental diets diets composed of purified ingredients of known chemical composition; intended to supply all essential nutrients to people who cannot eat foods.

When you eat foods, you are receiving more than just nutrients.

Some foods offer phytochemcials in addition to the six classes of nutrients.

who eat a healthful diet do not need such formulas and, with a nutritious diet, most need no dietary supplements at all. Even if a person's basic nutrient needs are perfectly understood and met, concoctions of nutrients still lack something that foods provide. Hospitalized clients who are fed nutrient mixtures through a vein often improve dramatically when they can finally eat food. Something in real food is important to health—but what is it? What does food offer that cannot be provided through a needle or a tube? Science has some partial explanations, some physical and some psychological.

In the digestive tract, the stomach and intestine are dynamic, living organs, changing constantly in response to the foods they receive—even to just the sight, aroma, and taste of food. When a person is fed through a vein, the digestive organs, like unused muscles, weaken and grow smaller. Lack of digestive tract stimulation may even weaken the body's defenses against certain infections, such as infections of the respiratory tract. Medical wisdom now dictates that a person should be fed through a vein for as short a time as possible and that real food taken by mouth should be reintroduced as early as possible. The digestive organs also release hormones in response to food, and these send messages to the brain that bring the eater a feeling of satisfaction: "There, that was good. Now I'm full." Eating offers both physical and emotional comfort.

Food does still more than maintain the intestine and convey messages of comfort to the brain. Foods are chemically complex. In addition to their nutrients, foods contain **phytochemicals,** compounds that confer color, taste, and other characteristics to foods. Some may be **bioactive** food components that interact with metabolic processes in the body and may affect disease risks. Even an ordinary baked potato contains hundreds of different compounds. In view of all this, it is not surprising that food gives us more than just nutrients. If it were otherwise, *that* would be surprising.

KEY POINT In addition to nutrients, food conveys emotional satisfaction and hormonal stimuli that contribute to health. Foods also contain phytochemicals that give them their tastes, aromas, colors, and other characteristics. Some phytochemicals may play roles in reducing disease risks.

LO 1.3, 1.4

The Challenge of Choosing Foods

Well-planned meals convey pleasure and are nutritious, too, fitting your tastes, personality, family and cultural traditions, lifestyle, and budget. Given the astounding numbers and varieties available, consumers can lose track of what individual foods contain and how to put them together into health-promoting diets. A few guidelines can help.

The Abundance of Foods to Choose From

A list of the foods available 100 years ago would be relatively short. It would consist of **whole foods**—foods that have been around for a long time, such as vegetables, fruits, meats, milk, and grains (Table 1-5). These foods have been called basic, unprocessed, natural, or farm foods. By whatever name, choosing a sufficient variety of these foods each day is an easy way to obtain a nutritious diet. On a given day, however, almost three-quarters of our population consume too few vegetables, and two-thirds of us fail to consume enough fruit.[10] Also, although people generally consume a few servings of vegetables, the vegetable they most often choose is potatoes, usually prepared as French fries. Such dietary patterns make development of chronic diseases more likely.

phytochemicals compounds in plant-derived foods (*phyto* means "plant").

bioactive having biological activity in the body. See also the Controversy in Chapter 2.

TABLE 1-5 Glossary of Food Types

The purpose of this little glossary is to show that good-sounding food names don't necessarily signify that foods are nutritious. Read the comment at the end of each definition.

- **whole foods** milk and milk products; meats and similar foods such as fish and poultry; vegetables, including dried beans and peas; fruits; and grains. These foods are generally considered to form the basis of a nutritious diet. Also called *basic foods*.
- **enriched foods** and **fortified foods** foods to which nutrients have been added. If the starting material is a whole, basic food such as milk or whole grain, the result may be highly nutritious. If the starting material is a concentrated form of sugar or fat, the result may be less nutritious.
- **fast foods** restaurant foods that are available within minutes after customers order them—traditionally, hamburgers, French fries, and milkshakes; more recently, salads and other vegetable dishes as well. These foods may or may not meet people's nutrient needs, depending on the selections made and on the energy allowances and nutrient needs of the eaters.
- **functional foods** whole or modified foods that contain bioactive food components believed to provide health benefits, such as reduced disease risks, beyond the benefits that their nutrients confer. However, all nutritious foods can support health in some ways; Controversy 2 provides details.
- **medical foods** foods specially manufactured for use by people with medical disorders and prescribed by a physician.
- **natural foods** a term that has no legal definition but is often used to imply wholesomeness.
- **nutraceutical** a term that has no legal or scientific meaning but is sometimes used to refer to foods, nutrients, or dietary supplements believed to have medicinal effects. Often used to sell unnecessary or unproven supplements.
- **organic foods** understood to mean foods grown without synthetic pesticides or fertilizers. In chemistry, however, all foods are made mostly of organic (carbon-containing) compounds. (See Chapter 12 for details.)
- **processed foods** foods subjected to any process, such as milling, alteration of texture, addition of additives, cooking, or others. Depending on the starting material and the process, a processed food may or may not be nutritious.
- **staple foods** foods used frequently or daily, for example, rice (in East and Southeast Asia) or potatoes (in Ireland). If well chosen, these foods are nutritious.

The number of foods supplied by the food industry today is astounding. Thousands of foods now line the market shelves—many are processed mixtures of the basic ones, and some are even constructed mostly from artificial ingredients. Ironically, this abundance often makes it more difficult, rather than easier, to plan a nutritious diet.

The food-related terms defined in Table 1-5 reveal that all types of food—including **fast foods** and **processed foods**—offer various constituents to the eater. You may also hear about **functional foods,** a marketing term coined to identify those foods containing substances, natural or added, that might lend protection against chronic diseases. The trouble is, scientists trying to single out the most health-promoting foods find that almost every naturally occurring food—even chocolate—

Did You Know?

In 1900, Americans chose from among 500 or so different foods; today, they choose from more than 50,000.

Izzy Schwartz/Photodisc/Getty Images

All foods once looked like this . . .

© Polara Studios, Inc.

. . . but now many foods look like this.

is functional in some way with regard to human health.[11] Controversy 2 in Chapter 2 provides more information about functional foods.

The extent to which foods support good health depends on the calories, nutrients, and phytochemicals they contain. In short, to select well among foods, you need to know more than their names; you need to know the foods' inner qualities. Even more important, you need to know how to combine foods into nutritious diets. Foods are not nutritious by themselves; each is of value only insofar as it contributes to a nutritious diet. A key to wise diet planning is to make sure that the foods you eat daily, your **staple foods,** are especially nutritious.

KEY POINT Foods come in a bewildering variety in the marketplace, but the foods that form the basis of a nutritious diet are whole foods, such as ordinary milk and milk products; meats, fish, and poultry; vegetables and dried peas and beans; fruits; and grains.

How, Exactly, Can I Recognize a Nutritious Diet?

A nutritious diet has five characteristics. First is **adequacy:** the foods provide enough of each essential nutrient, fiber, and energy. Second is **balance:** the choices do not overemphasize one nutrient or food type at the expense of another. Third is **calorie control:** the foods provide the amount of energy you need to maintain appropriate weight—not more, not less. Fourth is **moderation:** the foods do not provide excess fat, salt, sugar, or other unwanted constituents. Fifth is **variety:** the foods chosen differ from one day to the next. In addition, to maintain a steady supply of nutrients, meals should occur with regular timing throughout the day.

Adequacy Any nutrient could be used to demonstrate the importance of dietary adequacy. Iron provides a familiar example. It is an essential nutrient: you lose some every day, so you have to keep replacing it; and you can get it into your body only by eating foods that contain it.[†] If you eat too few of the iron-containing foods, you can develop iron-deficiency anemia: with anemia you may feel weak, tired, cold, sad, and unenthusiastic; you may have frequent headaches; and you can do very little muscular work without disabling fatigue. Some foods are rich in iron; others are notoriously poor. If you add iron-rich foods to your diet, you soon feel more energetic. Meat, fish, poultry, and **legumes** are in the iron-rich category, and an easy way to obtain the needed iron is to include these foods in your diet regularly.

Balance To appreciate the importance of dietary balance, consider a second essential nutrient, calcium. A diet lacking calcium causes poor bone development during the growing years and increases a person's susceptibility to disabling bone loss in adult life. Most foods that are rich in iron are poor in calcium. Calcium's richest food sources are milk and milk products, which happen to be extraordinarily poor iron sources. Clearly, to obtain enough of both iron and calcium, people have to balance their food choices among the types of foods that provide specific nutrients. Balancing the whole diet to provide enough but not too much of every one of the 40-odd nutrients the body needs for health requires considerable juggling, however. As you will see in Chapter 2, food group plans that cluster rich sources of nutrients into food groups can help you to achieve dietary adequacy and balance because they recommend specific amounts of foods from each group. Balance among the food groups then becomes the goal.

Calorie Control Energy intakes should not exceed energy needs. Nicknamed calorie control, this diet characteristic ensures that energy intakes from food balance energy expenditures required for body functions and physical activity. Eating such a diet helps to control body fat content and weight. The many strategies that promote this goal appear in Chapter 9.

adequacy the dietary characteristic of providing all of the essential nutrients, fiber, and energy in amounts sufficient to maintain health and body weight.

balance the dietary characteristic of providing foods of a number of types in proportion to each other, such that foods rich in some nutrients do not crowd out the diet foods that are rich in other nutrients. Also called *proportionality.*

calorie control control of energy intake; a feature of a sound diet plan.

moderation the dietary characteristic of providing constituents within set limits, not to excess.

variety the dietary characteristic of providing a wide selection of foods—the opposite of monotony.

legumes (leg-GOOMS, LEG-yooms) beans, peas, and lentils, valued as inexpensive sources of protein, vitamins, minerals, and fiber that contribute little fat to the diet. Also defined in Chapter 6.

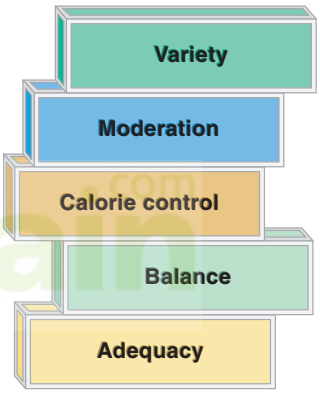
[†] A person can also take supplements of iron, but as later discussions demonstrate, eating iron-rich foods is preferable.

Moderation Intakes of certain food constituents such as fat, cholesterol, sugar, and salt should be limited for health's sake. A major guideline for healthy people is to keep fat intake below 35 percent of total calories.[12] Some people take this to mean that they must never indulge in a delicious beefsteak or hot-fudge sundae, but they are misinformed: moderation, not total abstinence, is the key. A steady diet of steak and ice cream might be harmful, but once a week as part of an otherwise moderate diet plan, these foods may have little impact; as once-a-month treats, these foods would have practically no effect at all. Moderation also means that limits are necessary, even for desirable food constituents. For example, a certain amount of fiber in foods contributes to the health of the digestive system, but too much fiber leads to nutrient losses.

Variety As for variety, nutrition scientists agree that people should not eat the same foods, even highly nutritious ones, day after day. One reason is that a varied diet is more likely to be adequate in nutrients.[13] In addition, some less-well-known nutrients and phytochemicals could be important to health and some foods may be better sources of these than others. Another reason is that a monotonous diet may deliver large amounts of toxins or contaminants. Such undesirable compounds in one food are diluted by all the other foods eaten with it and are diluted still further if the food is not eaten again for several days. Last, variety adds interest—trying new foods can be a source of pleasure.

A caution is in order. Any one of these dietary principles alone cannot ensure a healthful diet. For example, the most likely outcome of relying solely on variety could easily be a low-nutrient, high-calorie diet consisting of a variety of snack foods and nutrient-poor sweets.[14] If you establish the habit of using all of the principles just described, you will find that choosing a healthful diet becomes as automatic as brushing your teeth or falling asleep. Establishing the A, B, C, M, V habit may take some effort, but the payoff in terms of improved health is overwhelming. Table 1-6 takes an honest look at some common excuses for not eating well.

- A nutritious diet follows the A, B, C, M, V principles:
  - *Adequacy.*
  - *Balance.*
  - *Calorie control.*
  - *Moderation.*
  - *Variety.*



All of these factors help to build a nutritious diet.

KEY POINT A well-planned diet is adequate in nutrients, is balanced with regard to food types, offers food energy that matches energy expended in activity, is moderate in unwanted constituents, and offers a variety of nutritious foods.

Why People Choose Foods

Eating is an intentional act. Each day, people choose from the available foods, prepare the foods, decide where to eat, which customs to follow, and with whom to dine. Many factors influence food-related choices.

TABLE 1-6 What's Today's Excuse for Not Eating Well?

If you find yourself saying, "I know I should eat well, but I'm too busy" (or too fond of fast food, or have too little money, or a dozen other excuses), take note:

- *No time to cook.* Everyone is busy. Convenience packages of frozen vegetables, jars of pasta sauce, and prepared meats and salads make nutritious meals in little time.
- *Not a high priority.* Priorities change drastically and instantly when illness strikes—better to spend a little effort now nourishing your body's defenses than to spend enormous resources later fighting illnesses.
- *Crave fast food and sweets.* Occasional fast-food meals and sweets in moderation are acceptable in a nutritious diet.
- *Too little money.* Eating right costs no more than eating poorly. Chips, colas, fast food, and premium ice cream cost as much or more per serving as nutritious foods.[a]
- *Take vitamins instead.* Vitamin pills cannot make up for consistently poor food choices.

[a]*For a discussion of this topic, see L. M. Lipsky, Are energy-dense foods really cheaper? Reexamining the relation between food price and energy density,* American Journal of Clinical Nutrition *90 (2009): 1397–1401.*

Sharing ethnic food is a way of sharing culture.

Cultural and Social Meanings Attached to Food

Like wearing traditional clothing or speaking a native language, enjoying traditional **cuisines** and **foodways** can be a celebration of your own or a friend's heritage. Sharing **ethnic food** can be symbolic: people offering foods are expressing a willingness to share cherished values with others. People accepting those foods are symbolically accepting not only the person doing the offering but the person's culture. Developing **cultural competence** is particularly important for professionals who help others to achieve a nutritious diet.[15]

Cultural traditions regarding food are not inflexible; they keep evolving as people move about, learn about new foods, and teach each other. Today some people are ceasing to be **omnivores** and are becoming **vegetarians.** Vegetarians often choose this lifestyle because they honor the lives of animals or because they have discovered the health and other advantages associated with diets rich in beans, whole grains, fruits, nuts, and vegetables.[16] The Chapter 6 Controversy explores the pros and the cons of both the vegetarian's and the meat-eater's diets.

• Figure 2-10 in Chapter 2 depicts some ethnic foods that have become an integral part of the "American diet."

Factors That Drive Food Choices

Consumers today value convenience so highly that they are willing to spend over half of their food budget on meals that require little or no preparation. They frequently eat out, bring home ready-to-eat meals, cook meals ahead in commercial kitchens, or have food delivered.[17] In their own kitchens, they want to prepare a meal in 15 to 20 minutes, using only four to six ingredients. Such convenience doesn't have to mean that nutrition is out the window. This chapter's Food Feature addresses the time, money, and nutrition trade-offs that many busy people face today.

Convenience is only one consideration. Physical, psychological, social, and philosophical factors all influence how you choose the foods you generally eat. These include:

- *Advertising.* The media have persuaded you to consume these foods.[18]
- *Availability.* They are present in the environment and accessible to you.[19]
- *Cost.* They are within your financial means.
- *Emotional comfort.* They can make you feel better for a while.
- *Habit.* They are familiar; you always eat them.
- *Personal preference and genetic inheritance.* You like the way these foods taste, with some preferences possibly determined by the genes.[20]
- *Positive or negative associations. Positive:* They are eaten by people you admire, or they indicate status, or they remind you of fun. *Negative*: They were forced on you or you became ill while eating them.
- *Region of the country.* They are foods favored in your area.
- *Social pressure.* They are offered; you feel you can't refuse them.
- *Values or beliefs.* They fit your religious tradition, square with your political views, or honor the environmental ethic.
- *Weight.* You think they will help to control body weight.
- *Nutrition and health benefits.* You think they are good for you.

Just the last two of these reasons for choosing foods assign a high priority to nutritional health. Similarly, the choice of where, as well as what, to eat is often based more on social considerations than on nutrition judgments. College students often choose to eat at fast-food and other restaurants to socialize, to get out, to save time, or to date; they are not always conscious of the need to obtain nutritious food.

Nutrition understanding depends upon a firm base of scientific knowledge. The next section describes the nature of such knowledge and addresses one of the "how" questions posed earlier in this chapter: How do we know what we know about nutrition?

KEY POINT Cultural traditions and social values revolve around food and often find expression through foodways. Many factors other than nutrition drive food choices.

cuisines styles of cooking.

foodways the sum of a culture's habits, customs, beliefs, and preferences concerning food.

ethnic foods foods associated with particular cultural subgroups within a population.

cultural competence having an awareness and acceptance of one's own and other cultures and the ability to interact effectively with people of those cultures.

omnivores people who eat foods of both plant and animal origin, including animal flesh.

vegetarians people who exclude from their diets animal flesh and possibly other animal products such as milk, cheese, and eggs.

LO 1.5, 1.6

The Science of Nutrition

Nutrition is a science—a field of knowledge composed of organized facts. Unlike sciences such as astronomy and physics, nutrition is a relatively young science. Most nutrition research has been conducted since 1900. The first vitamin was identified in 1897, and the first protein structure was not fully described until the mid-1940s. Because nutrition science is an active, changing, growing body of knowledge, scientific findings often seem to contradict one another or are subject to conflicting interpretations. Bewildered consumers complain in frustration, "Those scientists don't know anything. If they don't know what's true, how am I supposed to know?"

Yet, many facts in nutrition are known with great certainty. To understand why apparent contradictions sometimes arise in nutrition science, we need to look first at what scientists do.

The Scientific Approach

In truth, though, it is a scientist's business not to know. Scientists obtain facts by systematically asking honest objective questions—that's their job.[21] Following the scientific method (outlined in Figure 1-3), they attempt to answer scientific questions. They design and conduct various experiments to test for possible answers (see Figure 1-4 and Table 1-7). When they have ruled out some possibilities and found evidence for others, they submit their findings, not to the news media, but to boards of reviewers composed of other scientists who try to pick the findings apart. Finally, the work is published in scientific journals where still more scientists can read it. Then the news reporters read it and write about it and you can read it, too. Table 1-8 explains what you can expect to find in a journal article.

KEY POINT Scientists ask questions and then design research experiments to test possible answers.

Scientific Challenge

An important truth in science is that one experiment does not "prove" or "disprove" anything. Even after publication, other scientists try to duplicate the work of the first researchers to support or refute the original finding.

Only when a finding has stood up to rigorous, repeated testing in several kinds of experiments performed by several different researchers is it finally considered confirmed. Even then, strictly speaking, science consists not of facts that are set in stone, but of *theories* that can always be challenged and revised. Some findings, though, like the theory that the earth revolves about the sun, are so well supported by observations and experimental findings that they are generally accepted as facts. What we "know" in nutrition is confirmed in the same way—through years of replicating

FIGURE 1-3 ANIMATED!

The Scientific Method

Research scientists follow the scientific method. Note that most research projects result in new questions, not final answers. Thus, research continues in a somewhat cyclical manner.

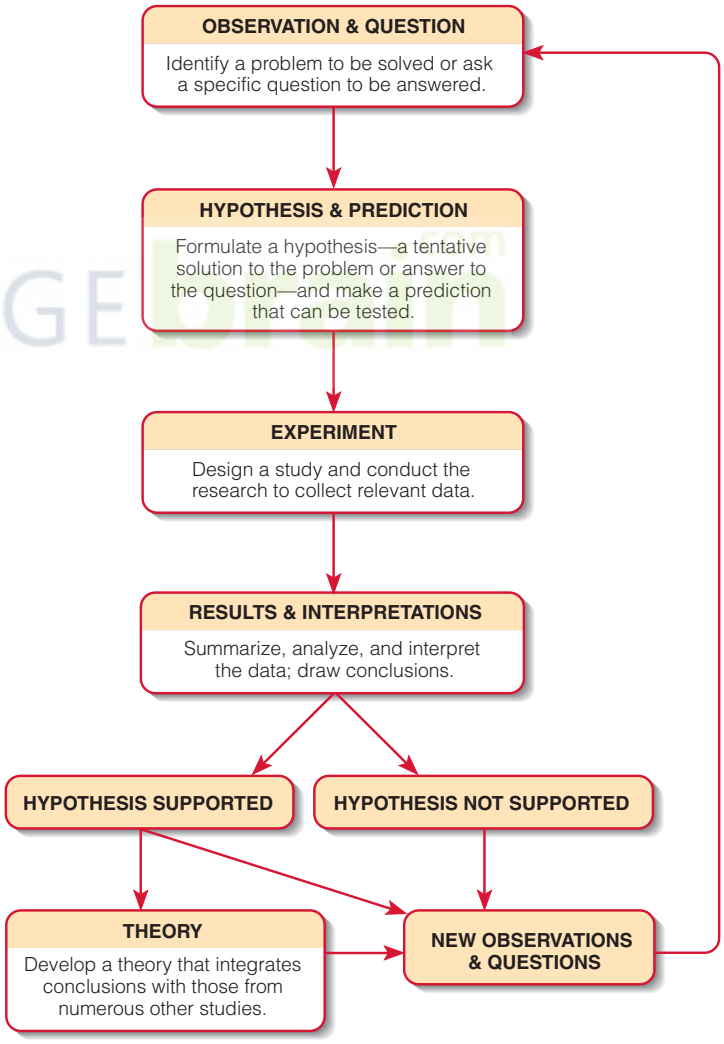


FIGURE 1-4 Examples of Research Design

The type of study chosen for research depends upon what sort of information the researchers require. Studies of individuals (**case studies**) yield observations that may lead to possible avenues of research. A study of a man who ate gumdrops and became a famous dancer might suggest that an experiment be done to see if gumdrops contain dance-enhancing power.

Studies of whole populations (**epidemiological studies**) provide another sort of information. Such a study can reveal a **correlation.** For example, an epidemiological study might find no worldwide correlation of gumdrop eating with fancy footwork but, unexpectedly, might reveal a correlation with tooth decay.

Studies in which researchers actively intervene to alter people's eating habits (**intervention studies**) go a step further. In such a study, one set of subjects (the **experimental group**) receive a treatment, and another set (the **control group**) go untreated or receive a **placebo** or sham treatment. If the study is a **blind experiment,** the subjects do not know who among the members receives the treatment and who receives the sham. If the two groups experience different effects, then the treatment's effect can be pinpointed. For example, an intervention study might show that withholding gumdrops, together with other candies and confections, reduced the incidence of tooth decay in an experimental population compared to that in a control population.

Finally, **laboratory studies** can pinpoint the mechanisms by which nutrition acts. What is it about gumdrops that contributes to tooth decay: their size, shape, temperature, color, ingredients? Feeding various forms of gumdrops to rats might yield the information that sugar, in a gummy carrier, promotes tooth decay. In the laboratory, using animals or plants or cells, scientists can inoculate with diseases, induce deficiencies, and experiment with variations on treatments to obtain in-depth knowledge of the process under study. Intervention studies and laboratory experiments are among the most powerful tools in nutrition research because they show the effects of treatments.

Case Study

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"This person eats too little of nutrient X and has illness Y."

Epidemiological Study

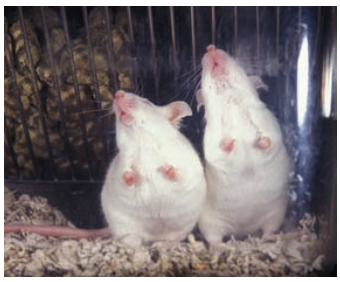
"This country's food supply contains more nutrient X, and these people suffer less illness Y."

Intervention Study

David Buffington/Photodisc/Getty Images

"Let's add foods containing nutrient X to some people's food supply and compare their rates of illness Y with the rates of others who don't receive the nutrient."

Laboratory Study



Leslie Newman & Andrew Flowers/Photo Researchers, Inc.

"Now let's prove that a nutrient X deficiency causes illness Y by inducing a deficiency in these rats."

controlled clinical trial a research study design that often reveals the effects of a treatment in human beings. Health outcomes are observed in a group of people who receive the treatment and are then compared with outcomes in a control group of similar people who received a placebo (an inert or sham treatment). Ideally, neither subjects nor researchers know who receives the treatment and who gets the placebo (a double-blind study).

study findings. This slow path of repeated studies stands in sharp contrast to the media's desire for today's latest news.

To repeat: the only source of valid nutrition information is slow, painstaking, authentic scientific research. We believe a nutrition fact to be true because it has been supported, time and again, in experiments designed to rule out all other possibilities. For example, we know that eyesight depends partly on vitamin A because

- In case studies, individuals with blindness report having consumed a steady diet devoid of vitamin A, and
- In epidemiological studies, populations with diets lacking in vitamin A are observed to suffer high rates of blindness, and
- In intervention studies (**controlled clinical trials**), vitamin A–rich foods provided to groups of vitamin A–deficient people reduce their blindness rates dramatically, and

TABLE 1-7 Research Design Terms

- **blind experiment** an experiment in which the subjects do not know whether they are members of the experimental group or the control group. In a *double-blind experiment,* neither the subjects nor the researchers know to which group the members belong until the end of the experiment.
- **case studies** studies of individuals. In clinical settings, researchers can observe treatments and their apparent effects. To prove that a treatment has produced an effect requires simultaneous observation of an untreated similar subject (a *case control*).
- **control group** a group of individuals who are similar in all possible respects to the group being treated in an experiment but who receive a sham treatment instead of the real one. Also called *control subjects.* See also *experimental group* and *intervention studies.*
- **correlation** the simultaneous change of two factors, such as the increase of weight with increasing height (a *direct* or *positive* correlation) or the decrease of cancer incidence with increasing fiber intake (an *inverse* or *negative* correlation). A correlation between two factors suggests that one may cause the other but does not rule out the possibility that both may be caused by chance or by a third factor.
- **epidemiological studies** studies of populations; often used in nutrition to search for correlations between dietary habits and disease incidence; a first step in seeking nutrition-related causes of diseases.
- **experimental group** the people or animals participating in an experiment who receive the treatment under investigation. Also called *experimental subjects.* See also *control group* and *intervention studies.*
- **intervention studies** studies of populations in which observation is accompanied by experimental manipulation of some population members—for example, a study in which half of the subjects (the *experimental subjects*) follow diet advice to reduce fat intakes while the other half (the *control subjects*) do not, and both groups' heart health is monitored.
- **laboratory studies** studies that are performed under tightly controlled conditions and are designed to pinpoint causes and effects. Such studies often use animals as subjects.
- **placebo** a sham treatment often used in scientific studies; an inert harmless medication. The *placebo effect* is the healing effect that the act of treatment, rather than the treatment itself, often has.

- In laboratory studies, animals deprived of vitamin A and only that vitamin begin to go blind; when it is restored soon enough in the diet, their eyesight returns, and
- Further laboratory studies elucidated the molecular mechanisms for vitamin A activity in eye tissues, and
- Replication of these studies provides the same results.

Now we can say with certainty, "eyesight depends upon sufficient vitamin A."

KEY POINT Nutrition knowledge builds slowly through years of research. Single studies must be replicated before their findings can be considered valid.

Can I Trust the Media to Deliver Nutrition News?

The news media are hungry for new findings, and reporters often latch onto ideas from the scientific laboratories before they have been fully tested. Also, a reporter who lacks a strong understanding of science may misunderstand complex scientific principles. To tell the truth, sometimes scientists get excited about their findings,

TABLE 1-8 The Anatomy of a Research Article

Here's what you can expect to find inside a research article:

- *Abstract.* The abstract provides a brief overview of the article.
- *Introduction.* The introduction clearly states the purpose of the current study.
- *Review of literature.* A review of the literature reveals all that science has uncovered on the subject to date.
- *Methodology.* The methodology section defines key terms and describes the procedures used in the study.
- *Results.* The results report the findings and may include summary tables and figures.
- *Conclusions.* The conclusions drawn are those supported by the data and reflect the original purpose as stated in the introduction. Usually, they answer a few questions and raise several more.
- *References.* The references list relevant studies (including key studies several years old as well as current ones).

MY TURN

Gabriel

Lose Weight While You Sleep!

See two students talking about how they learned the truth about nutrition claims made in advertising.

CENGAGENOW To hear their stories, log on to www.cengage.com/sso.

Did You Know?

Some newspapers, magazines, talk shows, Internet websites, and other media strive for accuracy in reporting, but others specialize in sensationalism that borders on quackery—see this chapter's Controversy for details.

too, and leak them to the press before they have been through a rigorous review by the scientists' peers. As a result, the public is often exposed to late-breaking nutrition news stories before the findings are fully confirmed. Then, when the hypothesis being tested fails to hold up to a later challenge, consumers feel betrayed by what is simply the normal course of science at work.

It also follows that people who take action based on single studies are almost always acting impulsively, not scientifically. The real scientists are trend watchers. They evaluate the methods used in each study, assess each study in light of the evidence gleaned from other studies, and modify little by little their picture of what is true. As evidence accumulates, the scientists become more and more confident about their ability to make recommendations that apply to people's health and lives. The Consumer Corner in this chapter offers some tips for evaluating news stories about nutrition.

Sometimes media sensationalism overrates the importance of even true, replicated findings. For example, a few years ago the media eagerly reported that oat bran lowers blood cholesterol, a lipid indicative of heart disease risk. Although the reports were true, oat bran is only one of several hundred factors that affect blood cholesterol. News reports on oat bran often failed to mention that cutting intakes of certain fats is still the major step to take to lower blood cholesterol.

• The links between lipids and heart disease are discussed in Chapters 5 and 11.

Also, new findings need refinements. Oat bran and oatmeal truly are cholesterol reducers, but how much must a person eat to produce the desired effects? Do little oat bran pills or powders meet the need? Do oat bran cookies? If so, how many cookies? For oatmeal, it takes a bowl-and-a-half daily to affect blood lipids. A few cookies cannot provide nearly so much and certainly cannot undo all the damage from a high-fat meal.

Today, oat bran's cholesterol-lowering effect is established, and labels on food packages can proclaim that a diet high in oats may reduce the risk of heart disease. The whole process of discovery, challenge, and vindication took almost 10 years of research. Some other lines of research have taken many years longer. In science, a single finding almost never makes a crucial difference to our knowledge as a whole, but like each individual frame in a movie, it contributes a little to the big picture. Many such frames are needed to tell the whole story.

KEY POINT News media often sensationalize single study findings, and are not always trustworthy sources of nutrition information.

National Nutrition Research

As you study nutrition, you are likely to hear of findings based on two ongoing national scientific research projects. The first, the National Health and Nutrition

CONSUMER CORNER

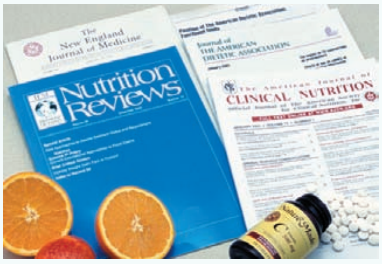
Reading Nutrition News with an Educated Eye

A newspaper reader, who had sworn off butter years ago for his heart's sake, bemoaned this headline: *"Margarine as Bad as Butter for Heart Health."* "Do you mean to say that I could have been eating butter all these years? That's it. I quit. No more diet changes for me." His response is understandable—diet changes, after all, take effort to make and commitment to sustain. He, like many others, feels betrayed when, years later, science appears to have turned its advice upside down.

It bears repeating: a single study never proves or disproves anything. Study results may support one view or another, but they rarely merit the sort of finality implied by journalistic phrases such as "Now we know" or "The answer has been found." Misinformed readers looking for simple answers to complex nutrition problems often take such phrases literally.

To read news stories with an educated eye, keep these points in mind:

- A scientific study under discussion should be published in a peer-reviewed journal, such as the *American Journal of Clinical Nutrition.* An unpublished study or one from a less credible source may or may not be valid; the reader has no way of knowing because the study lacks scrutiny by other experts.
- The news report should describe the researchers' methods; in truth, few provide these details. For example, it matters whether the study participants numbered 8 or 8,000, and whether researchers personally observed participants' behaviors or relied on self-reports given over the telephone.
- The report should define the study subjects—single cells, animals, or human beings. If they were human beings, the more you have in common with them (age and gender, for example), the more applicable the findings may be for you.
- Valid reports also present new findings in the context of previous research. Some reporters regularly follow developments in a research area and thus acquire the background knowledge needed to write meaningfully.
- Review articles provide a broad perspective on a single topic; they appear in journals such as *Nutrition Reviews.* Review articles describe findings of many studies on the same topic.



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A person wanting the whole story on a nutrition topic is wise to seek articles from peer-reviewed journals such as these. A review journal examines all available evidence on major topics. Other journals report details of the methods, results, and conclusions of single studies.

Finally, ask yourself if the study makes sense for you. Even if it turns out that the fat of margarine is damaging to the heart, do you eat enough margarine to worry about its effects? Is butter even worse? When a headline touts a shocking new "answer" to a nutrition question, read the story with a critical eye. It may indeed be a carefully researched report, but often it is a sensational story intended to catch the attention of newspaper and magazine buyers, not to offer useful nutrition information.

Examination Surveys (NHANES), is a nationwide project that gathers information from about 50,000 people using diet histories, physical examinations and measurements, and laboratory tests. Boiled down to its essence, NHANES involves

- asking people what they have eaten;
- recording measures of their health status.

The second project is the Continuing Survey of Food Intakes by Individuals (CSFII), which involves

- recording what people have actually eaten for two days;
- comparing the foods they have chosen with recommended food selections.

Nutrition monitoring makes it possible for research scientists to assess the nutrient status, health indicators, and dietary intakes of the U.S. population. The agencies involved with these efforts are listed in the margin.

KEY POINT Ongoing national nutrition research provides data on food consumption and nutrient status of the U.S. population.

- Agencies active in nutrition policy, research, and monitoring:
  - *Department of Health and Human Services (DHHS).*
  - *United States Department of Agriculture (USDA).*
  - *Centers for Disease Control and Prevention (CDC).*
- Ongoing national nutrition research projects:
  - *National Health and Nutrition Examination Surveys (NHANES).*
  - *Continuing Survey of Food Intakes by Individuals (CSFII).*

LO 1.7

A Guide to Behavior Change

Nutrition knowledge is of little value if it only helps people to make As on tests. The value comes when people use it to improve their diets. To act on knowledge, people must change their behaviors, and while this may sound simple enough, behavior change often takes substantial effort.

Otto Greule Jr./Time Life Pictures/ Getty Images

Many people need to change their daily routines to include physical activity.

- A dietary analysis computer program is available on the CengageNow website (**www.cengage.com/sso**) to help you through the process of examining your diet and comparing it to standards.

lapses times of falling back into former habits, a normal and expected part of behavior change.

motivation the force that moves people to act. Motivation may be either instinctive (inborn drives such as hunger and thirst) or learned (such as the drive to acquire possessions or to improve health).

The Process of Change

Psychologists describe six stages of behavior change, offered in Table 1-9. Knowing these stages can help you to recognize where you stand in relation to your own goals. Table 1-9 also demonstrates how to use this information to move forward in achieving your behavior change goals.

Assessments and Goals

To make a change, you must first be aware of a problem. Some problems, such as *never* consuming a vegetable, can be easy to spot. More subtle dietary problems, such as failing to meet your need for a particular vitamin or mineral, can have serious repercussions but often must be revealed by a study of the diet. Tracking food intakes over several days' time and then comparing intakes to standards (see Chapter 2) is a revealing exercise. Then, setting small, achievable goals in areas that need changing is the next step to making improvements. Realistic goals for body weight are discussed in Chapter 9.

Obstacles to Change

It is a rare person who, upon setting out to change a behavior, encounters only smooth progress toward the final goal. Obstacles that derail plans or cause **lapses** often arise in these general areas:

- Competence—the person lacks needed knowledge or skill to make the change.
- Confidence—the person possesses the needed knowledge and skills but *believes* that the needed change is beyond the scope of his or her ability or that the problem lies outside the realm of personal control.
- **Motivation**—the person possesses both competence and confidence but lacks sufficient reason to change.

TABLE 1-9 Stages of Behavior Change

Stage	Characteristics	Actions
Precontemplation	Not considering a change, have no intention of changing; see no problems with current behavior.	Collect information about health effects of current behavior and potential benefits of change.
Contemplation	Admit that change may be needed; weigh pros and cons of changing and not changing.	Commit to making a change and set a date to start.
Preparation	Preparing to change a specific behavior, taking initial steps, and setting some goals.	Write an action plan, spelling out specific parts of the change. Set small-step goals; tell others about the plan.
Action	Committing time and energy to making a change; following a plan set for a specific behavior change.	Perform the new behavior. Manage emotional and physical reactions to the change.
Maintenance	Striving to integrate the new behavior into daily life and striving to make it permanent.	Persevere through lapses. Teach others and help them achieve their own goals. (This stage can last for years.)
Adoption/Moving On	The former behavior is gone and the new behavior is routine.	After months or a year of maintenance without lapses, move on to other goals.

Competence The first obstacle, competence, is by far the most easily corrected. For example, a student who recognizes a lack of vegetables in her diet and wishes to increase her intake may not know how to prepare vegetables. Seeking information from a family cook can supply the missing knowledge, and trying out some recipes can bolster her skills. To deal with a serious threat, such as an eating disorder or excessive alcohol intake, outside help from reputable agencies may be needed to accomplish a change.

Confidence When a task seems insurmountable, confidence flags. Our vegetable-deprived student who sets the broad goal "I will eat all of the vegetables I need every day" might grumble, "I'll never be able to eat all those vegetables—I give up." If, instead, she sets a small, specific goal, such as "I will purchase carrot sticks tomorrow and eat them for my snacks this week," she may feel empowered to attempt it. Jotting down records of her snacks allows her to measure her success and identify obstacles to vegetable consumption.

People who take action and often succeed tend to be those with the quality of **self-efficacy,** that is, they believe in their own abilities. To boost self-efficacy, it helps to develop a strong internal **locus of control**—the belief that the individual has control over life's events. The opposite, an *external* locus of control, leaves one feeling helpless against outside forces, such as luck or fate. In other words, the more you believe in yourself and your ability to change your life for the better, the more likely that you will succeed in doing so.

Motivation The toughest obstacle to changing, however, may be a lack of motivation. Even if our student possesses both competence and confidence, she will not make a change unless she has sufficient motivation to do so: "I'm healthy now—why should I bother to eat more vegetables?" Motivation arises when the expected benefit or reward of the behavior change outweighs its perceived costs.

The Concept of Rewards Motivation is often based on the concept of rewards—the person making a change must expect that important rewards will follow the altered behaviors. Rewards are affected by four factors:

1. The value of the reward. (How big is the reward?)
2. Its timing. (How soon will the reward come, or how soon will the price have to be paid?)
3. The costs. (What will be the risks or consequences of seeking the reward?)
4. Its probability. (How likely is the reward to occur, and how certain the price?)

If motivation to make dietary changes eludes people, the reason is often because of timing, cost, and probability factors. They have to wait too long to receive the reward, or they perceive too high a cost, or they aren't sure they'll ever receive it. Here's an example:

- If you enjoy ice cream now (reward now), you won't notice your weight gain until next month (pay later).
- If you forgo the pleasure of eating ice cream now (pay now), you can't expect to see any weight loss until next month (reward later).

No wonder so many people fail to change their poor food habits!

Start Now

It is natural, as you progress through this text, to contemplate changing some of your own food habits. If you are ready to move beyond contemplation to preparation and action, the CengageNow Internet website offers some help. Little reminders entitled *Start Now* that appear at the end of each of this book's chapters invite you to visit the website to take inventory of your current behaviors, to set goals for a needed change, and to follow through until the new behavior becomes as comfortable and familiar as the old one once was.

Did You Know?

Outside help for making a change may be available from the professionals at a campus health center, counseling center, or community helping agency.

- If you wish to make a change during your study of nutrition, you can find help at the website **www.cengage.com/sso.** There, a series of exercises can help you to:
  - *Assess your current diet and exercise habits.*
  - *Identify behaviors to improve.*
  - *Determine your readiness to change.*
  - *Create a plan for change.*
  - *Track your efforts toward making the change.*

self-efficacy the belief in one's ability to take action and successfully perform a specific behavior.

locus of control the assigned source of responsibility for one's life events; an internal locus of control identifies the individual's behaviors as the driving force; an external locus of control blames chance, fate, or some other external factor. Most people's attitude falls somewhere in between.

FOOD FEATURE

How Can I Get Enough Nutrients Without Consuming Too Many Calories?

According to the experts, people in the United States are not very successful at selecting diets that meet their nutrition needs. In particular, only a tiny percentage of adults manage to achieve both adequacy and moderation. In trying to control calories while balancing the diet and making it adequate, certain foods are especially useful. These foods are rich in nutrients relative to their energy contents; that is, they are foods with high **nutrient density.**[22] Figure 1-5 is a simple depiction of this concept. Consider calcium sources, for example. Ice cream and fat-free milk both supply calcium, but the milk is denser in calcium per calorie. A cup of rich ice cream contributes more than 350 calories, a cup of fat-free milk only 85—and with almost double the calcium. Most people cannot, for their health's sake, afford to choose foods without regard to their energy contents. Those who do very often exceed calorie allowances while leaving nutrient needs unmet.

Nutrient density is such a useful concept in diet planning that this book encourages you to think in those terms. Right away, the next chapter asks you to apply your knowledge of nutrient density while developing skills in meal planning. Watch for tables and figures in later chapters that show the best buys among foods, not necessarily in nutrients per dollar, but in nutrients per calorie. Among foods that often rank high in nutrient density are the vegetables, particularly the nonstarchy vegetables such as broccoli, carrots, mushrooms, peppers, and tomatoes. These inexpensive foods take time to prepare, but time invested in this way pays off in nutritional health. Twenty minutes spent peeling and slicing vegetables for a salad is a better investment in nutrition than 20 minutes spent fixing a fancy, high-fat, high-sugar dessert. Besides, the dessert ingredients often cost more money and strain the calorie budget, too.[23]

nutrient density a measure of nutrients provided per calorie of food.

FIGURE 1-5

A Way to Judge Which Foods Are Most Nutritious

Some foods deliver more nutrients for the same number of calories than others do. These two breakfasts provide about 500 calories each, but they differ greatly in the nutrients they provide per calorie. Note that the sausage in the larger breakfast is lower-calorie turkey sausage, not the high-calorie pork variety. Making small choices like this at each meal can add up to large calorie savings, making room in the diet for more servings of nutritious foods and even some treats.

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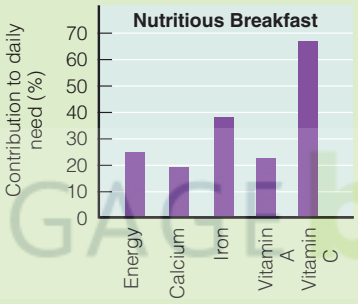
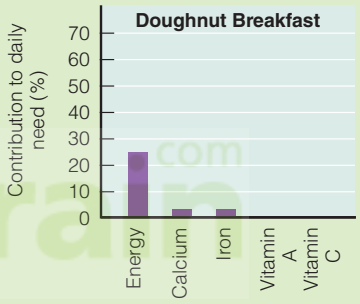


Higher Nutrient Density



Lower Nutrient Density

Time, however, is another concern. Today's working families, college students, and active people of all ages may have little time to devote to food preparation. Busy chefs should seek out convenience foods that are nutrient-dense, such as bags of ready-to-serve salads, refrigerated prepared low-fat meats and poultry, canned beans, and frozen vegetables. Dried fruit and dry-roasted nuts require only that they be kept on hand and make a tasty, nutritious topper for salads and other foods. To round out the meal, fat-free milk is both nutritious and convenient. Other convenient selections, such as most pot pies, many frozen pizzas, ramen noodles, and "pocket"-style sandwiches, are less nutritious overall because they contain too few vegetables and too many calories, making them low in nutrient density. The Food Features of later chapters offer many more tips for choosing convenient and nutritious foods.

All of this discussion leads to a principle that is central to achieving nutritional health: It is not the individual foods you choose, but the way you combine them into meals and the way you arrange meals to follow one another over days and weeks that determine how well you are nourishing yourself. Nutrition is a science, not an art, but it can be used artfully to create a pleasing, nourishing diet. The remainder of this book is dedicated to helping you make informed choices and combine them artfully to meet all the body's needs.

Diet Analysis PLUS Concepts in Action

Track Your Diet

After each Food Feature section in this text, exercises like this one provide an ongoing diet analysis activity that asks you to apply what you've learned in the chapter to your own diet. To do so, use the Diet Analysis Plus (DA+) program that accompanies this book. To get started, do the following:

1. From the Home page of the DA+ program (after your personal data has been entered), select the Reports tab from the red navigation bar then Profile DRI Goals. Click Create PDF button. You will now have DRI values for calories, carbohydrates, and fat appropriate for your Profile.
2. For the next three days, with pencil and paper, keep track of everything you eat and drink. Be honest and careful in your record-keeping. Measure or estimate amounts of foods and beverages you consume, as well as margarine or butter, salt, cream sauces, gravies, pasta sauce, ketchup, relish, jams, jellies, and other add-ons. Even a slice of tomato and a lettuce leaf on a sandwich count toward the day's intake. Distribute your data among four meals for each day: breakfast, lunch, dinner, and snacks.
3. Keep track of your physical activity for all three of those days. Record all the minutes spent walking or biking to class, working out, vacuuming rugs, washing cars, playing sports, dancing with friends, or any other nonsedentary behavior. Hold on to this data: you'll need it in chapters to come.
4. From the Home page of DA+, select the Track Diet tab and enter each food item that you recorded for Day One, Day Two, and Day Three into the Find Foods area. When finished, select the Reports tab and go to Intake vs. Goals. Click the Generate Report button and choose all meals. What information on the report most surprised you?
5. From the Reports tab, go to Energy Balance. Using Day Two (from the three-day diet intake), choose all meals and generate a report. Was your calorie intake over or under the recommended calories (kcals) for your profile? Was it higher or lower than expected? You will analyze your energy balance in more detail later, in Chapter 9.

MEDIA MENU

CENGAGENOW Throughout this chapter, the CengageNOW logo indicates an opportunity for online self-study, linking you to interactive tutorials and videos based on your level of understanding. Go to **www.cengage.com/sso.**

Search for "nutrition" at the U.S. Government health and nutrition sites: **www.healthfinder.gov** or **www.nutrition.gov.**

Learn more about basic science research from the National Science Foundation and Research!America: **www.nsf.gov** and **researchamerica.org.**

View *Healthy People Objectives for the Nation:* **www.healthypeople.gov.**

Visit the food and nutrition center of the Mayo Clinic: **www.mayohealth.org.**

Create a chart of your family health history at the U.S. Surgeon General's site: **familyhistory.hhs.gov.**

SELF CHECK

Answers to these Self Check questions are in Appendix G.

1. Energy-yielding nutrients include all of the following except:
   A. vitamins
   B. carbohydrates
   C. fat
   D. protein
2. Organic nutrients include all of the following except:
   A. minerals
   B. fat

C. carbohydrates
D. protein

3. One of the characteristics of a nutritious diet is that the diet provides no constituent in excess. This principle of diet planning is called:
   A. adequacy
   B. balance
   C. moderation
   D. variety
4. A slice of peach pie supplies 357 calories with 48 units of vitamin A; one large peach provides 42 calories and 53 units of vitamin A. This is an example of:
   A. calorie control
   B. nutrient density
   C. variety
   D. essential nutrients
5. Which of the following is an example of a processed food?
   A. carrots
   B. bread
   C. nuts
   D. watermelon
6. Studies of populations in which observation is accompanied by experimental manipulation of some population members are referred to as:
   A. case studies
   B. intervention studies
   C. laboratory studies
   D. epidemiological studies
7. Both heart disease and cancer are due to genetic causes, and diet cannot influence whether they occur.
   T F
8. Both carbohydrates and protein have 4 calories per gram.
   T F
9. People most often choose foods for the nutrients they provide.
   T F
10. The belief in one's own abilities is the quality of self-efficacy.
    T F

CONTROVERSY 1

Sorting the Imposters from the Real Nutrition Experts

LO 1.8

From the time of salesmen selling snake oil from horse-drawn wagons to the Internet sales schemes of today, nutrition **quackery** has plagued the nation. Government attempts at quackery regulation and enforcement over the past decades have largely failed. To protect themselves, consumers must learn to distinguish authentic and useful nutrition products and services from the vast array of well-meaning but misinformed advice and outright scams used to steal people's money.

INFORMATION SOURCES AND COSTS OF WRONG CHOICES

Most people say that television is their source for nutrition information, with magazines a close second, and the Internet quickly gaining in popularity.[1]* Sometimes, these sources provide sound and scientific, and therefore trustworthy, information. More often, though, **infomercials, advertorials,** and **urban legends** (defined in Table C1-1) pretend to inform, but in fact aim to sell products by making fantastic promises for health or weight loss with minimal effort and at bargain prices.

When scam products are garden tools or stain removers, hoodwinked consumers may lose a few dollars and some pride. When the products are ineffective, untested, or even hazardous "dietary supplements" or "medical devices," consumers stand to lose the very thing they are seeking: good health. When a sick person wastes time with quack treatments, serious problems can easily advance while proper treatment is delayed.[2] And dietary supplements have inflicted liver failure and other dire outcomes on previously well people who took them in hopes of *improving* their health.

Each year, consumers spend a deluge of dollars on nutrition-related services and products from both legitimate and fraudulent businesses. Each year, nutrition and other health

*Reference notes are found in Appendix F.

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Who is speaking on nutrition?

TABLE C1-1 Quackery and Internet Terms

- **advertorials** lengthy advertisements in newspapers and magazines that read like feature articles but are written for the purpose of touting the virtues of products and may or may not be accurate.
- **anecdotal evidence** information based on interesting and entertaining, but not scientific, personal accounts of events.
- **fraud** or **quackery** the promotion, for financial gain, of devices, treatments, services, plans, or products (including diets and supplements) claimed to improve health, well-being, or appearance without proof of safety or effectiveness. (The word *quackery* comes from the term *quacksalver,* meaning a person who quacks loudly about a miracle product—a lotion or a salve.)
- **infomercials** feature-length television commercials that follow the format of regular programs but are intended to convince viewers to buy products and not to educate or entertain them. The statements made may or may not be accurate.
- **Internet (the Net)** a worldwide network of millions of computers linked together to share information.
- **urban legends** stories, usually false, that may travel rapidly throughout the world via the Internet gaining strength of conviction solely on the basis of repetition.
- **websites** Internet resources composed of text and graphic files, each with a unique URL (Uniform Resource Locator) that names the site (for example, www.usda.gov).
- **World Wide Web** (the Web, commonly abbreviated **www**) a graphical subset of the Internet.

fraud diverts tens of *billions* of consumer dollars from legitimate health care.[3] Consumers with questions or suspicions about fraud can contact the FDA on the Internet at www.FDA.gov or by telephone at (888) INFO-FDA.

How can people learn to distinguish valid nutrition information from misinformation? Some quackery is easy to identify—like the claims of the salesman in Figure C1-1. Other fraudulent nutrition claims are subtle and so more difficult to detect.

Between the extremes of accurate scientific data and intentional quackery lies an abundance of less easily recognized nutrition misinformation.[4†] An instructor at a gym, a physician, a health-store clerk, an author of books, or an advocate for juice machines or weight-loss gadgets may all sincerely believe that the nutrition regimens they recommend are beneficial. But what qualifies them to give advice? Would following their advice be helpful or harmful? To sift the meaningful nutrition information from the rubble, you must first learn to recognize quackery wherever it presents itself.

†*Quackery-related definitions are available from the National Counsel Against Health Fraud, www.ncahf.org/pp/definitions.html.*

IDENTIFYING VALID NUTRITION INFORMATION

Nutrition derives information from scientific research, which has these characteristics:

- Scientists test their ideas by conducting properly designed scientific experiments. They report their methods and procedures in detail so that other scientists can verify the findings through replication.
- Scientists recognize the inadequacy of **anecdotal evidence** or testimonials.
- Scientists who use animals in their research do not apply their findings directly to human beings.
- Scientists may use specific segments of the population in their research. When they do, they are careful not to generalize the findings to all people.
- Scientists report their findings in respected scientific journals. Their work must survive a screening review

FIGURE C1-1 Earmarks of Nutrition Quackery

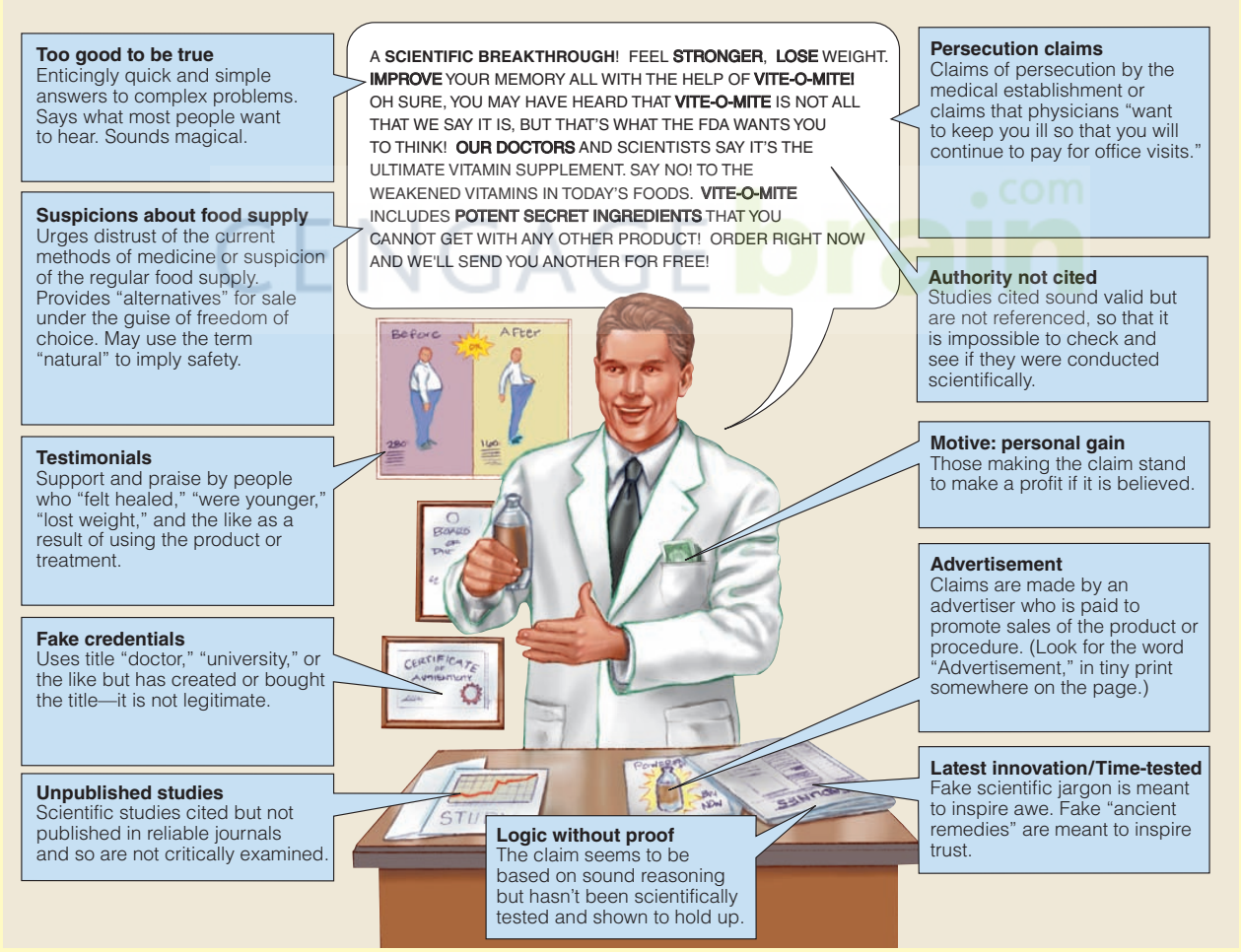

TABLE C1-2 Credible Sources of Nutrition Information

Professional health organizations, government health agencies, volunteer health agencies, and consumer groups provide consumers with reliable health and nutrition information. Credible sources of nutrition information include:

- Professional health organizations, especially the American Dietetic Association's National Center for Nutrition and Dietetics (NCND), www.eatright.org/ncnd.html, also the Society for Nutrition Education, www.sne.org and the American Diabetes Association, www.diabetes.org
- Government health agencies such as the Federal Trade Commission (FTC), www.ftc.gov and the National Institutes of Health Office of Dietary Supplements, www.dietary-supplements.info.nih.gov
- Certain consumer watchdog agencies such as the National Council Against Health Fraud, www.ncahf.org, Stephen Barrett's Quackwatch, www.quackwatch.com, and Snopes.com—Rumor Has It, www.snopes.com
- Reputable consumer groups such as the Better Business Bureau, www.bbb.org, the Consumers Union, www.consumersunion.org and the American Council on Science and Health, www.acsh.org

by their peers before it is accepted for publication.

With each report from scientists, the field of nutrition changes a little—each finding contributes another piece to the whole body of knowledge. Table C1-2 lists some sources of credible nutrition information.

TABLE C1-3 Is This Site Reliable?

To judge whether an Internet site offers reliable nutrition information, answer the following questions.

- **Who is responsible for the site?** Clues can be found in the three-letter "tag" that follows the dot in the site's name. For example, "gov" and "edu" indicate government and university sites, usually reliable sources of information.
- **Do the names and credentials of information providers appear? Is an editorial board identified?** Many legitimate sources provide e-mail addresses or other ways to obtain more information about the site and the information providers behind it.
- **Are links with other reliable information sites provided?** Reputable organizations almost always provide links with other similar sites because they want you to know of other experts in their area of knowledge. Caution is needed when you evaluate a site by its links, however. Anyone, even a quack, can link a webpage to a reputable site without the organization's permission. Doing so may give the quack's site the appearance of legitimacy, just the effect the quack is hoping for.
- **Is the site updated regularly?** Nutrition information changes rapidly, and sites should be updated often.
- **Is the site selling a product or service?** Commercial sites may provide accurate information, but they also may not, and their profit motive increases the risk of bias.
- **Does the site charge a fee to gain access to it?** Many academic and government sites offer the best information, usually for free. Some legitimate sites do charge fees, but before paying up, check the free sites. Chances are good you'll find what you are looking for without paying.
- **Some other credible websites include:**
  - Government agencies
    Department of Agriculture (USDA)
    www.usda.gov
    Department of Health and Human Services (DHHS)
    www.os.dhhs.gov
    Food and Drug Administration (FDA)
    www.fda.gov
    Health Canada
    www.hc-sc.gc.ca/index-eng.php
  - Volunteer health agencies
    American Cancer Society
    www.cancer.org
    American Diabetes Association
    www.diabetes.org
    American Heart Association
    www.americanheart.org
  - Reputable consumer and professional groups:
    American Council on Science and Health
    www.acsh.org
    American Dietetic Association
    www.eatright.org
    American Medical Association
    www.ama-assn.org
    Dietitians of Canada
    www.dietitians.ca
    Federal Citizen Information Center
    www.pueblo.gsa.gov
    International Food Information Council
    www.ific.org
  - Journals
    American Journal of Clinical Nutrition
    www.ajcn.org
    Journal of the American Dietetic Association
    www.adajournal.org
    New England Journal of Medicine
    www.nejm.org
    Nutrition Reviews
    www.ilsi.org

NUTRITION ON THE NET

Got a question? The **World Wide Web** on the **Internet** has an answer. The Internet offers endless opportunities to obtain high-quality information, but it also delivers an abundance of incomplete, misleading, or inaccurate information.[5] Simply put: anyone can publish anything on the Internet. For example, popular self-governed Internet "encyclopedia" **websites** allow anyone to post information or change others' postings on topics.[‡] Information on the sites may be correct, but it may not be—readers must evaluate it for themselves. Table C1-3 provides some clues to judging the reliability of nutrition information websites.

[‡]*An example is Wikipedia.*

Hoaxes and scare stories abound on websites and in e-mails. Be suspicious when:

- The contents were written by someone other than the sender or some authority you know.
- A phrase like "Forward this to everyone you know" appears anywhere in the piece.

- The piece states "This is not a hoax"; chances are, it is.
- The information seems shocking or something that you've never heard from legitimate sources.
- The language is overly emphatic or sprinkled with capitalized words or exclamation marks.
- No references are offered or, if present, are of questionable validity when examined.
- The message has been debunked on websites such as www.quackwatch.com or www.urbanlegends.com.

Of course, these hints alone are insufficient to judge nutrition information from any source. The user must also scrutinize "nutrition experts" who make statements, even when they possess legitimate degrees, as described in the next section.

In contrast, one of the most trustworthy sites for scientific investigation is the National Library of Medicine's PubMed website, which provides free access to over 10 million abstracts (short descriptions) of research papers published in scientific journals around the world. Many abstracts provide links to full articles posted on other sites. The site is easy to use and offers instructions for beginners. Figure C1-2 introduces this resource.

WHO ARE THE TRUE NUTRITION EXPERTS?

Most people turn to their physicians for dietary advice. Physicians are expected to know all about health-related matters. Only about 30 percent of all medical schools in the United States require students to take a comprehensive nutrition course; less than half require the minimum 25 hours of nutrition instruction recommended by the National Academy of Sciences.[6] By comparison, most students reading this text are taking a nutrition class that provides an average of 45 hours of instruction.

The American Dietetic Association

The **American Dietetic Association (ADA),** the professional association of dietitians, asserts that nutrition education should be part of the curriculum for health-care professionals: physicians' assistants, dental hygienists, physical and occupational therapists, social workers, and all others who provide services directly to clients. This plan would bring access to reliable nutrition information to more people.

Physicians who specialized in clinical nutrition in medical school are highly qualified to advise on nutrition. Membership in the American Society for Clinical Nutrition, whose journal is cited many times throughout this text, is another sign of nutrition knowledge. Still, few physicians have the knowledge, time, or experience to develop diet plans and provide detailed diet instruction for clients, and they often refer their clients to nutrition specialists. Table C1-4 lists the best specialists to choose.

Registered Dietitians: The Nutrition Specialists

Fortunately, the credential that indicates a qualified nutrition expert is easy to spot—you can confidently call on a **registered dietitian (RD).** Additionally, some states require that **nutritionists** and **dietitians** obtain a **license to practice.** Meeting state-established criteria in addition to **registration** with the American Dietetic Association certifies that an expert is the genuine article.

RDs are easy to find in most communities because they perform a multitude of duties in a variety of settings. They work in foodservice operations, pharmaceutical companies, sports nutrition programs, corporate wellness programs, the food industry, home health agencies, long-term care institutions, private practice, community and public health settings, cooperative extension offices,[§] research centers, universities and other educational settings, and hospitals, health maintenance organizations (HMOs), and other health-care facilities.

[§]*Cooperative extension agencies are associated with land grant colleges and universities and may be found in the phone book's government listings.*

FIGURE C1-2

PubMed (www.ncbi.nlm.nih.gov/pubmed): Internet Resource for Scientific Nutrition References

The U.S. National Library of Medicine's PubMed website offers tutorials to help teach the beginner to use the search system effectively. Often, simply visiting the site, typing a query in the "Search for" box, and clicking "Search" will yield satisfactory results.

For example, to find research concerning calcium and bone health, typing in "calcium bone" nets almost 3,000 results. To refine the search, try setting limits on dates, types of articles, languages, and other criteria to obtain a more manageable number of abstracts to peruse.

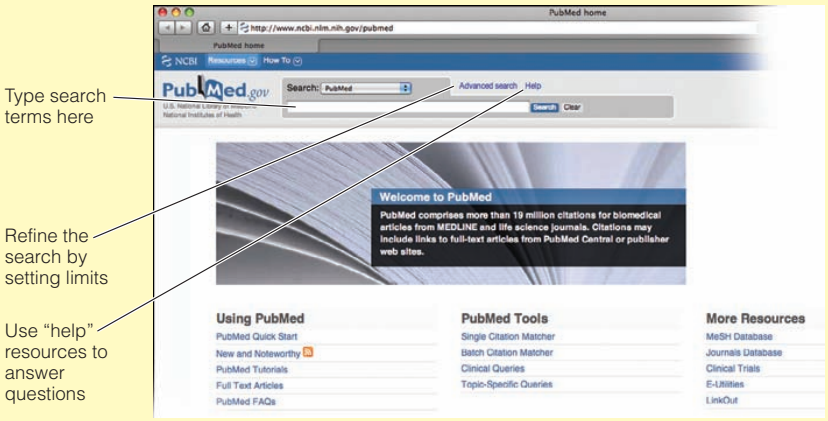

TABLE C1-4 Terms Associated with Nutrition Advice

- **American Dietetic Association (ADA)** the professional organization of dietitians in the United States. The Canadian equivalent is the Dietitians of Canada (DC), which operates similarly.
- **certified diabetes educator (CDE)** a health-care professional who specializes in educating people with diabetes to help them manage their disease through medical and lifestyle means. Extensive training, work experience, and an examination are required to achieve CDE status.
- **dietetic technician** a person who has completed a two-year academic degree from an accredited college or university and an approved dietetic technician program. A **dietetic technician, registered** (DTR) has also passed a national examination and maintains registration through continuing professional education.
- **dietitian** a person trained in nutrition, food science, and diet planning. See also *registered dietitian.*
- **license to practice** permission under state or federal law, granted on meeting specified criteria, to use a certain title (such as *dietitian*) and to offer certain services. Licensed dietitians may use the initials LD after their names.
- **medical nutrition therapy** nutrition services used in the treatment of injury, illness, or other conditions; includes assessment of nutrition status and dietary intake and corrective applications of diet, counseling, and other nutrition services.
- **nutritionist** someone who studies nutrition. Some nutritionists are RDs, whereas others are self-described experts whose training is questionable and who are not qualified to give advice. In states with responsible legislation, the term applies only to people who have master of science (MS) or doctor of philosophy (PhD) degrees from properly accredited institutions.
- **public health nutritionist** a dietitian or other person with an advanced degree in nutrition who specializes in public health nutrition.
- **registered dietitian (RD)** a dietitian who has graduated from a university or college after completing a program of dietetics. The program must be approved or accredited by the American Dietetic Association (or Dietitians of Canada). The dietitian must serve in an approved internship, coordinated program, or preprofessional practice program to practice the necessary skills; pass the five parts of the association's registration examination; and maintain competency through continuing education.[a] Many states also require licensing for practicing dietitians.
- **registration** listing with a professional organization that requires specific course work, experience, and passing of an examination.

[a]The five content areas of the registration examination for dietitians are food and nutrition; clinical and community nutrition; education and research; food and nutrition systems; and management. New emphasis is placed on genetics, cultural competency, complementary care, and reimbursement.

RDs in hospitals have many subspecialties. Administrative dietitians manage the foodservice system; clinical dietitians provide client care and are leaders in disease prevention services (see Table C1-5); and nutrition support team dietitians coordinate nutrition care, such as **medical nutrition therapy,** with the efforts of other health-care professionals.[7] A registered dietitian can become a **certified diabetes educator (CDE),** a specialist who educates people with diabetes about the management of their disease.

In the food industry, dietitians conduct research, develop products, and market services. In government, **public health nutritionists** play key roles in delivering nutrition services to people in the community. A public health nutritionist may plan, coordinate, administer, and evaluate food assistance programs; act as a consultant to other agencies; manage finances; and much more.

In some facilities, a **dietetic technician** assists registered dietitians in both administrative and clinical responsibilities. A dietetic technician has been educated and trained to work under the guidance of a registered dietitian; upon passing a national examination, the technician earns the title **dietetic technician, registered (DTR).**

TABLE C1-5 Selected Responsibilities of a Clinical Dietition

The first six items in this list play essential roles in medical nutrition therapy as part of a medical treatment plan. Dietitians also play leading roles in health promotion and disease prevention.

- Assesses clients' nutrition status.
- Determines clients' nutrient requirements.
- Monitors clients' nutrient intakes.
- Develops, implements, and evaluates clients' medical nutrition therapy.
- Counsels clients to cope with unique diet plans.
- Teaches clients and their families about nutrition and diet plans.
- Provides training for other dietitians, nurses, interns, and dietetics students.
- Serves as liaison between clients and the foodservice department.
- Communicates with physicians, nurses, pharmacists, and other health-care professionals about clients' progress, needs, and treatments.
- Participates in professional activities to enhance knowledge and skill.

DETECTING FAKE CREDENTIALS

In contrast to RDs and other credentialed nutrition professionals, thousands of people possess fake nutrition degrees and claim to be nutrition counselors, nutritionists, or "dietists." These and other such titles may sound meaningful, but most of these people lack the established credentials of the ADA-sanctioned dietitian. If you look closely, you can see signs that their expertise is fake.

Educational Background

Take, for example, a nutrition expert's educational background. The minimum standards of education for a dietitian specify a bachelor of science (BS) degree in food science and human nutrition (or related fields) from an **accredited**

TABLE C1-6 Terms Describing Institutions of Higher Learning, Legitimate and Fradulent

- **accredited** approved; in the case of medical centers or universities, certified by an agency recognized by the U.S. Department of Education.
- **diploma mill** an organization that awards meaningless degrees without requiring its students to meet educational standards.

college or university (Table C1-6 defines this term). Such a degree generally requires four to five years of study.

In contrast, a fake nutrition expert may display a degree from a six-month course of study; such a degree is simply not the same. In some cases, schools posing as legitimate institutions are actually **diploma mills**—fraudulent businesses that sell certificates of competency to anyone who pays the fees, from under a thousand dollars for a bachelor's degree to several thousand for a doctorate. To obtain these "degrees," a candidate need not read any books or pass any examinations, and the only written work is a signature on a check.

Accreditation and Licensure

Lack of proper accreditation is the identifying sign of a fake educational institution. To guard educational quality, an accrediting agency recognized by the U.S. Department of Education certifies that certain schools meet the criteria defining a complete and accurate schooling, but in the case of nutrition, quack accrediting agencies cloud the picture. Fake nutrition degrees are available from schools "accredited" by more than 30 phony accrediting agencies.**

***To find out whether an online school is accredited, write the Distance Education and Training Council, Accrediting Commission, 1601 Eighteenth Street, NW, Washington, D.C. 20009; call (202) 234-5100; or visit their website (www.detc.org).*

To find out whether a school is properly accredited for a dietetics degree, write the American Dietetic Association, Division of Education and Research, 120 South Riverside Plaza, Suite 2000, Chicago, Illinois 60606-6995, phone: 800/877-1600; or visit their website (www.eatright.org/caade).

The American Council on Education publishes a directory of accredited institutions, professionally accredited programs, and candidates for accreditation in Accredited Institutions of Postsecondary Education Programs *(available at many libraries). For additional information, write the American Council on Education, One Dupont Circle NW, Suite 800, Washington, D.C. 20036; call (202) 939-9382; or visit their website (www.acenet.edu).*

State laws do not necessarily help consumers distinguish experts from fakes; some states allow anyone to use the title *dietitian* or *nutritionist.* But other states have responded to the need by allowing only RDs or people with certain graduate degrees and state licenses to call themselves dietitians. Licensing provides a way to identify people who have met minimum standards of education and experience.

A Failed Attempt to Fail

To dramatize the ease with which anyone can obtain a fake nutrition degree, for $82 one writer enrolled in a nutrition diploma mill that billed itself as a correspondence school. She made every attempt to fail, intentionally answering all the examination questions incorrectly. Even so, she received a "nutritionist" certificate at the end of the course, together with a letter from the "school" officials explaining that they were sure she must have misread the test.

Would You Trust a Nutritionist Who Eats Dog Food?

In a similar stunt, Mr. Eddie Diekman was named a "professional member" of an association of nutrition "experts." For his efforts, Eddie received a diploma suitable for framing and displaying. Eddie is a cocker spaniel. His owner, Connie B. Diekman, then president of the American Dietetic Association, paid Eddie's tuition to prove that he could be awarded the title "nutritionist" merely by sending in his name.††

Staying Ahead of the Scammers

In summary, to stay one step ahead of the nutrition quacks, check a provider's qualifications. First look for the degrees and credentials listed after the person's name (such as MD, RD, MS, PhD, or LD). Next find out what you can about the reputations of the institutions that awarded the degrees. Then call your state's health-licensing agency and ask if dietitians are licensed in your state. If they are, find out whether the person giving you dietary advice has a license—and if not, find someone better qualified. Your health is your most precious asset, and protecting it is well worth the time and effort it takes to do so.

††The stunt described was patterned after that of the late Victor Herbert, whose cat Charlie and poodle Sassafras were also awarded nutritionist credentials by mail.

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Eddie displays his professional credentials.

APPENDIX F

Notes

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Chapter 11

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APPENDIX G

Answers to Self Check Questions

CHAPTER 1

1. a
2. a
3. c
4. b
5. b
6. b
7. False. Heart disease and cancer are influenced by many factors with genetics and diet among them.
8. True
9. False. The choice of where, as well as what, to eat is often based more on social considerations than on nutrition judgments.
10. True

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