

Identify Nutrition Concepts



Overview and Objectives

A certified dietary manager needs to select and recommend foods according to established nutrition principles. In addition, a Certified Dietary Manager needs to be able to apply guides and tools to assess nutritional adequacy. After completing this chapter, you should be able to:

- ✓ Discuss the importance of good nutrition
- ✓ Select types of carbohydrate
- ✓ Select types of lipids
- ✓ Explore health effects of protein
- ✓ Distinguish between vitamins and minerals
- ✓ Identify the role of water as a nutrient
- ✓ Define phytochemicals and functional foods
- ✓ Select the best food sources of specific vitamins and minerals
- ✓ Calculate daily fluid requirement
- ✓ Differentiate between different food guides
- ✓ Analyze own intake for the leader nutrients

This chapter helps you look at the total diet. The total diet is about consuming food. The Dietary Guidelines Advisory Committee (DGAC) defines “total diet” as “the combination of foods and beverages that provide energy and nutrients and constitute an individual’s complete dietary intake, on average, over time. This encompasses various foods and food groups, their recommended amounts and frequency, and the resulting eating pattern.” With so many foods from which to choose, what is the best combination of nutrients while consuming food?

Sound nutrition advice combined with food consumption advice is available from both government and private agencies. We will look at several in this chapter.

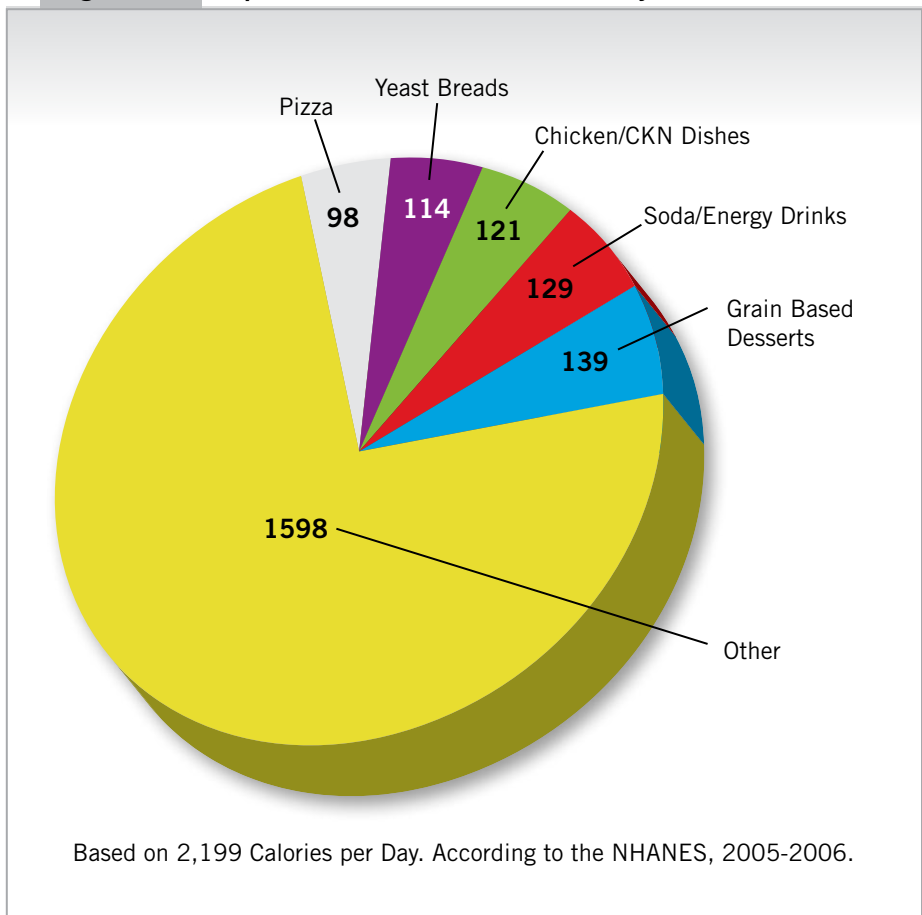
- ✓ Dietary Guidelines
- ✓ MyPyramid
- ✓ USDA Food Plans
- ✓ Healthy People Campaign
- ✓ Dietary Reference Intakes (DRIs)

Health Concerns

Early nutrition scientists focused on identifying essential nutrients. A few decades ago, nutrition advice centered on encouraging intake of certain foods to prevent deficiencies and enhance growth. Today, however, nutrition scientists devote a great deal of research to an opposite problem: nutritional excess and imbalance. The Surgeon General's Report on Nutrition and Health in 1988 became a kind of turning point for nutritional planning. The report concluded that over-consumption of certain nutrients—not deficiency—should be our chief nutritional concern. Generally, the over-consumed nutrients are macronutrients. Some studies of over-consumption focus on fats and types of fats, as well as overall caloric intake.

The American government tracks what we eat, the nutritional content, and the related health concerns. Two such surveys were combined in 2002 to become What We Eat in America (WWEIA), NHANES. These two agencies conducted national food surveys: USDA's Continuing Survey of Food Intakes by Individuals (CSFII) and HHS' NHANES (National Health and Nutrition Examination Survey). The most recent data release was 2005-2006 and Figure 2.1 shows the top food sources of calories.

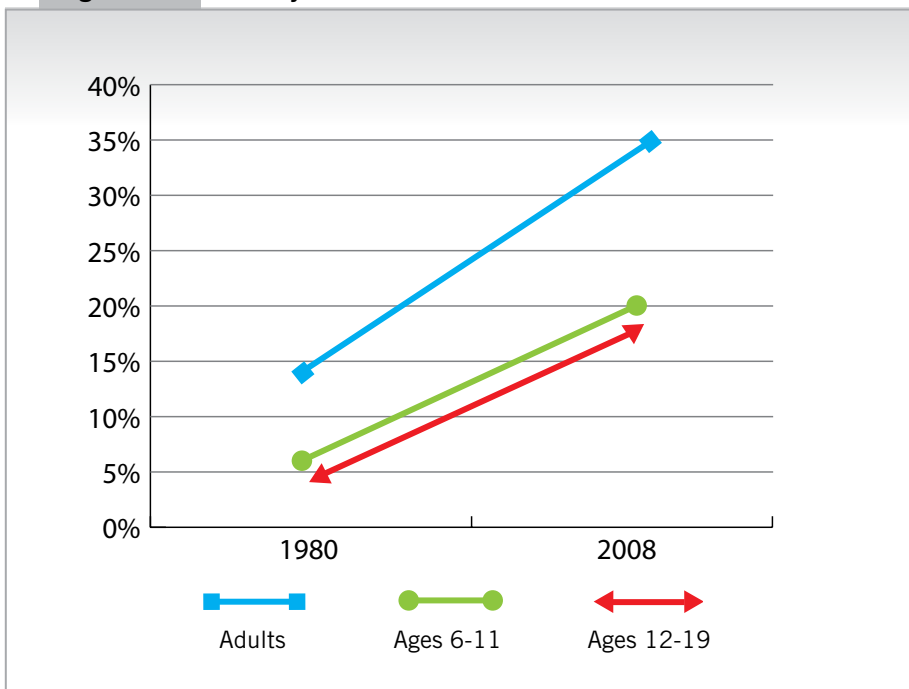
Figure 2.1 Top Food Sources of Calories Per Day for Adults



Specifically, the survey found that Americans eat too many calories and too much solid fats, added sugars, refined grains, and sodium. Americans also eat too little dietary fiber, vitamin D, calcium, potassium, and unsaturated fatty acids (specifically omega-3s), and other important nutrients that are mostly found in vegetables, fruits, whole grains, low-fat milk and milk products, and seafood.

Obesity is a major public health challenge, not only in the United States, but world-wide. According to the Surgeon General's Report in 2010, "obesity contributes to an estimated 112,000 preventable deaths in the U.S. annually." Figure 2.2 shows the obesity trends over the past 30 years and illustrates that the trend is a concern not just for adults but also young children and teens. Because of the dramatic increase in childhood obesity, the White House convened a Task Force on Childhood Obesity (including 12 federal agencies) in 2010 in order to make recommendations to address childhood obesity.

Figure 2.2 Obesity Trends Over the Past 30 Years



Source: CDC, Surgeon General

Being overweight is measured through **body mass index (BMI)**. BMI is used to express weight adjusted for height. BMI is calculated as weight in kilograms divided by height in meters squared. There are many charts available where one can just enter height in inches and weight in pounds to pinpoint BMI. **Overweight** is defined as being at a BMI of 25-29.9. **Obesity** is defined as being at a BMI of 30 or greater.

According to the Dietary Guidelines Advisory Committee report on Energy Balance and Weight Management, 2010, the conditions listed in Figure 2.3 are health risks associated with overweight and obesity and with a sedentary life style. Note the health risks that are the same.

Glossary

Body Mass Index (BMI)

A method of determining degree of overweight that takes into consideration both weight and height

Overweight

Having a body mass index of 25 to 29.9

Obesity

Having a body mass index (BMI) of 30 or greater

Figure 2.3 Health Risks Associated with Overweight, Obesity, and Sedentary Life Style

Overweight and Obesity Health Risks	Sedentary Life Style Health Risks
<ul style="list-style-type: none"> • Type 2 Diabetes (T2D) • Hypertension • Cardiovascular Disease (CVD) • Stroke • Certain Kinds of Cancer • Osteoarthritis • Gall Bladder Disease • Sleep Apnea • Dyslipidemia 	<ul style="list-style-type: none"> • Type 2 Diabetes (T2D) • Hypertension • Coronary Artery Disease • Stroke • Certain Kinds of Cancer • Osteoporosis • Depression • Decreased Health-Related Quality of Life • Overweight and Obesity • Decreased Overall Fitness

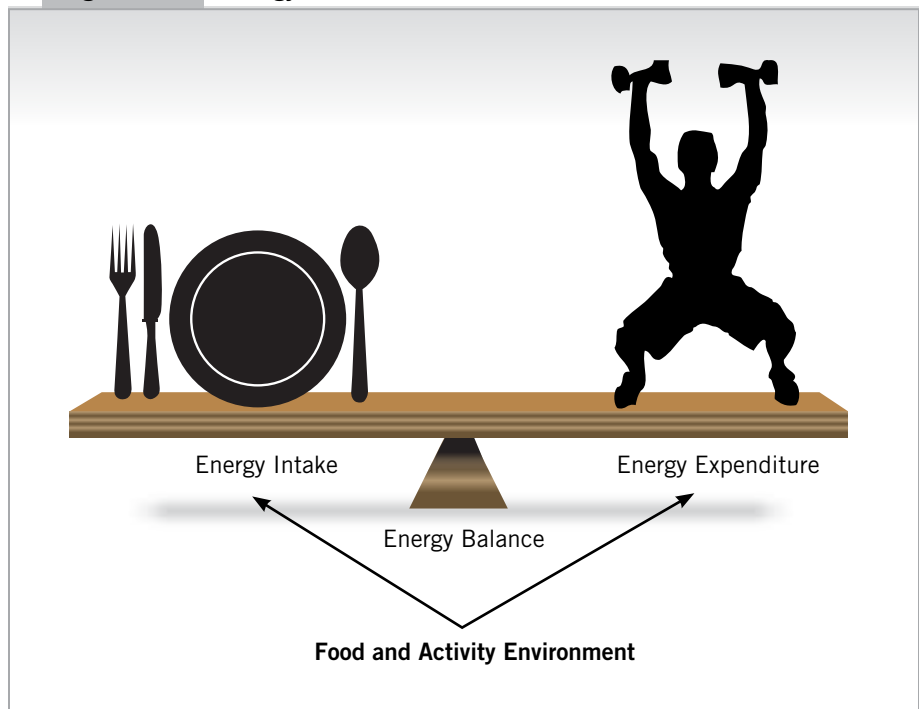
Note that some of the health risks are the same in both categories.

Obesity is influenced by many factors. For each individual, body weight is the result of a combination of genetic, metabolic, behavioral, environmental, cultural, and socioeconomic influences. However, based on a growing amount of evidence provided by the Dietary Guidelines Advisory Committee, there are two factors that have a significant impact on the obesity epidemic:

- ✓ The food environment
- ✓ Amount of physical activity

The food environment is associated with a lower intake of fruits and vegetables and an increased body weight. Food environment includes the distance from a supermarket that offers a large variety of fruits and vegetables and the density

Figure 2.4 Energy Balance



Putting It Into Practice: 1

If a client had a BMI of 25.5, how would they be classified?

(Check your answer at the end of this chapter)

of fast food restaurants in the area where you live. “The strongest documented relationship between fast food and obesity is when one or more fast-food meals are consumed per week.” There is also a direct relationship between portion size and body weight. An important addition in the discussion on food environment is the amount of screen time (amount of time spent watching TV, the computer, or video games) for both adults and children. “The strongest association with overweight and obesity is with television screen time.”

There is solid evidence to indicate that we consume too many calories in comparison to the current level of physical activity. While food alone does not cause, cure, or control obesity, weight control is a nutritional issue. When we consume more than we use, we gain weight. Exercise is very important in managing weight and preventing disease. Exercising regularly helps a person:

- ✓ Achieve a healthy balance of energy consumed and energy used (see Figure 2.4)
- ✓ Prevent heart disease by strengthening the heart and cardiovascular system
- ✓ Reduce the risk of developing breast cancer, colon cancer, and other forms of cancer through weight control

It is obvious from the information above that we need both dietary goals and physical activity goals to maintain energy balance. Figure 2.5 provides physical activity goals and facts on inactivity.

Dietary Guidelines

How can we manage our food environment with so many foods from which to choose? How can we evaluate our diet, plan adequate menus or advise others about how to choose health-promoting foods? The Center for Nutrition Policy and Promotion, an organization of the U.S. Department of Agriculture, was established in 1994 to improve the nutrition and well-being of Americans. The Center focuses its efforts on two primary objectives:

1. Advance and promote dietary guidance for all Americans, and
2. Conduct applied research and analyses in nutrition and consumer economics

Figure 2.5 Physical Activity Goals and Facts on Inactivity

Physical Activity and Inactivity

- It is recommended that Americans accumulate at least 30 minutes (adults) or 60 minutes (children) of moderate physical activity most days of the week. More may be needed to prevent weight gain, to lose weight, or to maintain weight loss.
- Less than $\frac{1}{3}$ of adults engage in the recommended amounts of physical activity.
- Many people live sedentary lives; in fact, 40 percent of adults in the United States do not participate in any leisure time physical activity.
- 43 percent of adolescents watch more than 2 hours of television each day.
- Physical activity is extremely helpful in maintaining weight loss, especially when combined with healthy eating.

Source: US Surgeon General, American Cancer Society

The Center produces six core products to support its objectives; those starred below will be addressed in this chapter.

- ✓ Dietary Guidelines for Americans*
- ✓ **MyPyramid** Food Guidance System*
- ✓ Healthy Eating Index
- ✓ U.S. Food Plans*
- ✓ Nutrient Content of the U.S. Food Supply
- ✓ Expenditures on Children by Families

Dietary Guidelines for Americans

The **Dietary Guidelines** for Americans 2010 supports a total diet approach to achieving dietary goals. They are issued jointly by the U.S. Department of Agriculture (USDA) and the U.S. Department of Health and Human Services (DHHS). According to the USDA, “The Guidelines provide authoritative advice for people two years and older about how good dietary habits can promote health and reduce risk for major chronic diseases. They serve as the basis for federal food and nutrition education programs.”

The Guidelines are intended to “summarize and synthesize knowledge regarding individual nutrients and food recommendations into a pattern of eating that can be adopted by the public,” says the USDA. They are updated every five years based on new scientific information.

Dietary Guidelines 2010 list recommendations under nine groups. Each group contains a series of key recommendations, including some for specific population groups. See Figure 2.6.

With the 2010 Dietary Guidelines, Americans are being urged to “achieve their recommended nutrient intakes by consuming foods within a total diet that meets but does not exceed energy needs.” This begins with Americans being aware of what and how much they consume every day while self monitoring their physical activity levels. It is important to remember that beverages count in our calorie intake. This is especially true today with the dramatic increase in sport and juice drinks. Portion control plays a very important part in managing our total diet. Excessive portions are common today in restaurants.

The 2010 Dietary Guidelines focus specifically on reducing calories from **solid fats** and **added sugars**, called **SoFAS**. SoFAS represent about 35 percent of our daily calorie intake and are responsible for our increased saturated fat and cholesterol intakes. See Figure 2.7 for examples of SoFAs that represent major food sources in today’s diets.

It is important to remember that these are guidelines and that putting the guidelines into practice is the responsibility of each person. Three of the core products produced by the USDA’s Center for Nutrition Policy and Promotion provide Americans with specific eating patterns that incorporate current research.

Glossary

Dietary Guidelines

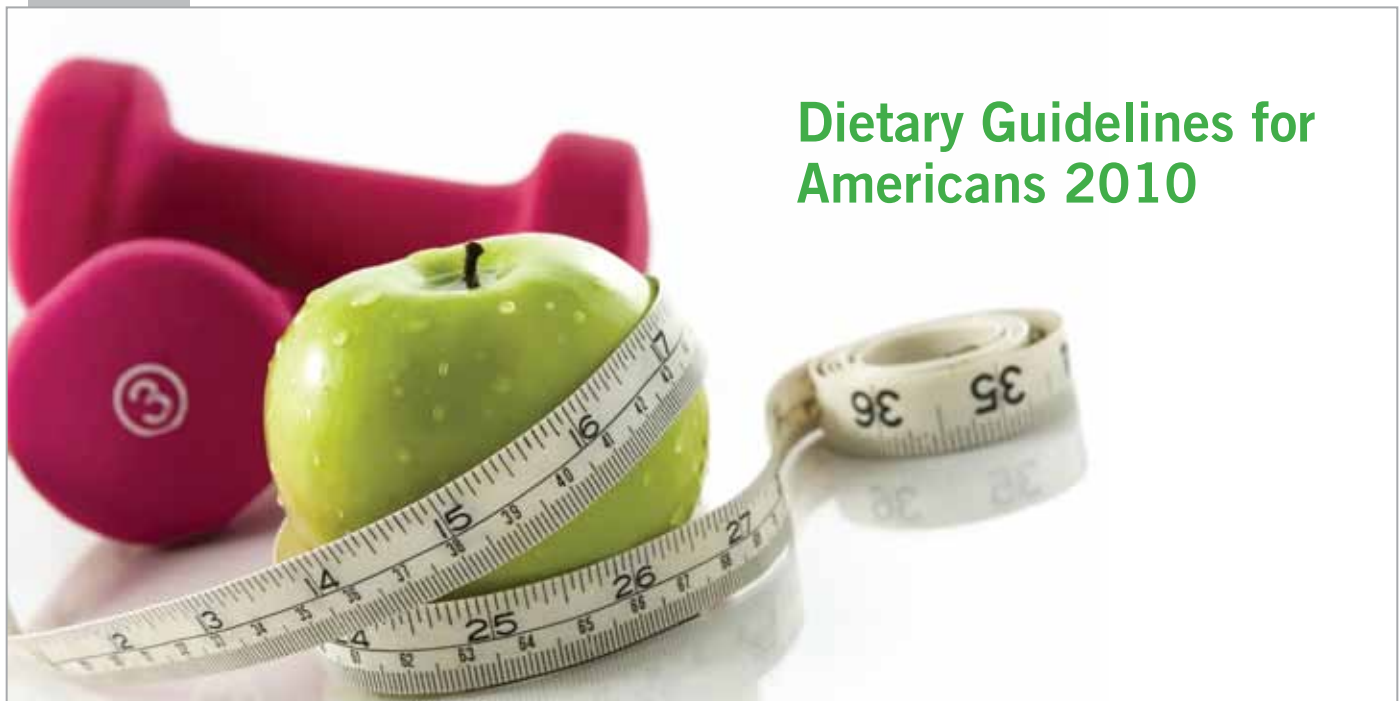
Guidelines issued jointly by the U.S. Department of Agriculture (USDA) and the U.S. Department of Health and Human Services (DHHS) to provide advice, promote health, and reduce risk for major chronic diseases

SoFAS

A new term in the 2010 Dietary Guidelines that refers to **solid fats** and **added sugars**

MyPyramid

Also developed by the USDA and DHHS provides a personalized plan about how to eat and apply the Dietary Guidelines

Figure 2.6 Dietary Guidelines for Americans 2010

Dietary Guidelines for Americans 2010

Executive Summary

Eating and physical activity patterns that are focused on consuming fewer calories, making informed food choices, and being physically active can help people attain and maintain a healthy weight, reduce their risk of chronic disease, and promote overall health.

The *Dietary Guidelines for Americans, 2010* exemplifies these strategies through recommendations that accommodate the food preferences, cultural traditions, and customs of the many and diverse groups who live in the United States.

By law (Public Law 101-445, Title III, 7 U.S.C. 5301 et seq.), *Dietary Guidelines for Americans* is reviewed, updated if necessary, and published every 5 years. The U.S. Department of Agriculture (USDA) and the U.S. Department of Health and Human Services (HHS) jointly create each edition. *Dietary Guidelines for Americans, 2010* is based on the Report of the *Dietary Guidelines Advisory Committee* on the *Dietary Guidelines for Americans, 2010* and consideration of Federal agency and public comments.

Dietary Guidelines recommendations traditionally have been intended for healthy Americans ages 2 years and older. However, *Dietary Guidelines for Americans, 2010* is being released at a time of rising concern about the health of the American population. Poor diet and physical inactivity are the most important factors contributing to an epidemic of overweight and obesity affecting men, women, and children in all segments of our society. Even in the absence of overweight,

poor diet and physical inactivity are associated with major causes of morbidity and mortality in the United States. Therefore, the *Dietary Guidelines for Americans, 2010* is intended for Americans ages 2 years and older, including those at increased risk of chronic disease.

Dietary Guidelines for Americans, 2010 also recognizes that in recent years nearly 15 percent of American households have been unable to acquire adequate food to meet their needs.¹ This dietary guidance can help them maximize the nutritional content of their meals. Many other Americans consume less than optimal intake of certain nutrients even though they have adequate resources for a healthy diet. This dietary guidance and nutrition information can help them choose a healthy, nutritionally adequate diet.

The intent of the Dietary Guidelines is to summarize and synthesize knowledge about individual nutrients and food components into an interrelated set of recommendations for healthy eating that can be adopted by the public. Taken together, the Dietary Guidelines recommendations encompass two overarching concepts:

(Continued...)

Figure 2.6 Dietary Guidelines for Americans 2010 (Continued)

- **Maintain calorie balance over time to achieve and sustain a healthy weight.** People who are most successful at achieving and maintaining a healthy weight do so through continued attention to consuming only enough calories from foods and beverages to meet their needs and by being physically active. To curb the obesity epidemic and improve their health, many Americans must decrease the calories they consume and increase the calories they expend through physical activity.
- **Focus on consuming nutrient-dense foods and beverages.** Americans currently consume too much sodium and too many calories from solid fats, added sugars, and refined grains.² These replace nutrient-dense foods and beverages and make it difficult for people to achieve recommended nutrient intake while controlling calorie and sodium intake. A healthy eating pattern limits intake of sodium, solid fats, added sugars, and refined grains and emphasizes nutrient-dense foods and beverages—vegetables, fruits, whole grains, fat-free or low-fat milk and milk products,³ seafood, lean meats and poultry, eggs, beans and peas, and nuts and seeds.

A basic premise of the Dietary Guidelines is that nutrient needs should be met primarily through consuming foods. In certain cases, fortified foods and dietary supplements may be useful in providing one or more nutrients that otherwise might be consumed in less than recommended amounts. Two eating patterns that embody the Dietary Guidelines are the USDA Food Patterns and their vegetarian adaptations and the DASH (Dietary Approaches to Stop Hypertension) Eating Plan.

A healthy eating pattern needs not only to promote health and help to decrease the risk of chronic diseases, but it also should prevent foodborne illness. Four basic food safety principles (Clean, Separate, Cook, and Chill) work together to reduce the risk of foodborne illnesses. In addition, some foods (such as milks, cheeses, and juices that have not been pasteurized, and undercooked animal foods) pose high risk for foodborne illness and should be avoided.

The information in the *Dietary Guidelines for Americans* is used in developing educational materials and aiding policy-makers in designing and carrying out nutrition-related programs, including Federal food, nutrition education, and information programs. In addition, the *Dietary Guidelines for Americans* has the potential to offer authoritative statements as provided for in the Food and Drug Administration Modernization Act (FDAMA).

The following are the *Dietary Guidelines for Americans, 2010* Key Recommendations, listed by the chapter in which they are discussed in detail. These Key Recommendations are the most important in terms of their implications for improving public health.⁴ To get the full benefit, individuals should carry out the Dietary Guidelines recommendations in their entirety as part of an overall healthy eating pattern.

(Continued...)



Figure 2.6 Dietary Guidelines for Americans 2010 (Continued)

Key Recommendations

Balancing Calories to Manage Weight

- Prevent and/or reduce overweight and obesity through improved eating and physical activity behaviors.
- Control total calorie intake to manage body weight. For people who are overweight or obese, this will mean consuming fewer calories from foods and beverages.
- Increase physical activity and reduce time spent in sedentary behaviors.
- Maintain appropriate calorie balance during each stage of life—childhood, adolescence, adulthood, pregnancy and breastfeeding, and older age.

Food and Food Components to Reduce

- Reduce daily sodium intake to less than 2,300 milligrams (mg) and further reduce intake to 1,500 mg among persons who are 51 and older and those of any age who are African American or have hypertension, diabetes, or chronic kidney disease. The 1,500 mg recommendation applies to about half of the U.S. population, including children, and the majority of adults.
- Consume less than 10 percent of calories from saturated fatty acids by replacing them with monounsaturated and polyunsaturated fatty acids.
- Consume less than 300 mg per day of dietary cholesterol.

- Keep trans fatty acid consumption as low as possible by limiting foods that contain synthetic sources of trans fats, such as partially hydrogenated oils, and by limiting other solid fats.
- Reduce the intake of calories from solid fats and added sugars.
- Limit the consumption of foods that contain refined grains, especially refined grain foods that contain solid fats, added sugars, and sodium.
- If alcohol is consumed, it should be consumed in moderation—up to one drink per day for women and two drinks per day for men—and only by adults of legal drinking age.⁵

Foods and Nutrients to Increase

Individuals should meet the following recommendations as part of a healthy eating pattern while staying within their calorie needs.

- Increase vegetable and fruit intake.
- Eat a variety of vegetables, especially dark-green and red and orange vegetables and beans and peas.
- Consume at least half of all grains as whole grains. Increase whole-grain intake by replacing refined grains with whole grains.
- Increase intake of fat-free or low-fat milk and milk products, such as milk, yogurt, cheese, or fortified soy beverages.⁶
- Choose a variety of protein foods, which include seafood, lean meat and poultry, eggs, beans and peas, soy products, and unsalted nuts and seeds.
- Increase the amount and variety of seafood consumed by choosing seafood in place of some meat and poultry.

(Continued)



Figure 2.6 Dietary Guidelines for Americans 2010 (Continued)

- Replace protein foods that are higher in solid fats with choices that are lower in solid fats and calories and/or are sources of oils.
- Use oils to replace solid fats where possible.
- Choose foods that provide more potassium, dietary fiber, calcium, and vitamin D, which are nutrients of concern in American diets. These foods include vegetables, fruits, whole grains, and milk and milk products.

Recommendations for Specific Population Groups

Women capable of becoming pregnant⁷

- Choose foods that supply heme iron, which is more readily absorbed by the body, additional iron sources, and enhancers of iron absorption such as vitamin C-rich foods.
- Consume 400 micrograms (mcg) per day of synthetic folic acid (from fortified foods and/or supplements) in addition to food forms of folate from a varied diet.⁸

Women who are pregnant or breastfeeding⁷

- Consume 8 to 12 ounces of seafood per week from a variety of seafood types.
- Due to their high methyl mercury content, limit white (albacore) tuna to 6 ounces per week and do not eat the following four types of fish: tilefish, shark, swordfish, and king mackerel.
- If pregnant, take an iron supplement, as recommended by an obstetrician or other health care provider.

Individuals ages 50 years and older

- Consume foods fortified with vitamin B12, such as fortified cereals, or dietary supplements.

Building Healthy Eating Patterns

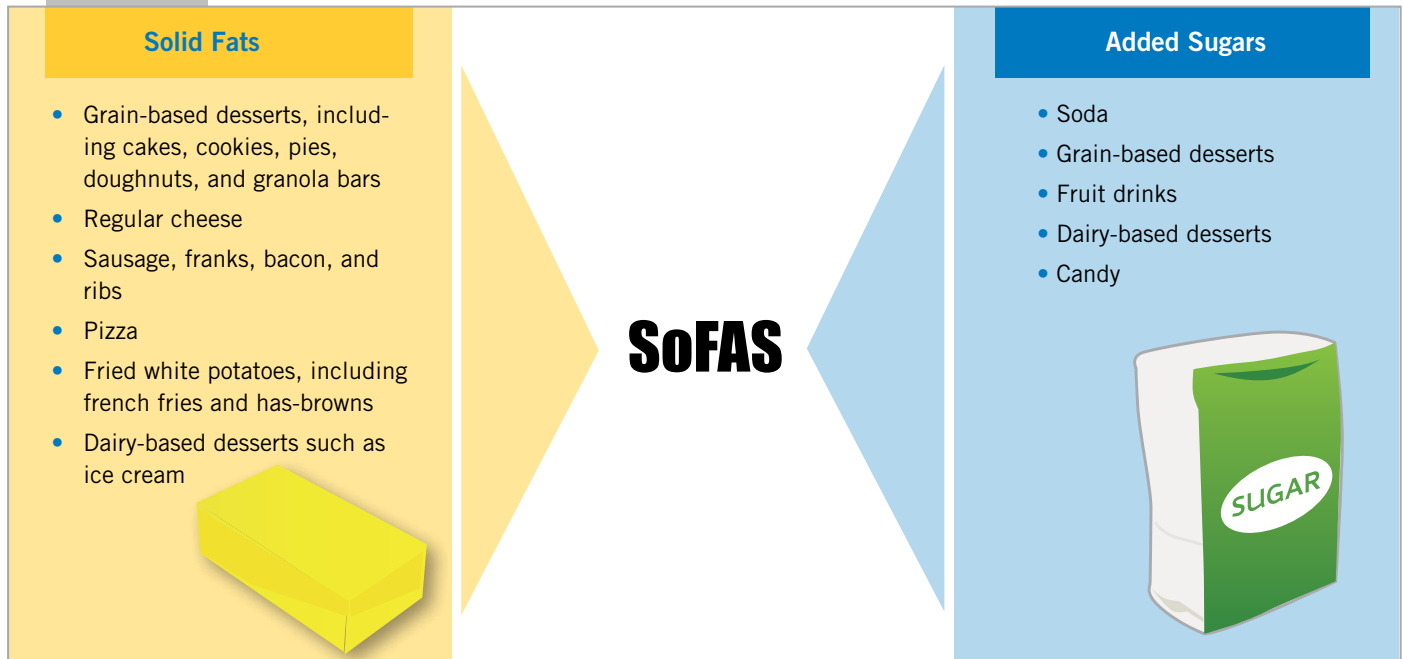
- Select an eating pattern that meets nutrient needs over time at an appropriate calorie level.
- Account for all foods and beverages consumed and assess how they fit within a total healthy eating pattern.
- Follow food safety recommendations when preparing and eating foods to reduce the risk of foodborne illnesses.

Footnotes

1. Nord M, Coleman-Jensen A, Andrews M, Carlson S. Household food security in the United States, 2009. Washington (DC): U.S. Department of Agriculture, Economic Research Service. 2010 Nov. Economic Research Report No. ERR-108. Available from <http://www.ers.usda.gov/publications/err108>.
2. Added sugars: Caloric sweeteners that are added to foods during processing, preparation, or consumed separately. Solid fats: Fats with a high content of saturated and/or trans fatty acids, which are usually solid at room temperature. Refined grains: Grains and grain products missing the bran, germ, and/or endosperm; any grain product that is not a whole grain.
3. Milk and milk products also can be referred to as dairy products.
4. Information on the type and strength of evidence supporting the Dietary Guidelines recommendations can be found at <http://www.nutritionevidencelibrary.gov>.
5. See Chapter 3, Foods and Food Components to Reduce, for additional recommendations on alcohol consumption and specific population groups. There are many circumstances when people should not drink alcohol.
6. Fortified soy beverages have been marketed as “soymilk,” a product name consumers could see in supermarkets and consumer materials. However, FDA’s regulations do not contain provisions for the use of the term soymilk. Therefore, in this document, the term “fortified soy beverage” includes products that may be marketed as soymilk.
7. Includes adolescent girls.
8. “Folic acid” is the synthetic form of the nutrient; whereas, “folate” is the form found naturally in foods.



Source: Diet Instructions. Becky Dornier & Associates, Inc. Used with permission.

Figure 2.7 Examples of Solid Fats and Added Sugars in Current American Diets

Eating Plans

An eating plan or eating pattern is designed to integrate dietary recommendations and current research into a healthy way to eat for most individuals. These eating patterns are not weight loss diets, but rather illustrative examples of how to eat in accordance with the Dietary Guidelines. Three eating plans based on the Dietary Guidelines are:

- ✓ MyPyramid /Choose MyPlate
- ✓ DASH diet (covered in Chapter 5)
- ✓ USDA Food Patterns

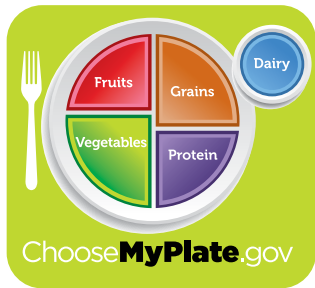
MyPyramid

The myPyramid plan, developed by the USDA and the Department of Health and Human Services, provides practical guidance about how to eat. It offers a pattern for making dietary choices, based on sound nutrition. It is not designed as a therapeutic diet to address specific health conditions. However, for the general healthy public over the age of two, it represents solid “basic nutrition” advice that can help individuals choose foods that will contribute to health, balance calorie intake with physical activity, and consume nutrient-dense foods.

The myPyramid plan is presented as “a personalized plan” because it is scalable across a range of target calorie levels. How many calories does a person need? This depends on age, sex, and level of physical activity.

The myPyramid Website at www.myPyramid.gov has an interactive page that takes into account your age, sex, height, weight, and how much physical activity you usually do. This will help you design your own personal eating plan or pattern.





Serving Sizes from MyPyramid

Grains	= 1 oz.*
Veggies	= 1 cup, 2 cup leafy greens
Fruits	= 1 cup, ½ cup dried
Milk	= 1 cup, 1½ oz. cheese
Meat	= 1 oz., 1 egg, 1 Tbsp. peanut butter, ¼ cup dry beans
Oils	= 1 tsp.

* In the 2011 Choose MyPlate campaign, half of your grains should be whole grains.



Putting It Into Practice: 2

In the menu below, what would the sources of SoFAS be?

- Tomato soup
- Grilled cheese sandwiches on white bread
- Pickle slices
- Birthday cake

(Check your answer at the end of this chapter)

Ten Tips—Choose MyPlate

The Choose MyPlate plan illustrates ten recommendation/categories as follows:

1. **Balance Calories**—Find out how many calories YOU need for a day as a first step in managing your weight. Go to www.ChooseMyPlate.gov to find your calorie level. Being physically active also helps you balance calories.
2. **Enjoy Your Food, But Eat Less**—Take the time to fully enjoy your food as you eat it. Eating too fast or when your attention is elsewhere may lead to eating too many calories. Pay attention to hunger and fullness cues before, during, and after meals. Use them to recognize when to eat and when you've had enough.
3. **Avoid Oversized Meals**—Use a smaller plate, bowl, and glass. Portion out foods before you eat. When eating out, choose a smaller size option, share a dish, or take home part of your meal.
4. **Foods to Eat More Often**—Eat more vegetables, fruits, whole grains, and fat-free or 1% milk and dairy products. These foods have the nutrients you need for health—including potassium, calcium, vitamin D and fiber. Make them the basis for meals and snacks.
5. **Make Half Your Plate Fruits and Vegetables**—Choose red, orange, and dark-green vegetables like tomatoes, sweet potatoes and broccoli, along with other vegetables for your meals. Add fruit to meals as part of main or side dishes or as dessert.
6. **Switch to Fat-Free or Low-Fat (1%) Milk**—They have the same amount of calcium and other essential nutrients as whole milk, but fewer calories and less saturated fat.
7. **Make Half Your Grains Whole Grains**—To eat more whole grains, substitute a whole-grain product for a refined product—such as eating whole wheat bread instead of white bread or brown rice instead of white rice.
8. **Foods to eat Less Often**—Cut back on foods high in solid fats, added sugars, and salt. They include cakes, cookies, ice cream, candies, sweetened drinks, pizza, and fatty meats like ribs, sausages, bacon and hot dogs. Use these foods as occasional treats, not everyday foods.
9. **Compare Sodium in Foods**—Use the Nutrition Facts label to choose lower sodium versions of foods like soup, bread and frozen meals. Select canned foods labeled “low sodium,” “reduced sodium,” or “no salt added.”
10. **Drink Water Instead of Sugary Drinks**—Cut calories by drinking water or unsweetened beverages. Soda, energy drinks, and sports drinks are a major source of added sugar and calories in American diets.

Now take a look at Figure 2.8, which shows how many servings from each food group are recommended at several different calorie levels. The Choose MyPlate website at www.choosemyplate.gov lists intake patterns for additional calorie levels.

Figure 2.8 Sample myPyramid Servings at Three Calorie Levels

Calorie Level	Fruits	Vegetables	Grains	Meat & Beans	Milk	Oils	Discretionary Calories
1600	1.5 cups	2 cups	5 oz-eq	5 oz-eq	3 cups	5 tsp.	132
2200	2 cups	3 cups	7 oz-eq	6 oz-eq	3 cups	6 tsp.	290
2800	2.5 cups	3.5 cups	10 oz-eq	7 oz-eq	3 cups	8 tsp.	426

Source: USDA and DHHS

Servings and Portions

What is a serving? A serving is a measurement used for keeping track of amounts of food designated in an eating plan. This is different from a portion. A portion is the total amount of food served or consumed at any point in time. A portion can be larger (or smaller) than a serving. For example, consider the Choose MyPlate guide for a person targeting 2,200 calories per day. The suggested intake from the Grains group is 7 servings. To meet that total, a person may choose many different combinations and amounts of grains foods, such as:

- ✓ 1 cup of ready-to-eat whole-grain cereal at breakfast (1 serving), plus
- ✓ 2 slices of rye bread at lunch in a sandwich (2 servings), plus
- ✓ Several crackers (1 serving) for a snack, plus
- ✓ 1½ cups of rice or pasta at dinner (3 servings)

This would provide a total of seven servings from this group for a day.

For mixed foods, you can estimate food groups of the main ingredients. For example, a generous serving of pizza would count in the Grains group (crust), the Milk group (cheese), and the Vegetable group (tomato). A serving of beef stew would count in the Meats and Beans group and the Vegetable group. Figure 2.9 provides examples of counting mixed dishes in the Choose MyPlate plan.

A food pyramid approach provides a simple tool that is readily understood. Most people can select their own food choices from within each food group and make personal dietary choices that contribute to good health. The pyramid image is easy to conceptualize and makes a good educational tool as well. Note that myPyramid, like other food guides, is not absolute. As you will learn in later chapters, an individual's nutritional needs vary throughout the stages of life. In addition, medical conditions can affect what constitute "ideal" dietary choices for any individual. In later chapters, you will learn more about how diets may need to be modified for certain disease states.

USDA Food Pattern

The USDA Food Pattern (see Figure 2.10) is the recommended daily intake amounts from each food group or subgroup at all calorie levels. Recommended intakes from vegetable subgroups are per week. This food pattern can be used to plan menus for school foodservice, correctional facilities, and healthcare facilities. Additional food patterns are available online at: www.fns.usda.gov/cnd/menu/menu_planning.doc

Healthy People Campaign

The U.S. Department of Health and Human Services (DHHS) sets science-based, 10-year national objectives for promoting health and preventing disease. Healthy People 2020 is the current edition. There are 38 categories of objectives that range from A (Access to Health Services) to V (Vision). Figure 2.11 shows the objectives for the *Nutrition and Weight Status* category. The purpose of these objectives is to provide direction for diverse groups of people

Figure 2.9 Examples of Counting Mixed Dishes

Food and Sample Portion	Amount From Food Group in This Portion					Estimated Total Calories
	Grains Group	Vegetable Group	Fruit Group	Milk Group	Meat & Beans Group	
Cheese Pizza—Thin Crust (1 slice from medium pizza)	1 oz.-eq.	1/8 cup	0	1/2 cup	0	215
Macaroni and Cheese (1 cup made from package mix)	2 oz.-eq.	0	0	1/2 cup	0	260
Tuna Noodle Casserole (1 cup)	1 1/2 oz.-eq.	0	0	1/2 cup	2 oz.-eq.	260
Chicken Pot Pie (8 oz. pie)	2 1/2 oz.-eq.	1/4 cup	0	0	1 1/2 oz.-eq.	500
Beef Taco (2 tacos)	2 1/2 oz.-eq.	1/4 cup	0	1/4 cup	2 oz.-eq.	370
Egg Roll (1)	1/2 oz.-eq.	1/8 cup	0	0	1/2 oz.-eq.	150
Chicken Fried Rice (1 cup)	1 1/2 oz.-eq.	1/4 cup	0	0	1 oz.-eq.	270
Stuffed Peppers with Rice and Meat (1/2 pepper)	1/2 oz.-eq.	1/2 cup	0	0	1 oz.-eq.	190
Clam Chowder-New England (1 cup)	1/2 oz.-eq.	1/8 cup	0	1/2 cup	2 oz.-eq.	165
Cream of Tomato Soup (1 cup)	1/2 oz.-eq.	1/2 cup	0	1/2 cup	0	160
Large Cheeseburger	2 oz.-eq.	0	0	1/3 cup	3 oz.-eq.	500
Peanut Butter & Jelly Sandwich (1)	2 oz.-eq.	0	0	0	2 oz.-eq.	375
Tuna Salad Sandwich (1)	2 oz.-eq.	1/4 cup	0	0	2 oz.-eq.	290
Chef Salad (3 cups—no dressing)	0	1 1/2 cups	0	0	3 oz.-eq.	230
Pasta Salad with Vegetables (1 cup)	1 1/2 oz.-eq.	1/2 cup	0	0	0	140
Apple Pie (1 slice)	2 oz.-eq.	0	1/4 cup	0	0	280

Source: USDA and DHHS

to combine their efforts and work as a team. Whatever phase of healthcare or foodservice you are in, achieving these objectives should be part of your efforts.

Dietary Modifications

Today's nutrition advice indicates a need to make some adjustments to the usual American diet. Here are more tips for making changes for each of the macronutrients.

Carbohydrate

The Dietary Guidelines for Americans recommend using sugars only in moderation. Foods containing large amounts of refined sugars should be eaten in moderation by most healthy people and sparingly by people with low calorie needs. For very active people with high calorie needs, sugars can be an additional source of calories. The following tips can help reduce sugar in the diet:

- ✓ Instead of regular soft drinks or powdered drink mixes, choose diet soft drinks, 100 percent fruit juices, bottled waters such as seltzer, or iced tea made without added sugar or with nonnutritive sweeteners.
- ✓ Instead of sweet desserts such as cake, emphasize fruits in desserts. Fresh fruit can be baked (as in baked apples), poached (as in poached pears), broiled, or made into compote. Choose canned fruits that are packed in fruit juice (not syrup).
- ✓ Make your own cakes, cookies, pies, and other baked goods and reduce the sugar by one-quarter to one-third. It usually does not affect the quality of the product. Use recipes that contain fruits to sweeten, and sweet spices such as cinnamon, nutmeg, and cloves.
- ✓ Try a cookie that uses less sugar, such as graham crackers, vanilla wafers, ginger snaps, or fig bars.
- ✓ Choose 100 percent pure fruit juices. They do not contain added sugars. Products labeled as fruit drinks, fruit beverages, or flavored drinks usually contain only small amounts of fruit juice and much refined sugar.
- ✓ Choose unsweetened breakfast cereals. Choose cereals with less than four grams of sugar per serving, unless the sugar comes from a dried fruit such as raisins. Top cereals with fresh fruit.
- ✓ Jams, jellies, and pancake syrup contain considerable amounts of refined sugar. For less refined sugar and calories, select jams and jellies made without (or with less) sugar, and pancake syrup labeled "reduced calorie." Other toppings for toast or pancakes are chopped fresh fruit, applesauce, part-skim ricotta cheese, and fruit.

Choose MyPlate: Mixed Dishes

Some mixed foods also contain a lot of fat, oil, or sugar, which adds calories. The values listed in Figure 2.9 are estimates based on how these foods are often prepared. The estimated total calories in each dish are also shown. The amounts in an item you eat may be more or less than these examples.

- ✓ Instead of sweetened breakfast pastries such as Danish, try a bagel, English muffin, roll, or fruited muffin and make them whole grain.



Putting It Into Practice: 3

How would you change the following menu to reduce the total daily sugar intake?

Breakfast

- Sugar-coated flakes
- Low-fat milk
- Whole-wheat toast
- Orange juice drink

Lunch

- Roast beef
- Mashed potatoes
- Steamed green beans
- Apple pie squares

Dinner

- Turkey sandwich
- Canned peaches
- Low-fat milk
- Oatmeal cookie

(Check your answer at the end of this chapter)

Figure 2.10 USDA Food Patterns

Recommended daily intake amount¹ from each food group or subgroup at all calorie levels. Recommended intakes from vegetable subgroups are per week.

Energy Level of Pattern ²	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200
Fruits	1 c	1 c	1½ c	1½	1½	2 c	2 c	2 c	2½ c	2½ c	2½ c	2½ c
Vegetables	1 c	1½ c	1½ c	2 c	2½ c	2½ c	3 c	3½ c	3½ c	3½ c	4 c	4 c
Dark green vegetables	½ c/wk	1 c/wk	1 c/wk	1½ c/wk	1½ c/wk	1½ c/wk	2 c/wk	2 c/wk	2½ c/wk	2½ c/wk	2½ c/wk	2½ c/wk
Red/Orange vegetables	2½ c/wk	3 c/wk	3 c/wk	4 c/wk	5½ c/wk	5½ c/wk	6 c/wk	6 c/wk	7 c/wk	7 c/wk	7½ c/wk	7½ c/wk
Cooked dry beans & peas	½ c/wk	½ c/wk	½ c/wk	1 c/wk	1½ c/wk	1½ c/wk	2 c/wk	2 c/wk	2½ c/wk	2½ c/wk	3 c/wk	3 c/wk
Other vegetables	1½ c/wk	2½ c/wk	2½ c/wk	3½ c/wk	4 c/wk	4 c/wk	5 c/wk	5 c/wk	5½ c/wk	5½ c/wk	7 c/wk	7 c/wk
Grains	3 oz eq	4 oz eq	5 oz eq	5 oz eq	6 oz eq	6 oz eq	7 oz eq	8 oz eq	9 oz eq	10 oz eq	10 oz eq	10 oz eq
Whole grains	1½ oz eq	2 oz eq	2½ oz eq	3 oz eq	3 oz eq	3 oz eq	3 ½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5 oz eq	5 oz eq
Other grains	1½ oz eq	2 oz eq	2½ oz eq	2½ oz eq	3 oz eq	3 oz eq	3 ½ oz eq	4 oz eq	4½ oz eq	5 oz eq	5 oz eq	5 oz eq
Meat and beans	2 oz eq	3 oz eq	4 oz eq	5 oz eq	5 oz eq	5½ oz eq	6 oz eq	6½ oz eq	6½ oz eq	7 oz eq	7 oz eq	7 oz eq
Milk	2 c	2 c	2 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c
Oils	15 g	17 g	17 g	22 g	24 g	27 g	29 g	31 g	34 g	36 g	44 g	51 g
Maximum SoFAS ³ limit, Calories (% total calories)	137 (14%)	137 (11%)	137 (10%)	121 (8%)	161 (0%)	258 (13%)	266 (12%)	330 (14%)	362 (14%)	395 (14%)	459 (15%)	596 (19%)

- Food group amounts shown in cup (c) or ounce equivalents (oz. eq). Oils are shown in grams (g). Quantity equivalents for each food group are:
 - Grains, 1 ounce equivalent is: ½ cup cooked rice, pasta, or cooked cereal; 1 ounce dry pasta or rice; 1 slice bread; 1 small muffin (1 oz.); 1 oz. ready-to-eat cereal.
 - Fruits and vegetables, 1 cup equivalent is: 1 cup raw or cooked fruit or vegetable, 1 cup fruit or vegetable juice, 2 cups leafy salad greens.
 - Meat and beans, 1 ounce equivalent is: 1 ounce lean meat, poultry, fish; 1 egg, ¼ cup cooked dry beans; 1 Tbsp. peanut butter; ½ ounce nuts/seeds.
 - Milk, 1 cup equivalent is: 1 cup milk or yogurt, 1½ ounces natural cheese such as Cheddar cheese or 2 ounces of processed cheese.
- Food intake patterns at 1000, 1200, and 1400 calories meet the nutritional needs of children ages 2 to 8 years. Patterns from 1600 to 3200 calories meet the nutritional needs of children 9 years of age and older and adults. If a child ages 2 to 8 years needs more calories and, therefore, is following a pattern at 1600 calories or more, the recommended amount from the milk group can be 2 cups per day. Children ages 9 years and older and adults should not use the 1000, 1200, or 1400 calorie patterns.
- SoFAS are calories from solid fats and added sugars.

Figure 2.11 Healthy People 2020 Nutrition and Weight Status Objectives

<ul style="list-style-type: none"> • Increase the proportion of adults who are at a healthy weight. • Reduce the proportion of adults who are obese. • Reduce iron deficiency among young children and females of childbearing age. • Reduce iron deficiency among pregnant females. • Reduce the proportion of children and adolescents who are overweight or obese. • Increase the contribution of fruits to the diets of the population aged 2 years and older. • Increase the variety and contribution of vegetables to the diets of the population aged 2 years and older. • Increase the contribution of whole grains to the diets of the population aged 2 years and older. • Reduce consumption of saturated fat in the population aged 2 years and older. • Reduce consumption of sodium in the population aged 2 years and older • Increase consumption of calcium in the population aged 2 years and older. 	<ul style="list-style-type: none"> • (Developmental) Increase the proportion of worksites that offer nutrition or weight management classes or counseling. • Increase the proportion of physician office visits that include counseling or education related to nutrition or weight. • Eliminate very low food security among children in U.S. households. • (Developmental) Prevent inappropriate weight gain in youth and adults. • Increase the proportion of primary care physicians who regularly measure the body mass index of their patients. • Reduce consumption of calories from solid fats and added sugars in the population aged 2 years and older. • Increase the number of States that have State-level policies that incentivize food retail outlets to provide foods that are encouraged by the Dietary Guidelines. • Increase the number of States with nutrition standards for foods and beverages provided to preschool-aged children in childcare. • Increase the percentage of schools that offer nutritious foods and beverages outside of school meals.
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- ✓ Use less refined sugars in coffee, tea, cereals, etc., or use sugar substitutes.
- ✓ Try fresh or dried fruit for a sweet snack instead of candy.

General recommendations for fiber intake are from 20 to 35 grams daily. The Daily Value used for Nutrition Facts Labeling is 25 grams. For children, use the “age + 5” rule, which recommends that children consume an amount of fiber equal to their age plus an additional 5 grams of fiber. Unfortunately, the average American takes in less than 20 grams of fiber a day. Figure 2.12 lists good sources of fiber. When increasing fiber intake, do so slowly to avoid problems with cramps, diarrhea, and excessive gas. Also, it’s important to chew foods well and drink at least 8 to 10 glasses of water each day, because fiber takes water out of the body. Make at least half of your grains whole grains.

Fat

The Dietary Guidelines for Americans recommend a diet moderate in total fat and low in saturated fat and cholesterol. Guidelines generally suggest that no more than 30 percent of daily calories should come from fat. Figure 2.13 gives some examples of fat levels corresponding to various calorie levels. Additional recommendations for Americans without cardiovascular disease include:

- ✓ No more than 10 percent of total calories should be in the form of saturated fat with an eventual goal of <7 percent.
- ✓ Avoid trans-fatty acids from processed food sources.
- ✓ Cholesterol intake should be less than 300 milligrams daily.
- ✓ Increase total amount of fish consumption to two times per week, especially those fish high in omega-3 fatty acids.

This advice does not apply to infants and toddlers below the age of two years. After age two, children should gradually adopt a diet that, by about five years of age, contains no more than 30 percent of calories from fat. As they begin to consume fewer calories from fat, children should replace these calories by eating more grain products, fruits, vegetables, low-fat milk products or other calcium-rich foods, beans, lean meat, poultry, fish, or other protein-rich foods.

Meat, poultry, fish, and shellfish contain saturated fat and/or cholesterol. Luckily, some choices are quite low in saturated fat. In general, poultry is low in saturated fat, especially when the skin is removed. When buying fresh ground turkey or chicken, find a product that says “light meat” or “breast” on the label. Poultry products that include the skin and/or dark meat and are much higher in fat. Goose and duck are also high in fat. Most fish is lower in saturated fat and cholesterol than meat and poultry. Fatty fish (such as salmon and tuna) are rich in omega-3 fatty acids, which may protect against heart disease and certain forms of cancer. Shellfish varies in cholesterol content.

Figure 2.14 lists lean cuts of meat. High-fat processed meats, such as many luncheon meats and sausages, provide a hefty 60 to 80 percent of their calories from fat, much of which is saturated. Other examples of these processed meats are bacon, bologna, salami, hot dogs, and sausage. In some cases, these processed meats are made from turkey or chicken and are lower in fat. Look for low-fat processed meats. Organ meats, like liver, sweetbreads, and kidneys are relatively low in fat. However, these meats are high in cholesterol.

When cooking meats, poultry, and fish, use cooking methods that use little or no fat, such as roasting, broiling, grilling, boiling, stir frying or poaching. Do not fry. When making pan gravy, refrigerate the drippings first so the fat will solidify and can be removed. One may also extend meat with pasta or vegetables for hearty dishes. For less saturated fat and cholesterol and more variety, dried beans or legumes are an excellent meat alternative.

Figure 2.12 Good Sources of Fiber and Fiber Grams per Standard Serving Size

<p>Breakfast Cereals (1 cup)</p> <p>Bran-type Cereals10</p> <p>Raisin Bran-type Cereals8</p> <p>Whole Wheat Breakfast Cereals4</p> <p>Whole Oat Breakfast Cereals2</p> <p>Breads and Pastas (1 ounce)</p> <p>Whole Wheat Bread2</p> <p>Bran Muffin5</p> <p>Whole Wheat Pasta 1-6</p> <p>Dried Beans and Peas (½ cup)</p> <p>All Cooked Beans and Peas7</p>	<p>Vegetables (½ cup)</p> <p>Broccoli3</p> <p>Brussels Sprouts3</p> <p>Cabbage2</p> <p>Carrots3</p> <p>Cauliflower2</p> <p>Peas4</p> <p>Potatoes with Skin (1 each)5</p> <p>Spinach, raw<1</p> <p>Sweet Potatoes (1 each)3</p>	<p>Fruits</p> <p>Apple<1</p> <p>Banana3</p> <p>Blackberries (1 cup)8</p> <p>Cherries (10 each)2</p> <p>Dates (10 each)6</p> <p>Figs (10 each)2</p> <p>Grapefruit2</p> <p>Kiwi Fruit3</p> <p>Orange3</p> <p>Pear4</p> <p>Prunes (1 cup)16</p> <p>Raspberries (1 cup)8</p> <p>Strawberries (1 cup)3</p>
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Figure 2.13 Recommended Fat and Saturated Fat Intake

Total Daily Calories	Saturated Fat @ 10%	Saturated Fat @ 7%	Total Fat @ 30%
1200	13 grams	9 grams	40 grams
1500	17 grams	12 grams	50 grams
1800	20 grams	14 grams	60 grams
2000	22 grams	15.5 grams	67 grams
2200	24 grams	17 grams	73 grams
2400	27 grams	19 grams	80 grams
2600	29 grams	20 grams	86 grams
2800	31 grams	22 grams	93 grams
3000	33 grams	23 grams	100 grams

Although many people believe that meats have the highest cholesterol and saturated fat content, dairy products can also be high in saturated fat and cholesterol. As dairy products are often added to foods like casseroles, cakes, or pies, it's easy to eat a significant amount of them without knowing it. Both 1% percent and skim milk provide much less saturated fat and cholesterol and fewer calories than whole milk, as shown in Figure 2.15.

Often, when people cut back on meat, they replace it with cheese, thinking they are cutting back on their saturated fat and cholesterol. They couldn't be more wrong. Because most cheeses are prepared from whole milk or cream, they are also high in saturated fat and cholesterol. Cheeses are particularly high in saturated fat (Figure 2.15). Fortunately, manufacturers offer low-fat versions of cheese favorites like cheddar, Swiss, and mozzarella. They use skim milk and vegetable oils to replace some of the cream and other fat. The result is reduced fat or fat free cheese. (Please see Chapter 10 for terms used on food labels and their exact definitions.)

Americans love ice cream. Ice cream is made from whole milk and cream and therefore contains a considerable amount of saturated fat and cholesterol. Some frozen desserts such as ices, popsicles, and sorbet are generally made without fat. Ice milk contains less fat and saturated fat than regular ice cream, as does frozen low-fat yogurt. With the wide variety of frozen desserts, it's a good idea to read nutrition labels.

Egg yolks are high in cholesterol. The average large egg yolk contains 213 milligrams of cholesterol, about two-thirds of the suggested daily intake. For less cholesterol and fat, use egg substitutes with less than 60 calories per one-quarter cup serving, or egg whites, which contain no cholesterol. Two egg whites can be substituted for one egg in most recipes.

Most breads and bread products contain only small amounts of fat, with less than two grams per slice or serving—that is, if we don't spread margarine or mayonnaise on them. Some breads typically have significant fat added in their



Putting It Into Practice: 4

Your daily calorie intake is 1800 calories. To help meet the new recommendations of 7% of the calories from saturated fat, what changes would you make to the following meal?

- 4 ounce roast beef with gravy
- ½ cup mashed potatoes
- ½ cup steamed broccoli with cheese sauce
- 1 cup 2% milk
- ½ cup ice cream with chocolate sauce

(Check your answer at the end of this chapter)

Figure 2.14 Lean Cuts of Meat

Beef	Veal	Pork	Lamb
<ul style="list-style-type: none"> • Eye of the Round • Top Round 	<ul style="list-style-type: none"> • Shoulder • Ground Veal • Cutlets • Sirloin 	<ul style="list-style-type: none"> • Tenderloin • Sirloin • Top Loin 	<ul style="list-style-type: none"> • Leg-shank

preparation. Examples include biscuits, croissants, cornbread, and muffins. Also note that most granolas are high in fat. Commercial cakes, pies, cookies, donuts, and pastry are often high in fat, saturated fat, and calories. In addition, some are quite high in cholesterol. Tasty alternatives include angel food cake, sponge cake, fig bars, ginger snaps, and baked goods made with little or no fat. Recipe substitution ideas appear in Figure 2.16. Many desserts can also be made with less fat. Simply reduce the fat called for by one-fourth to one-third the original amount.

Protein

Proteins are especially important because they provide both energy (4 calories per gram) and essential amino acids. Unlike fats, the amount required per day is based on grams of protein per kilogram of body weight. The Recommended Dietary Allowance (RDA) for protein is 0.8 g protein/kg body weight/day for ages 19 and above. Average protein intake for most Americans is considered adequate but as Americans decrease their calorie intake to fight obesity, the percentage of calories from protein may need to increase, especially from a high quality protein source. See Figure 2.17 on how the percentage of calories from protein changes for a 150-pound person based on the total daily calorie intake.

Figure 2.15 Comparison of Milk, Poultry, Meat and Cheese

Food	Total Fat	Saturated Fat	Cholesterol	Calories
Milk				
Skim Milk	0.4 grams	0.3 grams	4 milligrams	86
1% Milk	2.6 grams	1.6 grams	10 milligrams	102
2% Milk	4.7 grams	2.9 grams	18 milligrams	121
Whole Milk	8.2 grams	5.1 grams	33 milligrams	150
Chicken	—	1 gram	64 milligrams	4 grams
Roasted Chicken, no skin, light meat, 3 ounces				
Meat	—	3 grams	73 milligrams	8 grams
Beef, top round, broiled, 3 ounces				
Cheese	—	6 grams	30 milligrams	9 grams
Natural Cheddar, 1 ounce				

Source: National Institutes of Health

Figure 2.16 Lower Fat Baking Substitutions

Instead of this...	Use this...
1 cup shortening	2/3 cup vegetable oil
1 whole egg	2 egg whites
1 cup sour cream	1 cup reduced-fat sour cream
1 cup whole milk	1 cup skim milk
1 tablespoon cream cheese	1 tablespoon light cream cheese
1 cup cream	1 cup low-fat yogurt
1 ounce baking chocolate	3 tablespoons cocoa and 1 tablespoon vegetable oil
Some of the butter or oil in a baked product	Fruit-based butter and oil replacements

High quality protein sources are animal proteins. In the past few years, many consumers have adopted high-protein diets for weight-loss purposes. This has resulted in some Americans consuming diets high in protein, especially animal sources. According to the Report of the DGAC on the Dietary Guidelines for Americans 2010, “long term studies of weight loss or maintenance of weight loss find no differences among diets lower or higher in protein.” Eating too much protein has no benefits. In fact, eating excess protein from animal products may add excessive fat and calories.

Lower quality protein sources are plant based. If you are choosing a vegetarian diet, it is important to consume complementary protein sources such as beans and rice. Review the complementary protein sources in Chapter 3. Consuming lower-quality proteins is of greater concern when protein needs are high such as pregnancy, lactation, childhood, and during illness or injury. The Report of the DGAC on the Dietary Guidelines for Americans, 2010, found moderate evidence linking a plant-protein diet to lower blood pressure.

The best way to manage protein intake is to follow the Dietary Guidelines and Choose MyPlate. Also, note that many of the recommendations for reducing dietary fat and saturated fat are based on following recommended portion sizes.

Dietary Reference Intakes (DRIs)

Since 1941, the Food and Nutrition Board of the National Academy of Sciences has been preparing recommendations on nutrient intakes for Americans. Contemporary studies address topics ranging from the prevention of classical nutritional deficiency diseases to the reduction of risk of chronic diseases such as osteoporosis, cancer, and cardiovascular disease. In partnership with Health Canada, the Food and Nutrition Board has responded to these developments by making fundamental changes in its approach to setting nutrient reference values. This partnership issued the first of its new standards in 1997, replacing Recommended Dietary Allowances (RDAs). Dietary Reference Intakes is the inclusive name given to the new approach.

Figure 2.17 Changes in Protein Needs by Calorie Level

Calorie Level	% of Calories
1200.....	18
1500.....	14.4
1800.....	12
2000.....	10.8
2500.....	8.5

Protein needs for 150 lb. person @ 0.8gm/kg = 54 grams
That amount stays the same regardless of the calorie level.

Dietary Reference Intakes (DRIs) is a generic term used to refer to four types of reference values: Estimated Average Requirement, **Recommended Dietary Allowance**, **Adequate Intake**, and **Tolerable Upper Intake Level**. Dietary reference intakes are designed for various age and gender groups, because nutrient needs vary from childhood through adulthood, and some needs vary between males and females.

Estimated Average Requirement (EAR)

The EAR is the intake value that is estimated to meet the requirement defined by a specified indicator of adequacy in 50 percent of a specific group (age and gender group). A requirement is how much is needed in the diet to prevent symptoms of deficiency. A deficiency is the illness that occurs over time when a nutrient is not present in adequate amounts. For example, not eating enough vitamin C causes the deficiency disease scurvy. Not having enough vitamin D causes the deficiency disease rickets. Scurvy and rickets are examples of nutrient deficiency illnesses. At the EAR level of intake, 50 percent of the specified group would not have its needs met. In other words, if everyone consumed exactly the EAR levels of nutrients, some people would actually develop nutrient deficiencies. Thus, the EAR is designed only for setting a benchmark for baseline nutrient requirements. An EAR is not intended for use in evaluating an individual's dietary intake.

Recommended Dietary Allowance (RDA)

A Recommended Dietary Allowance (RDA) is the amount of a nutrient that is adequate to meet the known nutrient needs of practically all healthy persons. Contrary to popular belief, an RDA is not a minimum daily requirement. It is a dietary recommendation. To develop RDAs, scientists first reviewed research studies that indicated what minimum levels of nutrients might be required to prevent nutrient deficiencies. Then, they padded the requirements to account for additional factors that might affect requirements. They also padded the numbers to account for the difference between the amount of a nutrient consumed and the amount the body can actually use. These scientists used statistics to calculate individual variations in nutrient needs, and projected figures that would address the needs of most healthy people. Thus, an RDA is truly a recommendation about how much of a nutrient to consume through food. If everyone consumed exactly the RDA levels of nutrients, very, very few people in that group would develop nutrient deficiencies. Also, RDAs are for healthy

individuals. RDAs do not always apply to someone who is suffering from a chronic illness or who has special medical conditions. Unlike the EAR, an RDA is a goal for groups of individuals.

Adequate Intake (AI)

For some nutrients, we simply don't know enough to set a meaningful RDA. We lack the scientific research that backs up the calculation of requirements. When this is the case, we use an Adequate Intake value. For example, we do not have a great deal of information about the physiological requirements for choline. Instead of setting an RDA, experts have designated an AI for choline. An AI represents a scientific judgment. We cannot be certain that an AI covers the nutrient needs of groups or individuals, but the AI value seems to be a reasonable point of reference based on what we know. When the only standard we have for a nutrient is an AI, it is fine to apply the AI to both groups and individuals.

Tolerable Upper Intake Level (UL)

The UL is the maximum level of daily nutrient intake that is unlikely to pose risks of adverse health effects. ULs have been developed for some nutrients as safety guidelines. For example, these points of reference are helpful in determining whether the doses of nutrients contained in nutritional supplements represent safe intakes.

As you might guess, setting dietary reference intakes is a complex task. Scientists are working to develop figures we can refer to when assessing individuals' diets and planning menus. Due to the enormity of this undertaking, the Dietary Reference Intake project has been divided into seven nutrient groups, which are updated intermittently.

How can I use the Dietary Reference Intakes?

The RDAs were developed to assess the diets of groups of people rather than individuals. Use the DRIs to plan and evaluate the diets of your facility. Because our bodies store nutrients for later use, we don't need to eat the RDAs every day. The USDA has a website that lists the current DRI tables (<http://fnic.nal.usda.gov/interactiveDRI/>). Log on to use their interactive tool to calculate daily nutrient recommendations for yourself or your client for dietary planning based on the Dietary Reference Intakes (DRIs). See Appendix B for the DRI, RDA, and AI.

Daily Fluid Requirement

Water is an essential nutrient. In the past, there was no dietary guideline or Dietary Reference Intake for water. Some people have even referred to it as the "forgotten nutrient." Since nearly all of our bodily systems depend on water and proper hydration, let's look at the recommendation for water and how to calculate daily fluid requirement. How much we need depends upon our health, our physical activity, and even where we live. We lose about 10 cups of water each day through breathing, sweating, and urine and bowel movements. Most physicians recommend drinking 8-10, 8-ounce glasses of water each day. We get about 20 percent of our fluid from food (refer to Figure 3.20 in Chapter 3).



Putting It Into Practice: 5

Your client is a strict vegetarian (vegan). How would you adjust the menu below to make sure they are receiving a complete protein source?

- Chicken tacos with lettuce and tomato
- Pickle chips
- Apple slices
- Oatmeal cookie

(Check your answer at the end of this chapter)

Sources of water from food plus the eight to ten glasses of water would help us replace what we lose each day. In our efforts to fight the obesity epidemic, replacing other fluids such as soda, sport drinks, and juice with water will help reduce calories. Currently, we consume over 130 calories each day from soda, sport drinks, and juice. One pound of fat is equivalent to 3500 calories. By substituting water for soda, sport drinks, and juice, we could lose over one pound each month with no other changes. For additional information on calculating fluid requirements, see Chapter 10.

Food or Supplements?

A common nutritional question concerns multivitamin preparations or supplements. Should you rely on a balanced diet or pills to ensure good nutrition? While nutrition science is quite advanced, we are only beginning to understand the many components of foods that are active in the human body. The emerging concept of functional foods makes this quite evident (see *Nutrition in the News* at the end of this chapter). Beyond vitamins, minerals, protein, lipids, and carbohydrates, foods provide other natural chemicals. Some appear to offer health benefits. Already, some functional ingredients in foods have been incorporated into nutritional supplements. But this is not a complete answer for sound nutrition. The bottom line is that real food is preferable to chemical formulations. In real food, provided through a balanced diet and based on established dietary guidance, we can obtain necessary nutrients, as well as compounds we may not understand very well as yet. Real food also gives people pleasure, offers fiber (not present in all supplemental products) and water. It provides a sense of satiety or fullness when we eat it.

Multivitamins or nutritional supplements can be important for an individual who wishes to ensure adequate nutrition, or who needs to correct a deficiency. Iron supplements, for example, may be important to supplement dietary intake of iron. Iron-deficiency anemia is common in the U.S., and it is not easy for everyone to consume adequate iron through food. Calcium is another nutrient that may be worth supplementing—especially for adult women. The AI level is not easy for every woman to achieve, and calcium plays a role in preventing osteoporosis. These are just examples of situations in which supplementation may be useful. However, it's prudent to consider supplements as what they are—*supplements*—not *replacements* for healthy eating habits. It is also important to review DRIs for nutrients, and pay particular attention to the UL levels for nutrients. Excessive supplementation of some nutrients can cause health problems.

The Dietary Guidelines emphasize real foods over nutrition supplements, saying, “A basic premise of the Dietary Guidelines is that nutrient needs should be met primarily through consuming foods. Foods provide an array of nutrients and other compounds that may have beneficial effects on health. In certain cases, fortified foods and dietary supplements may be useful sources of one or more nutrients that otherwise might be consumed in less than recommended amounts. However, dietary supplements, while recommended in some cases, cannot replace a healthful diet.” Figure 2.18 provides guidelines for maximizing nutrient loss during cooking.

Glossary

Dietary Reference Intakes

Generic terms that encompass four types of reference values: Estimated Average Requirement, Recommended Dietary Allowance, Adequate Intake, and Tolerable Upper Intake Level

Recommended Dietary Allowance (RDA)

The amount of a nutrient adequate to meet the known nutrient needs of practically all healthy persons

Adequate Intake (AI)

A scientific judgment on the amount of some nutrients for which a specific RDA is not known

Tolerable Upper Intake Level (UL)

The maximum level of a daily nutrient that is considered safe

In all, a diet is complex. So much information about nutrition bombards us that it can be challenging to make dietary choices. Reliance on Choose My-Plate and the Dietary Guidelines for Americans is an excellent way to assure a healthy diet. For menu planning and in-depth assessment, the DRIs offer science-based standards of reference.

Figure 2.18 Tips for Protecting Nutrients

<ul style="list-style-type: none">• Minimize storage time. Do not store foods longer than necessary.• Keep foods wrapped or covered in storage.• Do not soak foods in water unless absolutely necessary. If you need to soak a food, use as little water as possible. If practical, add the water to your product (e.g. a soup).• Cut and cook vegetables in large pieces to minimize contact between surface area and air.• To cook vegetables, steam rather than boil. This helps them retain nutrients.• Cook vegetables as soon as possible after cutting.• Use raw vegetables (rather than cooked) as practical.• Avoid adding baking soda to vegetables during cooking. Some people use this practice to retain color. However, it destroys thiamin and vitamin C.	<ul style="list-style-type: none">• Avoid overcooking food, as heat can destroy vitamins (especially vitamin C). Cook just until tender.• Do not rinse rice before cooking.• Do not brown undercooked rice before adding water. This destroys thiamin.• After cooking rice, pasta, or other grain-based foods, do not rinse; just drain.• Store food away from light or in dark containers. This is important for milk, since riboflavin and B vitamin in milk is destroyed by light.• In foodservice operations, cook food as close to service times as possible. Cook in small batches as appropriate. For example, steamed vegetables may be prepared in small batches throughout an extended meal service time.• Minimize holding time as much as possible. Keep foods covered during holding.
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Source: USDA

Nutrition in the News**Functional Foods Fact Sheet: Antioxidants**

October 15, 2009

Background

Plant foods, such as fruits, vegetables, and whole grains contain many components that are beneficial to human health. Research supports that some of these foods, as part of an overall healthful diet, have the potential to delay the onset of many age-related diseases. These observations have led to continuing research aimed at identifying specific bioactive components in foods, such as antioxidants, which may be responsible for improving and maintaining health.

Antioxidants are present in foods as vitamins, minerals, carotenoids, and polyphenols, among others. Many antioxidants are often identified in food by their distinctive colors—the deep red of cherries and tomatoes; the orange of carrots; the yellow of corn, mangos, and saffron; and the blue-purple of blueberries, blackberries, and grapes. The most well-known components of food with antioxidant activities are vitamins A, C, and E; carotene; the mineral selenium; and more recently, the compound lycopene.

Health Effects

The research continues to grow regarding the knowledge of antioxidants as healthful components of food. Oxidation, or the loss of an electron, can sometimes produce reactive substances known as free radicals that can cause oxidative stress or damage to the cells. Antioxidants, by their very nature, are capable of stabilizing free radicals before they can react and cause harm, in much the same way that a buffer stabilizes an acid to maintain a normal pH. Because oxidation is a naturally occurring process within the body, a balance with antioxidants must exist to maintain health.

Research

While the body has its defenses against oxidative stress, these defenses are thought to become less effective with aging as oxidative stress becomes greater. Research suggests there is involvement of the resulting free radicals in a number of degenerative diseases associated with aging, such as cancer, cardiovascular disease, cognitive impairment, Alzheimer's disease, immune dysfunction, cataracts, and macular degeneration. Certain conditions, such as chronic diseases and aging, can tip the balance in favor of free radical formation, which can contribute to ill effects on health.

Consumption of antioxidants is thought to provide protection against oxidative damage and contribute positive health benefits. For example, the carotenoids lutein and zeaxanthin engage in antioxidant activities that have been shown to increase macular pigment density in the eye. Whether this will prevent or reverse the progression of macular degeneration remains to be determined. An increasing body of evidence suggests beneficial effects of the antioxidants present in grapes, cocoa, blueberries, and teas on cardiovascular health, Alzheimer's disease, and even reduction of the risk of some cancers.

Until recently, it appeared that antioxidants were almost a panacea for continued good health. It is only as more research has probed the mechanisms of antioxidant action that a far more complex story continues to be unraveled. Although recent research has attempted to establish a causal link between indicators of oxidative stress and chronic disease, none has yet been validated. A new area of research, led by the study of the human genome, suggests that the interplay of human genetics and diet may play a role in the development of chronic diseases. This science, while still in its infancy, seeks to provide an understanding of how common dietary nutrients such as antioxidants can affect health through gene-nutrient interactions.

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Functional Foods Fact Sheet: Antioxidants (Continued)

Examples of Functional Components*		
Class/Components	Source*	Potential Benefit
CAROTENOIDS		
Beta-carotene	Carrots, Various Fruits	Neutralizes free radicals which may damage cells; Bolsters cellular antioxidant defenses
Lutein, Zeaxanthin	Kale, Collards, Spinach, Corn, Eggs, Citrus	May contribute to maintenance of healthy vision
Lycopene	Tomatoes and Processed Tomato Products	May contribute to maintenance of prostate health
FLAVONOIDS		
Anthocyanidins	Berries, Cherries, Red Grapes	Bolster cellular antioxidant defenses; May contribute to maintenance of brain function
Flavanols—Catechins, Epicatechins, Procyanidins	Tea, Cocoa, Chocolate, Apples, Grapes	May contribute to maintenance of heart health
Flavanones	Citrus Foods	Neutralize free radicals which may damage cells; Bolster cellular antioxidant defenses
Flavonols	Onions, Apples, Tea, Broccoli	Neutralize free radicals which may damage cells; Bolster cellular antioxidant defenses
Proanthocyanidins	Cranberries, Cocoa, Apples, Strawberries, Grapes, Wine, Peanuts, Cinnamon	May contribute to maintenance of urinary tract health and heart health
ISOTHIOCYANATES		
Sulforaphane	Cauliflower, Broccoli, Brussels Sprouts, Cabbage, Kale, Horseradish	May enhance detoxification of undesirable compounds and bolster cellular antioxidant defenses
PHENOLS		
Caffeic Acid, Ferulic Acid	Apples, Pears, Citrus Fruits, Some Vegetables	May bolster cellular antioxidant defenses; May contribute to maintenance of healthy vision and heart health
SULFIDES/THIOLS		
Diallyl Sulfide, Allyl Methyl Trisulfide	Garlic, Onions, Leeks, Scallions	May enhance detoxification of undesirable compounds; May contribute to maintenance of heart health and healthy immune function
Dithiolthiones	Cruciferous Vegetables—Broccoli, Cabbage, Bok Choy, Collards	Contribute to maintenance of healthy immune function

(Continued...)

Functional Foods Fact Sheet: Antioxidants *(Continued)*

Examples of Functional Components <i>(continued)*</i>		
Class/Components	Source*	Potential Benefit
WHOLE GRAINS		
Whole Grains	Cereal Grains	May reduce risk of coronary heart disease and cancer; May contribute to reduced risk of diabetes

Chart adapted from International Food Information Council Foundation: Media Guide on Food Safety and Nutrition: 2004-2006.

* Not a representation of all sources

There still remains a lack of direct experimental evidence from randomized trials that antioxidants are beneficial to health, which has led to different recommendations for different populations. For example, the use of supplemental-carotene has been identified as a contributing factor to increased risk of lung cancer in smokers. However, because the risk has not been indicated in non-smokers, these studies suggest that a precaution regarding the use of supplemental-carotene is not warranted for non-smokers. If supplementation is desired, the use of a daily multivitamin-mineral supplement containing antioxidants has been recommended for the general public as the best advice at this time.

A recent review of current literature suggests that fruits and vegetables in combination have synergistic effects on antioxidant activities leading to greater reduction in risk of chronic disease, specifically for cancer and heart disease. For some time, health organizations have recognized the beneficial roles fruits and vegetables play in the reduced risk of disease and developed communication programs to encourage consumers to eat more antioxidant-rich fruits and vegetables. The American Heart Association recommends healthy adults “Eat a variety of fruits and vegetables. Choose 5 or more servings per day.” The American Cancer Society recommends to “Eat 5 or more servings of fruits and

vegetables each day.” The World Cancer Research Fund and the American Institute for Cancer Research 1997 Report Food, Nutrition and the Prevention of Cancer: A Global Perspective states, “Evidence of dietary protection against cancer is strongest and most consistent for diets high in vegetables and fruits.” The potential for antioxidant-rich fruits and vegetables to help improve the health of Americans led the National Cancer Institute (NCI) to start the, “5-A-Day for Better Health” campaign to promote consumption of these foods.

Given the high degree of scientific consensus about consumption of a diet that is high in fruits and vegetables—particularly those which contain dietary fiber and vitamins A and C; the Food and Drug Administration (FDA) released a health claim for fruits and vegetables in relation to cancer. Food packages that meet FDA criteria may now carry the claim “Diets low in fat and high in fruits and vegetables may reduce the risk of some cancers.” In addition the FDA, in cooperation with NCI, released a dietary guidance message for consumers, “Diets rich in fruits and vegetables may reduce the risk of some types of cancer and other chronic diseases.” Most recently the Dietary Guidelines for Americans stated, “Increased intakes of fruits, vegetables, whole grains and fat-free or low-fat milk and milk products are likely to have important health benefits for most Americans.”

Antioxidant research continues to grow and emerge as new beneficial components of food are discovered. Reinforced by current research, the message remains that antioxidants obtained from food sources, including fruits, vegetables and whole grains, are potentially active in disease risk reduction and can be beneficial to human health.

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The Bottom Line

Most research indicates that there are overall health benefits from antioxidant-rich foods consumed in the diet. The results of clinical trials with antioxidant supplements have yet to provide conclusive indication

of health benefits. Current recommendations by the U.S.

government and health organizations are to consume a varied diet with at least five servings of fruits and vegetables per day and 6-11 servings of grains per day, with at least three of those being whole grains.

Examples of Antioxidant Vitamins and Minerals

Vitamins	Dietary Reference Intake*	Antioxidant Activity	Sources
Vitamin A	300-900 µg/d	Protects cells from free radicals	Liver, Dairy Products, Fish
Vitamin C	15-90 mg/d	Protects cells from free radicals	Bell Peppers, Citrus Fruits
Vitamin E	6-15 mg/d	Protects cells from free radicals; Helps with immune function and DNA repair	Oils, Fortified Cereals, Sunflower Seeds, Mixed nuts
Selenium	20-55 µg/d	Helps prevent cellular damage from free radicals	Brazil Nuts, Meats, Tuna, Plant Foods

Chart adapted from Food and Nutrition Board Institute of Medicine DRI reports and National Institute of Health Office of Dietary Supplements

** DRIs provided are a range for Americans ages 2-70*

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END OF CHAPTER



Putting It Into Practice Questions & Answers

1. If a client had a BMI of 25.5, how would they be classified?

A. *The client would be classified as overweight, which is a BMI between 25 and 29.*

2. In the menu below, what would the sources of SoFAS be?

- ✓ Tomato soup
- ✓ Grilled sandwiches on white bread
- ✓ Pickle slices
- ✓ Birthday cake
- ✓ Cheese

A. *SoFAS are Saturated Fats and Added Sugars. The sources of SoFAS in this menu could be the saturated fat in tomato soup if cream or whole milk is used. It would be saturated fat in the cheese in the sandwich, which could be decreased if a low-fat cheese is used. The added sugars would be the pickle slices, if they are sweet pickles, and the birthday cake. The birthday cake may also be a source of saturated fats depending upon the fat used in the cake mix. Cakes made with oils will have less saturated fats.*

3. How would you change the following menu to reduce the total daily sugar intake?

Breakfast	Lunch	Dinner
✓ Sugar-coated flakes	✓ Roast beef	✓ Turkey sandwich
✓ Low-fat milk	✓ Mashed potatoes	✓ Canned peaches
✓ Whole-wheat toast	✓ Steamed green beans	✓ Low-fat milk
✓ Orange juice drink	✓ Apple pie squares	✓ Oatmeal cookie

A. *Substitute a whole grain cereal for the sugar-coated flakes and 100 percent orange juice in place of the orange drink. Substitute a baked apple for the apple pie squares for lunch. For dinner, use peaches canned in their own juice instead of a heavy syrup.*

4. Your daily calorie intake is 1800 calories. To help meet the new recommendations of 7 percent of the calories from saturated fat, what changes would you make to the following meal?

- ✓ 4 oz. roast beef with gravy
- ✓ ½ cup steamed broccoli
- ✓ 1 cup 2% milk
- ✓ ½ cup mashed potatoes
- with cheese sauce
- ✓ ½ cup ice cream with chocolate sauce

A. *Substitute roast turkey with non-fat gravy for the roast beef. Delete the cheese sauce on the broccoli and use a sprinkle of shredded cheese instead as a garnish. Replace the ice cream with ice milk.*

5. Your client is a strict vegetarian (vegan). How would you adjust the menu below to make sure they are receiving a complete protein source?

- ✓ Chicken tacos with lettuce and tomato
- ✓ Pickle chips
- ✓ Oatmeal cookie
- ✓ Apple slices

A. *Use corn tortillas for the taco shells and replace the chicken with refried beans. Corn and beans are complementary protein sources that together provide the essential amino acids. Replace the cookie with a granola bar made without eggs or milk.*