

NUTRITION AND AGING

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It's good food and not fine words that keep me alive.

—J. B. P. Moliere

Chapter Outline

Screening

The Nutrition Screening Initiative
Undernutrition: Weight Loss and Malnutrition

Treatment of Weight Loss and Other Nutritional

Problems Related to Aging
Weight Loss
Treatment of Gastrointestinal Problems

Overnutrition

Cardiovascular Disease
Diabetes

General Nutrition Recommendations

Drug And Nutrient Interactions
Alcohol

Behavioral Objectives

Upon completion of this chapter, the reader will be able to:

1. Demonstrate knowledge of current research on the impact of aging on nutrition status for healthy individuals and individuals with chronic diseases.
2. Describe the importance of early screening and intervention for nutritional risk in older adults.
3. Identify screening tools for the assessment of nutritional risk in the older adult.
4. Recognize the multiple factors that affect nutrition status in older adults (physiologic, social, psychological, economic, and environmental).
5. Describe the physiologic impact of aging on dietary intake and absorption.
6. Use MyPlate to advise the older adult about the implementation of the 2010 Dietary Guidelines for Americans.

7. Describe the basics of the Mediterranean diet and the DASH diet for the treatment of common chronic diseases in the older adult.
8. Recognize the impact of polypharmacy on nutritional status and drug–nutrient interactions in older adults.
9. Describe the appropriate use of nutritional supplements for the older adult

Key Terms

Anorexia	Fluid
Cachexia	Gluten
Calcium	Hypertension
Carbohydrates	Lactose intolerance
Cardiovascular disease	Malabsorption
Cholesterol	Malnutrition
Celiac disease	Mediterranean diet
DASH (Dietary Approach to Stop Hypertension) diet	Nutritional supplements
Dehydration	Overnutrition
Diabetes	Protein
Dietary fiber	Sarcopenia
Dietary Guidelines for Americans	Vitamin B ₁₂
Dysphagia	Vitamin D
	Weight loss

The importance of good nutrition throughout the life span and its contribution to health and quality of life cannot be overestimated. The average life span of individuals has increased dramatically over the past few decades. In 1940, only 7% of Americans aged 65 years were expected to live to age 90. Now, more than 27% are expected to become nonagenarians, and by 2050, given life circumstances similar to today, nearly 50% of 65-year-olds will reach this milestone.¹ In the next 20 years, the older population is predicted to reach 71 million, which will account for nearly 20% of the total U.S. population.

The aging population is a heterogeneous population ranging from healthy high functioning older adults living in the community to those who must depend on others for their care. Approximately 15% of older community-dwelling adults and 50% of hospitalized older adults are malnourished.² The incidence of chronic disease in this population is high, with 80% of older adults having at least one chronic disease and 50% having at least two.³ Many of these chronic diseases can be managed successfully with nutrition intervention to improve both quality and quantity of life for aging individuals.

For many, the late-life years are a time of great change socially, economically, psychologically, and physically. With the death of a spouse and/or friends, many older adults find themselves living alone and eating meals alone. Changes in income as a result of retirement can mean fewer resources are available for food purchases. Older adults may

also experience more limited mobility related to various joint, muscular, and other health problems. Individually or in combination, these factors interact and influence nutritional status in older adults.

The Older Americans Act of 2006 places special emphasis on integrated health promotion and disease prevention through nutrition education for older adults to improve the health of this population.^{4,5} To realize these goals, all older adults should receive early nutrition screening and intervention for the problems of weight loss, nutrient deficiencies, and overnutrition. Nutritional recommendations and treatment plans should include a consideration of the effects of individual variations in physiological, environmental, and social changes associated with aging, as discussed in this chapter.

SCREENING

THE NUTRITION SCREENING INITIATIVE

One of the best ways to achieve high-quality nutrition care for older adults is to promote early screening and intervention. Since 1989, the American Dietetic Association, the National Council on Aging, and the American Academy of Family Physicians have collaborated in an effort called the Nutrition Screening Initiative (NSI) to encourage early and routine screening and intervention for nutrition risk in older adults.⁶ The premise of the initiative is that nutrition status is a *vital sign* just as important in evaluating a person's health and well-being as the traditional vital signs of blood pressure and pulse.

The result of the Nutrition Screening Initiative is a self-assessment checklist that can be used in a variety of settings to help identify whether an individual is at risk for compromised nutritional well-being. In addition, the acronym DETERMINE is an educational device that can be used along with the checklist to help identify the warning signs of poor nutritional status in older adults. The self-assessment checklist and meaning of DETERMINE are presented in **Boxes 7-1** and **7-2**.

Three other screening instruments also might be helpful in assessing the nutritional status of your patient or client. They are the Subjective Global Assessment (SGA), the Mini Nutrition Assessment (MNA), and the Malnutrition Screening Tool (MST).

The SGA (available at www.hospitalmedicine.org/geriresource/toolbox/pdfs/subjective_global_assessmen.pdf) and MNA (available at www.mna-elderly.com/mna_forms.html) are similar to the NSI and have been deemed valid and reliable tools to determine nutritional risk and the presence of **malnutrition**. The Malnutrition Screening Tool (MST) consists of two simple questions:

- Have you been eating poorly because of decreased appetite?
- Have you lost weight recently without trying?

In a study published in 2012 comparing nutrition screening tools, the MST and the MNA scored in the highest quartile for both sensitivity and specificity.⁷ Both the SGA

BOX 7-1 Nutrition Screening Initiative Self-Assessment Checklist

Answer the following questions as carefully as you can. Add up the points for all yes answers and compare with the point evaluation scale. This checklist will help you determine if you are nutritionally at risk.

Question	Yes
I have an illness or condition that has recently made me change the kind and/ or amount of food I eat.	2 pts
I eat fewer than two meals per day.	3
I rarely eat fruits, vegetables, and milk products.	2
I have three or more glasses of beer, liquor, or wine almost every day.	2
I have tooth or mouth problems that make it hard for me to eat.	2
I don't always have enough money to buy the food I need.	4
I eat alone most of the time.	1
I take three or more different prescription or over-the-counter drugs a day.	1
Without wanting to, I have lost or gained 10 pounds in the past 6 months.	2
I am not always physically able to shop, cook, and/or feed myself.	2

Total Score

Point Evaluation Scale

0–2	Good! Recheck your score in 6 months.
3–5	You are at a moderate nutritional risk. See what can be done to improve your eating habits and lifestyle. The Area Agencies on Aging, senior nutrition programs, senior citizen centers, or health departments may be able to help. Recheck your score in 3 months.
6+	You are at nutritional risk. Bring this checklist the next time you see your doctor, dietitian, or other qualified healthcare provider. Ask for nutrition counseling.

Adapted from: The Nutrition Screening Initiative, a project of the American Academy of Family Physicians, the American Dietetic Association, and the National Council on Aging; 1989.

BOX 7-2 DETERMINE

Use this to help you remember the warning signs of nutrition risk.

- D** *Disease*: The presence of any disease causing a change in eating habits may make it harder to eat right and will increase risk. Four of five adults have chronic diseases affected by diet. Confusion and memory loss may make it harder to plan healthy diets and even to remember what and when you last ate. Depression and loneliness can cause changes in appetite, digestion, energy level, weight, and well-being.
- E** *Eating poorly*: Both eating too little and eating too much can cause a decline in health status. Lack of variety, poor quality foods, and poor balance of food types all lead to poor nutritional health. Many older adults skip meals and eat fewer than the recommended five servings daily of fruits and vegetables. Alcohol consumption is a concern, with one in four adults drinking too much.
- T** *Tooth loss or mouth pain*: Healthy mouth, gums, and teeth are essential to good nutrition. When dental health is compromised, so is nutritional well-being.
- E** *Economic hardship*: Although Social Security and Medicare have made great progress in combating poverty among older adults (approximately 35% were below the poverty level in 1959, whereas in 2003 only 10.2% fell below the poverty level; U.S. Department of Commerce, Bureau of the Census, 2003), financial struggles may make it harder to eat right and stay healthy.
- R** *Reduced social contact*: Approximately one-third of all older people live alone. For a variety of reasons, aging brings with it fewer meaningful social contacts. This, too, can affect nutritional well-being.
- M** *Multiple medicines*: Polypharmacy, the use of multiple drugs, can also compromise nutritional well-being. Almost half of older Americans take multiple medicines daily. Some of the side effects include changes in appetite and taste, constipation, weakness, and nausea.
- I** *Involuntary weight gain or loss*: Changes in weight (more than just a few pounds) should always be seen as a warning sign that a person's nutrition status may be compromised.
- N** *Needs assistance in self-care*: Older people who need help with walking, shopping, cooking, and feeding are at risk for decreased nutritional status.
- E** *Elder years past age 80*: Increasing age brings increased risk of health problems. Be sure to see your physician regularly, at least on an annual basis.

Adapted from: The Nutrition Screening Initiative, a project of the American Academy of Family Physicians, the American Dietetic Association, and the National Council on Aging; 1989.

and the MNA include an assessment of weight, muscle mass (mid-arm or calf circumference), and mobility or functional capacity. These criteria have been recommended in a consensus statement from the Academy of Nutrition and Dietetics and the American Society for Parenteral and Enteral Nutrition.⁸ A diagnosis of malnutrition includes two or more of the following six characteristics:

- Insufficient energy intake
- Weight loss
- Loss of muscle mass
- Loss of subcutaneous fat
- Localized generalized fluid accumulation that may mask weight loss
- Diminished functional status as measured by handgrip strength

UNDERNUTRITION: WEIGHT LOSS AND MALNUTRITION

Because the population of older adults is so heterogeneous, the prevalence of malnutrition will vary depending on age distribution and living situation, among other variables. A review of the results of the MNA survey that included countries in Europe, the United States, and South Africa showed that the prevalence of malnutrition in older adults was 22.8%. The highest rates of malnutrition were found among individuals living in institutional settings (50.5%) and the lowest among people living in the community (5.8%).⁹

Decreases in body weight are common in adults ages 65 to 90, and this should always be seen as a warning sign that the individual may be at nutritional risk. There is a clear relationship between undernutrition and increased morbidity and mortality.¹⁰

Involuntary **weight loss** may be caused by inadequate dietary intake, loss of appetite, muscle atrophy, and/or the inflammatory effects of disease. Many older adults may experience a combination of these factors, resulting in nutritional deficiencies in addition to weight loss.

Inadequate Dietary Intake Many older adults live and eat alone. Social isolation is associated with decreased food intake. Several studies have shown that food intake can be improved when older adults are able to eat with others.^{11,12} Older adults are often on fixed incomes, which may limit their ability to purchase food. Chronic disease and the medications associated with managing these conditions may also increase the financial burden for older adults, forcing them to choose between food and medications.

Inadequate nutritional intake and unexplained weight loss in older adults is often associated with malignancy (cancer) or depression. Several small studies of patients with unexplained weight loss showed that malignancy was a factor in between 16% and 36% of the patients evaluated.¹³⁻¹⁵ Depression is associated with decreased food intake. This is a factor in both the nursing home and institutional environment, as well as for community-dwelling older adults. Wilson et al. reviewed the charts of over 1,000 medical

outpatients and found that depression was a cause of weight loss in 30% of the older patients.¹³ In comparison, only 15% of the younger patients were found to have weight loss associated with depression.¹³

Dysphagia, the decreased ability or inability to swallow, is a common result of stroke and is also associated with Parkinson's disease or other motility or structural disorders of the esophagus. It is estimated that 7–10% of older adults suffer from dysphagia and the consequent negative impact on nutritional intake.^{16,17} Dementia also is associated with poor nutritional intake. In fact, inadequate energy and **protein** intake are commonly seen in persons with Alzheimer's disease; this lack of proper caloric intake is a predictive factor of morbidity and mortality.¹⁸

The physiological changes associated with aging also can result in decreased appetite or **anorexia**. There is a general reduction in gastrointestinal motility. Prolonged satiety from a decrease in the rate of gastric emptying can inhibit food intake.¹⁹ Decreased gastrointestinal motility may also be a factor in the development of constipation, a frequent complaint of older adults.

A decrease in appetite can be the result of declines in the senses of taste and smell.²⁰ Age raises the threshold for odor detection and for recognition of salt and other specific tastes. Reduced taste and smell acuity also can be caused by certain drugs and medications. **Table 7-1** presents a summary of the effects of certain categories of drugs on appetite. Additionally, zinc deficiencies can lead to loss of taste.

There is a normal decrease in food intake associated with aging.^{21,22} This is appropriate because the basal metabolic rate decreases with age, resulting in a decrease in energy needs. However, the regulation of food intake through hormones involved in satiety and neurotransmitters involved in appetite can be impaired in the older adult, resulting in further reduced food intake²³ and inappropriate weight loss. An extreme example of this would be **cachexia**, which is defined as a “complex metabolic syndrome associated with underlying illness and characterized by loss of muscle with or without loss of fat mass.”²⁴ This is

TABLE 7-1 Drugs That Affect Appetite

Examples of Drugs That Increase Appetite	Examples of Drugs That Decrease Appetite
Alcohol	Antibiotics
Antihistamines	Bulk agents
Corticosteroids	Indomethacin
Insulin	Digoxin
Thyroid hormone	Glucagon
Psychoactive drugs	Morphine
	Fluoxetine

Source: Beers, MH, Porter, RS, Jones, TV, Kaplan, JL, Berkwitz, M. Nutrition: General considerations. *The Merck Manual* (18th ed.). Whitehouse Station, NJ: Merck & Co.; 2006.

associated with the production of inflammatory cytokines that stimulate fat and muscle breakdown as well as anorexia. This condition is often resistant to nutritional intervention and must be treated by addressing the illness leading to the production of the cytokines.^{25,26}

Sarcopenia or Loss of Muscle Mass Aging is also associated with the loss of muscle mass or **sarcopenia**. Loss of muscle mass is obviously associated with a loss of strength, which can be severe enough to interfere with the ability to perform activities of daily living (ADLs). Causes of sarcopenia include changes in endocrine function such as low estrogen and testosterone levels,²⁷ or chronic diseases associated with insulin resistance²⁸ and inadequate dietary protein intake.²⁹ Physical activity frequently decreases with age, which also is associated with the decrease of lean muscle tissue.³⁰ In one study, sarcopenia was identified in more than half of men and women over the age of 80.³¹ It occurs in overweight individuals as well as individuals who are of normal weight or underweight. Increasing and maintaining physical activity levels in older adults may be one of the most effective methods to prevent or treat sarcopenia.³²

Decreased Absorption of Nutrients Other gastrointestinal changes that can affect food intake and absorption include **lactose intolerance** resulting from decreased lactase production. Lactase is an enzyme that converts lactose to the absorbable sugars glucose and galactose. Without the enzyme, lactose cannot be absorbed, and instead becomes food for intestinal bacteria, resulting in intestinal disturbances such as gas, bloating, diarrhea, and cramping. Lactose intolerance is more common in Native Americans as well as certain ethnic groups originating from Asia, Africa, and the Mediterranean. When the condition is severe, it can cause malabsorption of other nutrients, but the primary problem is decreased **calcium** intake due to decreased intake of dairy products.

Celiac disease is also more common in the elderly than was first recognized. About 25% of newly diagnosed patients are over the age of 60. Individuals have a sensitivity to the protein gliadin, which is a component of **gluten** found in wheat and some other grains. For those with celiac disease, consumption of gliadin or gluten results in damage to intestinal villi and malabsorption, especially of fats, fat-soluble vitamins such as vitamin D, and minerals such as calcium and iron.³³

Vitamin B₁₂ absorption decreases with age. In addition, medications for heartburn, gastroesophageal reflux, or diabetes, which are commonly taken by older adults, can interfere with its absorption. Patients on these medications should have their vitamin B₁₂ levels measured by their physician.

The ability to synthesize **vitamin D** in the skin by sunlight decreases with aging. In addition, older adults, especially those who are homebound, are less likely to get outdoors so exposure to sunlight is limited. Low vitamin D levels may increase the risk of falls and fractures and contribute to the development of osteoporosis.

With aging comes a change in sense of thirst and diminished activity in the hormonal regulation of fluid balance. Together these changes may make **dehydration** more likely, and severe dehydration can lead to confusion and hospitalization.⁸

Dehydration causes several specific signs and symptoms:

- Dry lips
- Sunken eyes
- Swollen tongue
- Increased body temperature
- Decreased blood pressure
- Constipation
- Decreased urine output
- Nausea
- Confusion

Chewing difficulty related to poor dental health also increases the risk for malnutrition and weight loss for the older adult. Individuals with missing teeth, poorly fitting dentures, or for whom chewing is painful often limit their food choices to soft foods and liquids. A limited variety of foods in the diet increases the risk for nutrient deficiencies in addition to lowered caloric intake. Poor nutrition can contribute to poor dental health, so it is important to encourage appropriate dental care for the older individual.

TREATMENT OF WEIGHT LOSS AND OTHER NUTRITIONAL PROBLEMS RELATED TO AGING

WEIGHT LOSS

Conducting regular body measurements in older adults is one of the simplest ways to assess nutritional adequacy. When an older adult loses 5% or more of his or her body weight in 1 month or 10% or more in 6 months, healthcare providers need to identify the causes for the weight loss. Once the cause has been identified, it is important to treat the condition and provide appropriate nutritional support to return the person to their ideal weight. Reversible causes of weight loss in the elderly are described by the mnemonic MEALS ON WHEELS, developed by Morley.³⁴

M: medications

E: emotional (depression)

A: alcoholism, anorexia tardive, or abuse of elders

L: late-life paranoia

S: swallowing problems (dysphagia)

O: oral problems

N: no money (poverty)

W: wandering and other dementia-related problems

H: hyperthyroidism, pheochromocytoma

E: enteric problems (malabsorption)

E: eating problems

L: low-sodium, low-**cholesterol** diet

S: shopping and meal preparation problems

A referral to a registered dietitian can provide appropriate intervention when the weight loss is due to inadequate food intake. In cases where dietary restrictions, such as sodium restrictions for **hypertension** or **carbohydrate** restriction for diabetes, are associated with weight loss, modification of the dietary restrictions can be considered. The need for feeding and shopping assistance may also need to be assessed. Meals can be planned and foods purchased to meet the individual's preferences. Nutrient supplements can be considered. The nutrient density of foods can be increased by adding egg whites, tofu or milk powder, or healthy oils to foods like puddings, sauces, vegetables, grains, and pasta. Healthy snacking and high-calorie nutritional supplements may be helpful.

TREATMENT OF GASTROINTESTINAL PROBLEMS

Constipation Constipation can often be treated by increasing the intake of **fluid** and fiber. These two components must be considered together. Older adults often limit their intake of fluids. This may be unintentional and related to changes in the ability to sense thirst or intentional because of concerns about incontinence. The potential of limited fluid intake must be recognized because **dietary fiber** absorbs fluid and the combination of fiber and fluid aids in moving waste material through the large intestine. The hydrated fiber softens the stools and makes them much easier to pass.³⁵ It is absolutely critical that any recommendation to increase dietary fiber intake be accompanied by a recommendation to increase fluid intake. Failure to do so increases the risk for fecal impactions. Ensuring adequate fiber intake also reduces the incidence of diverticulosis and may also lessen the risk of certain types of colon cancer.³⁶

Malabsorption The two most common **malabsorption** problems in older adult are lactose intolerance and celiac disease.

Lactose intolerance, or lactose malabsorption, is treated by eliminating lactose from the diet. Lactose is a sugar found in all dairy products. If all dairy products are avoided, care must be taken to include other calcium-rich or calcium-fortified foods in the diet. Dairy products treated with the enzyme lactase, which converts the lactose to glucose and galactose that can be absorbed, are also an option. There are many commercially treated dairy products available on the market. Yogurt with active cultures and acidophilus milk may also be well tolerated by some individuals. In spite of the availability of these products, individuals with lactose intolerance may have difficulty meeting their calcium needs, so calcium supplements might need to be considered.

Individuals with celiac disease, also known as gluten-induced enteropathy, must avoid all products containing gluten in order to avoid intestinal damage and the accompanying malabsorption. Gluten is found in the cereal grains wheat, barley, and rye. Any products containing these grains or their derivatives must be avoided. Fortunately there are many gluten-free products available commercially, so the diet is much less restrictive today than it was before these products became readily obtainable.

Inadequate Intake or Absorption of Vitamins and Minerals Routine multivitamin and mineral supplementation in the absence of compromised nutritional status is controversial. There is very little clinical evidence to support this practice. In addition, the 2006 National Institutes of Health Consensus Conference on the use of multivitamins and minerals found insufficient evidence to recommend for or against the use of multivitamins or minerals for the prevention of chronic disease in the general population.³⁷ A multivitamin supplement should be used to ensure adequate intake of nutrients whenever there is the suspicion of poor or inadequate food intake, laboratory results reveal a deficiency, or there is some other reason why an individual may not be getting enough nutrients through diet. Older adults are most at risk of developing deficiencies of vitamin B₁₂, vitamin D, and calcium.

Because of the age-related, decreased ability to absorb vitamin B₁₂, all older adults will benefit from supplemental B₁₂. This could be in the form of a multivitamin and mineral supplement or fortified foods such as fortified breakfast cereals. Supplemental vitamin B₁₂, including what is added to fortify foods, is more easily absorbed than B₁₂ found naturally in food.³⁸ Daily recommended intake is 10–15 micrograms.³⁹

There is also an age-related decrease in the ability to synthesize vitamin D. Older adults at highest risk for vitamin D deficiency include those who are institutionalized, homebound, or have limited sun exposure.⁴⁰ Inadequate vitamin D status has been associated with muscle weakness, functional impairments, depression, and an increased risk of falls.⁴¹ The daily recommended intake of vitamin D for adults up to age 70 years is 600 international units; this increases to 800 international units after age 71.⁴² Many older adults will not meet their vitamin D requirements, especially if dairy intake is limited, so vitamin D supplements should be considered.

Calcium is another nutrient whose absorption also decreases with age. Because dairy products are a major source of calcium in the U.S. diet, individuals with lactose intolerance or those who avoid dairy products should be evaluated for the need for calcium supplements. The recommendation for adults over age 51 is 1,200 mg per day.⁴² In most cases a multivitamin and mineral supplement will not include enough calcium to meet the requirement, so additional supplementation will be needed.

OVERNUTRITION

Overnutrition is a condition of excess nutrient and energy intake over time. It can be considered a form of malnutrition when it leads to morbid obesity. In the

general population, overnutrition (i.e., a body mass index [BMI] of 25.1 to 29.9, signaling overweight, or a BMI of 30 or greater, signaling obesity) is associated with an increase in all causes of mortality, as well as morbidity related to hypertension, dyslipidemia, type 2 diabetes, and other chronic diseases. However, some data suggest the mortality risk of obesity may decrease with age. There may even be a slight advantage to being overweight for men and women over age 65.⁴³ Recommendations for older adults regarding weight loss must be made on an individual basis. Those with a high-risk profile for cardiovascular disease or diabetes, or those who are experiencing a decrease in the quality of life due to excess weight, may benefit from losing weight. Any weight loss should be pursued cautiously, with care taken to provide adequate calcium and vitamin D supplementation as well as exercise in order to prevent loss of muscle mass and a decrease in bone density.

CARDIOVASCULAR DISEASE

Although weight loss in the elderly remains controversial, there is mounting evidence to support the positive effect of making dietary changes for the primary prevention of **cardiovascular disease** in older adults. Most recently, data from the PREDIMED trial showed a relative risk reduction for cardiovascular disease of 30% in both men and women who were consuming a **Mediterranean diet** supplemented with either nuts or olive oil, as compared to a low-fat control diet. The subjects in the study ranged in age from 55 to 80 years, and 92% were overweight or obese. The participants had either type 2 diabetes or at least three major risk factors for cardiovascular disease such as smoking, hypertension, dyslipidemia, being overweight, or a family history of premature coronary heart disease. The diet was energy (calorie) unrestricted, and participants did not lose significant amounts of weight. The Mediterranean diet is consistent with the U.S. Dietary Guidelines discussed later in this chapter.⁴⁴

DIABETES

Care for the older adult with **diabetes** should include a medical nutritional evaluation by a dietitian. The dietitian can tailor a nutrition prescription based on the medical, lifestyle, and personal needs of the older adult. The older person who has diabetes needs regular help in adhering to a diet to manage blood glucose levels, whether or not she or he is insulin dependent. The individual needs to work with his or her physician and dietitian to formulate a diet plan and develop workable menus that provide good control, as well as take into consideration the person's food preferences and lifestyle habits. The emphasis should be on foods that are low on the glycemic index and the diet should be rich in fruits, vegetables, and minimally processed carbohydrates. The obese older adult with diabetes may benefit from modest weight loss; however, because weight loss in older adults increases the risk of morbidity and mortality, this should be addressed in the medical nutrition evaluation.⁴⁵ The Mediterranean diet or the **DASH (Dietary Approach to Stop**

Hypertension) diet, as recommended in the 2010 Dietary Guidelines for Americans, are good models to follow.

GENERAL NUTRITION RECOMMENDATIONS

The most important thing to consider when making general nutrition recommendations for the older adult is the heterogeneity of this population. Any dietary recommendations must be made after consideration of each older adult's individual needs. A good place to start is with the 2010 **Dietary Guidelines for Americans**,⁴⁶ which emphasizes the need to balance calories in order to maintain a healthy weight. The guidelines also include recommendations about foods that should be increased in the diet such as fruits and vegetables, whole grains, and low-fat or fat-free dairy products, as well as foods that should be reduced, such as processed foods high in sodium and sugary drinks. Diet plans consistent with these recommendations would include the DASH diet and the Mediterranean diet. Both of these diet plans are rich in fruits and vegetables, low-fat or nonfat dairy, and whole grains. They tend to be higher in fiber, low to moderate in fat, and rich in potassium, calcium, and magnesium. The meal plans are consistent with dietary recommendations for the treatment of hypertension, heart disease, and diabetes. Sample meal plans with recommended servings from each group are shown in **Table 7-2**. The appropriate caloric level will be based on individual needs and should be chosen in order to maintain a healthy weight.

There are many resources available on the Internet to assist healthcare professionals as they help their clients or patients implement these recommendations. For example, MyPlate is part of a communications initiative from the U.S. Department of Agriculture to help Americans adopt healthier eating habits based on the 2010 Dietary Guidelines for Americans. MyPlate uses a graphic of a place setting to illustrate the five food groups—dairy, protein, fruits, vegetables, and grains. The food groups are arranged on the plate to emphasize the importance of choosing a diet rich in fruits and vegetables; these two groups cover half of the plate. MyPlate is part of a larger communications initiative that includes the website ChooseMyPlate.gov, which is a good resource for healthcare professionals as well as consumers. Two groups have produced adaptations of MyPlate for older adults. Both of these modified resources include graphics to emphasize important messages for older adults, such as maintaining adequate fluid intake, and consuming fiber-rich foods and foods fortified with or rich in vitamins B₁₂ and D.

The University of Florida resource (<http://fyics.ifas.ufl.edu/Extension/HNFS/ENAFS/MyPlate.php>) includes an example of a food plan at a lower calorie level more appropriate to the decreased energy needs of older adults (see **Figure 7-1**). Drawings of older adults engaging in physical activity are included to emphasize the value of physical activity for weight control and maintenance of muscle mass and strength.

TABLE 7-2 The number of daily servings in a food group vary depending on caloric needs.

Food Group	1,200	1,400	1,600	1,800	2,000	2,600	3,100	Serving Sizes
	Calories	Calories	Calories	Calories	Calories	Calories	Calories	
Grains	4–5	5–6	6	6	6–8	10–11	12–13	1 slice bread 1 oz dry cereal ½ cup cooked rice, pasta, or cereal
Vegetables	3–4	3–4	3–4	4–5	4–5	5–6	6	1 cup raw leafy vegetable ½ cup cut-up raw or cooked vegetable ½ cup vegetable juice
Fruits	3–4	4	4	4–5	4–5	5–6	6	1 medium fruit ¼ cup dried fruit ½ cup fresh, frozen, or canned fruit ½ cup fruit juice
Fat-free or low-fat milk and milk products	2–3	2–3	2–3	2–3	2–3	3	3–4	1 cup milk or yogurt 1½ oz cheese
Lean meats, poultry and fish	3 or less	3–4 or less	3–4 or less	6 or less	6 or less	6 or less	6–9	1 oz cooked meats, poultry, or fish 1 egg
Nuts, seeds, and legumes	3 per week	3 per week	3–4 per week	4 per week	4–5 per week	1	1	½ cup or 1½ oz nuts 2 Tbsp peanut butter 2 Tbsp or ½ oz seeds ½ cup cooked legumes (dried beans, peas)
Fats and oils	1	1	2	2–3	2–3	3	4	1 tsp soft margarine 1 tsp vegetable oil 1 Tbsp mayonnaise 1 Tbsp salad dressing
Sweets and added sugars	3 or less per week	3 or less per week	3 or less per week	5 or less per week	5 or less per week	<2	<2	1 Tbsp sugar 1 Tbsp jelly or jam ½ cup sorbet, galatin dessert 1 cup lemonade
Maximum sodium limit	2,300 mg/day	2,300 mg/day	2,300 mg/day	2,300 mg/day	2,300 mg/day	2,300 mg/day	2,300 mg/day	

Source: Data from U.S. Department of Agriculture and U.S. Department of Health and Human Services. *Dietary Guidelines for Americans, 2010, 7th Edition.* Washington, DC: U.S. Government Printing Office, December 2010.

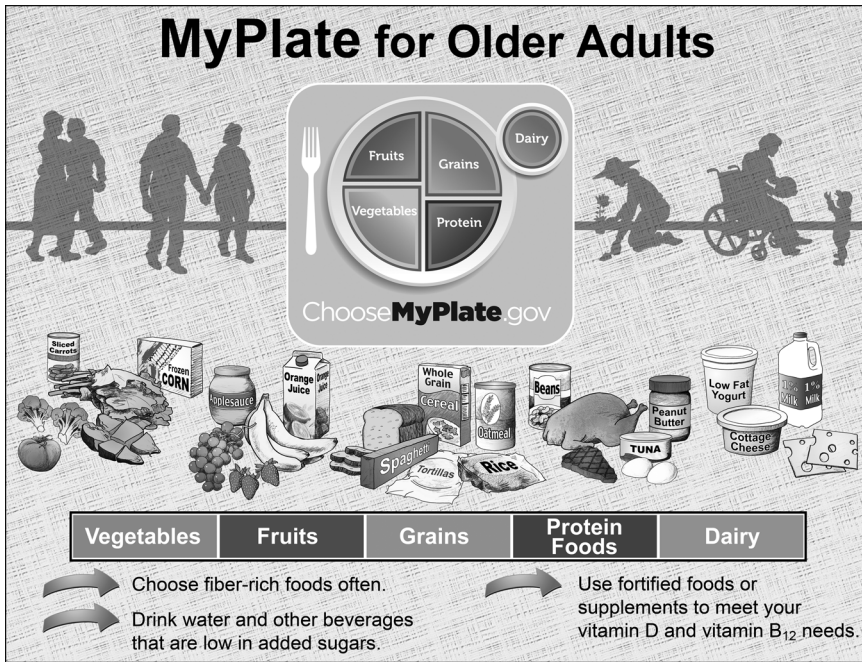


Figure 7-1 MyPlate for Older Adults: UFL Version.

Courtesy of University of Florida Family, Youth, and Community Sciences.

The adaptation by the nutrition scientists at Tufts University (www.nutrition.tufts.edu/research/myplate-older-adults) includes no text, but uses images to reinforce the healthy choices for older adults (see **Figure 7-2**). The following foods, fluids, and physical activities are represented on the Tufts University MyPlate for Older Adults:

- Bright-colored vegetables such as carrots and broccoli
- Deep-colored fruit such as berries and peaches
- Whole, enriched, and fortified grains and cereals such as brown rice and 100% whole wheat bread
- Low- and nonfat dairy products such as yogurt and low-lactose milk
- Dry beans and nuts, fish, poultry, lean meat, and eggs
- Liquid vegetable oils, soft spreads low in saturated and trans fat, and spices to replace salt
- Fluids such as water and fat-free milk
- Physical activity such as walking, resistance training, and light cleaning

Both of these adaptations emphasize some of the important factors discussed earlier in the chapter, including the need for exercise, plenty of fluid intake, and the use of

MyPlate for Older Adults

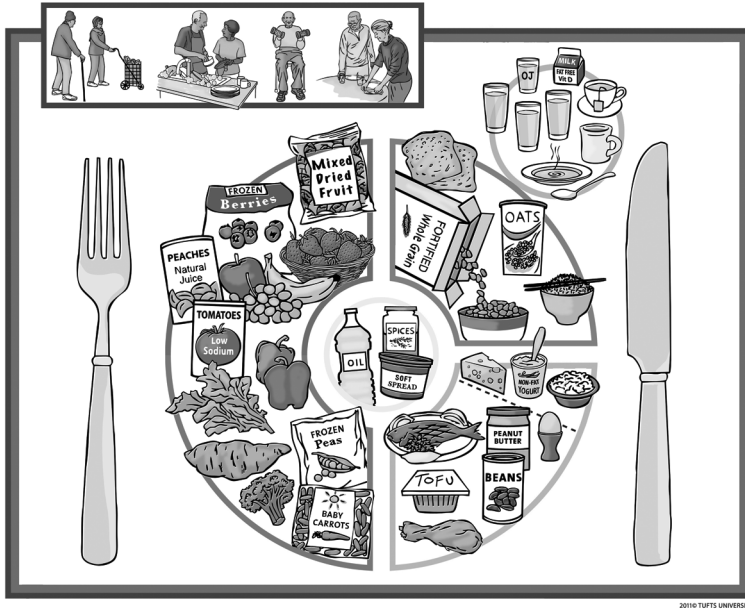


Figure 7-2 MyPlate for Older Adults: Tufts Version.

© 2011 Tufts University. For details about the MyPlate for Older Adults, please see <http://nutrition.tufts.edu/research/myplate-older-adults>.

fortified foods or supplements to meet needs for vitamins B₁₂ and D. In addition, tips to adapt the MyPlate eating plan for a vegetarian diet can be found on the ChooseMyPlate.gov website (www.choosemyplate.gov/healthy-eating-tips/tips-for-vegetarian.html)

Additional nutrition information for older adults can be found at these websites:

- Nutrition.gov: Nutrition Information for You, Seniors: www.nutrition.gov/life-stages/seniors
- NIH SeniorHealth, Eating Well as You Get Older: <http://nihseniorhealth.gov/eatingwellasyougetolder/benefitsofeatingwell/01.html>
- National Institute on Aging, Healthy Eating After 50: www.nia.nih.gov/health/publication/healthy-eating-after-50

DRUG AND NUTRIENT INTERACTIONS

More than 90% of older adults aged 57 to 85 regularly take at least one medication daily. Prescription medication use is the most prevalent, used by about 81% of this population. Over-the-counter medications or dietary supplements also are used by almost half of this

population. More than half of older adults use five or more prescription medications, over-the-counter medications, or dietary supplements every day. The most widely used medications are cardiovascular drugs including antihyperlipidemic agents and anticoagulants. **Nutritional supplements** including multivitamins and individual vitamins and minerals were the most commonly used over-the-counter medications.⁴⁷ This extensive use of medications in the population of older adults creates the potential for not only drug–drug interactions, but also drug–nutrient interactions. Antihyperlipidemic drugs such as statins can interact with niacin, a nutritional supplement (vitamin B₂), increasing the risk of myopathy and rhabdomyolysis. Garlic interacts with Coumadin (warfarin), an anticoagulant, and increases the risk of bleeding. Vegetables high in vitamin K may decrease the effectiveness of Coumadin and increase the risk of clotting. Grapefruit juice affects the metabolism of a large number of drugs including the statins. It increases the bioavailability of these drugs and can result in higher serum levels.⁴⁸ These are only a few examples, but they illustrate the necessity for older adults to consult a physician, dietitian, and/or pharmacist to avoid complications related to drug and nutrient interactions.

ALCOHOL

Continued use and abuse of alcohol in later life may be brought on by the many social changes that older adults experience, such as death of a spouse, loss of friendship, and feelings of loneliness and isolation. Healthcare professionals need to be sensitive to these problems and be ready to make referrals to other appropriate healthcare professionals and community support groups. Nutritionally speaking, alcohol abuse compromises health and leads to malnutrition for several reasons. First, alcohol replaces food in the diet. Alcohol is a source of empty calories, and when older people spend their limited resources on alcohol instead of healthy foods, they can compromise their health. Second, alcohol interferes with the normal absorption of vitamin B₁₂, folic acid, and vitamin C. Alcohol also interferes with the metabolism of vitamins D and B₆ and increases the need for B vitamins and magnesium. All of these may result in multiple deficiencies that can impair health.

SUMMARY

The value of appropriate nutrition screening and intervention cannot be overestimated in providing quality care for older adults. Good nutrition not only optimizes health and well-being, but also helps prevent the onset of many chronic diseases.

It is imperative that healthcare providers be sensitive to the many changes that occur with aging and to the ways in which nutrition can affect the quality of life of older people. The first step is to understand the basic principles of nutrition and how these can be applied to encourage healthy eating. Second, healthcare professionals need to be aware of how the aging process can alter nutritional status. With careful screening, counseling, and referral if necessary, healthcare professionals can be certain that older persons' nutritional

well-being is optimal. Ensuring quality nutrition is a crucial component of providing the best health care possible for the older population.

Review Questions

1. An important factor to consider when working with the older adult population is that
 - A. It is a heterogeneous population.
 - B. All suffer from chronic diseases.
 - C. It is an economically disadvantaged population.
 - D. All are underweight.
2. According to the Academy of Nutrition and Dietetics and the American Society for Parenteral and Enteral Nutrition, nutrition screening tools should include an assessment of
 - A. Weight
 - B. Muscle mass
 - C. Functional capacity
 - D. All of the above
3. In which of the following groups is the prevalence of malnutrition highest?
 - A. Residents of long-term care facilities
 - B. Residents of retirement communities for active older adults
 - C. Older adults ages 60–80 living in a small town
 - D. Attendees of a college program for seniors
4. Poor dietary intake is associated with
 - A. Depression, dysphagia, and dementia
 - B. Poverty, living with a spouse, and hypertension
 - C. Constipation, diabetes, and Alzheimer's disease
 - D. Dyslipidemia, lack of exercise, and alcohol
5. One of the most effective treatments for sarcopenia is
 - A. A high protein diet
 - B. The Mediterranean diet
 - C. Physical activity
 - D. Bed rest

Learning Activities

1. You have just met with a patient who will be included in your caseload. The patient is an 82-year-old man whose wife died last year. He has no family members who live in the community. He was referred to you by his physician, who is concerned because he has lost 20 pounds in the past year. The patient is 5'10" and his current

- weight is 158 pounds. What additional information do you need to assist this patient? What could be the potential causes of his weight loss? What are your recommendations? To whom would you refer him?
2. You have just met with a new patient at the practice where you work as a medical assistant. Your new patient is a 75-year-old woman who is 5'4" and weighs 105 pounds. She has a medical history of chronic pain caused by arthritis. She reports that she has recently lost interest in cooking for herself and her husband. She adds that she has a poor appetite and often forgets to eat. What would you suggest?
 3. You are asked by your employer to give a presentation to a senior citizen women's group that regularly meets at their local church for evening meals financed by the church and prepared by volunteers. You agree to join them, and note that the meal consists of roast beef, mashed potatoes and gravy, biscuits with butter, coffee, and apple pie. During dinner you ask and find that most of their meals are similar to this one. You present your talk on osteoporosis and agree to come back in a month for another talk. What would you want to focus on next time? Why?
 4. Discuss either how your current diet will be appropriate as you age or how it might need to change to improve your chances for optimal aging. Given the current weight status of your age group (and other cohorts), what will likely be the issues with regard to nutrition in the future? What can be done now to ensure future well-being to the highest degree possible?

REFERENCES

1. Allen, JE. *Assisted Living Administration: The Knowledge Base*. 2nd ed. New York: Springer, 2004: 300.
2. Reuben, DB, Yoshikawa, TT, Besdine, RW (Eds.). *Geriatrics Review Syllabus Supplement*. New York: American Geriatrics Society, 1993: 172.
3. Centers for Disease Control and Prevention, Merck Company Foundation. *The State of Aging and Health in America 2007*. Whitehouse Station, NJ: Merck Company Foundation, 2007. Retrieved April 12, 2012, from http://www.cdc.gov/aging/pdf/saha_2007.pdf
4. U.S. Department of Health and Human Services, Administration on Aging. *Older Americans Act*. 2006.
5. Institute of Medicine. *The Role of Nutrition in Maintaining Health in the Nation's Elderly: Evaluating Coverage of Nutrition Services for the Medicare Population*. Washington, DC: National Academy Press, 2000.
6. Dwyer, JT. *Screening Older Americans' Nutritional Health: Current Practices and Future Possibilities*. Washington, DC: Nutrition Screening Initiative, 1991.
7. Skipper, A, et al. Nutrition screening tools: An analysis of the evidence. *Journal of Parenteral and Enteral Nutrition*, 2012;36:292.
8. White, JV, et al. Consensus statement: Academy of Nutrition and Dietetics and American Society for Parenteral and Enteral Nutrition: Characteristics recommended for the identification and documentation of adult malnutrition (undernutrition). *Journal of Parenteral and Enteral Nutrition*, 2012;36:275.
9. Kaiser, MJ, et al. Frequency of malnutrition in older adults: A multinational perspective using the Mini Nutritional Assessment. *Journal of the American Geriatrics Society*, 2010;58:1734.
10. Sullivan, DH. Impact of nutritional status on health outcomes of nursing home residents.

- Journal of the American Geriatrics Society*, 1995;43:195.
11. de Castro, JM, Brewer, EM. The amount eaten in meals by humans is a power function of the number of people present. *Physiology and Behavior*, 1992;51:121.
 12. Locher, JL, et al. The effect of the presence of others on caloric intake in homebound older adults. *Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 2005;60:1475.
 13. Wilson, MM, et al. Prevalence and causes of undernutrition in medical outpatients. *American Journal of Medicine*, 1998;104:56.
 14. Thompson, MP, Morris, LK. Unexplained weight loss in the ambulatory elderly. *Journal of the American Geriatrics Society*, 1991;39:497.
 15. Rabinovitz, M, et al. Unintentional weight loss. A retrospective analysis of 154 cases. *Archives of Internal Medicine*, 1986;146:186.
 16. Achem, SR, Devault, KR. Dysphagia in aging. *Journal of Clinical Gastroenterology*, 2005;39:357.
 17. Keller, HH. Malnutrition in institutionalized elderly: How and why? *Journal of the American Geriatrics Society*, 1993;41:1212.
 18. White, H. Weight change in Alzheimer's disease. *Journal of Nutrition, Health and Aging*, 1998;2:110–112.
 19. Horowitz, M, et al. Changes in gastric emptying rates with age. *Clinical Science (London)*, 1984;67:213.
 20. Rolls, BJ. Do chemosensory changes influence food intake in the elderly? *Physiology and Behavior*, 1999;66:193.
 21. Roberts, SB. A review of age-related changes in energy regulation and suggested mechanisms. *Mechanisms of Ageing and Development*, 2000;116:157.
 22. Morley, JE. Decreased food intake with aging. *Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 2001;56(2):81.
 23. Parker, BA, Chapman, IM. Food intake and ageing—the role of the gut. *Mechanisms of Ageing and Development*, 2004;125:859.
 24. Evans, WJ, et al. Cachexia: A new definition. *Clinical Nutrition*, 2008;27:793.
 25. Martinez, M, Arnalich, F, Hernanz, A. Alterations of anorectic cytokine levels from plasma and cerebrospinal fluid in idiopathic senile anorexia. *Mechanisms of Ageing and Development*, 1993;72:145.
 26. Oldenburg, HS, et al. Cachexia and the acute-phase protein response in inflammation are regulated by interleukin-6. *European Journal of Immunology*, 1993;23:1889.
 27. Joseph, C, et al. Role of endocrine-immune dysregulation in osteoporosis, sarcopenia, frailty and fracture risk. *Molecular Aspects of Medicine*, 2005;26:181.
 28. Rasmussen, BB, et al. Insulin resistance of muscle protein metabolism in aging. *FASEB Journal*, 2006;20:768.
 29. Garry, PJ, et al. Nutritional status in a healthy elderly population: Dietary and supplemental intakes. *American Journal of Clinical Nutrition*, 1982;36:319.
 30. Rantanen, T, Era, P, Heikkinen, E. Physical activity and the changes in maximal isometric strength in men and women from the age of 75 to 80 years. *Journal of the American Geriatrics Society*, 1997;45:1439.
 31. Lindle, RS, et al. Age and gender comparisons of muscle strength in 654 women and men aged 20–93 yr. *Journal of Applied Physiology*, 1997;83:1581.
 32. Montero-Fernández, N, Serra-Rexach, JA. Role of exercise on sarcopenia in the elderly. *European Journal of Physical and Rehabilitation Medicine*, 2013;49(1):131–143.
 33. Holt, PR. Intestinal malabsorption in the elderly. *Digestive Diseases*, 2007;25:144–150.
 34. Morley, JE. Anorexia of aging: Physiologic and pathologic. *American Journal of Clinical Nutrition*, 1997;66:760–773.
 35. Slavin, JL. Position of American Dietetic Association: Health Implications of Dietary Fiber. *Journal of the American Dietetic Association*, 2002;102(7):993–1000.
 36. Giovannucci, E, et al. Relationship of diet to risk of colorectal cancer adenoma in men. *Journal of the National Cancer Institute*, 1992;84:91–98.
 37. National Institutes of Health State-of-the-Science Panel. National Institutes of Health state-of-the-science conference statement: Multivitamin/mineral supplements and chronic disease prevention. *Annals of Internal Medicine*, 2006; 145:364.

38. Baik, HW, Russell, RM. Vitamin B₁₂ deficiency in the elderly. *Annual Review of Nutrition*, 1999;19:357–377.
39. Institute of Medicine, Food and Nutrition Board. *Dietary Reference Intakes: Thiamin, Riboflavin, Niacin, Vitamin B-6, Vitamin B-12, Pantothenic Acid, Biotin, and Choline*. Washington, DC: National Academy Press, 1998.
40. MacLaughlin, J, Holick, MF. Aging decreases the capacity of human skin to produce vitamin D₃. *Journal of Clinical Investigation*, 1985;76:1536.
41. Gerdhem, P, Ringsberg, KA, Obrant, KJ, Akesson, K. Association between 25-hydroxy vitamin D levels, physical activity, muscle strength and fractures in the prospective population-based OPRA study of elderly women. *Osteoporosis International*, 2005;16:1425.
42. National Research Council. *Dietary Reference Intakes for Calcium and Vitamin D*. Washington, DC: National Academies Press, 2011.
43. Sui, X, et al. Cardiorespiratory fitness and adiposity as mortality predictors in older adults. *Journal of the American Medical Association*, 2007; 298:2507.
44. Estruch, R, et al. Primary prevention of cardiovascular disease with a Mediterranean diet. *New England Journal of Medicine*, 2013;368: 1279–1290.
45. Wedick, NM, Barrett-Connor, E, Knoke, JD, Wingard, DL. The relationship between weight loss and all-cause mortality in older men and women with and without diabetes mellitus: The Rancho Bernardo study. *Journal of the American Geriatrics Society*, 2002;50:1810.
46. U.S. Department of Agriculture, U.S. Department of Health and Human Services. *Dietary Guidelines for Americans, 2010*. 7th ed. Washington, DC: U.S. Government Printing Office, December 2010.
47. Qato, DM, Alexander, GC, Conti, RM, Johnson, M, Schumm, P, Lindau, S. Use of prescription and over-the-counter medications and dietary supplements among older adults in the United States. *Journal of the American Medical Association*, 2008;300(24):2867.
48. Leibovitch, ER, Deamer, RL, Sanderson, LA. Food–drug interactions: Careful drug selection and patient counseling can reduce the risk in older patients. *Geriatrics*, 2004;59:19–33.

