

# 6

## Older Adults

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### Objectives\*

- Describe the physiologic changes associated with aging and their impact on nutrient requirements, absorption, and metabolism.
- List common risk factors associated with poor nutritional status in older Americans.
- Identify the tools used to assess nutritional, functional, cognitive, and emotional status in older adults and the impact that alterations in any one or more of these parameters have on health and quality of life.
- Identify common drug-nutrient interactions in older adults and recognize why this population is at risk for such interactions.

The older adult population in the United States and in most Western nations is rapidly expanding. By the year 2030, an estimated 70 million Americans will be 65 years of age or older. Of these, approximately 18 million Americans will be 85 years of age or older. Minority populations (Hispanics, Asians/Pacific Islanders, Native Americans, and African-Americans) are projected to represent more than 25% of the elderly population by 2030. Women continue to significantly outnumber men as age increases.

Information on the health and nutritional status of older Americans from the third National Health and Nutrition Examination Survey (NHANES III) suggests that diet plays a major role in the health and disease of adults aged 65 years and older. For many low-income and minority older adults, it may be the most important factor. Only 21% of older Americans had diets that were rated “good” according to the Healthy Eating Index when compared to younger adults; 13% reported diets rated “poor,” and 67% consumed diets that

\* SOURCE: Objectives for chapter and cases adapted from the *NIH Nutrition Curriculum Guide for Training Physicians* (<http://www.nhlbi.nih.gov/funding/training/naa>).

“need improvement.” Inadequate physical activity is a health risk in older people, with one-third of older adults reporting no leisure time activity in a 2-week period.

Older adults are at increased risk of consuming an inadequate diet due to the presence of disease, physical disability, inability to chew food adequately, polypharmacy, social isolation, and poverty. Among older adults, nutrient intake tends to decline as age increases and regulation of energy intake in response to over- or underfeeding is less precise. Total calories and intakes of calcium, vitamin B<sub>12</sub>, and folate fall well below those suggested by the recommended dietary allowances (RDAs) and the dietary reference intakes (DRIs) (see Table 2-2).

### Physiologic Changes Associated with Aging

Recognition of the physiologic changes that usually occur with the aging process is essential to evaluating diet and health. Physiologic decline escalates in the fifth decade, with some functional measures changing very little (i.e., conduction velocity of cardiac myocytes) and others undergoing substantial alteration (i.e., renal plasma flow). Not all organs age in the same manner or at the same rate. Total body water decreases by approximately 20%, and body fat increases with age. Basal metabolic rate (BMR) decreases with age as a result of reductions in lean body mass and increased adipose tissue.

Moderate exercise helps to preserve lean body mass, thereby slowing the rate at which this process occurs. Among individuals of the same age and gender, however, body fat content is much more variable than is lean body mass. Digestion and absorption of macronutrients appear to be well preserved as aging occurs. Reduction in gastric acid secretion and gastric motility, however, may contribute to decreased absorption of critical nutrients such as folate, vitamin B<sub>12</sub>, vitamin D, and calcium.

Although an independent effect of age on taste and smell has been demonstrated, it is highly variable among individuals and its impact on food intake and diet quality is uncertain. Chronic disease, medication use, poor oral hygiene, dentures, smoking, and poor nutritional status itself are significant contributors to age-related changes in taste and smell. Changes in the sleep cycle often lead to poor sleep quality, insomnia, daytime drowsiness, reduced participation in activities, and depression; ability to access and to prepare a healthy diet may therefore be impaired. Table 6-1 highlights age-related physiologic changes and their potential consequences.

### Risk Factors for Poor Nutritional Status in Older Adults

#### Acute and Chronic Diseases or Disorders

Most older adults have at least one chronic disease or condition, and many have several. The prevalence of chronic disease increases with advancing age and varies according to gender and race. The most common are cardiovascular

**Table 6-1 Age-related physiologic changes with potential nutrition-related outcomes.**

ORGAN SYSTEM	CHANGE	POTENTIAL OUTCOME
Body composition	↑ Fat	↓ Basal metabolic rate ↑ Fat-soluble drug storage, with prolonged half-life
	↓ Body water	↑ Concentration of water-soluble drugs
Gastrointestinal	↓ Gastric acid secretion	↓ Absorption of folate, protein-bound vitamin B <sub>12</sub>
	↓ Gastric motility	↓ Bioavailability of minerals, vitamins, protein
	↓ Lactase activity	Avoidance of milk products, with reduced intake vitamin D and calcium
Hepatic	↓ Size and blood flow	↓ Albumin synthesis rate
	↓ Activity drug-metabolizing enzymes	Poor or delayed metabolism of certain drugs
Immune	↓ T-cell function	Anergy ↓ Resistance to infection
	Brain atrophy	↓ Cognitive function
Neurologic		
Renal	↓ Glomerular filtration rate	Reduced renal excretion of metabolites, drugs
Sensory-perceptual	↓ Taste buds, papilla on tongue	Altered taste threshold, reduced ability to detect sweet/salt, increased use of salt/sugar
	↓ Olfactory nerve endings	Altered smell threshold, reduced palatability causing poor food intake
Skeletal	↓ Bone density	↓ Fractures

SOURCE: Nutrition Screening Initiative. 2626 Pennsylvania Ave NW, Suite 301, Washington, DC 20037.

disease (65%), arthritis (49%), hypertension (36%), hearing impairment (30%), orthopedic impairment (18%), cataracts (17%), sinusitis (12%), and diabetes (10%). These data underestimate the prevalence of the dementias, a group of illnesses dominated by Alzheimer's disease (AD). Leading causes of death in this age group include heart disease, cancer, and stroke, respectively.

The presence of a chronic disease or condition often results in a prescribed or self-imposed modification in food intake. Such modifications frequently limit variety and result in decreased total nutrient intake.

AD is the main cause of progressive dementia in old age. The characteristic, extremely slow onset of AD makes its early recognition difficult for family and clinician alike, and authorities encourage earlier diagnosis. This would lead to earlier medical treatment and earlier training of family caregivers, who have essential roles, including ensuring nutrition and hydration. A meta-analysis of reported early symptoms of AD confirms that apathy is the most frequent early behavioral manifestation, with indecisiveness, impaired abstract thinking, and reduced ability in complex instrumental activities of daily living (IADLs; i.e., planning and conceptualizing shopping and food preparation) also very characteristic. This one illness even before the patient has enough impairment to be described as suffering from "dementia" is an often unrecognized contributor to overt undernutrition. In summary, patients who present with unintentional

weight loss or signs/symptoms of undernutrition in conjunction with acute or chronic illness should be monitored closely.

### Oral Health Problems

Approximately 23% of the older US population is edentulous, with the prevalence by state ranging from 14% in Hawaii to 48% in West Virginia. Edentulism is higher among minorities and among those who smoke, are uninsured, have less formal education, and reside in a nursing home. Nearly one-third of older Americans with natural teeth had untreated root or crown cavities, and 41% had periodontal disease. Incidence of periodontal disease is higher in those with cardiovascular disease or diabetes. Patients who have loose, decaying, or missing teeth; difficulty chewing; or ill-fitting dentures or who fail to wear their dentures are at increased risk for poor nutritional status due to a decreased or modified food intake.

### Cognitive and Emotional Impairment

Changes in the level of cognitive function that are associated with normal aging are difficult to quantify. The limited data from longitudinal sources suggest that short-term memory (20 seconds or less) declines with age. Progressive dementia is characterized by a gradual decline in multiple cognitive functions that causes loss of the ability to make choices, to initiate activities (such as shopping and food preparation), and to simply remember to eat appropriately. Clearly, dementia is a major risk factor for undernutrition. Extensive evidence has shown that patients with dementia often become undernourished.

Grief or mourning is viewed as a normal part of life, yet the elderly are forced to suffer its effects more often because they are more likely to experience loss—death of friends, spouses, or loved ones; retirement; decline in personal income; and decline in general health. In individuals of all ages, grief may dramatically disrupt memory and can result in a general sense of confusion and disorganization. Disease processes for which mourners may be at increased risk include myocardial infarction, gastrointestinal cancer, hypertension, neurodermatitis, rheumatoid arthritis, diabetes, thyrotoxicosis (women in particular), depression, alcohol/drug abuse, undernutrition, headaches, low back pain, colds/flu, excessive fatigue, impotence, and sleep disorders. Although the symptoms of grief, such as insomnia, changes in appetite, difficulty in decision-making, and problems in cognition, can mimic those of a depressive disorder, it is important to distinguish between these conditions. Older adults may need more frequent contact with their physician during the first 2 years following a grief-inducing incident.

In older people, depression can present as cognitive impairment, with memory and concentration being particularly affected. However, change in appetite (usually a reduction but sometimes a pathologic increase) is a defining feature of “major depression,” that is, a depression that will likely respond to treatment with antidepressant drugs. The depressed individual will become undernourished

with decreased food intake as a result of feelings of poor self-esteem, lack of motivation, and negativity. New onset of reduced food intake should always lead to consideration of depression as a cause.

### **Isolation**

Seventeen percent of men and 40% of women aged 65 years and older live alone. The likelihood of living alone increases as age advances. Loneliness is greater among divorced, widowed, or childless men; older women who have outlived spouse and friends; older adults who live alone; those with few contacts; those more physically disabled; those who subjectively feel that their health is poorer or that their economic condition is inadequate; and those with hearing or visual impairments.

Elderly people who have limited social interaction or infrequent contact with family, friends, or neighbors on an individual level, and who are unable or unwilling to access social support systems on a broader level, may experience decreased food intake, lack of appetite, and limited motivation to shop and prepare meals as a result. Eating is a social event that is often enhanced by the presence of others. Loneliness, and in particular the lack of a companion at mealtimes, tends to have a negative impact on food intake.

### **Alcohol/Drug Use**

The potential benefits of moderate alcohol use (1 to 2 drinks per day) described in the literature for older individuals include mood enhancement, stress reduction, sociability, social integration, maintenance of long-term cognitive functioning, improved cardiovascular health, and enhanced bone mineral density. However, 6% to 11% of elderly patients admitted to hospitals and 14% of those in emergency rooms exhibit symptoms of alcoholism. In nursing homes, the percentage may be as high as 49%. Studies of elderly living in the community suggest that although 62% report alcohol consumption, approximately 13% of men and 2% of women drink heavily. Generally, about 6% of US elderly are considered heavy alcohol users (>2 drinks per day). Early-onset alcoholics frequently have a family history of alcoholism and higher prevalence of antisocial behavior. Poverty and family estrangement are common in this group. Late-onset drinkers usually have higher education and income levels. They are more likely to have greater resources, family support, and better treatment outcomes. Depression, loneliness, and lack of social support are the most frequent reasons given for late-onset drinking by the elderly.

The type of alcohol/drug consumed and the duration and frequency of alcohol/drug consumption should be ascertained using a simple questionnaire (CAGE; see Chapter 8, Case 1). Interviewing family members may also be helpful. Remember that denial or understatement of amount or frequency of alcohol consumption is common. Ascertain the presence of anxiety, depression, or other psychiatric/personality disorders and look for isolation, falls,

accidents, or other clues for intoxication. Remind patients that use of prescription or over-the-counter medications may be a contraindication to alcohol consumption.

### Socioeconomic Status

Approximately 17% of the older US population were poor and near poor in 2000. Women, minorities, and elders living in central cities, rural areas, and the South had higher than average poverty rates. Elders living alone or with nonrelatives were more likely to be poor than those living in families. Highest poverty rates were experienced by older Hispanic women (38.3%) living alone or with nonrelatives.

Many older individuals are reluctant to use food stamps or similar feeding programs because of “welfare stigma” and their pride. Many do not know how to access federal programs, are uncomfortable going to a congregate dining site, do not qualify for home-delivered meals, or are placed on a long waiting list. Food/meals provision activities sponsored by churches or other nongovernmental agencies are often the type of help that most elders find acceptable. Consideration of the older person’s socioeconomic status and knowledge of available social service options are essential to reducing nutritional risk in elders.

### Functional Status

More than half of older Americans report some degree of disability, and over one-third report severe disability. Approximately 14% report limitation in the activities of daily living (ADLs), which reflect an individual’s capacity for self-care, and 21% report limitation in the IADLs, which reflect more complex tasks that enable a person to live independently in the community (Table 6-2). The percent with disability increases with increased age.

Even after controlling for demographic, socioeconomic, gender, and racial factors, level of disability predicts increased mortality risk. It is imperative that,

**Table 6-2** Commonly used measures of functional capacity.

ACTIVITIES OF DAILY LIVING (ADLs) (REFLECT CAPACITY FOR SELF-CARE)	INSTRUMENTAL ACTIVITIES OF DAILY LIVING (IADLs) (REFLECT CAPACITY FOR INDEPENDENT LIVING)
Bathing	Telephone use
Dressing	Walking
Toileting	Shopping: groceries/clothes
Transferring	Meal preparation
Continence	Housework/laundry
Feeding	Home maintenance/repair
	Taking medicines
	Managing money

SOURCE: Nutrition Screening Initiative. 2626 Pennsylvania Ave NW, Suite 301, Washington, DC 20037.

when taking a medical history in older individuals, questions regarding functional capacity be included.

### **Polypharmacy**

A recent survey of adult Americans showed that in those aged 65 and older, 91% of men used at least 1 drug, 44% used 5 or more drugs, and 12% used 10 or more drugs during the preceding week. For older women, the figures were 94%, 57%, and 12%, respectively. The most common reasons for taking drugs were hypertension and headache. However, several concurrent medications are the standard of care for an increasing number of conditions (e.g., chronic obstructive pulmonary disease, cardiovascular illnesses), and other medications are widely regarded as underprescribed (e.g., cholinesterase inhibitors that postpone the progression of AD, antidepressants, analgesics—including narcotics—for relief of chronic severe pain). Thus, multiple medications are often necessary in elders; unfortunately, the prescriber rarely considers the potential detriment to nutritional health of each and every prescription. Elderly people in poor health and on multiple medications are at highest risk for undernutrition.

Vitamin/mineral supplement use was reported by 47% and 59% of older men and women, respectively, and the use of herbal supplements was reported by 11% and 14%. Vitamins/minerals and herbs were taken because they “promote health/are good for you.” Foods/nutrients have the potential to alter the effects of drugs by affecting their pharmacokinetics (absorption, distribution, metabolism, or excretion) and influencing their pharmacologic actions or effects. Drug categories and specific examples of drugs within these categories that may be affected by food are listed in Table 6-3. It is increasingly clear that some complementary/alternative medicines are pharmacologically active substances and should be regarded as “real” medicines, although unregulated and freely available (i.e., St. John’s wort, ginkgo biloba) (Chapter 3).

### **Nutrition Screening and Assessment Tools**

No single physical or biochemical parameter accurately measures nutritional status. Thus, a number of tools have been developed in an attempt to provide relevant information that clinicians can use in the identification of poor nutritional status in the elderly. The Nutrition Screening Initiative’s (NSI) Determine Your Nutritional Health Checklist and Level 2 Screen, Subjective Global Assessment, the Meals on Wheels mnemonic and Mini Nutritional Assessment, the NSI Care Alerts, and the Health Care Financing Administration (Centers for Medicare and Medicaid Services) Nutrition and Hydration Care are examples of structured approaches to nutrition screening and assessment in the elderly. All tools are available online and are listed in the reference section. Each has benefits and limitations. Regardless of the tool used, a structured approach to nutrition screening and assessment must become an integral component of your care of each older person, either free living or institutionalized.

**Table 6-3 Common medications and nutrition-related side effects.**

**Antimicrobial agents**

- Absorption of tetracyclines and certain fluoroquinolones may be decreased by chelation with dietary cations such as calcium and magnesium in milk products.
- Absorption of macrolide agents (i.e., azithromycin, erythromycin) may be reduced by food/meals.
- A disulfiram-like reaction is produced by the ingestion of metronidazole or cephalosporins and alcohol.
- Vitamin B<sub>6</sub> metabolism is impaired by isoniazid; the effect is dose related and can lead to the development of peripheral neuropathy.
- Absorption of didanosine is decreased by food.
- Absorption of griseofulvin is increased by food.

**Cardiovascular and cholesterol-lowering drugs**

- Concentrations of digoxin may be reduced by food/fiber intake.
- Hyperkalemia and/or changes in taste may be caused by angiotensin-converting enzyme (ACE) inhibitors.
- Flavonoid compounds in grapefruit increase serum felodipine concentrations.
- Foods high in soluble fiber decrease absorption of 3-hydroxy-3-methyl-glutaryl-coenzyme A (HMG-CoA) reductase inhibitors.
- Bile acid sequestrants decrease absorption of the fat-soluble vitamins (A, D, E, K).

**Oral anticoagulants**

- Foods high in vitamin K (including enteral formulations) may counteract the effects of oral anticoagulants.
- Ginkgo biloba and allium sativum (garlic) augment the anticoagulant effect of oral anticoagulants.

**Bronchodilators**

- Protein and carbohydrate alter hepatic clearance of theophylline.
- Food may induce dose-dumping of sustained-release theophylline preparations.
- Caffeine increases serum theophylline concentrations and enhances its pharmacologic effects.

**Anticonvulsants**

- Enteral formulations reduce serum phenytoin levels.
- Applesauce increases serum phenytoin levels.
- Reductions in serum folate levels caused by valproic acid may result in neural tube defects in the infants of women taking this drug. Carbamazepine, phenobarbital, and primidone produce a similar effect.
- Folic acid may reduce serum phenytoin levels and decrease seizure control.
- Vitamin D metabolism is altered by phenytoin and phenobarbital and may result in osteoporosis.

**Anti-Parkinson drugs**

- Protein may delay absorption of levodopa.
- Tyramine-containing foods may interact with selegiline hydrochloride.

**Antidepressants**

- Tyramine-containing foods interact with monoamine oxidase (MAO) inhibitors, which may produce a hypertensive crisis and chest pain.
- High- and low-sodium diets may increase and decrease renal lithium excretion, respectively; decreased lithium excretion may result in lithium toxicity.
- Appetite is temporarily suppressed by fluoxetine hydrochloride and similar serotonin reuptake inhibitors (SSRIs), although anorexia from the depression itself may respond to SSRIs.
- Ginkgo biloba may increase digoxin toxicity.

**Table 6-3 (continued)**

**Laxatives**

- Stimulant or saline laxatives decrease absorption of electrolytes.
- Stimulant laxatives, if taken with milk, may dissolve in the stomach rather than the small intestine, causing gastric irritation and abdominal cramps.
- Mineral oil decreases absorption of the fat-soluble vitamins (A, D, E, K).

**Antacids**

- Aluminum-containing antacids may decrease the absorption of phosphate.

**Antineoplastic drugs**

- Numerous antineoplastic drugs may suppress appetite, resulting in weight loss.

## Nutritional Needs of Older Adults

The nutritional needs of older adults are difficult to quantify due to “physiologic diversity and heterogeneity” and the prevalence of chronic diseases. Deficiency signs and symptoms are uncommon in elderly individuals who live in the community but are occasionally seen in people who are frail, homebound, and must rely on others to meet basic needs. In general, nutrient needs in older adults appear to be similar to those for middle-aged adult populations. However, for some nutrients, clear evidence of increased need exists.

The recently revised DRIs (see Table 2-2) represent quantitative estimates that are useful in planning and assessing diets for healthy people. To date, DRIs have been established for the vitamins/minerals essential for maintenance of bone health and for the B-complex vitamins and choline. Those nutrients for which clear evidence of increased need in older adults has been established are discussed below.

### **Calcium**

Osteoporosis is a major health risk for older women and men. Calcium recommendations were set at levels associated with maximum retention of body calcium since bones that are calcium rich are known to be less susceptible to fracture. For men and women aged 51 years and older including those over age 70, the DRI value for calcium is 1200 mg per day, and the tolerable upper intake level (UL) for calcium is 2500 mg per day. Supplements should be considered for those whose dietary intake of calcium is poor.

### **Vitamin D**

For vitamin D, the DRI value for men and women aged 51 to 70 years is 10  $\mu$ g per day (400 IU), and for those over age 70, it is 15  $\mu$ g per day (600 IU). The tolerable UL for vitamin D for adults is 50  $\mu$ g per day (2000 IU). Supplements should be considered for frail homebound or institutionalized elderly patients whose exposure to sunlight is limited or those in whom evidence of osteomalacia or osteoporosis is documented.

### **Folate**

The DRI value for folate for adults aged 51 years and older is set at 400  $\mu$ g per day. Because folate fortification of grain products is now widespread in the United

States, it is believed that most older people can obtain an adequate folate intake from their diet. The upper intake limit for folate has been set at 1000  $\mu\text{g}$  per day (1 mg per day). Excessive consumption of folic acid may mask a vitamin B<sub>12</sub> deficiency, allowing the neurologic sequelae to progress even though the anemia associated with this deficiency resolves.

*The Warning Signs of poor nutritional health are often overlooked. Use this Checklist to find out if you or someone you know is at nutritional risk.*

Read the statements below. Circle the number in the “yes” column for those that apply to you or someone you know. For each “yes” answer, score the number in the box. Total your nutritional score.

## DETERMINE YOUR NUTRITIONAL HEALTH

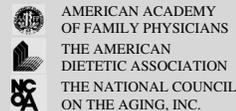
	YES
I have an illness or condition that made me change the kind and/or amount of food I eat.	2
I eat fewer than 2 meals per day.	3
I eat few fruits or vegetables or milk products.	2
I have 3 or more drinks of beer, liquor or wine almost every day.	2
I have tooth or mouth problems that make it hard for 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 3 or more different prescribed or over-the-counter drugs a day.	1
Without wanting to, I have lost or gained 10 pounds in the last 6 months.	2
I am not always physically able to shop, cook and/or feed myself.	2
<b>TOTAL</b>	

Total Your Nutritional Score. If it's –

- 0-2 Good! Recheck your nutritional score in 6 months.
- 3-5 You are at moderate nutritional risk. See what can be done to improve your eating habits and lifestyle. Your office on aging, senior nutrition program, senior citizens center or health department can help. Recheck your nutritional score in 3 months.
- 6 or more You are at high nutritional risk. Bring this Checklist the next time you see your doctor, dietitian or other qualified health or social service professional. Talk with them about any problems you may have. Ask for help to improve your nutritional health.

**Remember that Warning Signs suggest risk, but do not represent a diagnosis of any condition. Turn the page to learn more about the Warning Signs of poor nutritional health.**

*These materials are developed and distributed by the Nutrition Screening Initiative, a project of:*



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 The Nutrition Screening Initiative is funded in part by a grant from Ross Products Division of Abbott Laboratories, Inc.

**Figure 6-1 Determine your nutritional health.**

SOURCE: The Nutritional Screening Initiative

The Nutrition Checklist is based on the Warning Signs described below.  
Use the word **DETERMINE** to remind you of the Warning Signs.

## **D**ISEASE

Any disease, illness or chronic condition which causes you to change the way you eat, or makes it hard for you to eat, puts your nutritional health at risk. Four out of five adults have chronic diseases that are affected by diet. Confusion or memory loss that keeps getting worse is estimated to affect one out of five or more of older adults. This can make it hard to remember what, when or if you've eaten. Feeling sad or depressed, which happens to about one in eight older adults, can cause big changes in appetite, digestion, energy level, weight and well-being.

## **E**ATING POORLY

Eating too little and eating too much both lead to poor health. Eating the same foods day after day or not eating fruit, vegetables, and milk products daily will also cause poor nutritional health. One in five adults skip meals daily. Only 13% of adults eat the minimum amount of fruit and vegetables needed. One in four older adults drink too much alcohol. Many health problems become worse if you drink more than one or two alcoholic beverages per day.

## **T**OOTH LOSS/MOUTH PAIN

A healthy mouth, teeth and gums are needed to eat. Missing, loose or rotten teeth or dentures which don't fit well, or cause mouth sores, make it hard to eat.

## **E**CONOMIC HARDSHIP

As many as 40% of older Americans have incomes of less than \$6,000 per year. Having less -- or choosing to spend less -- than \$25-30 per week for food makes it very hard to get the foods you need to stay healthy.

## **R**EDUCED SOCIAL CONTACT

One-third of all older people live alone. Being with people daily has a positive effect on morale, well-being and eating.

## **M**ULTIPLE MEDICINES

Many older Americans must take medicines for health problems. Almost half of older Americans take multiple medicines daily. Growing old may change the way we respond to drugs. The more medicines you take, the greater the chance for side effects such as increased or decreased appetite, change in taste, constipation, weakness, drowsiness, diarrhea, nausea, and others. Vitamins or minerals, when taken in large doses, act like drugs and can cause harm. Alert your doctor to everything you take.

## **I**NVOLUNTARY WEIGHT LOSS/GAIN

Losing or gaining a lot of weight when you are not trying to do so is an important warning sign that must not be ignored. Being overweight or underweight also increases your chance of poor health.

## **N**EEDS ASSISTANCE IN SELF CARE

Although most older people are able to eat, one of every five have trouble walking, shopping, buying and cooking food, especially as they get older.

## **E**LDER YEARS ABOVE AGE 80

Most older people lead full and productive lives. But as age increases, risk of frailty and health problems increase. Checking your nutritional health regularly makes good sense.



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Figure 6-1 (continued)

### Level II Screen

Complete the following screen by interviewing the patient directly and/or by referring to the patient chart. If you do not routinely perform all of the described tests or ask all of the listed questions, please consider including them but do not be concerned if the entire screen is not completed. Please try to conduct a minimal screen on as many older patients as possible, and please try to collect serial measurements, which are extremely valuable in monitoring nutritional status. Please refer to the manual for additional information.

#### Anthropometrics

Measure height to the nearest inch and weight to the nearest pound. Record the values below and mark them on the Body Mass Index (BMI) scale to the right. Then use a straight edge (paper, ruler) to connect the two points and circle the spot where this straight line crosses the center line (body mass index). Record the number below; healthy older adults should have a BMI between 24 and 27; check the appropriate box to flag an abnormally high or low value.

Height (in): \_\_\_\_\_  
 Weight (lbs): \_\_\_\_\_  
 Body Mass Index  
 (weight/height<sup>2</sup>): \_\_\_\_\_

Please place a check by any statement regarding BMI and recent weight loss that is true for the patient.

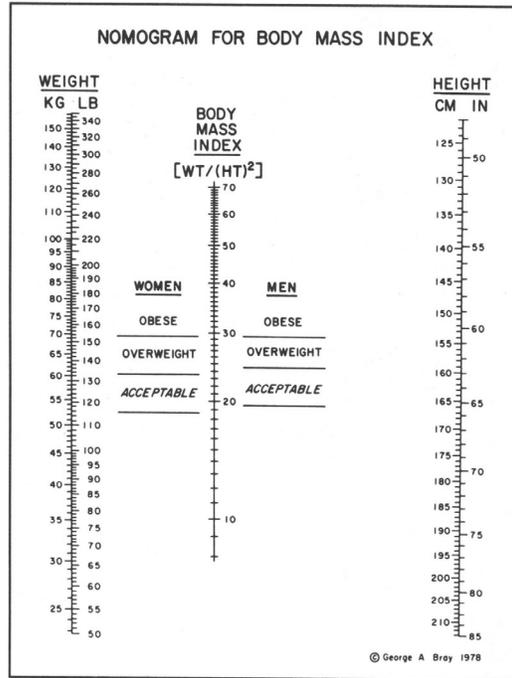
- Body mass index <24
- Body mass index >27
- Has lost or gained 10 pounds (or more) of body weight in the past 6 months

Record the measurement of mid-arm circumference to the nearest 0.1 centimeter and of triceps skinfold to the nearest 2 millimeters.

Mid-Arm Circumference (cm): \_\_\_\_\_  
 Triceps Skinfold (mm): \_\_\_\_\_  
 Mid-Arm Muscle Circumference (cm): \_\_\_\_\_

Refer to the table and check any abnormal values:

- Mid-arm muscle circumference <10th percentile



- Triceps skinfold <10th percentile
- Triceps skinfold >95th percentile

Note: mid-arm circumference (cm) - (0.314 x triceps skinfold (mm)) = mid-arm muscle circumference (cm)

For the remaining sections, please place a check by any statements that are true for the patient.

#### Laboratory Data

- Serum albumin below 3.5 g/dl
- Serum cholesterol below 160 mg/dl
- Serum cholesterol above 240 mg/dl

#### Drug Use

- Three or more prescription drugs, OTC medications, and/or vitamin/mineral supplements daily

LEVEL II SCREEN

Name:

Date:

Figure 6-2 Determine your nutritional health level II screen.

SOURCE: The Nutritional Screening Institute

**Clinical Features**

Presence of (check each that apply):

- Problems with mouth, teeth, or gums
- Difficulty chewing
- Difficulty swallowing
- Angular stomatitis
- Glossitis
- History of bone pain
- History of bone fractures
- Skin changes (dry, loose, nonspecific lesions, edema)

Percentile	Men		Women	
	55-65 y	65-75 y	55-65 y	65-75 y
<b>Arm circumference (cm)</b>				
10th	27.3	26.3	25.7	25.2
50th	31.7	30.7	30.3	29.9
95th	36.9	35.5	38.5	37.3
<b>Arm muscle circumference (cm)</b>				
10th	24.5	23.5	19.6	19.5
50th	27.8	26.8	22.5	22.5
95th	32.0	30.6	28.0	27.9
<b>Triceps skinfold (mm)</b>				
10th	6	6	16	14
50th	11	11	25	24
95th	22	22	38	36

From: Frisancho AR. New norms of upper limb fat and muscle areas for assessment of nutritional status. *Am J Clin Nutr* 1981; 34:2540-2545. © 1981 American Society for Clinical Nutrition.

**Eating Habits**

- Does not have enough food to eat each day
- Usually eats alone
- Does not eat anything on one or more days each month
- Has poor appetite
- Is on a special diet
- Eats vegetables two or fewer times daily
- Eats milk or milk products once or not at all daily
- Eats fruit or drinks fruit juice once or not at all daily
- Eats breads, cereals, pasta, rice, or other grains five or fewer times daily
- Has more than one alcoholic drink per day (if woman); more than two drinks per day (if man)

**Living Environment**

- Lives on an income of less than \$6000 per year (per individual in the household)
- Lives alone
- Is housebound
- Is concerned about home security

- Lives in a home with inadequate heating or cooling
- Does not have a stove and/or refrigerator
- Is unable or prefers not to spend money on food (<\$25-30 per person spent on food each week)

**Functional Status**

Usually or always needs assistance with (check each that apply):

- Bathing
- Dressing
- Grooming
- Toileting
- Eating
- Walking or moving about
- Traveling (outside the home)
- Preparing food
- Shopping for food or other necessities

**Mental/Cognitive Status**

- Clinical evidence of impairment, e.g. Folstein<26
- Clinical evidence of depressive illness, e.g. Beck Depression Inventory>15, Geriatric Depression Scale>5

Patients in whom you have identified one or more major indicator (see pg 2) of poor nutritional status require immediate medical attention; if minor indicators are found, ensure that they are known to a health professional or to the patient's own physician. Patients who display risk factors (see pg 2) of poor nutritional status should be referred to the appropriate health care or social service professional (dietitian, nurse, dentist, case manager, etc.).

These materials developed by the Nutrition Screening Initiative.

Figure 6-2 (continued)

**Table 6-4 Nutrition-related questions for the history and physical examination of older adults.**

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**Medical history**

- Chief complaint (especially if nutrition problem suspected).
- History of chronic disease [allergy, anemia, anorexia/cachexia, arthritis, cancer, cardiovascular disease (CVD), diabetes, hypertension, hepatic disease, malabsorption, obesity, psychiatric disorder, chronic obstructive pulmonary disease (COPD), pneumonia, renal disease].
- History of recent surgery/illness.
- Current or past use of enteral or parenteral nutrition therapies.

**Medications**

- Medications, including over-the-counter products and alternative/complementary therapies.
- Vitamin, mineral, herbal, or dietary fiber supplements; use or abuse.
- Addicting substances use (type, frequency, amount; alcohol, cigarettes, drugs).

**Family history**

- Pertinent family history.

**Review of systems**

- Changes in appetite, weight, nausea, vomiting, diarrhea.
- Handicaps to feeding (change in appetite; biting, chewing, swallowing problems; ill-fitting dentures or rotten, missing, or decayed teeth; persistent nausea, vomiting, constipation, diarrhea, heartburn).

**Psychosocial history**

- Occupation.
- Living arrangements (family members in the home, food preparation/storage facilities, transportation).
- Income level (food budget, reliance on medical/food assistance programs).
- Cognitive/emotional status (including grief).
- Functional status [activities of daily living (ADLs) and instrumental activities of daily living (IADLs)].
- Cultural, ethnic, religious factors that affect food intake.
- Education level (literacy, learning style, motivation/receptiveness).

**Diet history**

- Current eating pattern (meals/snacks, type/amounts of food consumed).
- Prescribed/self-imposed dietary modifications.
- Food aversions/restrictions.
- Activity level/sleep patterns.

**Physical examination**

- Vital signs, including height, weight, body mass index (BMI), waist circumference, weight loss.
- Signs of passive or self-neglect or even physical abuse (poor hygiene, bruising).
- Mobility/balance difficulty.
- Poor oral health (dry mouth, caries, periodontal disease, ill-fitting dentures).
- Signs of loss of skin strength or actual skin breakdown, e.g., healed or unhealed areas.

**Laboratory data (as indicated by history/physical)**

- Albumin, prealbumin, transferrin, complete blood count (CBC) with hematocrit/hemoglobin (ferritin, vitamin B<sub>12</sub>, folate), glucose, cholesterol, triglycerides, low-density lipoprotein (LDL), high-density lipoprotein (HDL), blood urea nitrogen (BUN), and electrolytes (potassium, sodium, magnesium).

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SOURCE: Lisa Hark, Ph D, RD, University of Pennsylvania School of Medicine. Used with permission.

### **Vitamin B<sub>12</sub>**

The DRI for vitamin B<sub>12</sub> for people over age 50 has been set at 2.4  $\mu\text{g}$  per day. Although most Americans who consume animal products can get sufficient vitamin B<sub>12</sub> from food, it is estimated that between 10% and 30% of older people have lost the ability to absorb protein-bound vitamin B<sub>12</sub> adequately. Thus, the Food and Nutrition Board recommends that people over age 50 meet most of their dietary requirement for vitamin B<sub>12</sub> with synthetic B<sub>12</sub> (free vs. protein-bound) from fortified foods or supplements. Most oral supplements currently on the market contain free versus protein-bound B<sub>12</sub>. Intrinsic factor and hydrochloric acid (needed to cleave B<sub>12</sub> from its protein carrier) are not required for the digestion/absorption of this form of B<sub>12</sub> versus the food form of B<sub>12</sub>; thus, widespread use of vitamin B<sub>12</sub> injections is no longer necessary if the free form of B<sub>12</sub> is given as an oral supplement.

### **Vitamin B<sub>6</sub>**

The DRI for vitamin B<sub>6</sub> in adults over age 50 is 1.5 mg per day, which can be met through dietary means. It has been suggested that adequate intakes of this vitamin also help to reduce homocysteine levels and thus the risk of cardiovascular disease. The upper intake for vitamin B<sub>6</sub> has been set at 100 mg per day. Adults who take doses of vitamin B<sub>6</sub> above this level are at increased risk of developing progressive, crippling neurologic damage.

## **Summary**

In summary, poor nutritional status is a common yet frequently overlooked problem in old age. It is a potential sign of treatable illness, which must be sought. It has medical consequences, both short- and long-term, including being a major factor in the prevention, treatment, and ability to recover from acute/chronic illness. It is a contributor to morbidity in the majority of frail, dependent elders. By considering nutrition in all aspects of medical decision-making (e.g., diagnosis, medication prescription, surgery, rehabilitation, referral, placement), quality of life can be improved and successful aging can be the outcome for a higher proportion of our nation's adults.

For a list of references for this chapter, please visit the University of Pennsylvania School of Medicine's Nutrition Education and Prevention Program web site: <http://www.med.upenn.edu/nutrimed/articles.html>

## Case 1

# Malnutrition and Depression

Katherine Galluzzi and Larry Finkelstein

### Objectives

- Identify common risk factors for poor nutritional status in older adults.
- Describe the effects of undernutrition on physiologic function in geriatric patients.
- Develop a nutritional care plan for an older adult with poor nutritional status and weight loss secondary to altered living situation.
- Provide nutritional counseling appropriate to the physiologic, emotional, social, and financial changes that occur with aging.
- Recognize the unique contribution of different members of a health care team, including social workers, home health aides, and community volunteers, in the effort to improve the nutritional status of older people.

ML is a 75-year-old widow who was brought to her primary care physician's office by the local Older Americans Transportation Service. She had missed her two prior scheduled office visits because of the recent death of her husband and a subsequent fall, which resulted in an intertrochanteric fracture of her right hip.

On presentation, ML appeared withdrawn and much more frail than on previous visits. She answered in a monotone with terse, nonspontaneous speech, and she lacked expression. When asked about how she has been coping after the loss of her husband, she became tearful. She admitted that in addition to the loss of companionship, the loss of his pension has caused tremendous financial hardship.

### Past Medical History

ML tripped on the steps in her house 2 months ago and fractured her hip. She underwent an open reduction/internal fixation surgery to repair the fracture, and the operation went well. She had no serious operative complications, but she lost approximately 350 cm<sup>3</sup> blood during the procedure (1 unit = 500 cm<sup>3</sup>). ML underwent inpatient rehabilitation for 10 days after discharge from the surgical service and then returned home, where she lives alone. She ambulates slowly with a cane and can climb stairs only with difficulty.

During her inpatient rehabilitation stay, she was diagnosed with depression and she was started on an antidepressant. She has no major chronic diseases except for osteoporosis, discovered at the time of her hip fractures 2 months ago. ML had an appendectomy at age 46 and bilateral cataract surgeries 10 years ago. She has no previous history of pneumonia, tuberculosis, hepatitis, or urinary tract infection.

## Medications

ML currently takes fluoxetine (Prozac), 20 mg daily, for depression and an iron supplement for anemia three times per day. She also self-medicates with over-the-counter preparations of ibuprofen (200 to 400 mg three times a day) and frequently uses over-the-counter laxatives and glycerin suppositories for her constipation, which she attributes to her iron tablets. She does not take a multiple vitamin, calcium, or vitamin D. She has no known food allergies.

## Social History

ML lives alone in the four-bedroom, two-story home she has occupied since she married 55 years ago. Her son and daughter both live out of state. Although they call her every few weeks, they have not visited since her husband's death. ML also explains that she used to attend church and visit the local senior center regularly with her husband but has not been to either lately. ML explains that she has no energy to "get up and go" anymore and she falls asleep in front of the television. She also reports being constipated and that her food does not have much taste. She avoids alcohol and tobacco and drinks one cup of coffee and two cups of tea daily.

## Review of Systems

*General:* Weakness, fatigue, weight loss, and depression.

*Mouth:* Food lacks taste (hypogeusia); dry, "thick-feeling" tongue; sores in corners of mouth.

*Gastrointestinal (GI):* Poor appetite, constipation.

*Extremities:* Hip pain when climbing stairs, some tenderness at old incision site, and chronic low back pain.

## Physical Examination

### Vital Signs

*Temperature:* 97.0°F (36°C)

*Heart rate:* 88 beats per minute (BPM)

*Respiration:* 18 BPM

*Blood pressure:* 130/80 mm Hg

*Height:* 5'6" (168 cm)

*Current weight:* 110 lb (50 kg)

*Usual weight:* 140 lb (64 kg)

*BMI:* 18 kg/m<sup>2</sup>

*Weight 6 months ago to surgery:* 125 lb (57 kg)

*Percent weight change:* 12% (125 to 110/125 × 100)

*General:* Thin, elderly woman who is appropriately conversant but withdrawn. She is well groomed, but her clothes are loose fitting, suggesting weight loss.

*Skin:* Warm to touch, patches of dryness and flaking to elbows and lower extremities

*Head, ears, eyes, nose, throat (HEENT):* Temporal muscle wasting, no enlargement of thyroid

*Mouth:* Ill-fitting dentures, sore beneath bottom plate; cracks/fissures at corners of mouth (angular cheilitis)

*Cardiac:* Regular rate at 88 BPM, soft systolic murmur

*Abdomen:* Well-healed appendectomy site scar, no enlargement of liver or spleen, diffusely diminished bowel sounds

*Extremities:* Well-healed hip surgery incision with slight surrounding erythema, no sores on feet, trace pretibial edema to both lower extremities

*Rectal:* Hard stool in vault, stool test for occult blood negative

*Neurologic:* Alert, good memory, no evidence of sensory loss

*Gait:* Slightly wide-based with decreased arm swing, antalgic and tentative but with safe, appropriate use of cane

## Laboratory Data

Patient's Laboratory Values	Normal Values
Albumin: 2.5 g/dL	3.5–5.8 g/dL
Hemoglobin: 11.0 g/dL	11.8–15.5 g/dL
Hematocrit: 33.0%	36%–46%

## ML's 24-Hour Dietary Recall

At her physician's request, ML provided the following 24-hour dietary recall, stating that this represents her usual daily intake:

<i>Breakfast (home)</i>	Jelly doughnut	1 whole
	White toast	1 slice
	Jelly	2 Tbsp.
	Coffee	1 cup
<i>Lunch (home)</i>	Butter cookies	2
	Chicken and rice soup	1 cup
	Saltine crackers	6
	Tea	2 cups

<i>Dinner (home)</i>	White bread	1 slice
	Jelly	2 Tbsp.
	Peanut butter	2 Tbsp.
	Butter cookies	2
Total calories: 1270 kcal		
Protein: 25 g per day (8% of calories)		
Fat: 42 g (30% of calories)		
Carbohydrate: 201 g (63% of calories)		
Calcium: 153 mg		
Iron: 6 mg		

## Case Questions

1. What information from the case history would cause you concern over ML's functional status?
2. Based on that information, what medical, environmental, and social factors could lead to nutritional problems in this patient?
3. What do ML's BMI and percent weight change indicate about her nutritional status?
4. What are ML's calorie and protein requirements for repletion? What general conclusions can you draw regarding ML's diet?
5. How can ML's diet be improved to meet her increased requirements, achieve weight gain, and relieve her constipation?
6. What specific recommendations would you offer to improve ML's nutritional status?

## Case Answers

### Part 1: Assessing Activities of Daily Living

1. What information from the case history would cause you concern over ML's functional status?

#### Activities of Daily Living

Although ML can feed herself, she has trouble chewing because of her loose dentures and a sore in her mouth. She has insufficient money for a visit to the dentist. ML also exhibits poor mobility; she walks with a cane, has difficulty with stairs, and fears falling since her hip fracture. Although she is mobile, she reports pain with movement and moves slowly about the house. Finally, ML dislikes eating alone, which may have a negative impact on her food intake.

### Instrumental Activities of Daily Living

Since her injury, ML has been afraid to go outside, which may be secondary to fear of falling or lack of energy from exertion. Because she does not drive and is unaccustomed to using public transportation, she has difficulty shopping for food and other necessities. ML reports a very limited social life; since her husband's death she has avoided church, community programs, and the senior center. Her reported dislike of cooking for one person most likely has a negative effect on the quality and quantity of her food intake. She denies difficulty with dressing, grooming, or toileting, however, and feels that if her husband were alive she would still be doing cooking duties.

2. Based on that information, what medical, environmental, and social factors could lead to nutritional problems in this patient?

ML's ill-fitting dentures and hypogeusia may lead to decreased intake and undernutrition. Depression over the loss of her husband may decrease her appetite. Also, ML lives alone in a large house and may be unable to clean and cook for herself because of her poor mobility, and she lacks money for assistance with household tasks. Because she is homebound, her exposure to sunlight is limited, which may result in vitamin D deficiency. Furthermore, she no longer participates in community activities that could provide support, meals, and social interaction. Her children have not visited recently or provided any assistance. Finally, the loss of her husband's pension has significantly reduced her income.

### Part 2: Nutrition Assessment

3. What do ML's BMI and percent weight change indicate about her nutritional status?

It should be noted that in this case the value used for ML's usual weight is 125 lb (57 kg), her weight 6 months earlier (rather than her usual weight of 140 lb). Her percent weight change is greater than 10% in a period of 6 months, which represents a clinical indicator of the risk for undernutrition. ML's BMI of 18 kg/m<sup>2</sup> also indicates that she is underweight and may be at risk for undernutrition; normal BMI values fall in the range of 18.5 to 24.9 kg/m<sup>2</sup>.

4. What are ML's calorie and protein requirements for repletion? What general conclusions can you draw regarding ML's diet?

ML's total estimated daily calorie requirements, based on the RDA, are 25 to 30 kcal/kg body weight for weight maintenance and an additional 250 to 500 calories per day to gain 1/2 to 1 lb (0.22 to 0.45 kg) per week.

$$(50 \text{ kg}) \times (25 \text{ to } 30 \text{ kcal/kg}) = 1250 \text{ to } 1500 \text{ kcal/day} + 250 \\ \text{to } 500 \text{ additional calories} = 1500 \text{ to } 2000 \text{ kcal/day}$$

The estimated total daily protein requirements are 1.5 g/kg weight.

$$(50 \text{ kg}) \times (1.5 \text{ g/kg}) = 75 \text{ g per day}$$

ML's usual daily intake provides 1270 calories and 25 g protein. Her diet is low in calories due to her lack of appetite and poor selection of foods. ML's limited consumption of meats and poultry products, resulting in a poor overall protein and iron intake, probably is due to her limited income and poor dentition. Because ML stopped drinking milk many years ago and does not shop for dairy products regularly, her diet is deficient in calcium and vitamin D. The fissures at the corners of her mouth most likely indicate a riboflavin deficiency. Riboflavin is also found in dairy products. Fruits, vegetables, and fluids also appear to be below acceptable limits in ML's diet.

### Part 3: Medical Nutrition Therapy

#### 5. How can ML's diet be improved to meet her increased requirements, achieve weight gain, and relieve her constipation?

Constipation, very common in older adults, can often be corrected by increasing fiber and fluid intake; physical activity should also be encouraged. Examples of high-fiber foods include fresh fruits, vegetables, bran cereals, and whole-grain products such as whole-wheat bread and brown rice. One bowl of raisin bran cereal or oatmeal every day would most likely be sufficient to achieve bowel regularity. If these measures are not sufficient, fiber supplements can be recommended. She should be advised to drink at least one liter of water daily and preferably more if tolerated. Increasing fluid intake will also help alleviate constipation. The elderly, however, are prone to hypodipsia (blunted thirst response), which leads to inadequate fluid intake. Older adults may require prompting or frequent reminders to ensure adequate fluid intake. In light of her weight loss and inadequate dietary intake, ML's diet clearly needs to be higher in calories, protein, and calcium to fulfill her current requirements. She should also be asked whether she is taking her iron supplements, as older adults tend to discontinue these minerals if constipation occurs.

#### High-Calorie, High-Protein Dietary Recommendations

<i>Breakfast (home)</i>	Coffee	1 cup
	Instant oatmeal	1 package
	Lactose-free 2% milk	6 oz (180 mL)
	Orange juice	4 oz (120 mL)
<i>Lunch (senior center)</i>	Chicken drumstick	3 oz (85 g)
	Baked potato	1 medium

	Margarine	2 Tbsp.
	Green beans	4 Tbsp.
<i>Snack (senior center)</i>	Lactose-free 2% milk or yogurt	8 oz (240 mL)
	Canned peaches	1/2 cup
<i>Dinner (home)</i>	Tuna salad	4 oz (113 g)
	Saltine crackers	6
	Tomatoes	3 slices
	Vanilla pudding	5 oz (142 g)
<i>Snack (home)</i>	Applesauce	1/2 cup

Total calories: 1540 kcal  
Protein: 72 g (19% of calories)  
Fat: 57 g (33% of calories)  
Carbohydrate: 190 g (49% of calories)  
Calcium: 974 mg  
Iron 15 mg

**6. What specific recommendations would you offer to improve ML's nutritional status?**

In addition to the recommended dietary modifications, ML or her primary care physician, or both, should take the following steps to ensure her continued well-being.

- Contact her other health care providers, specifically her psychiatrist or psychologist, regarding recommended changes in medications and make arrangements to have her dentures properly adjusted.
- Drink high-calorie, high-protein liquid supplements or suggest adding nonfat powdered milk to puddings to increase her intake of calories, protein, vitamins, and minerals.
- Prescribe a multivitamin and mineral supplement with 100% of the RDA for older adults and calcium (600 mg twice a day) with vitamin D.
- Use a microwave oven to prepare convenience foods and decrease cooking time.
- Contact a social worker to help ML get in touch with the area council on aging, Meals on Wheels, and other community resources.
- Consider a home health aide to monitor ML's weekly weight and food intake and assess whether her ambulatory status is improving or whether she is at increased risk of falling again.
- Use community volunteers to shop for food or contact a grocery store that delivers.

- Contact her children and other family members for support and to help her arrange to move to an apartment or a smaller, single-story home.
- Undergo further rehabilitation and exercise therapy to increase her diminished mobility.
- Contact a neighbor with whom ML could share meals or travel to the senior center daily for a hot lunch.

See Chapter Review Questions, pages A-20 to A-22.

