

# CHAPTER 16



## Nutrition for Health and Disease in Older Adults and Geriatrics

Nancy Munoz, DCN, MHA, RDN, FAND

### Chapter Outline

**Ageing Demographics**

**Cardiovascular, Cerebrovascular, and Respiratory Conditions**

**Cancer**

**Cognitive Disorders**

**Endocrine and Metabolic Conditions**

**Gastrointestinal Conditions**

**Obesity and Malnutrition**

**Skeletal Health**

**Wound Healing**

**Renal and Genitourinary Conditions**

### Learning Objectives

1. Describe cardiovascular disease concepts.
2. Understand the role of nutrition in the care of older adults with cancer.
3. Develop strategies and interventions to encourage adequate nutrition and meal acceptance for older adults with dementia.
4. Comprehend the nutrition recommendations for the care of the older adult with diabetes.
5. Describe nutrition issues that may occur as a result of common gastrointestinal and digestive conditions.
6. Explain the significance of weight management in older adults.
7. Define frequency and management of iron- and folate-deficiency anemias in older adults.
8. List risk factors for developing skeletal disorders.
9. Describe the evidence-based guidelines for treating pressure injuries.
10. List the risk factors associated with impaired kidney function in older adults and the applicable nutrition intervention/prevention strategies.

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## Case Study

Elsa is an 82-year-old woman that had been living alone for many and is independent in performing her activities of daily living. She has a past medical history of insulin-dependent diabetes mellitus, hypothyroidism, osteoarthritis, hypertension (HTN), cardiovascular disease (CVD), obesity, and gastroesophageal reflux disorder (GERD). Most recently, Elsa experienced a hip fracture after a fall for which she went through a hip-replacement surgery. Her postoperative progression is complicated by a urinary tract infection (UTI). After her hospital discharge, she was moved to a long-term care facility. Elsa's height is 5 feet 4 inches, weight is 195 pounds, and body mass index (BMI) is 33.4.

## Aging Demographics

**Preview** Leading causes of death for older adults include heart disease, cancer, stroke, chronic lower respiratory disease, Alzheimer's dementia, and diabetes mellitus.

The aging concerns of healthcare professionals are different from the concerns expressed by older adults themselves.<sup>1</sup> As older Americans age, they express concern with maintaining their physical health, preventing cognitive decline, and promoting mental health.<sup>1</sup> Professionals and healthcare providers are concerned with protecting older adults from financial scams, ensuring access to affordable housing, and promoting brain health to prevent memory loss.<sup>1</sup> Interestingly, both groups agree that healthy eating and maintaining a positive attitude are essential in promoting health and well-being in older adults.<sup>1</sup>

As 10,000 Americans celebrate their 65th birthday every day since 2011, the progression in the number and proportion of older adults is unparalleled in the history of the United States. A longer life span and aging baby boomers will contribute to doubling the population of Americans aged 65 years and older over the next 25 years to about 72 million. By 2030, older adults will account for approximately 20% of the U.S. population.<sup>2</sup>

It is the position of the Academy of Nutrition and Dietetics that all Americans aged 60 years and older receive appropriate nutrition care; have access to coordinated, comprehensive food and nutrition services; and receive the benefits of ongoing research to identify the most effective food and nutrition programs, interventions, and therapies.<sup>3</sup>

Over the last century, there has been a shift in the leading causes of death, from infectious and acute diseases to chronic and degenerative illnesses. Currently, two out of three older adults have numerous chronic

conditions. Heart disease and cancer are the leading causes of death in older adults. Other chronic diseases and conditions, such as stroke, chronic lower respiratory diseases, **Alzheimer's disease**, and diabetes, are also common.<sup>2</sup> (See **FIGURE 16.1**.) Sixty-six percent of all health-care dollars in the United States are spent on managing chronic conditions in older adults.<sup>2</sup>

## Cardiovascular, Cerebrovascular, and Respiratory Conditions

**Preview** Cardiovascular disease (CVD) encompasses a number of conditions such as stroke and heart failure. A cerebrovascular accident is the result of interrupted blood flow to the brain. Chronic obstructive pulmonary disease is a lung disease in which a chronic obstruction of the lung airflow restricts normal breathing.

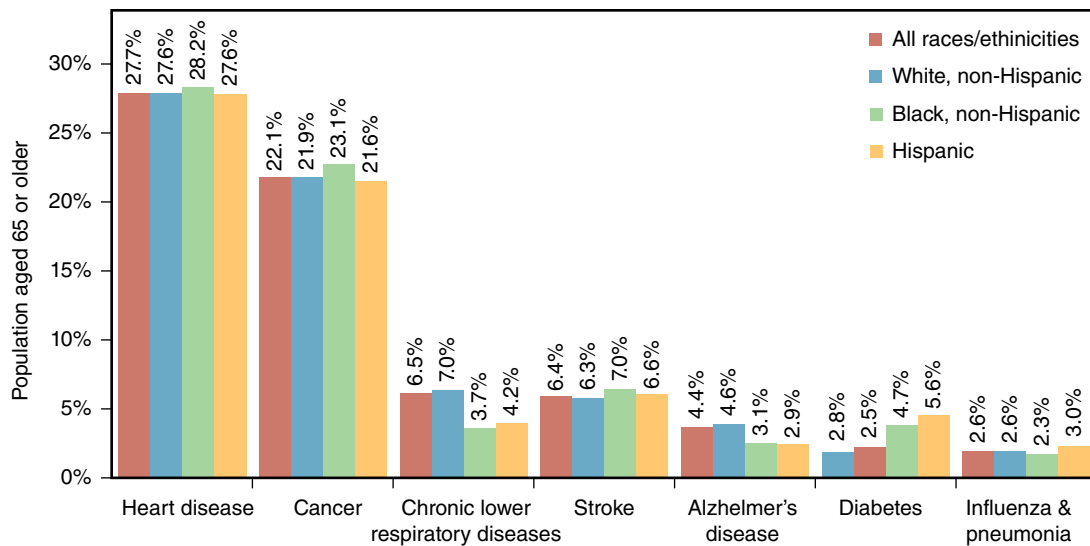
The term *cerebrovascular disease* encompasses all syndromes in which an area of the brain is briefly or permanently affected by ischemia or hemorrhage, with one or more of the cerebral blood vessels affected by disease. *Stroke* is a broad word denoting a group of illnesses that include cerebral infarction, cerebral hemorrhage, and subarachnoid hemorrhage.<sup>4</sup> Stroke is the third cause of death and second cause of disability and dementia in older adults worldwide.<sup>4</sup> The number of deaths triggered by cerebrovascular diseases increases with age.<sup>5</sup>

Approximately 90% of cerebrovascular disease and its comorbidities are avoidable.<sup>6</sup> Cerebrovascular disease deterrence can occur by encouraging healthy eating habits, being physically active, consuming alcohol in moderation, and avoiding tobacco use. Managing comorbidities such as diabetes mellitus and high cholesterol levels is crucial in decreasing the possibility of acquiring cerebrovascular disease.<sup>7</sup>

### Hypertension Prevalence and Etiology

Hypertension (HTN) is a condition in which the blood pressure (BP) is clinically elevated. Though normally asymptomatic, if left untreated, HTN can have catastrophic outcomes and result in death.<sup>8</sup> HTN is a risk factor for strokes, heart attacks, and arterial aneurysms. Nearly 80 million Americans have a diagnosis of HTN.<sup>8</sup> The kidneys are the main organ system involved in blood pressure regulation. Medical conditions common in older adults related to the renal system can precipitate HTN.<sup>6,7</sup>

The American Heart Association classifies blood pressure as normal, prehypertension, hypertension stage 1, hypertension stage 2, and hypertensive crisis. See **TABLE 16.1**.



**Figure 16.1**  
**Leading causes of death among U.S. adults aged 65 and older in 2007-2009.**

Data from: CDC, National Center for Health Statistics. National Vital Statistics System, 2007-2009. National Council on Aging. The United States of Aging Survey 2015 results. Arlington, VA: National Council on Aging; July 2015. Retrieved from: <https://www.ncoa.org/news/usoa-survey/2015-results/>. Accessed September 29, 2016.

### Prevention and Treatment

Signs and symptoms of hypertension involve abnormal (high) blood pressure measurement, severe headaches, anxiety, shortness of breath, and nosebleeds. Treatment goal of HTN is to control (manage) the signs and symptoms present. HTN is treated with medication and lifestyle modifications.<sup>8</sup> Some treatment strategies for older adults with HTN include the following:

- Consuming a healthy diet that includes foods that are low in sodium
- Being physically active
- Promoting a healthy weight
- Managing stress
- Avoiding smoking
- Complying with medication treatment
- Consuming alcoholic beverages in moderation

Research in adults has shown that modest decreases in the range of 20 mm Hg in the systolic and 10 mm Hg in

### Let's Discuss

#### Promoting Community Health

What is the Great American Smokeout? Does your community initiate any activities to participate in this event?

#### Reference

American Cancer Society. The Great American Smokeout. Atlanta, GA: American Cancer Society. Retrieved from: <http://www.cancer.org/healthy/stayawayfromtobacco/greatamericansmokeout/index>. Accessed September 29, 2016.

the diastolic blood pressure can have a significant impact in decelerating the development of CVD or cardiac events such as stroke or myocardial infarction (MI).<sup>9,10</sup> Diet and lifestyle are crucial to both the prevention and treatment

**Table 16-1**

#### Categories for Blood Pressure Levels in Adults (in mmHg, or millimeters of mercury)

Category	Systolic (top number)		Diastolic (bottom number)
Normal	Less than 120	And	Less than 80
Prehypertension	120-139	Or	80-89
High blood pressure			
Stage 1	140-159	Or	90-99
Stage 2	160 or higher	Or	100 or higher

Reproduced from Medicine Plus. Blood Pressure Numbers: What They Mean. *Winter 2010 Issue: Volume 5 Number 1 Page 10*. Retrieved from: <https://medlineplus.gov/magazine/issues/winter10/articles/winter10pg10a.html>

of hypertension.<sup>11,12</sup> Changes in diet and promoting a healthy weight are fundamental in the treatment of many of the modifiable risk factors associated with CVD.<sup>12</sup> Sodium and potassium intake, for example, have been recognized as nutrients that can contribute to the development of HTN and that can be used in the management of the condition.<sup>12</sup>

Many older adults require medications to help manage their HTN. Common HTN medications include diuretics, angiotensin-converting enzyme (ACE) inhibitors, beta blockers, calcium channel blockers, and renin inhibitors.<sup>13</sup> Medical nutrition therapy (MNT) and weight reduction are key components of the treatment.<sup>14–16</sup> MNT recommendations include reduced sodium intake; a dietary pattern such as the Dietary Approaches to Stop Hypertension (DASH) diet is recommended.<sup>17</sup> The DASH diet emphasizes consumption of fruits, vegetables, whole grains, low-fat dairy, seafood, nontropical vegetable oils (such as olive and canola), and nuts and limiting sodium, saturated fat and trans fat. Guidelines from the American Heart Association (AHA) and American College of Cardiology (ACC), published in November 2013, support consumption of 2,300 mg of sodium (or less) per day, with an additional decrease to 1,500 mg/d for individuals with increased risk for HTN.<sup>14,18</sup>

Being physically active has been shown to reduce blood pressure by 4–9 mm Hg.<sup>15</sup> The AHA and ACC endorse engaging in at least 30 minutes of moderate-to vigorous-intensity **aerobic physical activity** on most days of the week.<sup>14</sup> Guidelines for the management of overweight and obesity in adults support that the loss of approximately 5% to 10% of initial body weight can be effective in improving some of the risk factors associated with CVD, including blood pressure, lipids profiles, and glycemic control.<sup>15</sup>

## Case Study



Upon admission to the long-term facility, Elsa's blood pressure readings are as follows:

Day	BP Reading
1	180/90 mm Hg
2	185/95 mm Hg
3	175/80 mm Hg

## Questions

- After reviewing Elsa's most recent history (s/p surgery, UTI, and just being admitted to a long-term care facility) how should her obesity level be treated?
- What nutrition interventions and lifestyle changes should be recommended to treat Elsa's stage II blood pressure?

## Stroke

### Prevalence and Etiology

A **stroke**, also referred to as a cerebrovascular accident (CVA), is the result of interrupted blood flow to the brain. There are two types of strokes: ischemic and hemorrhagic. Almost 80% of all strokes are the result of inadequate blood flow to the brain (ischemia). This can be caused by a blood clot that interrupts blood flow to a blood vessel in the brain. A hemorrhagic stroke is the result of a weakened blood vessel that ruptures and leaks blood into the brain. Transient ischemic attacks (TIAs), also referred to as mini strokes, take place when the blood supply to the brain is temporarily stopped. Stroke patients older than 85 years of age make up 17% of all stroke patients.<sup>19</sup>

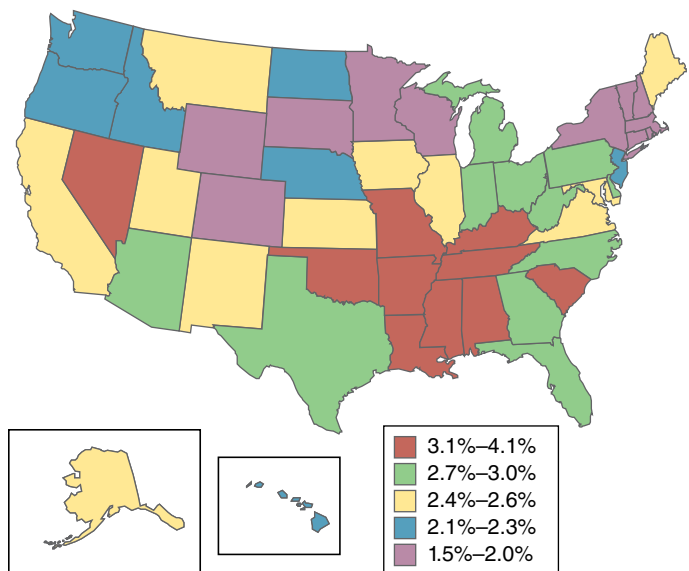
**FIGURE 16.2** shows the prevalence of stroke among noninstitutionalized adults by state in the United States.

Signs and symptoms of a stroke involve an abrupt episode of numbness or weakness of the face, arm, or leg; confusion; difficulty with speech patterns; problems seeing that can affect one or both eyes; inability to walk; dizziness and loss of balance or coordination; and strong headache without apparent cause.<sup>20</sup>

Hypertension is the main contributor for developing a stroke.<sup>21</sup> Other conditions and lifestyles that can contribute to developing a stroke include smoking, overweight and obesity, hyperlipidemia, diabetes mellitus, history of TIA, and atrial fibrillation.<sup>21</sup>

### Prevention and Treatment

Managing stroke risk factors is essential to prevent stroke episodes. Uncontrolled HTN contributes to more than 50% of all stroke episodes. Treatment interventions aim to stop a stroke while it is in progress by rapidly dispersing the



**Figure 16.2**  
Stroke prevalence in the United States.

Reproduced from Centers for Disease Control and Prevention. MMWR. Prevalence of Stroke - United States, 2006–2010. Retrieved from: <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6120a5.htm>

blood clot or by ending the bleeding. After the stroke, individuals need to participate in rehabilitation to overcome disabilities and damage that remain. The use of blood thinners is the most common drug therapy for stroke treatment.<sup>20</sup> Antihypertensives are used to lower blood pressure by opening the blood vessels, decreasing blood volume, or decreasing the rate or force of heart contraction. When the arteries are affected by plaque buildup, procedures such as carotid endarterectomy, angioplasty, and stents are used.<sup>22</sup>

## Heart Failure

### Prevalence and Etiology

**Heart failure (HF)** is caused by the heart's inability to pump adequate amounts of oxygenated blood to support other body organs. HF is a common illness, particularly in older adults.<sup>23,24</sup>

Heart failure is more predominant in some parts of the United States. **FIGURE 16.3** shows the death rate in the United States from heart failure from 2011 to 2013.

Laboratory testing can be instrumental in diagnosing the occurrence of heart failure. Blood tests can be helpful for distinguishing heart failure from pulmonary disease. In many instances individuals who smoke suffer from both HF and pulmonary disease. Differentiating between these two disorders to provide a true diagnosis can pose a challenge for the physician.<sup>25</sup>

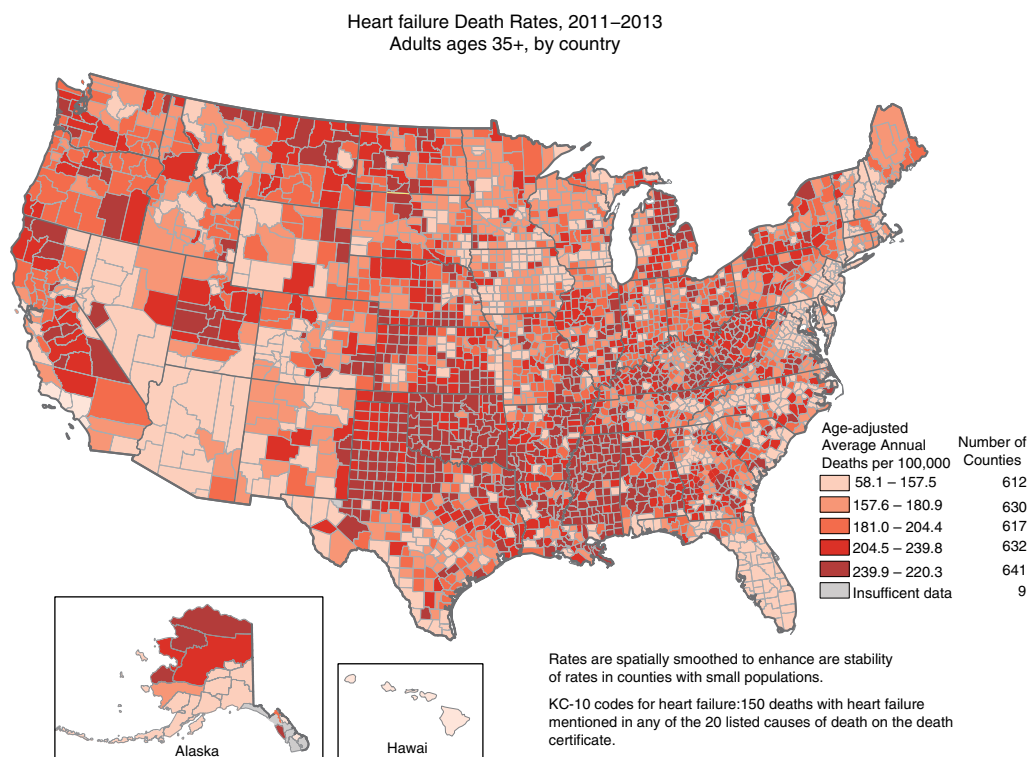
### Prevention and Treatment

History of uncontrolled HTN and history of MI are the two most common risk factors for heart failure.<sup>10,26</sup> Aging contributes to increased risk for this condition. In older adults 75–85 years of age, the risk of developing HF is four times greater than in their younger counterparts.<sup>10</sup> Mortality rate is nearly 50% within 5 years of receiving a diagnosis.<sup>22,23</sup> Research suggests that controlling blood pressure and low-density lipoprotein (LDL) cholesterol can reduce the risk of HF. Prescription medications normally used in the treatment of HF include diuretics, ACE inhibitors, aldosterone antagonists, **Angiotensin** receptor blockers, beta blockers, Isosorbide dinitrate/hydralazine hydrochloride, and digoxin.<sup>27</sup> Promoting glycemic control, weight reduction, limiting alcohol, and smoking cessation are also keys to preventing this disease.<sup>24</sup>

### Lifestyle Changes

Incorporating healthy lifestyle behavior into the older adult's daily routine is an important component in preventing and treating HF. This includes adopting a heart healthy diet, sufficient fluid intake, active lifestyle, promoting a healthy weight, and eluding the use of tobacco and illegal drugs.<sup>23,27</sup>

For older patients with HF, a healthy diet should be low in sodium and saturated fats. High sodium intake may contribute to fluid retention in the body. When there



**Figure 16.3**  
Death rates due to heart failure, 2011–2013.

Reproduced from Centers for Disease Control and Prevention Division for Heart Disease and Stroke Prevention. Heart failure fact sheet. Atlanta, GA: Centers for Disease Control and Prevention; last updated June 16, 2016. Retrieved from: [http://www.cdc.gov/dhdsdp/data\\_statistics/fact\\_sheets/fs\\_heart\\_failure.htm](http://www.cdc.gov/dhdsdp/data_statistics/fact_sheets/fs_heart_failure.htm). Accessed June 26, 2016.

is fluid overload, the heart must work harder to manage greater volume in the body. Consumption of fat and trans fatty acids can promote increased cholesterol levels and increased risks for heart disease. The heart healthy diet is also low in sugar and refined grains.<sup>23,27</sup>

Because some of the medications used to manage HF deplete the body of potassium, potassium-rich foods should be part of a heart healthy diet. Fluid restriction is usually part of the dietary regime of individuals with HF. Fluids are generally limited to 2 liters per day.<sup>23,27</sup>

Older HF patients who are overweight and obese should be encouraged to lose weight to reach a healthy weight in efforts to avert the progression of HF. In HF patients weight is examined every day. Smokers should be encouraged to stop this lifestyle habit.<sup>23,27</sup>

### Medications

Prescription medications normally used in the treatment of HF include the following:<sup>27</sup>

- Diuretics aid in controlling fluid accumulation.
- ACE inhibitors support normal blood pressure.
- Aldosterone antagonists help relieve the body of excess fluid and sodium. This action helps to decrease the blood volume that is pushed by the heart.

## Chronic Obstructive Pulmonary Disease

### Prevalence and Etiology

Chronic obstructive pulmonary disease (COPD) is the fourth leading cause of death in the United States.<sup>28</sup> This condition affects 10% of the general population, and increase in age is strongly associated with an increasing prevalence.<sup>29</sup>

### Risk Factors

The most common risk factor for developing COPD is smoking. Individuals with a history of obstructions of the airway and those who are obese are also at risk.<sup>30</sup>

The diagnosis of COPD is difficult to make because symptoms such as dyspnea, or shortness of breath upon exertion, reduced exercise tolerance, and fatigue are also present in other conditions such as HF.<sup>31</sup>

### Prevention and Treatment

The management of COPD is multidisciplinary. The goals of treatment in the older adult with COPD are to treat and avert chronic symptoms, reduce emergency room visits and hospitalizations, improve and/or maintain physical activity level, and augment pulmonary function with minimal side effects from medications. Management should also focus on improving health status (quality of life), which is greatly impaired by respiratory symptoms such as breathlessness and by symptoms of anxiety and depression. As the disease advances, the goals of treatment shift to lessen the decline of lung function over time and decrease mortality.<sup>32</sup>

The older adults' nutritional status has an impact on their ability to respond to medical treatment. The presence of malnutrition, particularly protein-calorie malnutrition, can exacerbate the disease development, producing **atrophy** of the diaphragm and the muscles responsible for the pumping mechanism, which control the expansion and contraction of the diaphragm to move air in and out of the lungs.<sup>33</sup>

A number of factors can affect dietary intake of older adults with COPD and can also contribute to weight loss. Change in taste from chronic sputum production, flattening of the diaphragm leading to early satiety, and fatigue that limits energy for both consuming and preparing meals can interfere with individuals' ability to meet their nutritional needs. As a result of the metabolic changes in COPD produced by a rise in daily expenditure and reduced respiratory muscle efficiency, the caloric needs of these individuals are higher than their non-COPD counterparts.<sup>34–36</sup> For older adults with high protein needs, protein should be provided in sufficient amounts, 1.2–1.7 g/kg of body weight, to promote, maintain, and restore lung and muscle strength as well as promote immune function.<sup>37</sup> Interventions to manage some of the nutrition symptoms associated with COPD include high-calorie/high-protein, nutrient-dense foods to maintain body weight and lean body mass as well as to prevent **cachexia**.<sup>35</sup> Strategies such as resting before meals to limit fatigue when preparing and consuming meals, eating small and frequent meals to manage dyspnea and early satiety, and consuming high-calorie/high-protein oral nutrition supplements and/or vitamin and mineral supplements should be suggested to older patients with COPD.<sup>35</sup>

**Recap** Over the last century, there has been a shift in the leading causes of death, from infectious and acute diseases to chronic and degenerative illnesses. Heart disease is one of the leading causes of death in older adults. Conditions and lifestyles that can contribute to developing a stroke include the presence of hypertension, smoking, overweight and obesity, hyperlipidemia, diabetes mellitus, history of TIA, and atrial fibrillation. Managing stroke risk factors is essential to prevent stroke episodes. Heart failure is a common illness, particularly in older adults. History of uncontrolled HTN and history of MI are the two most common risk factors for developing heart failure.<sup>10,26</sup> COPD is the fourth leading cause of death in the United States.<sup>28</sup> The most common risk factor for developing COPD is smoking.

1. Summarize the nutrition interventions to be considered when counseling an older adult with cardiovascular disease.
2. Develop a 2-day menu for an older adult with a diagnosis of CHF.
3. Calculate the protein needs for an older adult with COPD who weighs 190 pounds. What are some of the interventions that can be put in place to meet the protein needs of this individual?

## Cancer

**Preview** Cancer is characterized by an uncontrolled division of abnormal cells in a part of the body. Healthcare providers need to help older adults realize the effect of intensive treatment on their physical, emotional, and social well-being.

It is hard to discern why one individual develops cancer and another goes disease free. Age, alcohol consumption, cancer-causing substances, chronic inflammation, diet, hormones, immunosuppression, infectious agents, obesity, radiation, sunlight exposure, and consumption of tobacco products are the most commonly cited cancer risk factors.<sup>38</sup>

### Prevalence and Etiology

Aging is the strongest risk factor for the development of cancer. More than 60% of all episodes of cancer occur in older adults 65 years and older.<sup>39</sup> Cancer is a group of diseases with an abnormal, unregulated cell growth caused by a series of **DNA** metamorphoses. Abnormal DNA can be inherited or acquired. Damaged DNA can occur as a result of lifestyle activities such as cigarette smoking or environmental causes such as sun exposure.<sup>40</sup> Although genetic and environmental factors have been linked to effected DNA and cell replication abnormalities, the exact causes of cancer-causing transformations are not completely understood.<sup>41</sup> Individuals with cancer need treatment that is intended for the type of cancer with which they have been diagnosed.<sup>40</sup> Older adults with cancer may have additional challenges including other health and medical conditions, social and economic barriers, and physical and functional limitations that make dietary guidance more complex.

### Risk Factors

Research suggests that some risk factors increase the probability of anyone developing cancer.<sup>38</sup>

A number of nutrients and food items have been studied in efforts to define their association with increase or decrease in cancer risk with unique considerations for older adults. These include the following:<sup>38</sup>

- **Alcohol:** Alcohol use has been linked to the development of cancer. The association of red wine and reduction of cancer risk has not been scientifically defined.
- **Antioxidants:** Laboratory and animal research has shown that exogenous antioxidants can help avert the free radical injury linked with the development of cancer. Numerous large randomized, placebo-controlled prevention clinical trials, however, did not support this hypothesis, and some of the largest clinical trials had to be abandoned because the patients getting antioxidants had an increased

rate of cancer compared with patients who did not receive them.<sup>42</sup>

- **Artificial sweeteners:** Studies have been done on the safety of several artificial sweeteners, such as saccharin, aspartame, acesulfame potassium, sucralose, neotame, and cyclamate. There is no conclusive evidence that the artificial sweeteners available commercially in the United States are associated with cancer risk in humans.
- **Calcium:** Research results examining the association between increased calcium consumption and decreased risk for developing colorectal cancer, while promising, are inconclusive. Whether a relationship exists between higher calcium intakes and reduced risks of other cancers, such as breast and ovarian cancer, is unclear. Some research suggests that a high calcium intake may increase the risk of prostate cancer.
- **Charred meat:** Certain chemicals, called heterocyclic amines (HCAs) and polycyclic aromatic hydrocarbons (PAHs), are formed when muscle meat, including beef, pork, fish, and poultry, is cooked using high-temperature methods. Exposure to high levels of HCAs and PAHs can cause cancer in animals; however, whether such exposure causes cancer in humans is unclear.
- **Cruciferous vegetables:** There is no conclusive evidence demonstrating the association between cruciferous vegetables and reduced risk for developing cancer.
- **Fluoride:** Water fluoridation has been shown to prevent and can even reverse tooth decay. Many studies, in both humans and animals, have shown no association between fluoridated water and cancer risk.
- **Garlic:** Some studies have suggested that garlic consumption may reduce the risk of developing several types of cancer, especially cancers of the gastrointestinal tract. However, the evidence is not definitive.
- **Tea:** Tea contains polyphenol compounds, particularly catechins, which are antioxidants. Results of epidemiologic research exploring the association between tea ingestion and cancer risk have been inconclusive.
- **Vitamin D:** Epidemiologic research in humans has implied that higher intakes of vitamin D or higher levels of vitamin D in the blood may be connected with a decreased risk of colorectal cancer; nonetheless, the results of randomized studies have been inconclusive.

Individuals who are obese may have an added risk of some types of cancer, including cancer of the breast (in women who have been through menopause), colon, rectum, endometrium, esophagus, kidney, pancreas, and gallbladder. Equally, consuming a healthy diet, being physically active, and keeping a healthy weight may help reduce risk of some cancers.<sup>38</sup>

Tobacco use is a leading cause of developing cancer and of death from cancer. Tobacco use should be discouraged at every age.

### Prevention and Treatment

Researchers are actively exploring different ways to prevent cancer. These include controlling factors known to cause cancer, changes in diet and lifestyle, identifying precancerous conditions early, and chemoprevention.<sup>43</sup> Interventions to lower cancer risk are being studied in clinical trials.<sup>43</sup> Chemoprevention is the use of drugs, vitamins, or other agents (laboratory made) to try to reduce the risk of, or delay the development or recurrence of, cancer.<sup>44</sup>

When it comes to actual treatment, it is important to note that although cancer treatment for older adults can sometimes be complex and challenging, treatment can be just as useful for them as for younger adults. The goals of cancer treatment for older adults may include the following:<sup>45</sup>

- Getting rid of the cancer
- Helping a person live longer
- Reducing any signs and symptoms related to cancer
- Maintaining physical and emotional abilities and a person's quality of life

Treatment considerations and assessments, made with the healthcare team and the older adult with cancer and their family, should be based on the type of cancer and the level of metastasis (as applicable). Available treatment options, specific for cancer type, including the risks and benefits, should be addressed. The presence of medical conditions other than cancer that may put the older adult with cancer at an increased risk for treatment-related side effects or complications needs to be evaluated. Healthcare providers need to help the older adult realize the effect of intensive treatment on their physical, emotional, and social well-being. Special consideration should be given to quality of life because older adults living with cancer often make treatment choices based on what they value most in their lives and their level of physical, emotional, and social well-being. Older adults are more likely to have limited resources and live on a fixed income; therefore, financial limitations need to be considered. Some older adults might refuse treatment solely based on cost. Spiritual beliefs must be taken into account because many older adults have already come to terms with their mortality as a result of chronic illnesses, the loss of a spouse, or advanced age.<sup>45</sup>

Cancer treatment options for older adults may consist of a single therapy or a combination of therapies. The most common cancer treatment alternatives are surgery, chemotherapy, and radiation therapy. Palliative care is treatment to relieve a person's symptoms, improve a person's quality of life, and provide support to patients and their families. Palliative care is an important component of cancer management for an older

adult. Palliative care may be a component of the standard treatment.<sup>45</sup>

### Nutrition Recommendations

The Academy of Nutrition and Dietetics Evidence Analysis Library has outlined guidelines for the care of adults with cancer. The goals for nutrition care are to define symptoms that have an impact on the older individual's nutritional status and develop a nutrition plan that helps the person prevent or reverse nutritional deficiencies. Efforts should be made to identify cancer cachexia, help the person preserve lean body mass, and minimize nutrition-related side effects that can interfere with the individual's tolerance to treatment.<sup>46</sup>



### Case Study

Elsa's medications include Humalog (insulin lispro), methimazole, nonsteroidal anti-inflammatory drugs (NSAIDs), thiazide diuretic, a calcium channel blocker, an antacid, and antibiotics.

In the past 3 weeks, Elsa has reported changes in bowel habits, abdominal pain, fatigue, decline in appetite, and a 5-pound weight loss in the past week.

Her new weight is 190 pounds. Her BMI is 32.6. The physician ordered laboratory work. Results were significant for low iron level and (+) occult blood in stool.

### Question

1. Elsa has had a weight loss with a BMI decline to 32.6. She is showing GI symptoms such as changes in bowel habits, anorexia, and laboratory studies with low iron levels and (+) for occult blood. What additional information would be useful to complete Elsa's nutrition assessment.

**Recap** Cancer is a group of diseases with an abnormal, unregulated cell growth caused by a series of DNA metamorphoses. The cell changes generate the growth of tumors, which may spread to adjoining tissue or other parts of the body, thus creating metastasis. Healthcare providers need to help older adults realize the effect of intensive treatment on their physical, emotional, and social well-being. Special consideration should be given to quality of life because older adults living with cancer often make treatment choices based on what they value most in their lives and their level of physical, emotional, and social well-being.

1. Which modifiable risk factors should be highlighted for older adults at risk for developing cancer?
2. What are the goals of nutrition recommendations for older adults with cancer?



## Cognitive Disorders

**Preview** In the United States, millions of individuals experience Alzheimer's disease (AD) and other types of dementia. AD is a leading cause of death in the United States. As AD develops, individuals lose the ability to identify food and fail to recognize feelings of thirst and hunger.

Cognitive health is vital to overall health and well-being. As such, it must be treated in older adults with the same perseverance as physical health. More than 16 million people in the United States live with cognitive impairment.<sup>48</sup> The severity of dementia ranges from a mild stage, during which the older adult starts to see changes in functioning, to a severe stage, in which the person becomes fully dependent on caregivers for all activities of daily living. Dementia can also promote variations in mood and personalities, making it impossible for the older adult to solve problems or control emotions.

### Prevalence

Every 67 seconds, somebody in the United States acquires Alzheimer's disease. By the year 2050, every 33 seconds an American will develop AD.<sup>47,49</sup> Presently, AD is the sixth leading cause of death in the United States, accounting for about 500,000 deaths every year.<sup>47</sup>

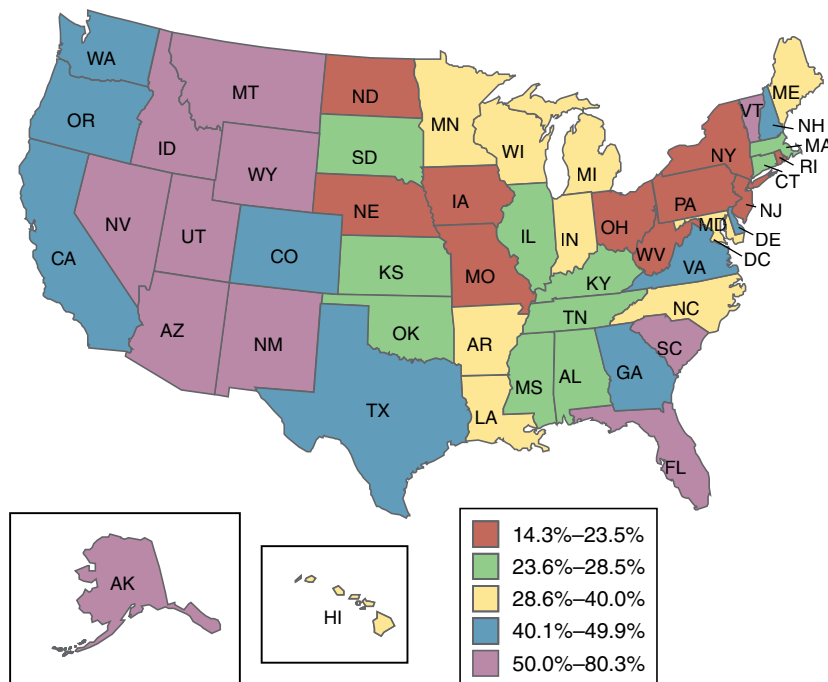
As the overall segment of the adult population continues to increase, so does the percentage of the U.S.

population with AD.<sup>47</sup> Unless a cure for this disease is discovered, it is projected that the number of older adults with dementia will triple from around 5 million in 2014 to 16 million by 2050.<sup>49</sup> In the years to come, every U.S. state will see a rise in the number of older adults with a diagnosis of AD. **FIGURE 16.4** portrays the anticipated percentage increase of older adults with AD between the years 2014 and 2025.<sup>47</sup> A national estimate of the incidence of all forms of dementia is approximately 13.9%.<sup>50</sup>

Dementia is frequently defined as cognitive decline that affects a person's ability to clearly think, remember, and reason. Cognitive decline also affects behavioral abilities to the point that it hinders an older adult's capacity to perform activities of daily living (ADLs).<sup>51</sup> The severity of dementia ranges from a mild stage, during which the older adult starts to see changes in functioning, to a severe stage, in which the person becomes fully dependent on caregivers for all ADLs.<sup>51</sup>

### Cognition and Memory Loss

Cognition relates to brain-related activities such as attention, memory, learning, executive function, and language. An individual's cognitive performance can define his or her sense of worth and purpose and influence the ability to stay socially engaged, be self-sufficient, recuperate from illness or injury, and handle the physiological changes associated with the aging process.<sup>52</sup> As people age, the confusion or memory loss seen over time can be an indication of decline in cognition.<sup>53</sup>



**Figure 16.4**  
State prevalence of Alzheimer's disease, 2014–2015.

Reprinted with permission from the Alzheimer's Association. Alzheimer's disease facts and figures. Retrieved from: [http://www.alz.org/alzheimers\\_disease\\_1973.asp](http://www.alz.org/alzheimers_disease_1973.asp).

Memory loss is classically one of the first warning indications of cognitive decline.<sup>54</sup> Mild cognitive injury is also a possible precursor to AD.<sup>55</sup> Several triggers for cognitive deterioration are modifiable. This includes symptoms such as depression, infections, medication side effects, and nutritional deficiencies such as vitamin B<sub>12</sub> deficiency. All these symptoms should be treated in a timely manner by a healthcare provider.<sup>54</sup>

## Dementia

Dementia is a brain condition that interferes with older adults' capacity to remember, obtain and process new information, and communicate. Usual activities, such as clothing oneself or consuming meals, become hard to achieve. These changes in cognitive abilities eventually make it challenging for individuals to care for themselves.

Dementia can also promote variations in mood and personality, making it impossible for the older adult to solve problems or control emotions.<sup>51,56</sup>

## Diagnosis

A number of risk factors serve as a precursor for dementia. To determine the specific brain disease that is causing dementia in an individual, different tests must be performed. **TABLE 16.2** offers a list of the different types of dementia and their unique characteristics.

## Alzheimer's Disease

Alzheimer's disease (AD) was first identified over a hundred years ago. Research addressing symptoms, causes, risk factors, and treatment has only gained interest in the past 30 years. Through research we have learned a great

**Table 16.2**

### Types of Dementia and Their Characteristics

Disease	Description
Alzheimer's disease (AD)	<p>Most common type of dementia; accounts for an estimated 60–80% of cases. About 50% of these cases involve solely Alzheimer's pathology; many have evidence of pathologic changes related to other dementias. This is called mixed dementia (see mixed dementia in this table).</p> <p>Difficulty remembering recent conversations, names, or events is often an early clinical symptom; apathy and depression are also often early symptoms. Later symptoms include impaired communication, disorientation, confusion, poor judgment, behavior changes, and, ultimately, difficulty speaking, swallowing, and walking.</p> <p>Revised criteria and guidelines for diagnosing AD were proposed and published in 2011. They recommend that AD be considered a slowly progressive brain disease that begins well before clinical symptoms emerge.</p> <p>The hallmark pathologies of AD are the progressive accumulation of the protein fragment beta-amyloid (plaques) outside neurons in the brain and twisted strands of the protein tau (tangles) inside neurons. These changes are eventually accompanied by the damage and death of neurons.</p>
Vascular dementia	<p>Previously known as multi-infarct or poststroke dementia, vascular dementia is less common as a sole cause of dementia than AD, accounting for about 10% of dementia cases. However, it is very common in older individuals with dementia, with about 50% having pathologic evidence of vascular dementia (infarcts). In most cases, the infarcts coexist with Alzheimer's pathology.</p> <p>Impaired judgment and the inability to make decisions, plan, or organize are more likely to be initial symptoms, as opposed to the memory loss often associated with the initial symptoms of AD.</p> <p>Vascular dementia occurs most commonly from blood vessel blockage or damage leading to infarcts (strokes) or bleeding in the brain. The location, number, and size of the brain injuries determine whether dementia will result and how the individual's thinking and physical functioning will be affected.</p> <p>In the past, evidence of vascular dementia was used to exclude a diagnosis of AD (and vice versa). That practice is no longer considered consistent with the pathological evidence, which shows that the brain changes of both types of dementia commonly coexist. When two or more types of dementia are present at the same time, the individual is considered to have mixed dementia (see mixed dementia in this table).</p>
Frontotemporal lobar degeneration (FTLD)	<p>Includes dementias such as behavioral-variant FTLN, primary progressive aphasia, Pick's disease, corticobasal degeneration, and progressive supranuclear palsy.</p> <p>Typical early symptoms include marked changes in personality and behavior and difficulty with producing or comprehending language. Unlike AD, memory is typically spared in the early stages of disease.</p> <p>Nerve cells in the front (frontal lobe) and side regions (temporal lobes) of the brain are especially affected, and these regions become markedly atrophied (shrunken). In addition, the upper layers of the cortex typically become soft and spongy and have protein inclusions (usually tau protein or the transactive response DNA binding protein).</p> <p>The brain changes of behavioral-variant FTLN may occur in those age 65 years and older, similar to AD, but most people with this form of dementia develop symptoms at a younger age (at about age 60). In this younger age group, FTLN is the second most common degenerative dementia.</p>

Disease	Description
Mixed dementia	<p>Characterized by the hallmark abnormalities of more than one type of dementia—most commonly AD combined with vascular dementia, followed by AD with dementia with Lewy bodies (DLB), and AD with vascular dementia and DLB. Vascular dementia with DLB is much less common.</p> <p>Recent studies suggest that mixed dementia is more common than previously recognized, with about half of those with dementia having mixed pathologies.</p>
Parkinson's disease (PD) dementia	<p>Problems with movement (slowness, rigidity, tremor, and changes in gait) are common symptoms of PD. In PD, alpha-synuclein aggregates appear in an area deep in the brain called the substantia nigra. The aggregates are thought to cause degeneration of the nerve cells that produce dopamine.</p> <p>The incidence of PD is about one-tenth that of AD.</p>
Creutzfeldt–Jakob disease	<p>As PD progresses, it often results in dementia secondary to the accumulation of Lewy bodies in the cortex (similar to DLB) or the accumulation of beta-amyloid clumps and tau tangles (similar to AD).</p> <p>This very rare and rapidly fatal disorder impairs memory and coordination and causes behavior changes. Results from a misfolded protein (prion) that causes other proteins throughout the brain to misfold and malfunction.</p> <p>May be hereditary (caused by a gene that runs in an individual's family), sporadic (unknown cause), or caused by a known prion infection.</p> <p>A specific form called variant Creutzfeldt–Jakob disease is believed to be caused by consumption of products from cattle affected by mad cow disease.</p>
Normal-pressure hydrocephalus	<p>Symptoms include difficulty walking, memory loss, and inability to control urination.</p> <p>Caused by impaired reabsorption of cerebrospinal fluid and the consequent buildup of fluid in the brain, increasing pressure in the brain.</p> <p>People with a history of brain hemorrhage (particularly subarachnoid hemorrhage) and meningitis are at increased risk. Can sometimes be corrected with surgical installation of a shunt in the brain to drain excess fluid.</p>

Modified from Alzheimer's Association. 2014 Alzheimer's disease facts and figures. *Alzheimers Dement*. March 2014;10(2):47–92; Fernando MS, Ince PG. MRC Cognitive Function and Ageing Neuropathology Study Group: vascular pathologies and cognition in a population-based cohort of elderly people. *J Neurol Sci*. 2004;226(1–2):13–17; Schneider JA, Arvanitakis Z, Bang W, Bennett DA. Mixed brain pathologies account for most dementia cases in community-dwelling older persons. *Neurology*. 2007;69:2197–2204; Schneider JA, Arvanitakis Z, Leurgans SE, Bennett DA. The neuropathology of probable Alzheimer disease and mild cognitive impairment. *Ann Neurol*. 2009;66(2):200–208.

deal about this condition, but information addressing the biologic changes that promote the development of AD as well as prevention strategies and the disease's progression need further research.<sup>47</sup>

### Risk Factors for Alzheimer's Disease

The true cause of AD is not known. Theories suggest that AD occurs as a result of environmental, lifestyle, and genetic factors congregating to make the pathophysiologic succession of events that over decades progresses to AD. Some of the risk factors that contribute to the development of AD over time include age, genetics, family history, the presence of insulin resistance and vascular factors, dyslipidemia, hypertension, inflammatory markers, Down syndrome, and traumatic brain injury.<sup>47,57</sup> Most cases of AD are identified in those 65 years of age and older. There are instances in which individuals younger than 65 years of age develop AD; however, this is small fraction of the population.<sup>47,57,58</sup>

Researchers have identified two forms of genes that can play a role in determining whether a person develops AD.<sup>56–58</sup> These are the risk genes and opportunistic genes.<sup>56–58</sup> Family history has also been identified as a risk factor in the development of AD. Individuals whose parents, sibling, or child has AD are at increased risk for developing AD. The number of family members and the risk for developing the disease run parallel. As the number

of family members with the disease rises, so does the possibility of developing AD.<sup>47,56,57</sup>

Depression has been identified as a risk factor in the development of AD and other dementias. The Framingham Study revealed a 50% increase in AD and dementia in individuals identified with depression.<sup>59</sup> The study showed that 21.6% of subjects with original history of depression developed dementia, whereas only 16.6% of participants who had no history of depression developed AD.<sup>59</sup>

A low level of education is being looked at as a risk factor for developing AD as well as other types of dementias.<sup>60</sup> Some researchers report that individuals with more years of formal education build a “cognitive reserve” that protects the brain against some of the changes associated with signs and symptoms of AD.<sup>60</sup>

### Diagnosis of Alzheimer's Disease

Individuals with AD show a gradual brain deterioration and atrophy that affects cognition. Signs and symptoms and the rate of advancement through the diverse disease phases are distinctive for each individual.

After almost 30 years, in 2011 the National Institute on Aging and the Alzheimer's Association modified the initial diagnosing criteria/guidelines for AD that were established in 1984.<sup>61</sup> The modified guidelines incorporate scientific and technological trends with the purpose of further defining existing diagnosis techniques, sustaining

autopsy studies of brain alterations resulting from the disease process, and ascertaining research priorities. The guidelines emphasize pinpointing the following:<sup>61</sup>

- Dementia as a result of AD
- Mild cognitive impairment (MCI)
- Preclinical expression of AD
- Standards for recording and reporting AD brain alterations assessed through autopsy

### Treatment of AD

There is no defined cure for AD. Pharmacological and nonpharmacological interventions are used to control both cognitive and behavioral signs and symptoms. The research agenda for AD ranges from strategies to advance quality of life to dealing with behavioral symptoms, controlling the progression of the disease, and helping individuals maintain cognitive status.<sup>47</sup>

The goal of nonpharmacologic treatment frequently focuses on maintaining cognitive level, helping the brain offset impairments, or increasing quality of life by decreasing behavioral signs and symptoms like depression, indifference, wandering, sleep disturbances, anxiety, and belligerence.

### Nutrition Implications and Recommendations

The brain and body changes that take place as a result of AD affect an individual's physical function and make the person susceptible to other health complications. Dysphagia, for example, can make individuals with AD prone to pneumonia and infections, malnutrition, and dehydration.<sup>62</sup>

As AD develops, individuals lose the ability to identify food and fail to recognize feelings of thirst and hunger. In some instances, food and water are declined because of confusion or belligerent conducts linked to AD.<sup>62</sup>

In the initial stages of AD, individuals can continue to shop for food and prepare meals. As the disease progresses, a number of changes that influence food selection and nutritional status occur. As persons with AD start to forget to eat and drink, the risk for weight decrease and dehydration increases. Some individuals react differently in the sense that they forget that they already ate. This results in the consumption of numerous meals during the day, contributing to weight gain and higher BMI.<sup>63</sup> Many of these patients start replacing the consumption of a well-balanced meal with a diet that consists of a small number of items (decreased food selection) that are readily available, such as convenience food items, sweet snacks, and other foods that lack nutrient density. Behaviors such as eating very fast put individuals at increased risk for choking. People who display this behavior usually fail to properly chew their food. The presence of aspiration is very common in the last stages of AD.<sup>64</sup>

As AD advances, patients become poor historians; procuring a diet history and identifying food preferences can be a challenging task for dietitians. Observing individuals at mealtime and obtaining information from family and friends can be helpful strategies in trying to define meal patterns in these individuals.<sup>63</sup>

### Eating Strategies

AD can lead to decreased nutrient consumption because of inability to feel hunger and thirst, decreased ability to smell and taste, dysphagia, and incompetence in coordinating the use of eating instruments, diminished ability to feed self, and apraxia. The main nutrition goals when treating individuals with AD and other forms of dementia are to prevent weight loss, malnutrition, pressure injuries and other comorbidities.<sup>57</sup>

Conducting a nutrition assessment in patients with AD involves determining conditions such as poor oral health, capacity to concentrate during mealtime, and swallowing difficulties. Signs of decline, such as rejecting meal substitutes, inability to concentrate on consuming the meal, or wandering away from meals, and leaving 25% or more of meals uneaten, need to be evaluated as part of the nutrition assessment process.<sup>65</sup>

Creating activities to engage patients at mealtime can help stimulate their interest in the meal and promote better meal intake. Activities like getting individuals involved in menu selection and table service can create interest. Strategies such as baking bread and cookies before meals can help to arouse olfactory senses and stimulate appetite. Patients' anxiety level might require mealtimes to be changed to a time when the individual is less confused, unsettled, or restless. AD patients should be encouraged to practice any activities that promote their independence. For example, for patients who are slow eaters, mealtimes need to be prolonged to allow ample time for them to eat at their pace.<sup>65</sup> If patients seem to be overwhelmed by too many food choices, providing one food item at a time might be helpful.

Strategies used during meal service include staff members sitting down next to the patient at eye level while assisting with meals. This promotes trust and helps the patient focus. "Food first" is the preferred approach to ensure adequate nutrient intake. Patients with AD who cannot meet their nutrient needs with food alone might need fortified foods and supplements to boost their intake. On the basis of individuals' wishes and **advance directives**, during the end stage of the disease, the use of enteral nutrition versus comfort measures should be explored. For those near the end of their life, artificial nutrition and hydration may be withdrawn, according to their written/expressed wishes.<sup>65</sup>

### Let's Discuss

Repeated nasogastric tube insertions are reported by competent patients to be very unpleasant. Patients with AD may not understand what is being done. They may try to pull their tubes out and potentially have the additional discomfort of being held in restraints. Debate the arguments for and against providing artificial feedings to patients with end-stage AD.

## Case Study



During mealtime today, Elsa was staring at her meal without making any effort to pick up the eating utensils to feed herself. When the caregiver approached to encourage intake, Elsa looked the other way.

### Question

1. Elsa is easily distracted and makes no effort to feed herself. What mealtime/ eating strategies can be implemented to facilitate meal intake?

**Recap** Almost every minute, someone in the United States acquires Alzheimer's disease, and this rate is projected to double by the year 2050. The severity of dementia ranges from a mild stage, during which the older adult starts to see changes in functioning, to a severe stage, in which the person becomes fully dependent on caregivers for all ADLs. The true cause of AD is not known.

1. Discuss the nutritional challenges faced by older adults with dementia.
2. What are some of the environmental, behavioral, and physical considerations that need to be considered when assessing patients with a form of dementia?

## Endocrine and Metabolic Conditions

**Preview** There are two main forms of diabetes, type 1 (T1DM) and type 2 (T2DM). T1DM is mainly an autoimmune disorder in which the body's immune system attacks the beta cells of the pancreas where **insulin** is produced. T2DM occurs as a gradual decline in beta cell function that results in a reduction in insulin production and progresses to insulin resistance and, finally, insulin deficiency. Nearly 50% of adults 50 years and older meet the criteria for metabolic syndrome.

By 2050, one out of every three adults in the United States could have a diagnosis of diabetes. Nearly 50% of adults 50 years and older meet the criteria for metabolic syndrome, with risk factor that include irregular levels of blood lipid, impaired fasting glucose, HTN, and excess abdominal obesity. The American Diabetes Association has created evidence-based guidelines and recommendation that include medical nutrition therapy (MNT) in the treatment of diabetes mellitus (DM). Nutrition therapy is recommended for all people with **type 1** and **type 2 diabetes** as an effective component of the overall treatment plan. Metabolic syndrome is a disease in which the individual suffers from irregular levels of blood lipids

(low high-density lipoprotein [HDL] and high triglycerides), impaired fasting glucose, HTN, and excess abdominal obesity.<sup>66</sup>

### Diabetes

In the 32 years from 1980–2012, the number of adults with a diagnosis of diabetes mellitus (DM) in the United States has almost quadrupled, from 5.5 million to 21.3 million. On average, approximately 1.7 million new incidents of diabetes are diagnosed every year. At this rate, by 2050 one out of every three adults in the United States could have a diagnosis of DM.<sup>67</sup>

### Prevalence and Etiology

The World Health Organization (WHO) estimates that by the year 2030 DM will become the seventh leading cause of death worldwide.<sup>68</sup> In 2012, 29.1 million individuals, accounting for 9.3% of the U.S. population, were classified as having diabetes. This statistic includes 21.3 million people diagnosed and nearly 8 million undiagnosed.<sup>67</sup>

T2DM is more common in older adults. The etiology of T2DM is hereditary and often prompted by lifestyle or environmental elements. T2DM occurs as a gradual decline in beta cell function that results in a reduction in insulin production and progresses to insulin resistance and, finally, insulin deficiency.<sup>69,70</sup> In older adults, changes in body composition accompanied by aging, sarcopenia of aging, vitamin D deficiency, and inflammatory response are believed to contribute to the development of DM.<sup>69,70</sup>

### Risk Factors

T2DM typically presents in older adults, and frequency increases with age. It is estimated that approximately one-third of adults age 65 and older have diminished glucose tolerance.<sup>71</sup> Risk factors for development of T2DM include over weight, inactivity, family history, race, age, high blood pressure, and abnormal cholesterol and triglyceride levels.<sup>72</sup>

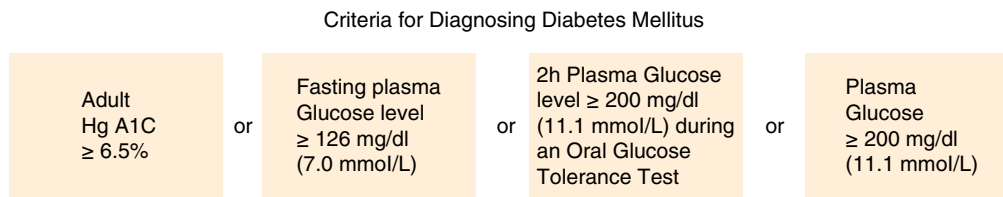
### Screening and Diagnosis

The American Diabetes Association (ADA) advocates that screening for diabetes should be performed in all adults, starting at age 45, and every 1 to 3 years thereafter, depending on the individual's risk factors.<sup>73</sup> Diagnosis of diabetes is characteristically based on the results of one of three blood tests: fasting blood glucose, 2-hour 75-g oral glucose tolerance test (OGTT), or **hemoglobin A1c (HbA1c)**. (See **FIGURE 16.5**.)

### Management

#### Diabetes Self-Management Education and Support

Older adults can benefit from diabetes self-management education and support (DSME/S). Research supports that DSME is as valuable in the management of older adults with diabetes as it is with their younger counterparts.<sup>74</sup>



**Figure 16.5**  
Criteria for diagnosing diabetes mellitus.

Data from American Diabetes Association. Classification and Diagnosis. *Diabetes Care* 2014; 37:515.

The main role of diabetes education is to empower the diabetic patient to acquire the knowledge, skills, and confidence to accomplish self-care behaviors for managing diabetes.<sup>73</sup> The education element emphasizes obtaining the knowledge and skills for managing diabetes. The support component aids individuals with DM to define and implement a plan of action for behavior change to influence care.<sup>73</sup> In older adults, often the plan must consider the presence of multiple medical conditions simultaneously.

### Medical Nutrition Therapy

The American Diabetes Association has created evidence-based guidelines and recommendations that include medical nutrition therapy (MNT) in the treatment of DM. Nutrition therapy is recommended for all people with type 1 and type 2 diabetes as an effective component of the overall treatment plan. Older adults who have prediabetes or diabetes should receive individualized MNT as needed to achieve treatment goals, preferably provided by a registered dietitian nutritionist (RDN) familiar with the components of diabetes MNT. Diabetes nutrition therapy can result in improved quality of life for older adults, cost savings, and improved outcomes such as reduction in HbA<sub>1c</sub>. Nutrition plays a significant role in the management of diabetes symptoms and comorbidities. The MNT provided to older adults needs to be individualized and must consider all aspects of care, including comorbid conditions, nutrient needs that might be altered by chronic disease process, and physiologic changes associated with aging such as the ability feed self, difficulty chewing and swallowing, and changes in intake due to anosmia and ageusia.<sup>75</sup>

### Diet

It is the position of the American Diabetes Association (ADA) that there is not a one-size-fits-all eating pattern for individuals with diabetes. The ADA also acknowledges the vital role of nutrition therapy in the management of DM and endorses that each person with DM should be actively involved in self-management, education, and treatment planning with a healthcare provider, which includes the creation of a personalized eating plan.<sup>76,77</sup>

As outlined by the ADA, the goals of nutrition therapy for adults with diabetes include encouraging individuals to maintain a healthy eating pattern that accentuates the consumption of nutrient-dense foods and adequate portion sizes in an effort to improve health. Following a healthy diet can help an older adult achieve glycemic, blood pressure, and lipid goals as well as reach and maintain healthy weight, thereby managing risk factors associated with other chronic conditions prevalent in this age group.<sup>73</sup> Evidence-based guidelines suggest there is no ideal percentage of calories from carbohydrate, protein, and fat for all people with diabetes, and macronutrient distribution should be based on individualized assessment of current eating patterns, preferences, and metabolic goals.<sup>73</sup> In older adults, eating patterns must also consider other health and medical conditions, living arrangements, and functional and physical independence.

The use of dietary meal patterns such as a Mediterranean-style eating pattern, the Dietary Approaches to Stop Hypertension (DASH) diet, and low-fat and lower carbohydrate eating patterns has been beneficial in promoting improved metabolic parameters such as glycemic control, lipids, blood pressure, and weight.<sup>71,75,78</sup>

### Meal Planning Strategies

Meal planning approaches such as carbohydrate counting have been shown to improve glycemic control.<sup>73,79</sup> In individuals with fixed daily insulin dosage, consistent carbohydrate intake in terms of consistent schedule and consistent meal composition can contribute to improved glycemic response.<sup>77</sup> Recommending meal plans that focus on portion control and healthy eating might be an appropriate intervention for individuals with low health literacy and numeracy.<sup>77</sup> Simple meal planning approaches such as the MyPlate method may be appropriate for some.

### Weight Management

Modest weight loss of 7% accompanied by physical activity has produced positive outcomes in terms of improved blood glucose levels and **insulin sensitivity**.<sup>77</sup> In older adults, BMI alone should not be the sole measurement on which to recommend weight loss. In this population,

BMI is not an accurate indicator of body composition. Body changes that occur as part of the aging process, such as sarcopenia, render this measurement an unreliable indicator of obesity for older adults.<sup>70</sup> Weight loss programs for older adults must be individualized and monitored.<sup>80</sup>

### Physical Activity

Being physically active may contribute to improved metabolic control, functional capacity (mobility), and physical fitness.<sup>80</sup> Because muscle strength loss and poor muscle function are linked to aging and diabetes, staying physically active is an important aspect of disease management especially in old age.

### Medication Management

When individuals with T2DM are incapable of maintaining stable glycemic control with diet and physical activity, medication must be prescribed. Medication selection is based on treatment goals set for the patient. **TABLE 16.3**

lists medications commonly used in the treatment of DM. Individuals with T1DM require the use of insulin. For those with T2DM, insulin is prescribed after the efficacy of lifestyle changes and oral antihyperglycemic medications are no longer successful.

### Metabolic Syndrome

#### Prevalence, Risk Factors, and Etiology

Metabolic syndrome (MetS) is a disease in which the individual has irregular levels of blood lipids (low HDL and high triglycerides), impaired fasting glucose, HTN, and excess abdominal obesity.<sup>66</sup> Nearly 50% of adults 50 years and older meet the National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III definition of metabolic syndrome.<sup>81</sup> Individuals suffering from MetS are at higher risk for premature death, heart disease, and stroke.<sup>82</sup>

**TABLE 16.4** describes the risk factors of MetS. The pathogenesis of MetS is multifaceted, and not fully understood. People with MetS are commonly older, follow a

**Table 16.3**

#### Diabetic Medications

Drug Name	Class	Reason Prescribed	Action	Risks
Diabinese	Sulfonylurea (first generation)	Insufficient insulin secretion	Stimulates insulin secretion from pancreatic beta cells; basal insulin.	High risk of <b>hypoglycemia</b> Weight gain
Glyburide Amaryl	Sulfonylurea (second generation)			Monitor cardiovascular risk
Glucotrol Glucotrol XL Amaryl				
Prandin Starlix	Meglitinide	Insufficient insulin secretion at mealtime	Stimulates pancreatic beta cell insulin secretion in response to CHO intake.	Less risk of hypoglycemia
Glucophage	Biguanide	Increased gluconeogenesis; insulin resistance	Decreases hepatic glucose production; increases insulin sensitivity; preserves beta cell function.	May cause gas, bloating, diarrhea, nausea. Monitor pts with HF, renal failure, and hepatic failure. Decreases folate and vitamin B <sub>12</sub> absorption.
Actos/ Avandia	Thiazolidinediones	Insulin resistance; hyperinsulinemia	Acts on peripheral cells; increases insulin sensitivity.	Most expensive. Slow-acting. Weight gain, edema. Not for pts with HF. Monitor liver function.
Januvia Onglyza Tradjenta	DPP4-inhibitor	Insufficient insulin secretion in response to meals; elevated glucagon secretion	Increases release of insulin; decreases release of glucagon; decreases stomach emptying; wt loss due to increased satiety.	Long-term side effects are not known. Titrate dose based on renal function.
Precose	$\alpha$ -glucosidase inhibitor	Elevated gluconeogenesis	Delays absorption of glucose in the gut; increases satiety.	Debilitating gas and digestion complaints.
Amylin Symlin	Injectable amylin analogs	Postprandial glucagon production	Delays gastric emptying, decreases appetite, decreases glucagon production.	Susceptible to hypoglycemia; GI complaints. Monitor /evaluate renal function.

CHO = carbohydrate; GI, gastrointestinal; HF = heart failure; pt = patient; wt = weight.

**Table 16.4****American Heart Association Adult Treatment Panel III  
Definition of Metabolic Syndrome**

Factor	Three or more of the following
Abdominal obesity	Waist circumference: > 40 in. (102 cm) for men > 35 in. (88 cm) for women
Triglycerides, mg/dL	> 150 mg/dL or on drug treatment for high TG
HDL, mg/dL	< 40 mg/dL for men < 50 mg/dL for women, or on drug treatment for low HDL
Blood pressure, mm Hg	Systolic blood pressure (SBP) > 130 mm Hg or diastolic blood pressure > 85 mm Hg, or on drug treatment for HTN
Fasting glucose, mg/dL	FPG > 100 mg/dL

FPG = fasting plasma glucose; HDL = high-density lipoprotein;  
HTN = hypertension ; TG = triglycerides.

Data from: Grundy SM. Metabolic syndrome scientific statement by the American Heart Association and the National Heart, Lung, and Blood Institute. *Arterioscler Thromb Vasc Biol.* Nov 2005;25(11):2243–2244.

sedentary lifestyle, are overweight or obese, and suffer from insulin sensitivity.<sup>83</sup>

Diagnosis of MetS can be made with the presence of three out of the five factors listed in **TABLE 16.5**.<sup>84</sup>

**Prevention and Treatment**

The National Heart, Lung and Blood Institute recommends that adopting a healthy lifestyle is the best way to prevent MetS.<sup>85</sup> Changes in diet and exercise that facilitate or preserve a healthy body weight can delay or prevent the onset of MetS.

**Weight Management**

Treatment plans often focus on promoting weight loss and changes in body composition. The presence of visceral fat is linked to increased production of adipocytokines, leptin, tumor necrosis factor, and angiotension II, which cause the insulin resistance abnormalities of MetS.<sup>86</sup> Weight reduction of 5–10% has been shown to

**Table 16.5****Diagnosis of Metabolic Syndrome**

1. Abdominal obesity (waist circumference of 40 inches or more in men, and 35 inches or more in women)
2. Triglyceride level of 150 mg/dL of blood or greater
3. HDL cholesterol of less than 40 mg/dL in men or less than 50 mg/dL in women
4. Systolic blood pressure (top number) of 130 mm Hg or greater, or diastolic blood pressure (bottom number) of 85 mm Hg or greater
5. Fasting glucose of 100 mg/dL or greater

positively influence the metabolic parameters of MetS, especially insulin sensitivity.<sup>87</sup>

**Diet**

Research comparing culturally similar population groups exposed to diverse dietary situations support that Westernized diets are connected to an increased possibility of developing MetS.<sup>88</sup> On the contrary, diets containing dairy products, fish, and cereal grains have been connected with a lesser risk of developing MetS.<sup>89</sup> The Mediterranean-style diets seem to contribute to a lower risk for developing this MetS and have a beneficial effect on other chronic disease risk factors common in older adults.<sup>90</sup>

**Physical Activity**

In addition to dietary adjustments, physical activity plays a key role in the management of MetS. In individuals with MetS, moderate-intensity physical activity, for 135 to 180 minutes per week, considerably decreases waist circumference. Triglyceride levels, blood pressure, and insulin sensitivity are also positively influenced by physical activity.<sup>91</sup>

**Case Study**

In the past month, Elsa's blood sugar has been running between 195 and 205. The latest HbA<sub>1c</sub> was 8.9.

**Questions**

1. What lifestyle changes can be recommended to help her attain her goals?
2. What would be the most appropriate diet for Elsa to follow at this stage?

**Recap** There are two main forms of diabetes, type 1 (T1DM) and type 2 (T2DM). T1DM is mainly an autoimmune disorder in which the body's immune system attacks the beta cells of the pancreas where insulin is produced. T2DM is more common in older adults. T2DM occurs as a gradual decline in beta cell function that results in a reduction in insulin production and progresses to insulin resistance and, finally, insulin deficiency. Nutrition plays a significant role in the management of diabetes symptoms and comorbidities. Metabolic syndrome is a disease in which the individual has irregular levels of blood lipids impaired fasting glucose, HTN, and excess abdominal obesity. A healthy lifestyle is the best way to prevent MetS.

1. Prepare an education pamphlet describing the nutritional needs of an older adult with diabetes mellitus.
2. Outline the nutrition components of older adults with metabolic syndrome.



## Gastrointestinal Conditions

**Preview** The gastrointestinal tract is essential for digesting food and absorbing nutrients. Twenty-three percent of older adults in extended care facilities suffer from gastroesophageal reflux disease. Approximately 50% of older adults suffer from diverticular disease.

The primary function of the gastrointestinal (GI) tract and its accessory organs is to digest food and absorb nutrients. Therefore, diseases and conditions that impair the normal function of the digestive system are likely to affect an individual's nutrition status adversely. Common GI conditions in older adults include gastroesophageal reflux, diverticular disease, lactose intolerance, fructose malabsorption, celiac disease, and constipation. All these conditions rely on specific dietary modifications to control the symptoms associated with the disease.

### Gastroesophageal Reflux Disease

Gastroesophageal reflux disease (GERD) is a chronic disorder in which gastric acid and other stomach fluids leak into the esophagus, characteristically producing irritation and damage to the esophageal tissue. GERD escalates the risk for other comorbidities such as **Barrett's esophagus**, a condition characterized by alterations in the mucosa of the esophagus. Individuals with Barrett's esophagus are at higher risk for developing cancer of the esophagus.<sup>92</sup>

### Prevalence and Etiology

Approximately 18–28% of adult in the United States suffer from GERD. This number increases to about 23% among older adults living in extended care facilities.<sup>93,94</sup> Older adults account for about 50% of all GERD diagnoses in hospitals.<sup>95</sup> GERD results from a dysfunction of the lower **esophageal sphincter (LES)**. This is a ring of muscle fibers in the lower esophagus that separates the stomach from the esophagus. The LES prevents stomach contents and acids from backing up into the esophagus (reflux).

The most common signs and symptoms of GERD include a burning or painful sensation in the chest (heartburn), feeling that food is “stuck” behind the sternum, and regurgitation of stomach contents (water brash).

### Risk Factors

One of the most common risk factors for development of GERD is obesity. The pressure from the visceral fat on the stomach and on the LES serves as a precursor for developing GERD.<sup>96</sup> Other risk factors associated with a decreased LES pressure that can contribute to an exacerbation of GERD include the use of tobacco, alcohol, and some medications.<sup>97</sup>

### Prevention

Weight loss and deterrence of weight gain, coupled with smoking cessation and decreased alcohol intake, may be helpful in averting GERD.<sup>97</sup>

### Treatment

GERD is normally treated with medications such as **proton pump inhibitors (PPIs)**, which are a form of acid-reducing medication, along with modifications in diet and lifestyle. Weight loss has been identified as a strategy to improve GERD symptoms.<sup>98</sup> Lifestyle interventions to manage symptoms include waiting 3 hours after eating before going to bed (helps to reduce nighttime symptoms); consuming smaller, more frequent meals; elevating the head of the bed (creating an angle at the torso); and eliminating the use of tight, restrictive garments can be effective with older adults in the management of GERD.<sup>97</sup>

### Diverticular Disease

Diverticular disease encompasses diverticulosis, or the presence of diverticula projecting through the colonic wall, and diverticulitis, which is an acute inflammation of diverticula usually manifested with symptoms like fever, leukocytosis, and pain. In the United States, the presence of diverticulitis and diverticulosis accounts for approximately 312,000 hospital admissions and 1.5 million days of inpatient care.<sup>99</sup> Annual treatment expenditures in the United States surpass \$2.6 billion.<sup>99</sup>

### Prevalence

Occurrence of diverticulosis increases with age. Although most cases are asymptomatic and actual disease prevalence is difficult to calculate, it is estimated that 50% of older adults (aged 60 and older) suffer from diverticulosis.<sup>100</sup> It is further estimated that approximately two-thirds of older adults 85 and older have this disease.<sup>100</sup> The diverticulitis form of the disease affects almost 10–25% of individuals with diverticulosis.<sup>100</sup>

### Risk Factors

A number of factors can increase the risk for developing diverticulitis. As people age, the incidence of the disorder increases. Being overweight or obese increases the probability of developing diverticulitis and also developing symptoms. Smokers are more likely than nonsmokers to experience diverticulosis. Having a sedentary lifestyle and a diet high in fat and low in fiber have also been identified as risk factors. A number of medications have been associated with an increased risk for the development of diverticulitis. These include opiates and nonsteroidal anti-inflammatory drugs.<sup>101</sup>

### Prevention

Choosing a diet high in fiber and low in fat and red meats with adequate fluids and having an active lifestyle have been identified as preventive against diverticular disease.<sup>101–103</sup> Data from the Health Professionals follow-up study did not support the previous belief that consuming nuts, corn, and popcorn contributes to the pathogenesis of diverticulitis.<sup>104</sup>

## Treatment

Diverticulitis is normally treated with antibiotics, pain medication, and bowel rest. A small number of cases might require bowel surgery.<sup>101</sup> Diet therapy varies depending on the symptoms and tolerance to intake. Diet restrictions can run the gamut from clear liquids to soft foods to low-residue foods. Once the infection is managed, the patient's diet is advanced to regular as tolerated. In instances in which prolonged bowel rest is needed, parenteral nutrition may be required for nutrition support.

## Lactose Intolerance

**Lactose intolerance** is a common disorder caused by the failure to digest lactose into its components, glucose and galactose, that results from low levels of lactase enzyme in the brush border of the duodenum.<sup>105</sup> Symptoms include loose stools, abdominal pain, bloating, nausea, and flatulence. Condition symptoms are seen after lactose-containing food items are consumed. The severity of the symptoms increases as the amount of lactose consumed increases and the tolerance level of the individual decreases. Symptoms are seen anywhere from 30 to 120 minutes after lactose is consumed. Lactose intolerance diagnosis is assigned based on self-reported symptoms and a hydrogen breath test.<sup>105,106</sup> In the United States, ethnic groups such as African Americans, Hispanics, American Indians, and Asian Indians seem to be more likely to be lactose intolerant than Americans from European background. It is estimated that 30–50 million Americans suffer from lactose intolerance.<sup>107</sup> See **TABLE 16.6** for definitions of the different types of lactose intolerance.

**Table 16.6**

### Four Types of Lactase Deficiency that May Lead to Lactose Intolerance

- **Primary lactase deficiency**, also called lactase nonpersistence, is the most common type of lactase deficiency. In people with this condition, lactase production declines over time. This decline often begins at about age 2; however, the decline may begin later. Children who have lactase deficiency may not experience symptoms of lactose intolerance until late adolescence or adulthood. Researchers have discovered that some people inherit genes from their parents that may cause a primary lactase deficiency.
- **Secondary lactase deficiency** results from injury to the small intestine. Infection, diseases, or other problems may injure the small intestine. Treating the underlying cause usually improves the lactose tolerance.
- **Developmental lactase deficiency** may occur in infants born prematurely. This condition usually lasts for only a short time after they are born.
- **Congenital lactase deficiency** is an extremely rare disorder in which the small intestine produces little or no lactase enzyme from birth. Genes inherited from parents cause this disorder.

Reproduced from National Institute of Diabetes and Digestive and Kidney Diseases Lactose intolerance. National Institute of Diabetes and Digestive and Kidney Diseases. June 2014. Retrieved from: <http://www.niddk.nih.gov/health-information/health-topics/digestive-diseases/lactose-intolerance/Pages/facts.aspx>. Accessed September 30, 2016.

People may find it helpful to talk with a healthcare provider or a registered dietitian nutritionist (RDN) about a dietary plan.

## Fructose Malabsorption

Fructose malabsorption is the inability to metabolize free fructose (a 6-carbon monosaccharide) due to decreased expression of fructose-specific GLUT-5 transporters along the brush border membrane of the small intestine.<sup>41</sup> As with lactose intolerance, fructose malabsorption results in abdominal pain, bloating, nausea, and flatulence and loose stools. Symptoms and the severity of the symptoms correlate to the amount of fructose consumed. Fructose malabsorption diagnosis, like lactose intolerance diagnosis, occurs via the use of a breath test and the presence of symptoms.<sup>108</sup>

The nutritional management of fructose intolerance requires decreasing the older adult's intake of foods that have fructose. A fructose-free diet unavoidably means restricting the intake of fruit, particularly those with a high fructose-to-glucose ratio, along with fruit juices, sweeteners such as honey, agave nectar, and high-fructose corn syrup. Because fruit is an important source of vitamin C, supplementation with vitamin C should be recommended along with a diet that restricts fruit consumption.<sup>41</sup>

## Celiac Disease

**Celiac disease** (also known as sprue disease or gluten-sensitive enteropathy) is an immune condition in which the presence of gluten in the diet damages the inner lining of the small intestine and hinders nutrient absorption.<sup>109</sup> Gluten is a protein found in wheat, rye, and barley as well as in other products such as vitamin and nutrient supplements, lip balms, and certain medications. In individuals with celiac disease, gluten causes the immune system to react by damaging or destroying villi on the inner lining of the small intestine. Villi normally absorb nutrients from food and pass the nutrients through the walls of the small intestine and into the bloodstream. Without healthy villi, older adults can become malnourished, regardless of the amount of food consumed.<sup>109</sup>

Celiac disease digestive symptoms include diarrhea; pale, foul-smelling or fatty stools; fatigue; abdominal pain; abdominal distension; constipation; nausea; vomiting; and weight loss. Adults are less likely to have digestive signs and symptoms; instead, they might show symptoms of anemia, bone or joint pain, canker sores in the oral cavity, depression or anxiety, fatigue, headaches, tingling numbness of the hands and feet, and seizures. Skin indications in older adults include dermatitis herpetiformis, an itchy, blistering rash.<sup>109</sup>

The physician diagnoses celiac disease by conducting blood tests for specific antibodies, followed by a biopsy of the small intestine for confirmation.<sup>41</sup> Severity and location of diseased segments of the small intestine can contribute to malabsorption of calcium, iron, folate, and fat-soluble vitamins.<sup>109,110</sup>



Once thought of as a rare condition, celiac disease currently affects approximately 1–2% of the U.S. population.<sup>111</sup> Frequency in the United States has increased considerably from 1.3 new events per 100,000 people in 1999 to 6.5 per 100,000 in 2008.<sup>112</sup>

Following a strict gluten-free diet is a significant intervention in treating celiac disease. Villous atrophy is usually reversed within 6 to 24 months of adopting a gluten-free diet.<sup>113</sup> For individuals suffering from nutrition deficiencies, supplementation should be considered. Common nutrients normally supplemented include calcium, vitamin D, iron, vitamin B<sub>12</sub>, as well as other micronutrients.<sup>109</sup>

## Constipation

Constipation is a common condition in older adults. Although constipation is not a normal physiologic change related to aging, decreased mobility and other comorbidities could contribute to its increased frequency in older adults. Limited mobility, medication side effects, and comorbidities can contribute to constipation in older adults.<sup>114</sup>

## Prevalence and Etiology

The prevalence of constipation in older adults is not well defined. Prevalence has been reported as 25–50%.<sup>115,116</sup> Laxatives are used on a daily basis by 10–18% of community-dwelling older adults and 74% of nursing home patients.<sup>117</sup>

The etiology of constipation in older adults is frequently multifactorial. Factors that can contribute to constipation include organic conditions related to colorectal cancer; endocrine or metabolic factors such that can be triggered by diabetes mellitus; neurological conditions, as in the case of patients with multiple sclerosis; anorectal disease, as in inflammatory bowel disease; and as a medication side effect, as when opiates and antihypertensive medications are in use.<sup>118</sup> Older adults with limited mobility, poor fluid intake, and insufficient food consumption are at increased risk for constipation.<sup>118</sup>

## Treatment

The first step in the treatment of constipation is lifestyle and dietary modification. Common interventions like increased fluid intake and exercise are suggested to treat constipation, but there is little evidence to support this.<sup>119</sup> Bulk-forming laxatives are suggested in patients who do not respond to lifestyle and dietary modification.<sup>119</sup>

## Let's Discuss



Drug stores and supermarkets feature arrays of different probiotic supplements, often containing *Lactobacillus* or *Bifidobacterium*, two of the most commonly used species of bacteria. Search the scientific evidence to answer the question: can probiotics ease constipation?

## Case Study

In the past month, Elsa has had a 10-pound weight loss. The nursing assistant caring for Elsa reports frequent bowel movements (3+ per day) with foul-smelling stool.

### Questions

1. What could be causing the frequent bowel movements and foul-smelling stools?
2. What recommendations can you make to control the symptoms?

**Recap** Diseases and conditions that impair the normal function of the digestive system are likely to affect an individual's nutrition status adversely. Gastroesophageal reflux disease (GERD) is a chronic disorder in which gastric acid and other stomach fluids leak into the esophagus, characteristically producing irritation and damage to the esophageal tissue. Diverticular disease incorporates diverticulosis, or the presence of diverticula projecting through the colonic wall, and diverticulitis, which is an acute inflammation of diverticula usually manifested with symptoms like fever, leukocytosis, and pain. Lactose intolerance is a common disorder caused by the failure to digest lactose into its components, glucose and galactose, that results from low levels of lactase enzyme in the brush border of the duodenum.<sup>105</sup> Celiac disease (also known as sprue disease or gluten-sensitive enteropathy) is an immune condition in which the presence of gluten in the diet damages the inner lining of the small intestine and hinders nutrient absorption.

1. What nutrition recommendations can be outlined for an older adult suffering from GERD?
2. Develop education materials for patients diagnosed with celiac disease. What topics should be emphasized?

## Obesity and Malnutrition

**Preview** Unintentional and involuntary weight loss has been linked to adverse clinical outcomes and increased mortality. Weight management and maintenance of a healthy weight are encouraged in older adults because of their increased risk for developing chronic diseases associated with obesity.

One of the goals of *Healthy People 2020* is to “Promote health and reduce chronic disease risk through the consumption of healthful diets and achievement and maintenance of healthy body weights.”<sup>120</sup> This goal supports that all Americans should prevent unhealthy weight gain and individuals whose weight is too high should consider weight loss.<sup>121</sup>

## Underweight/Unintentional Weight Loss

Unintentional or involuntary weight loss is a common occurrence among older adults that is associated with adverse outcomes that include increased mortality.<sup>122</sup>

**Unintended weight loss** occurs in approximately 13% of the population.<sup>123</sup> It is estimated that 27% of frail older adults 65 years and older have involuntary and unplanned weight loss.<sup>124</sup> Significant weight loss in older adults is defined as 5% loss in 1 month and 10% in 6 months.<sup>125</sup>

The clinical outcomes of involuntary and unplanned weight loss can involve functional decline, development of infectious diseases, pressure injuries, and exacerbation of cognitive, clinical, and mood disorders.<sup>122,126</sup> Involuntary and unplanned weight loss can occur as a result of decreased food and fluid intake, increased metabolism, and increased caloric needs.<sup>127</sup>

## Etiology and Risk Factors

Weight loss in older adults with a BMI below 30 presents a higher mortality risk than not losing weight or having a BMI in the 25–30 range.<sup>128</sup> It is important to note that obesity with a BMI higher than 30 also affects morbidity and mortality in older adults. The benefit of intentional weight loss for older adults with osteoarthritis, limited physical activity, DM, and coronary heart disease (CHD) is becoming progressively evident.<sup>129</sup>

Involuntary weight loss is caused by inadequate food and fluid intake, periods of anorexia, disuse or muscle atrophy resulting in sarcopenia, inflammatory response related to disease process (cachexia), or a combination of any of these factors.

Unplanned weight loss related to inadequate nutrient intake can be influenced by a number of factors. Social factors such as poverty, isolation, psychological conditions such as depression, and dementia and medical conditions like dysphagia and diagnosis of an endocrine condition, as well as the possibility of polypharmacy, can affect intake. The possibility of social isolation at mealtime and financial limitations that influence the quality and quantity of food obtained affects both the enjoyment and the quality of the meals consumed. Research supports that older adults who eat in a social setting consume more calories than those who eat alone.<sup>130</sup> Physiologic elements related to unplanned weight loss include changes in taste and smell sensitivity, delayed gastric emptying, early satiety, and impairment in the regulation of food intake that occurs with aging.

Cachexia is a “complex metabolic syndrome associated with underlying illness, and characterized by loss of muscle with or without loss of fat mass.”<sup>131</sup> This syndrome is associated with higher morbidity rate. Signs and symptoms of cachexia include anorexia, inflammation, insulin resistance, and increased muscle protein breakdown. The cachexia syndrome includes many dysregulated pathways, which contribute to an imbalance between catabolism and anabolism in the body. Because of the presence

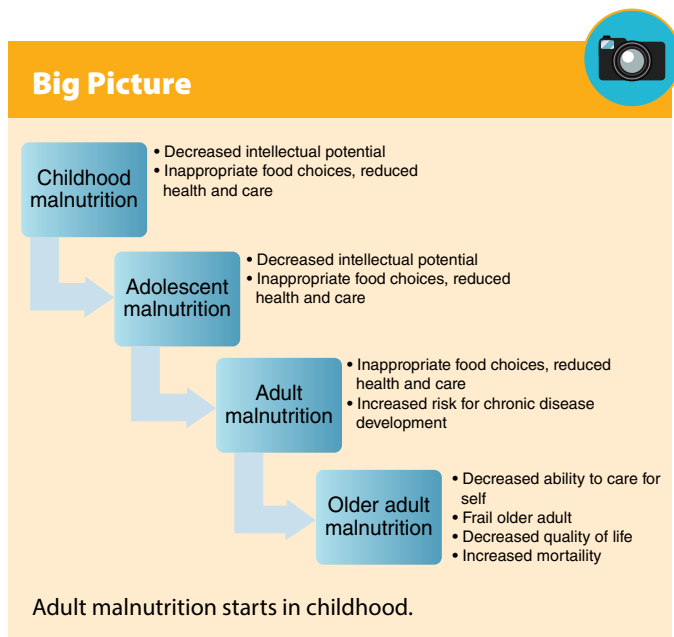
of inflammation and catabolism, the cachexia disorder is resistant to nutrition interventions.

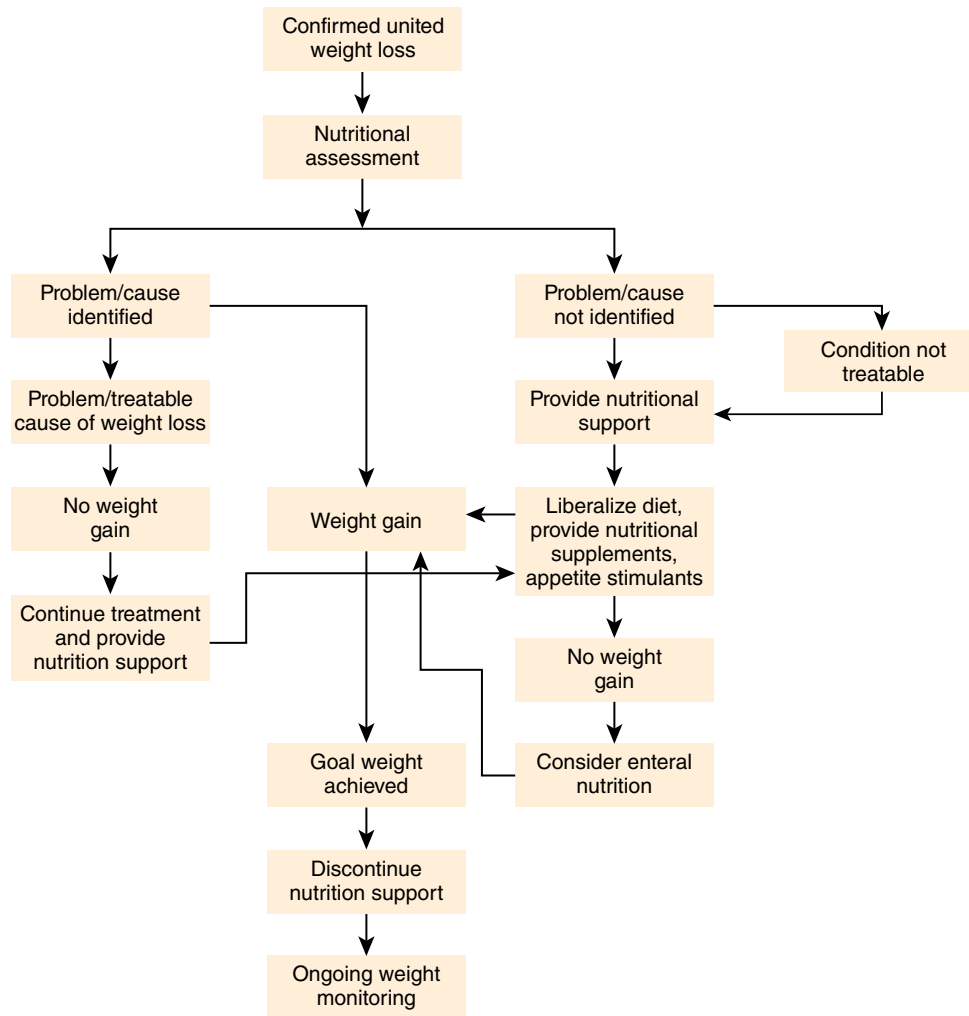
Sarcopenia is the progressive loss of skeletal muscle and muscle quality and decreased strength that can occur as part of the aging process. This can be caused by changes in the endocrine system, stimulation of pro-inflammatory cytokines, decreased physical activity, and not meeting protein needs.

## Nutrition Management of Unintentional Weight Loss

The Academy of Nutrition and Dietetics Evidence Analysis Library (EAL) has evaluated the literature and provides guidelines for managing unintended weight loss.<sup>132</sup> Medical nutrition therapy (MNT) is strongly recommended for older adults with unintended weight loss. Individualized nutrition care, directed by a registered dietitian nutritionist (RDN) as part of the healthcare team, results in improved outcomes related to increased energy, protein, and nutrient intakes; nutritional status; quality of life; or weight gain. For older adults, the RDN should recommend liberalization of diets with the exception of texture modification. Increased food and beverage intake is associated with liberalized diets. Research has not demonstrated benefits of restricting sodium, cholesterol, fat, and carbohydrate in older adults. Older adults should be encouraged to dine with others rather than dining alone. Improved food intake and nutritional status has been found in older adults who eat in a socially stimulating common dining area. See **FIGURE 16.6** for an algorithm on the steps to manage unintended weight loss in the older adult.

The approach to increase calorie and nutrient intake in older adults should promote real food first. However, when nutritional needs cannot be met with food alone, care guidelines support that medical food supplements should be recommended for older adults who are





**Figure 16.6**  
**Managing unintended weight loss in the older adult.**

Modified from Huffman, GB. Evaluating and treating unintentional weight loss in the elderly. *Am Fam Physician*. 2002; 65(4): 640–651.

undernourished or at risk of undernutrition, for example, for those who are frail and those who have infection, impaired wound healing, pressure injuries, depression, early to moderate dementia, or after hip fracture and orthopedic surgery.<sup>132</sup> Medical food supplementation is a method to provide energy and nutrient intake, promote weight gain, and maintain or improve nutritional status or prevent undernutrition. Care should be taken when evaluating older adults for the use of appetite stimulants.

## Anemia

Anemia is a common condition in the older adult population. Although normally mild, it has been linked with significant morbidity and mortality.<sup>133</sup> The World Health Organization (WHO) defines anemia as a level of hemoglobin < 14 g/L in men and < 12.3 g/L in women.<sup>133</sup> Prior to this, in 1968, the WHO had defined anemia as hemoglobin < 13 g/L for men and < 12 g/L for women. Because of the lack of an overall constant definition of anemia,

the prevalence reported in the literature varies greatly. In long-term care facilities, anemia is present in 48–63% of residents.<sup>134</sup> In noninstitutionalized older adults, the National Health and Nutrition Examination Survey (NHANES) III data show that 10.2% of women and 11% of men age 65 and older were categorized with anemia.<sup>135</sup> As the human body ages, the risk of developing anemia also increases. NHANES III data show that 26% of men and 20% of women 85 years of age and older were anemic.<sup>135</sup> Of the older adults with anemia, nearly one-third had iron-, vitamin B<sub>12</sub>-, or folate-deficiency anemia, another one-third had anemia related to chronic inflammation or renal insufficiency, and the final third had anemia that is unexplained.<sup>134</sup>

## Iron-Deficiency Anemia

**Iron-deficiency anemia** is a disorder in which the body has decreased number of red blood cells (RBCs). A low number of RBCs is symptomatic of a microcytic (small

cell) anemia. In iron-deficiency anemia, the RBCs are hypochromic (low in iron). An adequate number of RBCs are needed to provide oxygen to all cells while removing carbon dioxide from the body.<sup>133</sup>

Iron-deficiency anemia can occur as a result of inadequate intake of nutrients such as iron, vitamins, and minerals; long-term infections; impaired absorption; or blood loss from surgery or bleeding from the gastrointestinal tract.<sup>133</sup> Comorbidities such as the ones listed in **TABLE 16.7** can also contribute to iron-deficiency anemia.

### Treatment and Recommendations for Iron Deficiency

The most common symptom of all forms of anemia is fatigue. With iron-deficiency anemia, fatigue is seen as a result of inadequate RBCs and a reduced amount of hemoglobin in the RBCs to carry oxygen throughout the body. Other signs and symptoms of iron-deficiency anemia include shortness of breath, irregular heartbeat, pale skin and membranes, swelling and soreness of tongue, fissures in the sides of the mouth, spoon-shaped fingernails, cold extremities, enlarged spleen, and recurrent infections. Pica may also be present.

The Dietary Reference Intake (DRI) for adults older than 51 year is 8 mg/d for both males and females.<sup>136</sup> Increasing iron in the diet normally treats mild deficiency anemia that is not related to blood loss. If nutrition strategies are not effective at increasing iron in the body, an iron supplement containing 80–200 mg of elemental iron for 4 weeks should be considered.<sup>136</sup> Older adults may be at increased risk for toxicity from oral iron and may be treated with lower doses.

### Folate-Deficiency Anemia

Folate deficiency is the absence (or low levels) of folic acid (one of the B vitamins) in the blood. This can cause a type of anemia known as **megaloblastic anemia**. Like in iron-deficiency anemia, laboratory profiles will show low hemoglobin and hematocrit and high mean corpuscular volume (MCV).<sup>137</sup>

According to the 2003–2006 NHANES data, most individuals in the United States ingest sufficient amounts of folate. Signs and symptoms of megaloblastic anemia include weakness, fatigue, difficulty concentrating,

irritability, headache, heart palpitations, and shortness of breath.<sup>137</sup>

### Treatment and Recommendations for Folate-Deficiency Anemia

Older adults should consume fortified breads and cereals to avoid folate-deficiency anemia. The diet should include animal and vegetable sources of nutrients to meet the recommended intake of folate. The folate RDI for men and women 19 years of age and older is 400 mcg/d. To reverse a folate deficit, oral folate at a dosage of 1 to 5 mg/d should be provided.<sup>137</sup> Megadoses of iron and/or folate in the form of supplements must be avoided to avoid toxicity and nutrient overload.

### Anemia of Chronic Disease

Anemia of chronic disease is a multifactorial anemia often synchronous with iron insufficiency. Diagnosis normally involves the presence of chronic infection, inflammation, cancer, or microcytic or marginal normocytic anemia.

In older adults, anemia of chronic disease and iron-deficiency anemia have comparable symptoms. Both conditions share symptoms of low levels of circulating iron in the bloodstream. One differential factor is that in iron-deficiency anemia the storage form of iron in the liver, ferritin, is low, whereas when anemia of chronic disease is present, ferritin levels are normal to high. Decreased hemoglobin levels are seen in anemia of chronic disease as a result of inflammatory and chronic disease interference with the absorption of iron from both the diet and the body's failure to use stored iron.<sup>138</sup>

Anemia of chronic disease is linked to increased morbidity involving reduced quality of life, clinical depression, falls, functional impairment, reduced grip strength, decreased mobility, and increased mortality.<sup>138</sup>

Prevention of chronic disease is the best safeguard against anemia of chronic disease. Instructing patients to consume adequate amount of calories, stay physically active, avoid tobacco use, and limit alcohol use should promote healthy aging and may help to decrease the prevalence of anemia of chronic disease.

### Anorexia

In older adults, the decrease in appetite termed *anorexia* occurs as a result of many physiological factors. As we age, food intake diminishes and meal patterns change.<sup>139</sup> The intake reduction seen in the early stages of aging seems like a suitable response to the decreased energy needs that occur as an increased sedentary lifestyle, reduced resting energy expenditure, and decrease in lean body mass. This disposes older adults to develop what has been termed *anorexia of aging*. Although anorexia of aging is believed to be a common disorder in older adults, actual prevalence has not been defined. Overall prevalence of anorexia for individuals admitted to an acute rehabilitation facility was reported as 33% in women and 27% in men.<sup>140</sup>

**Table 16.7**

#### Conditions that Can Contribute to Iron-Deficiency Anemia

Crohn's disease	Inflammatory bowel disease
Increased or occult blood loss	Malignancy, especially gastrointestinal
NSAIDs therapy	Gastric or duodenal injury disease
Intestinal parasites	Decreased absorption
Vitamin A deficiency	<b>Pernicious anemia</b> with achlorhydria
Gastric surgery	Celiac or tropical sprue

## Recommendations

To assess the multifactorial causes of anorexia of aging, the use of validated screening tools such as the Simplified Nutritional Assessment Questionnaire (SNAQ) or other supported nutrition screening assessments is recommended. The SNAQ questionnaire contains four questions that ask about appetite and food intake. This tool is easy to use with older adults and has been validated for predictive capability of future weight loss.<sup>141</sup> Other risk factors to screen for that can interfere with proper nutrition in the older adult include depression, chewing and swallowing difficulty, and polypharmacy, to name a few.

The treatment of anorexia of aging involves addressing the root cause of the problem. Nutrition strategies discussed under unintended weight loss are appropriate strategies to treat the anorexia of aging.

## Obesity

Centers for Disease Control and Prevention (CDC) data report that more than one-third of adults aged 65 and older were obese in 2007–2010.<sup>142</sup> When compared to older adults 75 years of age and higher, obesity prevalence is higher in older adults between the ages of 65 and 74 years.<sup>142</sup>

### News You Can Use

#### Obesity in the United States (All Ages)

Obesity prevalence in 2013 varied across states and territories:

- No state had a prevalence of obesity less than 20%.
- Seven states and the District of Columbia had a prevalence of obesity between 20% and < 25%.
- Twenty-three states had a prevalence of obesity between 25% and < 30%.
- Eighteen states had a prevalence of obesity between 30% and < 35%.
- Two states (Mississippi and West Virginia) had a prevalence of obesity of 35% or greater.
- The South had the highest prevalence of obesity (30.2%), followed by the Midwest (30.1%), the Northeast (26.5%), and the West (24.9%).
- The prevalence of obesity was 27.0% in Guam and 27.9% in Puerto Rico.<sup>a</sup>

<sup>a</sup> Obesity prevalence in 2013 varied across states and territories. Originally published by the Centers for Disease Control for data available for 2013.

## Causal Factors of Obesity in Older Adults

An important factor in securing a healthy weight and body mass index is the association between calories consumed and energy spent. Obesity takes place when individuals consume a greater number of calories than they can process through metabolism and activity level. Researchers suggest that as we age, the amount of calories we consume does not decline.<sup>143</sup> Consequently, the decrease in energy expenditure seen in the 50- to 65-year-old group

coupled with no change in intake can be a main contributor to the increase in body weight.

## Obesity Comorbidities

A number of chronic conditions are associated with being overweight and obese. The risk for developing diabetes mellitus, hypertension, and dyslipidemia increases with increases in weight. Other comorbidities related to obesity include joint problems such as osteoarthritis, sleep apnea, respiratory problems, some forms of cancers, and psychosocial effects.<sup>144</sup>

## Obesity Prevention and Management Strategies

Prevention of obesity in the older adult can contribute to preventing unwanted health outcomes. Recommendations to avoid overweight and obesity include managing caloric intake with calorie expenditure and having an active lifestyle.<sup>144</sup>

Although weight management and maintenance of a healthy weight is advocated in older adults owing to their increased risk for developing chronic diseases related to obesity, it is important to remember that obesity thresholds for BMI, waist circumference, and waist-to-hip ratios for adults may not be appropriate measurements for older adults. Rather than trying to promote weight reduction to meet standard body weight guidelines, sustaining body weight or promoting physical activity as well as increasing functional status may be the best treatment goals for older adults.<sup>145</sup> *Obesity paradox*, also referred to as reverse epidemiology, is a term used for a medical hypothesis that supports that obesity as well as high cholesterol may be protective and linked to increased survival in segments of the population such as older adults. This theory also suggests that normal to low BMI may be disadvantageous and linked with higher mortality.<sup>146</sup> Healthcare providers should direct weight loss interventions on an individual basis, taking into account the benefits of weight loss measured against the risks associated with obesity in older adults.<sup>147</sup>

## Case Study

Elsa continues to have unplanned/unintentional weight loss. In the past month Elsa has had another 10-pound weight loss and her meal acceptance continues to decline. Elsa has been feeling exceptionally fatigued and was just diagnosed with iron-deficiency anemia.

### Questions

1. What are the physiologic elements related to unplanned, unintentional weight loss?
2. What are the guidelines for the management of unintentional weight loss?
3. List the conditions that can contribute to the development of iron-deficiency anemia

Table 16.8

**Academy of Nutrition and Dietetic Guidelines to Promote Weight Loss****1. Weight management program**

For weight loss and weight maintenance, the registered dietitian nutritionist (RDN) should include the following components as part of a comprehensive weight management program:

- Reduced calorie diet
- Increased physical activity
- Use of behavioral strategies

Adequate evidence indicates that intensive, multicomponent behavioral interventions for overweight and obese adults can lead to weight loss as well as improved glucose tolerance and other physiologic risk factors for cardiovascular disease.

**2. Nutrient adequacy during weight loss**

During weight loss, the RDN should prescribe an individualized diet, including patient preferences and health status, to achieve and maintain nutrient adequacy and reduce caloric intake based on one of the following caloric reduction strategies:

- 1,200 kcal to 1,500 kcal per day for women and 1,500 kcal to 1,800 kcal per day for men (kcal levels are usually adjusted for the individual's body weight)
- Energy deficit of approximately 500 kcal per day or 750 kcal per day
- Use of one of the evidence-based diets that restricts certain food types (such as high-carbohydrate foods, low-fiber foods, or high-fat foods) to create an energy deficit by reduced food intake

**3. Portion control and meal replacements/structured meal plans**

For weight loss and weight maintenance, the RDN should recommend portion control and meal replacements or structured meal plans as part of a comprehensive weight management program. Strong evidence documents a positive relationship between portion size and body weight, and research reports that the use of various types of meal replacements or structured meal plans was helpful in achieving health and food behavior change.

**4. Encourage physical activity for weight loss**

For weight loss, the RDN should encourage physical activity as part of a comprehensive weight management program, individualized to gradually accumulate 150 to 420 minutes or more of physical activity per week, depending on intensity, unless medically contraindicated. Physical activity less than 150 minutes per week promotes minimal weight loss, physical activity more than 150 minutes per week results in modest weight loss of approximately 2–3 kg, and physical activity of 225 to 420 or more minutes per week results in 5–7.5 kg weight loss, and a dose–response relationship exists.

Data from: Academy of Nutrition and Dietetics. Adult weight management. Chicago, IL: Academy of Nutrition and Dietetics Evidence Analysis Library; 2014. Retrieved from: <https://www.andeal.org/topic.cfm?menu=5276>. Accessed August 16, 2015.

The Academy of Nutrition and Dietetics Evidence Analysis Library guidelines to promote weight management in adults are outlined in **TABLE 16.8**.<sup>148</sup>

**Recap** One of the goals of *Healthy People 2020* is to “Promote health and reduce chronic disease risk through the consumption of healthful diets and achievement and maintenance of healthy body weights.”<sup>120</sup> It is estimated that 27% of frail older adults 65 years and older have involuntary and unplanned weight loss.<sup>124</sup> Prevention of obesity in the older adult can contribute to preventing unwanted health outcomes. Recommendations to avoid overweight and obesity include balancing caloric intake with calorie expenditure and having an active lifestyle.<sup>144</sup>

1. Discuss the risk factors for malnutrition in older adults.
2. Go to CDC Obesity Prevalence Maps (<http://www.cdc.gov/obesity/data/prevalence-maps.html>). What is the obesity rate in your state? What can you do to influence the obesity rate in your community?

## Skeletal Health

**Preview** The presence of osteoporosis increases the risk for fractures. A diet low in calcium and vitamin D, sedentary lifestyle, smoking, and extreme alcohol consumption are modifiable factors that contribute to development of osteoporosis.

The skeletal system is a dynamic body system that includes bones, ligaments, tendons, and cartilage. Bone is a living tissue that is in constant regeneration through **resorption** (removing old bone) and new bone formation. This system gives the body its basic structure, posture, and the ability to move. Development of skeletal diseases impairs bone and joint function, leads to compromised skeletal integrity, and impairs the ability to accomplish activities of daily living.

### Osteoporosis

Osteoporosis is a condition in which the bones weaken because of decreased bone mineral density (BMD) and



structural changes that increase the risk for fractures. The CDC reports that during 2005–2010, 16.2% of adults aged 65 and older had osteoporosis at the lumbar spine or femur neck. Nonmodifiable risk factors involve age, genetics, small frame, female, Asian or white ethnicity, and the presence of estrogen or testosterone deficiency.<sup>149</sup> Modifiable risk factors include inadequate diet, mainly calcium and vitamin D intake, sedentary lifestyle, smoking, extreme alcohol consumption (because of alcohol's negative effect on balance), and increased risk for falls.

### Symptoms

Osteoporosis is referred to as the “silent disease” because bone loss is asymptomatic. Very often the first indication of osteoporosis is fracture of a hip or vertebra resulting from a fall or sudden strain. The first symptoms of collapsed vertebrae include severe back pain, decrease in height, and spinal malformations such as kyphosis.<sup>150</sup>

### Prevention

Primary prevention of osteoporosis focuses on halting the disease before it starts by decreasing and removing risk factors. Primary prevention consists of immunoprophylaxis, chemoprophylaxis, and lifestyle modifications. Secondary prevention involves disease diagnosis and treatment in the beginning stages prior to the presence of symptoms and functional loss. In tertiary prevention the signs and symptoms of chronic disease are managed to prevent further functional losses and complications.<sup>151</sup>

To prevent osteoporosis, it is vital to secure optimal peak bone mass to promote new bone tissue generation. Nutrition plays a pivotal role in both preventing and managing osteoporosis. Adequate calcium and vitamin D are essential nutrients throughout the life span for promoting and maintaining bone health. **TABLE 16.9** lists some of the most common food sources of calcium.<sup>150</sup> See

**TABLE 16.10** for food sources of vitamin D.<sup>150</sup>

**Table 16.9**

#### Food Sources of Calcium

Food Category	Food Items
Low-fat dairy products	Milk, yogurt, cheese, and ice cream
Dark green leafy vegetables	Broccoli, collard greens, bok choy, and spinach
Protein sources	Sardines and salmon with bones, tofu, almonds
Foods fortified with calcium	Orange juice, cereals, breads

Data from National Institutes of Health Osteoporosis and Related Bone Diseases National Resource Center. Osteoporosis overview. Washington, DC: NIH, U.S. Department of Health and Human Services; June 2015. Retrieved from: [http://www.niams.nih.gov/Health\\_Info/Bone/Osteoporosis/overview.asp](http://www.niams.nih.gov/Health_Info/Bone/Osteoporosis/overview.asp). Accessed August 18, 2015.

**Table 16.10**

#### Food Sources of Vitamin D

Food Category	Food Items
Protein sources	Egg yolks, saltwater fish, and liver
Foods fortified with vitamin D	Milk

Data from NIH Osteoporosis and Related Bone Diseases National Resource Center. Osteoporosis overview. Washington, DC: NIH, U.S. Department of Health and Human Services; June 2015. Retrieved from: [http://www.niams.nih.gov/Health\\_Info/Bone/Osteoporosis/overview.asp](http://www.niams.nih.gov/Health_Info/Bone/Osteoporosis/overview.asp). Accessed August 18, 2015.

Weight-bearing exercise such as walking, hiking, and jogging is the best form of exercise to promote bone health.

A number of medications can contribute to increased bone loss. The long-term use of glucocorticoids can contribute to reduced bone density and increased risk for fracture. Bone loss can also occur as a result of long-term therapy with antiseizure drugs, like phenytoin (Dilantin) and barbiturates; excessive use of aluminum-containing antacids; and excessive thyroid hormone.<sup>150</sup>

### Treatment

Osteoporosis treatment emphasizes adequate nutrition intake, exercise and an active lifestyle, and safety measures to avert falls that can contribute to fractures. Medication intended to slow or stop bone loss, increase bone density, and reduce the risk for fractures might be indicated.<sup>152</sup>

### Osteoarthritis

Osteoarthritis (OA), also known as degenerative joint disease, is an ailment that involves the whole joint, including the cartilage, joint lining, ligaments, and underlying bone. This is the most common form of arthritis. The deterioration of these matters ultimately leads to pain and joint stiffness. The precise causes of OA are not known. However, it is hypothesized that both mechanical and molecular actions affect the joint. Illness onset is slow and typically starts after the age of 40, and currently there is no cure for OA.

### Prevalence and Risk Factors

In the United States OA affects 13.9% of adults 25 years and older as well as 33.6% (12.4 million) of older adults (those older than 65 years).<sup>153</sup> Overall, an estimated 30.8 million U.S. older adults suffered from OA. It is more prevalent in older women (13%) than in older men (10%).<sup>154</sup>

Usual risk factors related to OA include aging, overweight and obesity, trauma, repetitive joint use, joint slackness, and muscle weakness. OA characteristically affects the knees, hips, and hand joints.

### Prevention and Treatment

The basis for prevention and treatment of OA is weight management and exercise. In individuals who are obese and overweight, the added weight exacerbates the

symptoms. Low-caloric diet to produce a fast weight loss for fast symptom relief has been reported to produce the greatest benefits. It is important to remember that weight loss must be sustainable. The macronutrient distribution leading to the weight loss is not as important as the actual weight reduction to promote pain relief and increase mobility.<sup>155</sup> Following a healthy diet to facilitate a slow gradual weight loss of 1–2 lb/wk with the goal of a total 10% weight loss can also be used as an approach to alleviate symptoms and increase mobility.<sup>155</sup> Adding an exercise program to a weight loss or healthy eating program yields a deeper impact to physical function and pain control.<sup>155</sup>

## Rheumatoid Arthritis

Rheumatoid arthritis (RA) is a systemic inflammatory illness that shows symptoms in multiple joints of the body. The inflammatory progression mainly affects the synovial membrane lining of the joints, but it is known to attack other organs. The exacerbated synovium causes erosions of the cartilage and bone, which can result in joint deformity. Pain, swelling, and redness are common symptoms. Although the cause for this illness is not known, RA is considered to be the result of a damaged or compromised immune response. RA can manifest at any age and is coupled with fatigue and extended stiffness after rest periods. There is no cure for this condition. New and effective medications are constantly being introduced to treat the disorder and avoid deformed joints. Good self-management that includes being physically active are known to decrease pain and disability.<sup>156</sup>

## Prevalence

In 2007, an estimated 1.5 million adults had rheumatoid arthritis.<sup>157,158</sup> This condition is more prevalent in women (9.8/1,000) than in men (4.1/1,000).<sup>157,158</sup>

## Nutrition Considerations

A number of diets and diet alterations to reduce inflammation have been used in efforts to treat RA. Vegetarian and plant-based diets with reduced saturated fatty acids have shown to improve pain level, stiffness, and swelling.<sup>159</sup> Omega-3 fatty acids seem to have a protective benefit against RA.<sup>160</sup>

## Case Study



Elsa's finger joints are swollen, and she finds it painful to hold utensils when trying to feed herself, which is contributing to her poor intake and recent weight loss.

### Questions

1. Describe some of the interventions that can be put in place to relief her symptoms?
2. What are some of the diets proven to be effective in relieving symptoms for patients with OA? RA?

**Recap** The skeletal system is a dynamic body system that includes bones, ligaments, tendons, and cartilage. Development of skeletal diseases impairs bone and joint function, leads to compromised skeletal integrity, and impairs the ability to accomplish activities of daily living. Nutrition plays a pivotal role in both preventing and managing osteoporosis. Adequate calcium and vitamin D are essential nutrients in promoting and maintaining bone health.

1. When providing nutrition education to an older adult with arthritis, what topics should be highlighted?
2. For older adults with osteoporosis, which are the most important nutrients to monitor?

## Wound Healing

**Preview** A thorough nutrition screening and assessment is vital for the prevention and treatment of pressure injuries. Sufficient macro- and micronutrients are vital for the body to support tissue integrity and prevent breakdown.

The National Pressure Ulcer Advisory Panel (NPUAP) describes a pressure injury (PI) as a “localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear. A number of contributing or confounding factors are also associated with PIs; the significance of these factors is yet to be elucidated.”<sup>161</sup>

## Prevalence

Because a pressure ulcer (PU) is often referred to as a *bedsore* or *decubitus*, the inconsistency in labeling skin injuries has made it hard to pinpoint the true prevalence of PUs in different care settings.<sup>162</sup> In the United States, approximately 1.3–3.0 million patients have PUs.<sup>163</sup> Prevalence has been estimated at 3–15% of all patients in acute care and 11% of patients in extended care facilities.<sup>163,164</sup>

## Nutrition Screening and Assessment

Completing a thorough nutrition screening and assessment is vital for the prevention and treatment of **pressure injuries**. Current literature has identified more than a hundred risk factors for PI development. Some extrinsic (primary/nonphysiological) and intrinsic (secondary/physiological) risk factors that contribute to PU development include diabetes mellitus, peripheral vascular disease, malignancy, prolonged pressure on an area of the body, being 70 years of age and older, smoking, urinary and fecal incontinence, a history of PIs, a low BMI, and malnutrition.<sup>165</sup>

Pathophysiologic and **intrinsic factors** at the core of PU formation include nutrition. Maintaining adequate parameters of nutrition is considered a best practice in

both the prevention and treatment of PIs. Older adults with PIs or who are at risk for developing PIs should strive to achieve or maintain adequate nutrition parameters.

### Nutrition Screening

There are a number of validated pressure injury risk evaluation tools. These include the Norton Scale, Gosnell Scale, Warlow Scale, and the Braden Scale. In the United States, the Braden Scale for Predicting Pressure Sore Risk is the most frequently used screening instrument. The Braden Scale is composed of six subscales: sensory perception, moisture, activity, mobility, nutrition, and **friction/shear**. The sensory perception, mobility, and activity subscales help to pinpoint clinical situations that predispose patients to intense and persistent pressure. The moisture, nutrition, and friction/shear subscales identify clinical circumstances that can modify tissue tolerance for pressure. The nutrition subscale can be scored on a 1 to 4 scale to ascertain usual food intake, NPO (nothing by mouth), or enteral and parenteral intake. Patients identified as at risk should be referred to the RDN for assessment. The RDN must evaluate the nutrition subscale as part of conducting a nutrition assessment for pressure injuries. The Braden Scale can be retrieved at <http://bradenscale.com/>.

### Nutrition Assessment

Once the screen is completed, the patients identified as at risk are referred to the RDN for follow-up. A comprehensive nutrition assessment uses the Academy of Nutrition and Dietetics standardized Nutrition Care Process: assessment, diagnosis, intervention, and monitoring/evaluation should be started.<sup>166</sup>

### Role of Nutrients in Wound Prevention and Healing

Sufficient macronutrients (carbohydrates, protein, fats, and water) and micronutrients (vitamins and minerals) are vital for the body to support tissue integrity and prevent breakdown. Weight loss and difficulties with eating can increase the incidence of PIs.<sup>166</sup> Other nutrition-related risk factors that can contribute to PI development include a change in appetite, compromised dental health, gastrointestinal and elimination disturbances, decreased self-feeding abilities, drug–nutrient interactions, and alcohol and substance abuse.<sup>125,168,169</sup>

Restrictive diets can contribute to a decreased intake of nutrients.<sup>170</sup> A diet too low in protein lacks the amino acids needed for protein synthesis. Protein plays a major role in the production of enzymes involved in wound healing, cell multiplication, and collagen and connective tissue manufacture. Caloric needs must be met for protein to be spared for buildup and repair.<sup>171</sup> Although the amount of protein needed by patients with PIs can be debated, protein levels higher than the adult recommendation of 0.8 g/kg of body weight per day are generally accepted and recommended. The NPUAP recommends 1.25–1.5 g

of protein per kilogram of body weight per day and 30–35 kcal/kg of body weight per day for wound healing.<sup>172</sup>

Low-fat diets can be deficient in essential fatty acids, which the skin needs to maintain the lipid barrier. Carbohydrates are essential for the cells to carry out basic functions of metabolism and to prevent gluconeogenesis from protein stores.<sup>171</sup>

Water plays an important role in wound-site hydration and oxygen perfusion, is a solvent for nutrients and other small molecules to diffuse in to and out of cells, and removes waste from cells. Dehydration is a risk factor for wound development. Patients with draining wounds need additional fluids to replace losses.

Vitamin A fuels cellular differentiation in **fibroblasts** and is involved in collagen development. A true vitamin A deficiency, although rare, can result in delayed wound healing and compromised immune function.<sup>173</sup>

Vitamin C is vital for collagen production. Collagen and fibroblasts are the basis for the structure of a healing wound bed. A deficiency in vitamin C has been associated with prolonged wound healing time, decreased wound strength, and decreased immune function.<sup>171,172</sup> For patients with a diagnosed vitamin C deficiency, supplementation is recommended.<sup>171,172</sup>

Zinc is associated with collagen formation, protein metabolism, vitamin A transport, and immune function.<sup>171,172</sup> Zinc deficiency can emerge as a result of severe wound drainage or GI losses, corticosteroid use, or a long-term decreased dietary intake.<sup>171</sup> When considering supplementation, it is important to remember that consumption of increased zinc can interfere with copper metabolism, thus producing copper-induced anemia. The amount of zinc in a multivitamin and mineral supplement is generally adequate. Supplementing to no more than the Tolerable Upper Intake Limit of the Dietary Reference Intake (DRI; 40 mg of elemental zinc) until the deficiency is corrected may be recommended.<sup>174</sup>

Aside from the role of vitamins and minerals, the role of individual amino acids in wound healing has been explored. Arginine is a conditionally essential amino acid that in several studies has been shown to raise concentrations of hydroxyproline, an indicator of collagen

### Case Study



Over the past few weeks Elsa has taken less interest in her personal care, bathing, toileting, and dressing requiring increasingly more assistance with her ADLs and IADLs. Upon physical inspection, the nurse discovers a stage 4 pressure injury.

### Questions

1. What are her nutritional needs to promote wound healing?
2. What are some of the nutrition factors that contribute to increased risk for developing pressure injuries?

accumulation and protein at the wound site.<sup>171,172</sup> Current research supports the use of arginine to promote PU healing in adults with a pressure injury category/stage 3 or 4 or multiple pressure injuries when nutritional requirements cannot be met with traditional high-calorie and protein supplements.<sup>172</sup>

**Recap** Current literature has identified more than a hundred risk factors for PU development. Some extrinsic (primary/non-physiological) and intrinsic (secondary/physiological) risk factors that contribute to PU development include diabetes mellitus, peripheral vascular disease, malignancy, prolonged pressure on an area of the body, being 70 years of age and older, smoking, urinary and fecal incontinence, a history of PIs, a low BMI, and malnutrition.<sup>165</sup> Pathophysiologic and intrinsic factors at the core of PI formation include nutrition. Maintaining adequate parameters of nutrition is considered a best practice in both the prevention and treatment of PIs.

1. For patients with pressure injuries and compromised nutritional status, what are the main nutrition recommendations?
2. Which are the most commonly supplemented nutrients in patients with pressure injuries? What is the function of each nutrient?

## Renal and Genitourinary Conditions

**Preview** Nutrition intervention for older adults with renal disease is as individual as every patient. Actual cause, comorbidities, urine output, biochemical data, and the need and use of renal replacement therapy help to determine treatment.

A physiological decrease in kidney function is a normal component of the aging process. As we age, the number of **nephrons** may decrease, the overall amount of kidney tissue may decrease, and nephrosclerosis can be present, causing the kidneys to filter blood more slowly.<sup>175</sup>

### Acute Kidney Injury

**Acute kidney injury (AKI)** is the sudden loss of kidney function that causes urea nitrogenous waste products retention as well as imbalance of extracellular volume and electrolytes.<sup>175</sup>

### Prevalence and Risk Factors

Risk factors contributing to increased episodes of AKI include the presence of comorbidities such as DM and HTN, cardiovascular disease, overweight or obesity, high cholesterol, and autoimmune diseases such as lupus. It is estimated that about one out of three adults with DM and one out of five adults with high blood pressure develops chronic kidney disease (CKD). Changes in the kidney due

to normal aging such as nephrosclerosis also contribute to increased risk. Men with CKD are 50% more likely than women to develop kidney failure.<sup>176</sup>

Urinary tract obstructions triggered by benign prostatic hyperplasia (BPH), neurogenic bladder, and cancer are common disorders in older adults and can also contribute to kidney damage.<sup>177</sup>

### Prevention and Treatment

AKI prevention strategies in older adults emphasizes categorizing risk factors and making suitable changes. Recommendations to prevent AKI include promoting sufficient fluid consumption to avert dehydration, minimizing polypharmacy, avoiding the use of nephron-damaging substances like contrast dyes, maintaining adequate urine output for the individual, and closely monitoring kidney function (biochemical data: serum creatinine, blood urea nitrogen [BUN]).<sup>177–179</sup>

Treatment for AKI varies depending on the manner of causation, whether it is prerenal azotemia (inadequate renal perfusion), intrarenal (intrinsic kidney damage has occurred), or postrenal azotemia (urinary blockage). Treatment might include restoring fluid and electrolyte balance or the use of catheters to manage urinary tract obstructions.<sup>179</sup> Renal replacement therapy (RRT; dialysis) might be needed for the treatment of some hospitalized patients.<sup>179</sup>

### Nutrition Considerations

Nutrition intervention for older adults with AKI is as individual as every patient and differs based on actual cause, comorbidities, urine output, biochemical data, and the need and use of RRT.<sup>180,181</sup> The nutrition treatment goals in AKI center around preventing protein-energy wasting, averting fluid overload/edema, regulating blood pressure and electrolytes, and promoting acid-base balance.<sup>180,181</sup>

For individuals with DM and insulin resistance, episodes of high blood glucose should be prevented and a stable blood glucose level ranging between 110 and 150 mg/dL should be sustained.<sup>182</sup> Protein needs are contingent on the individual's renal function. Protein needs are initially calculated based on 1 g/kg of body weight. For individuals receiving RRT, the protein intake is calculated using 1.2–1.5 g/kg/d range to counterbalance dialysis losses. For individuals with continuous renal replacement therapy (CRRT), protein needs are based on 1.5–2 g/kg per day and could go up to 2.5 g/kg per day depending on the severity of the condition. Caloric needs are calculated using the 20–30 kcal/kg/d range. Care should be taken not to overfeed patients.<sup>181</sup> When oral intake is insufficient, the patient should be evaluated for an enteral/parenteral nutrition feeding alternative.<sup>180,181</sup> Regardless of the feeding mode, the DRIs for vitamins and minerals should be met. For patients receiving RRT, a renal multivitamin formula should be recommended as needed.<sup>181</sup>

To avoid fluid overload and edema, fluid intake is limited to urine output and an additional 500 mL/d.<sup>181</sup> Sodium (Na) is normally restricted to 2–3 g/d. The needs for serum potassium and phosphorus vary with AKI stage and the type of therapy used; thus, the levels for these nutrients need to be carefully monitored and recommendations for intake adjusted as needed.<sup>181</sup>

## Chronic Kidney Disease

### Prevalence and Symptoms

More than 20 million adults in the United States are assessed as having chronic kidney disease (CKD). This accounts for approximately 10% of the population. NHANES reports that nearly 25% of people aged 60 years and older have CKD.<sup>183</sup> Between 2000 and 2008, the number of older adults diagnosed with CKD doubled.<sup>183</sup>

Staging CKD is about identifying the severity of the disease. CKD can be classified into five stages. See **TABLE 16.11** for a description of CKD stages.<sup>184</sup>

### Prevention

Modifiable lifestyle changes to prevent CKD include decreasing sodium consumption to less than 2.3 g/d and promoting a healthy weight.<sup>185</sup> In patients with diabetes, blood glucose levels should be controlled. Decreasing ingestion of cholesterol and saturated fat-rich foods and drinking plenty of fluids to prevent dehydration are also recommended to prevent CKD.

### Nutrition Recommendations

The Academy of Nutrition and Dietetics recommends the nutrition prescription guidelines described in **TABLE 16.12** for patients with CKD who are not receiving dialysis and for those receiving hemodialysis treatment.<sup>181</sup>

The goal of the nutrition care treatment is to reduce the effects of the collection of waste products in the blood, delay disease progression, and prevent protein-energy wasting.<sup>181</sup>

**Table 16.11**

#### Chronic Kidney Disease Stages

Stage	Description
Stage 1	Normal GFR ( $\geq 90$ mL/min/1.73 m <sup>2</sup> ) plus either persistent <b>albuminuria</b> or known structural or hereditary renal disease
Stage 2	GFR 60 to 89 mL/min/1.73 m <sup>2</sup>
Stage 3	GFR 30–59 mL/min/1.73 m <sup>2</sup>
Stage 4	GFR 15–29 mL/min/1.73 m <sup>2</sup>
Stage 5	GFR $< 15$ mL/min/1.73 m <sup>2</sup>

GFR = glomerular filtration rate.

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## End-Stage Renal Disease

### Prevalence

End-stage renal disease (ESRD), also labeled as stage 5 CKD, takes place when the kidneys stop working to the point that the patient cannot live without dialysis or a kidney transplant. The glomerular filtration rate (GFR) in these patients is  $< 15$  mL/min/1.73 m<sup>2</sup> ( $< 15\%$  of kidney function).<sup>186</sup> Patients with ESRD are frequently older adults aged 65 and older.<sup>186</sup>

### Prevention

Interventions to avoid ESRD (stage 5 CKD) strive to slow the succession of CKD. These include early diagnosis and referral of individuals at risk, providing MNT commencing in CKD stage 3, modifying the meal plan so that patients consume protein in moderation with adequate amounts of calories, decreasing sodium intake to promote stable blood pressure, maintaining stable blood glucose levels, and controlling serum lipids.

### Treatment

There are risks and benefits with all ESRD treatments. A significant consideration for older adults is the potential influence of their treatment choice in their quality of life. Some common treatments include conservative management, hemodialysis, peritoneal dialysis, and kidney transplant.<sup>187</sup>

### Conservative Management

Conservative (nondialytic) management of ESRD involves meticulous care of fluid balance, anemia, acidosis, and hyperkalemia management. Lowering dietary potassium intake contributes to hyperkalemia management. Also, specific symptom management and palliative care are critical to sustain an adequate quality of life.<sup>188</sup>

### Hemodialysis Treatment

CKD and hemodialysis (HD) are risk factors for negative outcomes in the older adult. Increases in mortality, hospitalizations, frailty syndrome, disability, cognitive dysfunction, falls, and fall-related injuries can occur, and as the disease progresses hemodialysis treatment is needed to sustain life.<sup>189</sup> All risks aside, HD is the treatment of choice of more than 90% of individuals who decide to receive RRT.<sup>190</sup>

Exhaustion is a frequent side effect in patients receiving HD. This affects energy level for meal preparation and possibly reduces intake on treatment days. The use of dietary restrictions should be closely evaluated and monitored because dietary restrictions interfere with the consumption of the individual's favorite foods.

### Peritoneal Dialysis

Peritoneal dialysis (PD) can be a valid treatment selection for RRT in older adults.<sup>191</sup> Advantages of selecting PD as the treatment course include the patient's independence

Table 16.12

## Nutrition Prescription for Patients with CKD

Nutrient	Patients Not on Dialysis	Patients at Stage 5: Hemodialysis
Protein	<ul style="list-style-type: none"> <li>GFR &lt; 50 mL/min/1.73 m<sup>2</sup>: kg of body weight × 0.60 g/kg – 0.80 g protein/kg of body weight</li> <li>If diabetic nephropathy is present: kg of body weight × 0.80–0.90 g protein/kg<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>≥ 1.2 g/kg of body weight, ≥ 50% HBV protein</li> </ul>
Energy	<ul style="list-style-type: none"> <li>23–35 kcal/kg<sup>a</sup></li> <li>Overweight adults: 1,780–1,823 kcal/d<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>&lt; 60 y of age: kg of body weight × 35 kcal; &gt; 60 y of age: kg of body weight × 30–35 kcal/kg</li> </ul>
Sodium	<ul style="list-style-type: none"> <li>&lt; 2.4 g/d</li> </ul>	<ul style="list-style-type: none"> <li>&lt; 2.4 g/day</li> </ul>
Potassium	<ul style="list-style-type: none"> <li>&lt; 2.4 g/d (stages 3–4 CKD)</li> </ul>	<ul style="list-style-type: none"> <li>&lt; 2.4 g/day</li> </ul>
Phosphorus	<ul style="list-style-type: none"> <li>800 to 1,000 mg/d or 10–12 mg phosphorus per gram of protein when serum phosphorus &gt; 4.6 mg/dL or intact PTH is elevated (stages 3–4)</li> </ul>	<ul style="list-style-type: none"> <li>800–1,000 mg/d or 10–12 mg phosphorus per gram of protein when serum phosphorus &gt; 5.5 mg/dL or intact PTH is elevated</li> </ul>
Calcium	<ul style="list-style-type: none"> <li>Total elemental intake (including dietary calcium, calcium supplementation, and calcium-based binders) should not exceed 2 g/d (stages 3–4)</li> </ul>	<ul style="list-style-type: none"> <li>Total elemental intake (including dietary calcium, calcium supplementation, and calcium-based binders) should not exceed 2 g/d</li> </ul>
Fluid	<ul style="list-style-type: none"> <li>The need for a fluid restriction is determined by medical status, blood pressure control, physical findings (fluid accumulation), and any alterations in urine output<sup>b</sup></li> </ul>	<ul style="list-style-type: none"> <li>Urine output plus 1,000 mL</li> </ul>
Vitamins/minerals	<ul style="list-style-type: none"> <li>DRI for B-complex vitamins and vitamin C</li> <li>Vitamin D: supplementation recommended if 25-hydroxyvitamin D level less than 30 ng/mL<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>Vitamin C: 60–100 mg/d</li> <li>Vitamin B<sub>6</sub>: 2 mg/d</li> <li>Folate: 1–5 mg/d<sup>b</sup></li> <li>Vitamin B<sub>12</sub>: 3 mcg/d</li> <li>DRI for all other water-soluble vitamins</li> <li>Vitamin E: 15 IU/d</li> <li>Zinc: 15 mg/d</li> </ul>
Iron	<ul style="list-style-type: none"> <li>Oral or intravenous supplementation recommended if serum ferritin below 100 ng/mL and transferrin saturation below 20%</li> </ul>	<ul style="list-style-type: none"> <li>IV supplementation recommended if serum ferritin below 200 ng/mL and TSAT below 20%<sup>c</sup></li> </ul>
Vitamin D		<ul style="list-style-type: none"> <li>It is suggested that 25-hydroxyvitamin D levels be measured, with deficiency or insufficiency being corrected using treatment strategies recommended for general population<sup>a</sup></li> </ul>

CKD = chronic kidney disease; DRI = Dietary Reference Intake; GFR = glomerular filtration rate; HBV = high biological value; PTH = parathyroid hormone; TSAT = transferrin saturation.

<sup>a</sup> Academy of Nutrition and Dietetics. *Chronic Kidney Disease Evidence-Based Nutrition Practice Guidelines*. Chicago, IL: Academy of Nutrition and Dietetics Evidence Analysis Library; 2010.

<sup>b</sup> McCann L, ed. *Pocket Guide to Nutrition Assessment of the Patient with Chronic Kidney Disease*. 4th ed. New York, NY: National Kidney Foundation Council on Renal Nutrition; 2009.

<sup>c</sup> National Kidney Foundation. Clinical practice guidelines for nutrition in chronic renal failure. *Am J Kidney Dis*. 2000;35(suppl 2):S1–S140.

Data from Academy of Nutrition and Dietetics. *Nutrition Care Manual: Renal*. Chicago, IL: AND; 2015. Retrieved from: [https://www.nutritioncaremanual.org/topic.cfm?ncm\\_category\\_id=1&lv1=5537&ncm\\_toc\\_id=5537&ncm\\_heading=Nutrition%20Care](https://www.nutritioncaremanual.org/topic.cfm?ncm_category_id=1&lv1=5537&ncm_toc_id=5537&ncm_heading=Nutrition%20Care).

in being able to conduct his or her own treatments. Adults 75 years and older using PD as RRT live an average of 19.6 months following treatment.<sup>192</sup>

In individuals who use PD treatment, the absorption of additional calories from the dextrose-containing dialysate increases the risk for undesired weight increase, increased triglycerides, and high blood glucose levels.<sup>193</sup> Educating individuals to control excessive fluid gains that might require the use of greater concentrations of dextrose can help to control these risks.

The risk for hypoalbuminemia and protein-energy wasting is greater in patients utilizing PD (as opposed to HD). These patients should be encouraged to include

a source of protein at every meal as well as add high-protein snacks to their meal pattern.

### Kidney Transplant

Another RRT to extend the life of individuals with CKD is kidney transplant. It is important to note that a kidney transplant is not a cure for CKD. In older adults, the presence of comorbidities such as CVD can limit their chances of qualifying for a kidney transplant.<sup>194</sup>

Important nutrition interventions to consider after a kidney transplant include ensuring adequate consumption of protein and calories for healing.<sup>193</sup> A diet low in sodium ( $\leq$  2,300 mg/d) and reduced saturated fat and



cholesterol should be encouraged to decrease cardiovascular risk. Managing blood pressure (< 130/80 mm Hg), preventing hyperglycemia, and promoting a healthy weight are important components of care status postkidney transplant. Because of the compromised immune system, it is wise for patients to avoid events of foodborne illness.<sup>193</sup>

### Urinary Tract Disorders

Three regularly diagnosed urinary tract disorders are **urinary incontinence**, urinary tract infections, and kidney stones. Understanding these ailments can help to improve the health and quality of life for older individuals.<sup>193</sup>

### Prevalence, Etiology, and Prevention

**Urinary tract infections (UTIs)** are one of the most frequently identified infections in hospitalized, institutionalized, and community-dwelling older adults.<sup>195</sup> UTIs in elderly persons are often mistaken as the early stages of dementia or Alzheimer's because of symptoms such as confusion, delirium, and hallucinations. Nutrition interventions for the prevention of UTIs promote the consumption of adequate fluids. The recommended fluid intake is 1½–2 L/d if the kidneys are functioning properly.<sup>195</sup>

Urge incontinence is the inability to control the impulse to urinate. Urinary incontinence is more prevalent in women than in men. Older adults are at increased risk for developing incontinence.<sup>196</sup> Stress incontinence is the most common type of incontinence and often occurs when episodes of sneezing or coughing places a sudden pressure on the bladder.<sup>196</sup> Obesity can exacerbate stress incontinence by delivering abdominal pressure on the bladder.<sup>197</sup>

### Case Study

Elsa has had episodes of recurrent UTIs, with episodes of anorexia and confusion. She is refusing to drink the fluids provided with her meals. Her most recent laboratory results reflect mild dehydration.

### Questions

1. How much daily fluid should Elsa consume to reduce the risk of recurrent UTI?
2. What suggestions do you have to encourage her to consume more fluids?

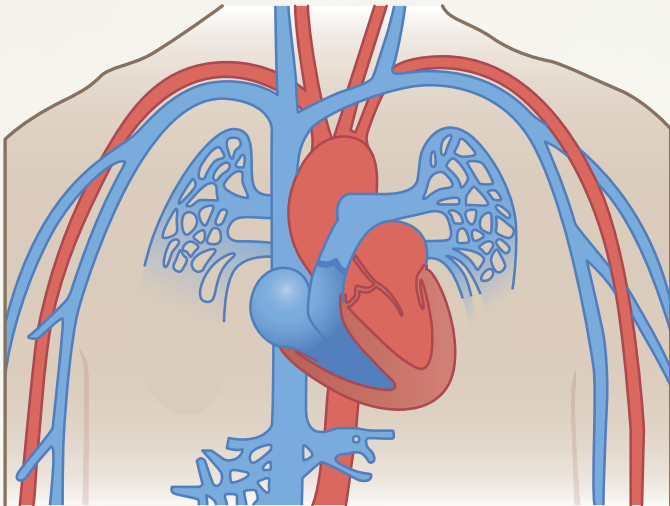
**Recap** A physiological decrease in kidney function is a normal component of the aging process. Acute kidney injury (AKI) is the sudden loss of kidney function that causes the retention of urea nitrogenous waste products as well as imbalance of extracellular volume and electrolytes.<sup>175</sup> Ten percent of the U.S. population suffers from chronic kidney disease (CKD). Modifiable risk factors to prevent CKD include decrease in sodium intake ( $\leq 2.3$  g/d), healthy weight, control of blood glucose levels, a diet low in cholesterol and saturated fats, and adequate consumption of fluids.

1. Prepare a "top 10" list of foods high in protein, phosphorus, sodium, and potassium. How can this list be used when conducting patient education?
2. What are the modifiable risk factors for patients with CKD?



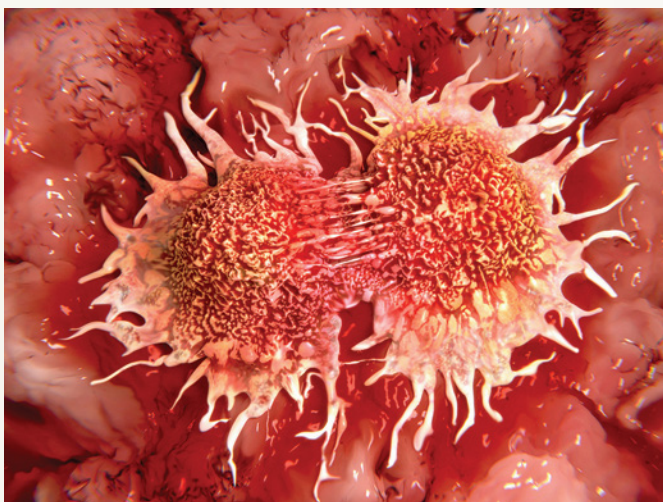
# Learning Portfolio

## Visual Chapter Summary



### Cardiovascular, Cerebrovascular, and Respiratory Conditions

- The term *cerebrovascular disease* encompasses all syndromes in which an area of the brain is briefly or permanently affected by ischemia or hemorrhage.<sup>4</sup>
- The American Heart Association classifies blood pressure as normal, prehypertension, hypertension stage 1, hypertension stage 2, and hypertensive crisis.
- There are two types of strokes: ischemic and hemorrhagic.
- Heart failure (HF) is caused by the heart's inability to pump adequate amounts of oxygenated blood to support other body organs.

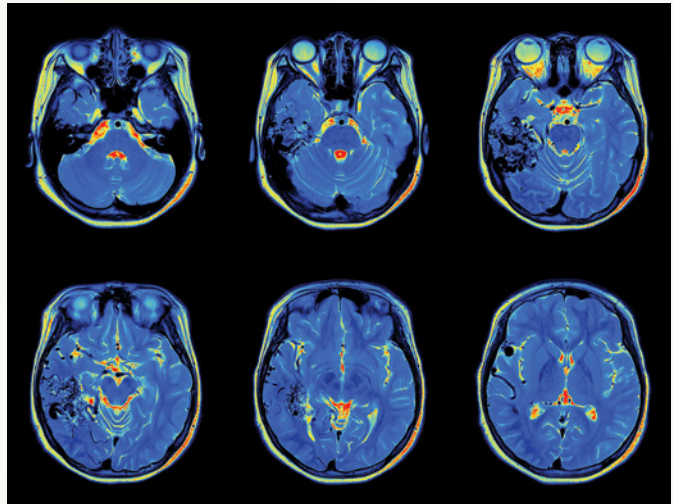


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- In chronic obstructive pulmonary disease (COPD), the presence of malnutrition can exacerbate the disease development, producing atrophy of the diaphragm and the muscles that move air in and out of the lungs.<sup>33</sup>

### Cancer

- Aging is the strongest risk factor for the development of cancer. More than 60% of all episodes of cancer occur in adults 65 years and older.<sup>39</sup>
- Cancer is a group of diseases that present as abnormal, unregulated cell growth caused by a series of DNA metamorphoses.
- Age, alcohol consumption, cancer-causing substances, chronic inflammation, diet, hormones, immunosuppression, infectious agents, obesity, radiation, sunlight exposure, and consumption of tobacco products are the most commonly cited cancer risk factors.<sup>38</sup>
- The goals for nutrition care are to define symptoms that have an impact on nutritional status and to develop a nutrition plan that helps each older adult prevent or reverse nutritional deficiencies.



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### Cognitive Disorders

- Dementia is a brain condition that interferes with older adults' ability to remember, obtain and process new information, and communicate.
- The true cause of Alzheimer's disease (AD) is not known. Theories support that AD occurs as a result



of environmental, lifestyle, and genetic factors that combine into the pathophysiologic succession of events that, over decades, progresses to AD.

- Signs and symptoms and the rate of advancement through the diverse disease phases are distinctive for each individual.
- The main nutrition goals when treating individuals with AD and other forms of dementia is to prevent weight loss, malnutrition, pressure injuries, and the presence of other comorbidities.<sup>55</sup>



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## Endocrine and Metabolic Conditions

- Type 1 diabetes mellitus (T1 DM) is mainly an autoimmune disorder in which the body's immune system attacks the beta cells of the pancreas where insulin is produced. Type 2 DM is more common in older adults.
- T2DM occurs as a gradual decline in beta cell function, which results in a reduction in insulin production that progresses to insulin resistance and finally results in insulin deficiency.<sup>67,68</sup>
- In older adults, changes in body composition accompanied by aging, sarcopenia of aging, vitamin D deficiency, and inflammatory response are believed to contribute to the development of DM.<sup>67,68</sup>
- Metabolic syndrome (MetS) is a disease in which an individual has irregular levels of blood lipids (low HDL and high triglycerides), impaired fasting glucose, hypertension (HTN), and excess abdominal obesity.<sup>64</sup>



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## Gastrointestinal Conditions

- Gastroesophageal reflux disease (GERD) is a chronic disorder in which gastric acid and other stomach fluids leak into the esophagus, characteristically producing irritation and damage to the esophageal tissue.
- Risk factors for development of GERD include obesity. Weight loss and deterrence of weight gain, coupled with smoking cessation and decreased alcohol intake, may be helpful in averting GERD.<sup>95</sup>
- Diverticular disease encompasses diverticulosis, or the presence of diverticula projecting through the colonic wall, and diverticulitis, which is an acute inflammation of diverticula usually manifested with symptoms like fever, leukocytosis, and pain.
- Celiac disease is an immune condition in which the presence of gluten in the diet damages the inner lining of the small intestine and hinders nutrient absorption.<sup>107</sup>



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## Learning Portfolio (continued)

### Obesity and Malnutrition

- Unintentional or involuntary weight loss is a common occurrence among older adults that is associated with adverse outcomes, including increased mortality.<sup>120</sup>
- Significant weight loss in older adults is defined as 5% in 1 month and 10% in 6 months.<sup>123</sup> Weight loss in older adults with a BMI below 30 presents a higher mortality risk than not losing weight or having a BMI in the 25–30 range.<sup>126</sup>
- Cachexia is a “complex metabolic syndrome associated with underlying illness, and characterized by loss of muscle with or without loss of fat mass.”<sup>129</sup>
- Sarcopenia is the progressive loss of skeletal muscle, quality, and decreased strength that can occur as part of the aging process.



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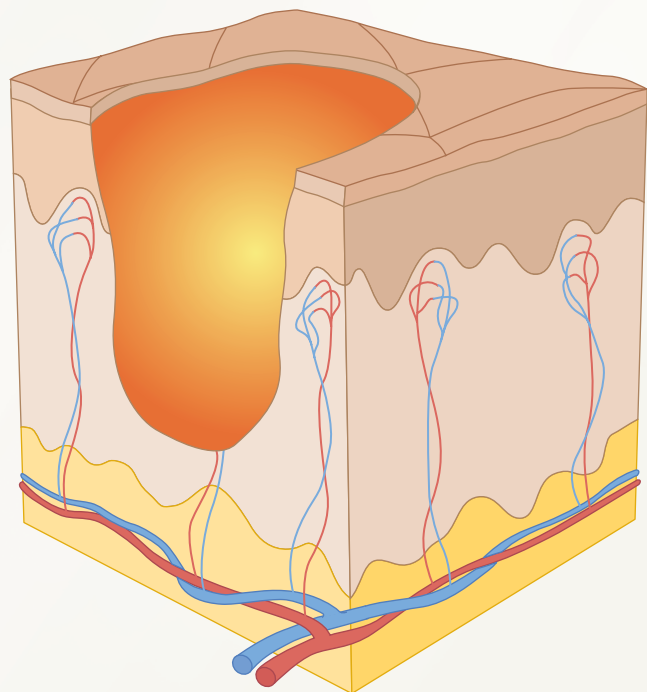
### Skeletal Health

- Osteoporosis is a condition in which the bones weaken as a result of low bone mineral density (BMD) and structural changes that increase the risk for fractures.
- Osteoporosis treatment emphasizes adequate nutrition intake, exercise to promote an active lifestyle, and safety measures to avert falls that can contribute to fractures.

- Osteoarthritis (OA), also known as degenerative joint disease, is an ailment that involves the whole joint, including the cartilage, joint lining, ligaments, and underlying bone. The basis for prevention and treatment of OA is weight management and exercise.
- Rheumatoid arthritis is a systemic inflammatory illness that shows symptoms in multiple joints of the body. Vegetarian and plant-based diets with reduced saturated fatty acids have shown to improve pain level, stiffness, and swelling.<sup>156</sup>

### Wound Healing

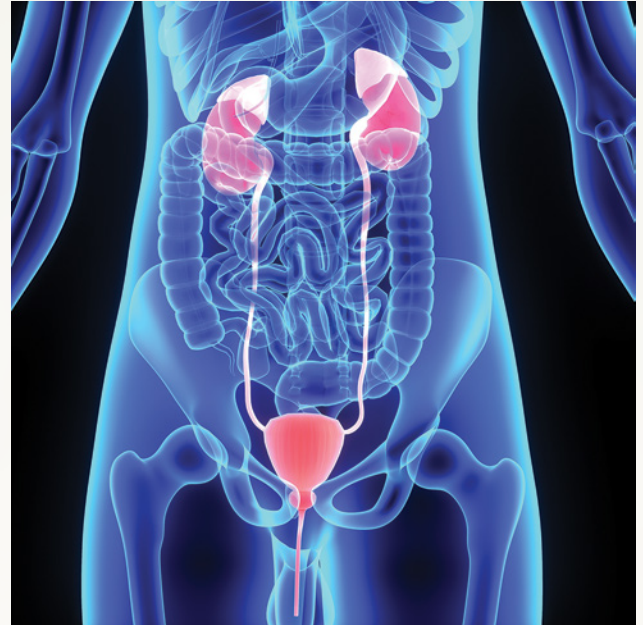
- The NPUAP describes a pressure injury (PI) as “localized damage to the skin and/or underlying soft tissue usually over a bony prominence or related to a medical or other device. The injury can present as intact skin or an open ulcer and may be painful. The injury occurs as a result of intense and/or prolonged pressure or pressure in combination with shear. The tolerance of soft tissue for pressure and shear may also be affected by microclimate, nutrition, perfusion, comorbidities and condition of the soft tissue.”<sup>158</sup>
- Sufficient macronutrients (carbohydrates, protein, fats, and water) and micronutrients (vitamins and minerals) are vital for the body to support tissue integrity and prevent breakdown.



Stage 4 pressure injury

## Renal and Genitourinary Conditions

- The NPUAP recommends 1.25–1.5 g of protein/kg of body weight per day and 30–35 kcal/kg of body weight per day for wound healing.<sup>171</sup>
- Acute kidney injury (AKI) is the sudden loss of kidney function that causes retention of urea nitrogenous waste products as well as imbalance of extracellular volume and electrolytes.<sup>176</sup>
- Risk factors contributing to increased episodes of AKI include DM and HTN, cardiovascular disease, overweight or obesity, high cholesterol, and autoimmune diseases such as lupus.
- Treatment might include restoring fluid and electrolyte balance or the use of catheters to manage urinary tract obstructions as well as dialysis.<sup>180</sup>
- The nutrition treatment goals in AKI center around preventing protein-energy wasting, averting fluid overload/edema, regulating blood pressure and electrolytes, and promoting acid–base balance.<sup>181–183</sup>



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## Key Terms

**acute kidney injury:** A sudden loss of kidney function that results in the accumulation of urea and other nitrogenous waste products as well as the dysregulation of extracellular volume and electrolytes.

**advance directives:** A written statement of a person's wishes regarding medical treatment, often including a living will, made to ensure those wishes are carried out should the person be unable to communicate them to a doctor.

**aerobic physical activity:** Physical activity that relies on the presence of oxygen to make ATP. The complete breakdown of glucose, fatty acids, and amino acids to carbon dioxide and water occurs only through aerobic metabolism.

**albuminuria:** An abnormal excretion rate of albumin.

**Alzheimer's disease:** A progressive, degenerative disorder that attacks the brain's nerve cells, or neurons, and that results in loss of memory, thinking, and language skills and behavioral changes.

**angiotensin:** A protein whose presence in the blood promotes aldosterone secretion and tends to raise blood pressure.

**atrophy:** The deterioration, wasting or decrease in the size of a body organ, tissue, or muscle that results from disease, injury or lack of use.

**Barrett's esophagus:** A serious condition that results as a side effect of gastroesophageal reflux disease (GERD). The lining of the esophagus changes from its normal lining to a type that is usually found in the intestines.

**cachexia:** Weight loss, weakness, wasting, and changes in body composition due to emotional disturbance and severe or chronic disease

**celiac disease:** An autoimmune disorder that occurs in genetically susceptible individuals in which the small intestine is hypersensitive to gluten, leading to difficulty in digesting food and small intestine damage.

**diabetes type 1:** A form of diabetes in which the body does not produce insulin.

**DNA (deoxyribonucleic acid):** A self-replicating material present in nearly all living organisms as the main constituent of chromosomes. It is the carrier of genetic information.

**fibroblast:** A cell in connective tissue that produces collagen and other fibers.

**friction:** The action of one surface or object rubbing against another.

**heart failure:** Severe failure of the heart to function properly, especially as a cause of death.

**hemoglobin A<sub>1c</sub>:** A minor component of hemoglobin to which glucose is bound.

**hypoglycemia:** Deficiency of glucose in the bloodstream.

**insulin:** A hormone produced in the pancreas by the islets of Langerhans that regulates the amount of glucose in the blood.

**insulin sensitivity:** How sensitive the body is to the effects of insulin.



# Learning Portfolio (continued)

**intrinsic factor:** A substance secreted by the stomach that enables the body to absorb vitamin B<sub>12</sub>. It is a glycoprotein. Deficiency results in pernicious anemia.

**lactose intolerance:** The inability to digest lactose, a component of milk.

**megaloblastic anemia:** An anemia (of macrocytic classification) that results from inhibition of DNA synthesis during red blood cell production.

**nephron:** The functional units in the kidney, consisting of a glomerulus and its associated tubule, through which the glomerular filtrate passes before emerging as urine.

**pernicious anemia:** A deficiency in the production of red blood cells through a lack of vitamin B<sub>12</sub>.

**pressure injuries:** Localized injuries to the skin and/or underlying tissue usually over a bony prominence that results from pressure or pressure in combination with shear.

**proton pump inhibitor:** Drugs that reduce the activity of proton pumps and that are used to reduce gastric acid secretion in the treatment of ulcers and gastroesophageal reflux disease.

**resorption:** The process or action by which something is reabsorbed.

**shear:** A chronic progressive disease that causes inflammation in the joints and that results in painful deformity and immobility, especially in the fingers, wrists, feet, and ankles.

**stroke:** The sudden death of brain cells due to lack of oxygen that is caused by blockage of blood flow or rupture of an artery to the brain.

**unintended weight loss:** Decrease in body weight that is not planned or desired.

**urinary incontinence:** The involuntary leakage of urine.

**urinary tract infection:** An infection of the kidney, ureter, bladder, or urethra.

## Discussion Questions

1. What are the risk factors for CVD?
2. What are common mealtime interventions for patients with exacerbation of COPD?
3. What are the potential causes for cancer in older adults?
4. Discuss common nutrition interventions used in the treatment of cancer.
5. Demonstrate mealtime interventions that can be used to promote adequate intake in older adults with dementia.
6. Do you know any older adults with diabetes? Have you noticed the things they do to manage the disease, like how they eat or medications they take?
7. What are the most common lifestyle modifications associated with the management of GERD symptoms?
8. Describe the nutrition and lifestyle priorities for an overweight older adult with malnutrition?
9. List the different forms of arthritis and discuss how each affects older adults.
10. Discuss the risk factors for developing osteoporosis.
11. Which conditions place older adults at increased risk for developing pressure injuries?
12. Discuss the key features in the dietary management of older adults with acute kidney disease.

## Activities

1. Create a blog to promote healthy eating for older adults with chronic diseases. Create an actual blog for free at [blogger.com](http://blogger.com). Each team member is to contribute an article.
2. Select one of the conditions discussed in the chapter and create an informational booklet.

## Study Questions

1. What does the term CVD encompass?
  - a. All syndromes in which the brain is permanently or briefly affected
  - b. Syndromes that affect heart function
  - c. Syndromes that affect the cardiovascular system
  - d. Syndromes that affect the cardiopulmonary system
2. What is a stroke?
  - a. Illnesses related to cerebral infarction
  - b. A word denoting cerebral hemorrhage and subarachnoid hemorrhage
  - c. A group of illnesses that includes cerebral infarction, hemorrhage, and subarachnoid hemorrhage
  - d. A term to denote all diseases of the brain

3. What does treatment for HTN include?
  - a. Consuming a healthy diet that is high in sodium and potassium
  - b. Consuming a healthy diet that includes foods that are low in sodium
  - c. Consuming a diet high in fiber
  - d. Consuming a diet high in calories and protein
4. What is a risk factor for developing cancer?
  - a. Consuming high amounts of vegetables
  - b. Young age
  - c. Unlimited alcohol consumption
  - d. Active lifestyle
5. What is the role of antioxidants in cancer prevention?
  - a. Consuming megadoses of antioxidants can help prevent the development of cancerous cells.
  - b. Research supports that consuming antioxidants does not affect the risk of developing cancer.
  - c. Laboratory animal research supports the use of antioxidants in the prevention of cancer. This remains to be confirmed in humans.
  - d. Consumption of vitamins and natural phenols can help reduce the risk of developing cancer.
6. What are some interventions to lower the risk of developing certain cancers?
  - a. Consuming a healthy diet, keeping a healthy weight, taking vitamins and minerals
  - b. Consuming a healthy diet, being physically active, and keeping a healthy weight
  - c. Being physically active, consuming vitamins and minerals, and adopting a diet low in sodium
  - d. Keeping a healthy weight, taking vitamins and minerals, and keeping a sedentary lifestyle
7. In older adults, how can dementia be characterized?
  - a. A brain condition that interferes with older adults' ability to stay physically active
  - b. A brain condition that requires older adults to be institutionalized to be properly cared for
  - c. Cognitive decline that promotes malnutrition
  - d. A brain condition that interferes with older adults' ability to remember, obtain and process new information, and communicate
8. Common risk factors that over time serve as precursors for dementia development include?
  - a. Age, genetics, family history
  - b. Genetics, obesity, sedentary lifestyle
  - c. Family history, traumatic brain injury, nutrient-dense diet
  - d. Genetics, hypertension, obesity
9. Which AD symptom contributes to decreased nutrient intake?
  - a. Increased number of food dislikes
  - b. Ability to consume a low-calorie diet
  - c. Inability to feel hunger and thirst
  - d. Individual's desire to feed self
10. How can T1DM be defined?
  - a. Overproduction of insulin
  - b. Insufficient insulin production
  - c. No insulin is produced in the body
  - d. Beta cells are intact
11. How can T2DM be defined?
  - a. Increase in beta cell function
  - b. Overproduction of insulin
  - c. The least common form of DM in older adults
  - d. A reduction in insulin production that progresses to insulin resistance
12. What should the meal pattern for an older adult with DM include?
  - a. Sixty percent of total calories should come from carbohydrates; the remainder should be divided equally between protein and fat.
  - b. There is no ideal percentage of calories from carbohydrate, protein, and fat for all people with diabetes.
  - c. The majority of the calories in the diet should come from protein foods.
  - d. The highest percentage of calories in the diet should come from fat.
13. How can gastroesophageal reflux disease be defined?
  - a. A condition characterized by alterations in the mucosa of the esophagus
  - b. A disorder in which bile acids enter the esophagus
  - c. A precursor to gastric ulcer
  - d. A disorder in which gastric acid and other stomach fluids leak into the esophagus
14. What is a risk factor for developing gastroesophageal reflux?
  - a. Obesity
  - b. Consuming a high-fat diet
  - c. Sedentary lifestyle
  - d. Prolonged use of antacids
15. What is a lifestyle intervention to manage gastroesophageal reflux?
  - a. Consuming a low-fat diet
  - b. Incorporating dietary supplements into the dietary regime
  - c. Consuming smaller, more frequent meals
  - d. Consuming a high-protein diet



## Learning Portfolio (continued)

16. How can the metabolic syndrome cachexia be characterized?
- Presence of cancer
  - Loss of muscle with or without loss of fat mass
  - Presence of edema
  - Abnormal weight gain
17. What does *sarcopenia* refer to?
- The progressive skeletal muscle loss and strength decrease that occurs as part of the aging process
  - The increased mortality rate seen in older adults with weight loss
  - A syndrome that occurs as a result of anorexia, inflammation, and insulin resistance
  - Increased muscle protein breakdown
18. What does iron-deficiency anemia occur as a result of?
- Microcytic red blood cells in the body
  - Microcytic white blood cells in the body
  - Hyperchromic red blood cells in the body
  - Hypochromic red blood cells in the body
19. How can osteoporosis be characterized?
- The body produces excessive calcium and decreased bone structure.
  - The bones are frail as a result of an inactive lifestyle.
  - The bones are weak owing to decreased bone mineral density.
  - Inadequate diet contributes to the development of anemia.
20. What does treatment of osteoporosis involve?
- Adequate intake, exercise, and fall prevention
  - High protein intake, active lifestyle, increased ability to perform activities of daily living
  - Low-impact exercise, medication, high-protein diet
  - Fall prevention, high-impact exercise, low-protein diet
21. What does treatment for osteoarthritis consist of?
- Adequate nutrition intake and fast weight loss
  - Weight management and exercise
  - Weight loss and medication
  - Weight monitoring and diet education
22. Vitamin A is essential in promoting skin integrity. What does this nutrient contribute to?
- Increased absorption of other vitamins
  - The granulation process that occurs during wound healing
  - Collagen development
  - Decreased healing time
23. Aside from prolonged healing time, what can vitamin C deficiency in older adults with pressure injuries contribute to?
- Anorexia and weight loss
  - Decreased wound strength and immune function
  - Decreased collagen and increased fibroblast production
  - Decreased wound strength and increased fibroblast production
24. When considering supplementation, what is important to remember?
- Increased zinc can interfere with copper metabolism and contribute to copper-induced anemia.
  - Research supports the use of a multivitamin for all older adults with pressure injuries.
  - Supplementation of vitamin A, vitamin C, zinc, and amino acids is essential for wound healing.
  - Only vitamin A and vitamin C are essential nutrients for wound healing.
25. What does acute kidney injury involve?
- Decreased kidney function over time
  - Increased nutrient elimination
  - Sudden loss of kidney function that causes retention of urea nitrogenous waste products
  - Excessive expression of electrolytes
26. To prevent acute kidney injury, what should older adults do?
- Reduce the amount of fluids consumed and monitor kidney function via biochemical data.
  - Consume adequate fluids and monitor kidney function via biochemical data.
  - Reduce the amount of fluids consumed to promote decreased urine output.
  - Monitor medications and consume limited amount of fluids.
27. What do treatment goals for patients with AKI center around?
- Preventing protein-energy wasting and fluid overload
  - Preventing weight increase and controlling blood pressure
  - Promoting weight loss and electrolyte balance
  - Preventing acid-base balance and weight loss

## Weblinks

- **Alz.org**  
[http://www.alz.org/alzheimers\\_disease\\_what\\_is\\_alzheimers.asp](http://www.alz.org/alzheimers_disease_what_is_alzheimers.asp)
- **American Cancer Society**  
<http://www.cancer.org>
- **American College of Gastroenterology**  
<http://gi.org>
- **American Diabetes Association**  
<http://www.diabetes.org/?referrer=https://www.google.com>
- **Bulletin of the World Health Organization: “Nutritional Surveillance”**  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2536157>
- **Cancer.net**  
<http://www.cancer.net/navigating-cancer-care/prevention-and-healthy-living/diet-and-nutrition>
- **Celiac Disease Foundation**  
<https://celiac.org>
- **Centers for Disease Control and Prevention: Heart Disease**  
<http://www.cdc.gov/heartdisease>
- **Centers for Disease Control and Prevention: Overweight and Obesity**  
<http://www.cdc.gov/obesity>
- **Medline Plus: Stroke**  
<https://www.nlm.nih.gov/medlineplus/stroke.html>
- **National Cancer Institute**  
<http://www.cancer.gov>
- **National Institute of Neurological Disorders and Stroke: NINDS Stroke Information Page**  
<http://www.ninds.nih.gov/disorders/stroke/stroke.htm>
- **National Kidney Foundation**  
<https://www.kidney.org/kidneydisease>
- **National Pressure Ulcer Advisory Panel**  
<http://www.npuap.org>
- **National Stroke Association**  
<http://www.stroke.org/understand-stroke/what-stroke>
- **NIH Osteoporosis and Related Bone Diseases National Resource Center: Bone Health for Life**  
[http://www.niams.nih.gov/Health\\_Info/Bone/Bone\\_Health/bone\\_health\\_for\\_life.asp](http://www.niams.nih.gov/Health_Info/Bone/Bone_Health/bone_health_for_life.asp)
- **Professional Heart Daily**  
<http://my.americanheart.org/professional/index.jsp>
- **World Health Organization: Obesity**  
<http://www.who.int/topics/obesity/en>

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