# Cardiovascular and cerebrovascular health and wellness

*Kathleen Jett*

## Learning objectives

1. Describe the normal changes in the aging cardiovascular system.

2. Identify the most common cardiovascular disorders seen in later life.

3. Describe how the presentation of these disorders in older adults differs from that seen in younger adults.

4. Suggest interventions to promote healthy aging in the face of cardiovascular disease regardless of the stage of illness.

http://evolve.elsevier.com/Touhy/TwdHlthAging

**A STUDENT SPEAKS**

I thought all hearts sounded the same, but after gaining a little more experience I started hearing all sorts of differences.
*Helen, a 19-year-old nursing student*

**AN ELDER SPEAKS**

I had always been very active and healthy, and then slowly I started feeling more and more tired. I just thought it was due to growing older, but found out that my heart was no longer beating as it should.
*Isabelle at 86*

The cardiovascular system, composed of the heart and blood vessels, is the vehicle through which oxygenated and nutrient-rich blood is transported throughout the body and metabolic waste is carried to the excretory organs. There are several age-related changes in the system, but these have little or no effect on the lives of healthy elders. However, by the time one is in later life, the choices made earlier, such as smoking, coupled with normal changes result in a very high rate of cardiovascular disease (CVD). Both the prevalence and the incidence of CVD are so high that they are often mistaken as normal parts of aging and referred to as the "diseases of old age." In reality, while cardiovascular changes occur, cardiovascular diseases are not inevitable.

# The aging heart

One particular age-related change to the aging heart muscle is the progressive decline in cardiac reserve. That is, it takes longer for the heart to accelerate to meet a sudden demand for oxygen and longer to return to its resting state. This becomes quite significant when an increased cardiac response is needed in the presence of a physical or mental challenge such as acute emotional distress, infection, fluid or blood loss, or tachycardia. The associated increased pulse rate seen under these circumstances in younger adults is less likely to occur in older adults. Even a person with a presumably healthy heart may not be able to maintain heart function and failure can occur suddenly. In the presence of preexisting disease, this age-related change has the potential to increase both morbidity and mortality when it is not possible for the heart to work harder when it is taxed.

In normal aging, the heart valves separating the chambers thicken and stiffen as a result of lipid deposits and collagen cross-linking. A murmur is the sound of the backflow of blood through a valve that is no longer completely patent. *Mild systolic murmurs* (between $S_1$ and $S_2$) are expected findings in the older adult. Aortic and mitral

valves are those most commonly affected. If the nurse auscultates a systolic murmur in an asymptomatic older adult, questions should be asked. Quite unlike a younger adult, most older adults will say, "Oh yes I have had that for years." If this is not the case, the person is referred to a cardiologist. If the new finding is accompanied by any signs or symptoms of distress, it is a medical emergency. *Diastolic murmurs* (heard between $S_2$ and $S_1$) are always indicative of a serious problem in cardiac hemodynamics and these persons are followed closely by a cardiologist. The nurse's ability to monitor this fragile condition is an essential skill in geriatrics and a means to work with the patient and the family to achieve the highest health-related quality of life possible.

# Cardiovascular disease (CVD)

In the United States 1 of every 4 deaths is related to heart disease, that is, about 600,000 deaths a year. More than half of these are the result of acute myocardial infarctions (AMIs) or heart attacks (CDC, 2014d). Although heart disease is the number 1 overall cause of death, it is second after cancer for Asian Americans, Hispanics, and Hawaiian/Pacific Islanders (Centers for Disease Control and Prevention [CDC], 2014a; Office of Minority Health [OMH], 2010) (Box 22-1). Nearly 44% of all African American men and 48% of African American women have some form of CVD (CDC, 2014c). Research has found that the risk factors for CVD are universal. They include those that the person cannot control, those in full control of the person, and those suspected to have an influence (Figure 22-1). Genetic factors influence the increased risk but do not in and of themselves cause one to develop CVD. Preventive strategies have shown to counter any genetic risk that may exist (CDC, 2014e).
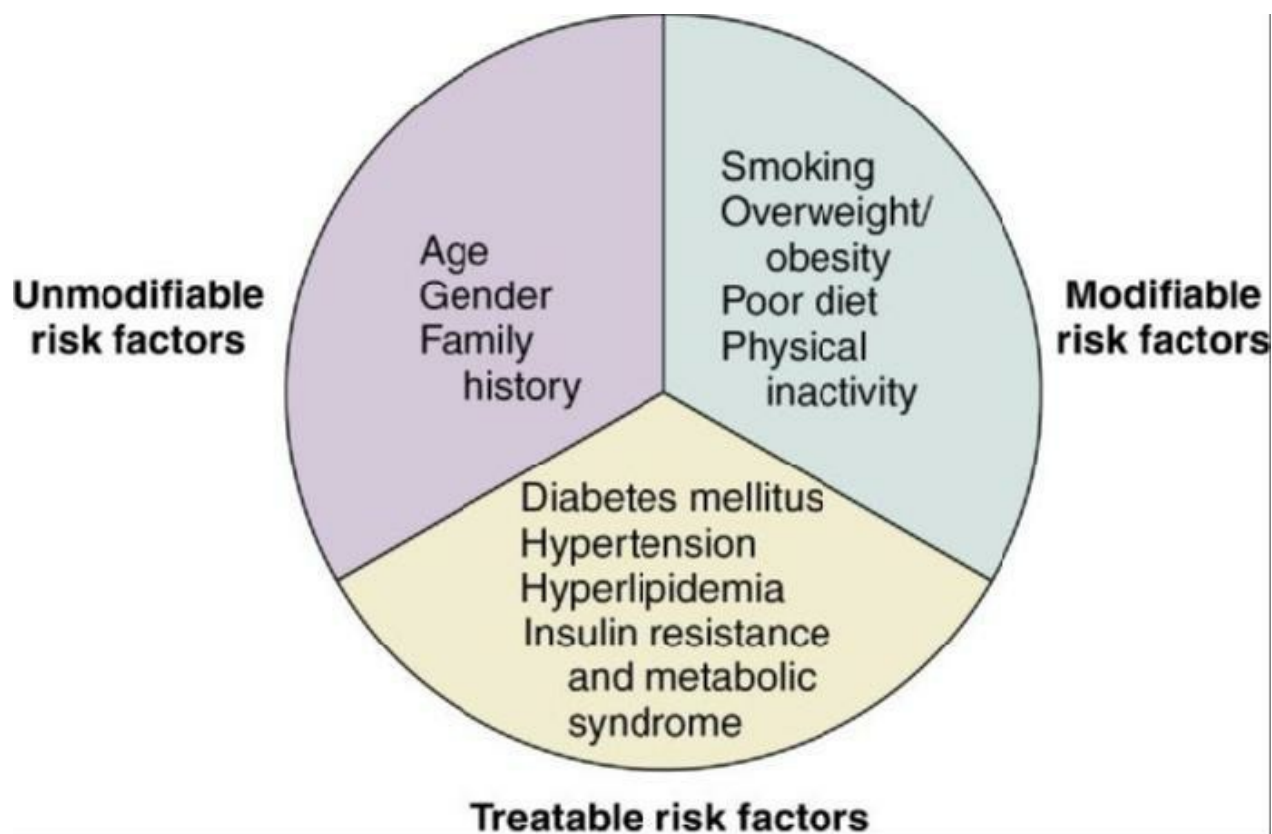
**FIGURE 22-1  Risk Factors for Coronary Heart Disease.** Source: (From Grundy SM, Pasternak R, Greenland P, et al: Assessment of cardiovascular risk by use of multiple-risk-factor assessment questions, *J Am Coll Cardiol* 34(4):1348–1359, 1999.)

## BOX 22-1

## Leading Causes of Death by Racial and Ethnic Group in the United States

| AFRICAN AMERICAN | AMERICAN INDIAN/ALASKAN NATIVE | ASIAN AMERICAN | HISPANIC OR LATINO | NATIVE HAWAIIAN AND OTHER PACIFIC ISLANDERS | WHITE |
|---|---|---|---|---|---|
| 1. Heart disease | 1. Heart disease | 1. Cancer | 1. Cancer | 1. Cancer | 1. Heart disease |
| 2. Cancer | 2. Cancer | 2. Heart disease | 2. Heart disease | 2. Heart disease | 2. Cancer |
| 3. Stroke | 3. Unintentional injuries | 3. Stroke | 3. Unintentional injuries | 3. Stroke | 3. Chronic lower respiratory tract disease |
| 4. Diabetes | 4. Diabetes | 4. Unintentional injuries | 4. Stroke | 4. Unintentional injuries | 4. Stroke |
| 5. Unintentional injuries | 5. Chronic liver disease | 5. Diabetes | 5. Diabetes | 5. Diabetes | 5. Unintentional injuries |
| 6. Kidney disease | 6. Chronic lower respiratory tract disease | 6. Influenza and pneumonia | 6. Chronic liver disease | 6. Influenza and pneumonia | 6. Alzheimer's disease |
| 7. Chronic lower respiratory tract disease | 7. Stroke | 7. Chronic lower respiratory tract disease | 7. Chronic lower respiratory tract disease | 7. Chronic lower respiratory tract disease | 7. Diabetes |
| 8. Homicide | 8. Suicide | 8. Kidney disease | 8. Influenza and pneumonia | 8. Kidney disease | 8. Influenza and pneumonia |
| 9. Septicemia | 9. Influenza and pneumonia | 9. Alzheimer's disease | 9. Homicide | 9. Alzheimer's disease | 9. Kidney disease |
| 10. Alzheimer's disease | 10. Kidney disease | 10. Suicide | 10. Kidney disease | 10. Suicide | 10. Suicide |

Data extracted from Centers for Disease Control and Prevention: *Black or African American populations*, 2014b. http://www.cdc.gov/minorityhealth/populations/remp/black.xhtml Accessed June 2014; Office of Minority Health (OMH): *White population: leading causes of death*, 2010. http://www.cdc.gov/omhd/populations/White.htm Accessed June 2014.

Cardiovascular diseases derive from damage to the blood vessels or to the heart itself. Hypertension, coronary heart disease (CHD), heart failure (HF), atrial fibrillation (AF), and peripheral and cerebral (strokes) vascular disorders in older adults are summarized in this chapter. For more detailed examinations of these conditions, the reader is referred to geriatric medicine and nursing texts that are disease based.

# Hypertension

Hypertension (HTN) is the most common chronic CVD encountered by the gerontological nurse. It occurs in 67 million people in the United States, or 1 out of every 3 persons, the majority of whom are African American and living in the Southeast (CDC, 2014e; National Heart, Lung and Blood Institute [NHLBI], 2012b).

Both the definition of and the guidelines for the treatment of HTN in the United States are provided by the Joint National Committee for the Detection, Evaluation, and Treatment of High Blood Pressure (JNC) (NHLBI, 2003). The previous guidelines did vary based on the person's age (NHLBI, 2003). The new guidelines, published in December 2013, include recommendations specifically for those ≥60 of age (Caboral-Stevens and Rosario-Sim, 2014; James et al, 2014).

### Signs and symptoms

Most persons with HTN are asymptomatic, and a diagnosis is only made during a routine health screening or after the manifestation of a disease that has developed as a result of long-standing uncontrolled hypertension (Box 22-2). Some people complain of a headache, "bad blood," light-headedness, a "swimmy head," or a "full head." These and other phrases are culture-based idioms and the nurse must first determine if the person believes that the symptoms are from an elevated or lowered blood pressure. Upon blood pressure measurement, the person may be normotensive, hypotensive, or hypertensive.

## ❤️ BOX 22-2

### HEALTHY PEOPLE 2020

#### Hypertension

#### Goal

Reduce the proportion of persons in the population with hypertension.

#### Baseline

29.9% of adults aged 18 years and older had high blood pressure/hypertension in 2005 to 2008 (age adjusted to the year 2000 standard population).

#### Target

26.9% of those older than 18 years of age by 2020

Data from U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion: *Healthy People 2020*, 2012. http://www.healthypeople.gov/2020

### Diagnosis

The 2014 guidelines for the diagnoses of hypertension are >140/90 mm Hg for younger

adults and *now ≥150/90 mm Hg in people ≥60 of age, regardless of race*. For those with diabetes or kidney disease of any age, the upper limit is 140/90 mm Hg (James et al, 2014). Diagnosis requires two measurements, 5 minutes apart, confirmed in the contralateral arm (NHLBI, 2003). A diagnosis can never be made with a single reading. If done when sitting and standing, evidence of orthostatic hypotension will be apparent and will influence the treatment approach. Diagnosis may also be done through the analysis of self-monitoring records, especially for those who report "white coat syndrome," where readings will be artificially high in a health care situation. Many older adults in the outpatient setting monitor their blood pressure at home. If the home device is reliable and the technique is accurate (Box 22-3), then the home measurements may be the most accurate for both diagnosing and monitoring treatment effects in older adults.

## BOX 22-3

### TIPS FOR BEST PRACTICE

#### Home Measurement of Blood Pressure

- Observe the technique that the person uses in the measurement of blood pressure, in both arms, using his or her personal home device.

- Duplicate the measurement using the same device, but with the nurse conducting the measurement.

- Measure the BP using either a reliable and tested BP cuff or a cuff and a stethoscope.

- If there is a discrepancy even with a person using good technique, counsel the person regarding the replacement of the home device.

## Etiology

The exact cause of hypertension cannot be determined in the vast majority of persons (primary hypertension). We suspect that optimal mental health, stress and anger management, and a number of other protective factors can counter any genetic influence (CDC, 2014g). The normal changes in the aging vascular system (p. 293) coupled with lifelong habits, such as smoking, are the factors most likely to account for the increased incidence of HTN with aging (NHLBI, 2012a). Secondary hypertension can be caused by non–cardiac diseases, such as pheochromocytoma or Cushing's syndrome, and are relatively rare in older adults (Mayo Clinic, 2013).

### Complications

While many of the complications of hypertension are preventable, there is a very low level of adequate control of blood pressure that could promote wellness (Table 22-1). In persons older than 80 years of age, only 38% of men and 23% of women in the United States have their blood pressure under adequate control with a U.S. goal of increasing that number (Box 22-4). In other countries control is even worse (Box 22-5). As a result, the ensuing complications are many, most notably increased rates of strokes, acute myocardial infarctions (AMIs), and coronary artery disease (CAD) (Table 22-2). Although there has been some discussion of the relationship between HTN and dementia, this is still under investigation (Helton, 2014).

**TABLE 22-1**

**Examples of Complications of Uncontrolled Hypertension**

| COMPLICATION | CORRELATION WITH CHANGE FROM HYPERTENSION |
|---|---|
| Predictive of increased risk for stroke, heart failure, and other cardiomyopathies increased risk of stroke | Widened pulse pressure |
| Increased risk of stroke | Coronary artery disease |
| Death | Congestive heart failure |
| Increased incidence of microvascular complications | Diabetes |
| Worsening of renal insufficiency, renal failure | Chronic renal disease |

Extracted from Helton M: Hypertension. In Ham RJ, Sloane PD, Warshaw GA, et al, editors: *Primary care geriatrics: a case-based approach,* ed 6, Philadelphia, 2014, Elsevier, pp 381–394.

**TABLE 22-2**

**Benefits of Controlling Blood Pressure**

| | AVERAGE PERCENT REDUCTION IN RISK FOR NEW EVENTS |
|---|---|
| Stroke decreased | 30-40 |
| Myocardial infarction decreased | 20-25 |
| Heart failure decreased | 50 |

♥ **BOX 22-4**

## HEALTHY PEOPLE 2020

### Hypertension and Blood Pressure

### Goal

Increase the proportion of adults with hypertension whose blood pressure is under control.

### Baseline

43.7% of adults aged 18 years and older with high blood pressure/hypertension had it under control in 2005 to 2008 (age adjusted to the year 2000 standard population).

### Target

61.2% of those with hypertension and at least 18 years of age will have their blood pressure under control by 2020.

Data from U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion: *Healthy People 2020*, 2012. http://www.healthypeople.gov/2020

**BOX 22-5**

## Global Issues: Uncontrolled Hypertension

In 2008, 3.5 million people in China died from CVD, especially related to HTN. Among the 1.3 billion living in rural areas, 97% had uncontrolled HTN. Through cooperative efforts of the CDC in the United States, the China-CDC, and WHO, high intake of salt was found to be a major factor.

Centers for Disease Control and Prevention: *Shaking the salt habit: sodium—hypertension control in China,* 2013. http://www.cdc.gov/globalhealth/ncd/hypertension.htm Accessed June 2014.

## Treatment

Nonpharmacological interventions that promote a healthy lifestyle have been found to be highly effective in reducing blood pressure and, in doing so, minimizing or even preventing long-term complications.

There is considerable evidence regarding the influence of diet and obesity on blood pressure. Healthy eating habits have been found to irrefutably lower blood pressure (Box 22-6). Even modest reductions in sodium intake and body weight (10%) may return a person to a normotensive state, reduce the risk for other CVD or stroke, or reduce the number of medications needed (Table 22-3) (Chapter 22). If able to read, teaching people how to read food labels is an important part of preventive health education *(see Chapter 14).*

**TABLE 22-3**

**Relationship between Lifestyle Change and Reduction in Systolic Blood Pressure**

| LIFESTYLE CHANGE | APPROXIMATE REDUCTION IN SBP |
|---|---|
| Reduce weight | Decrease of 5-20 mm Hg per 10-lb loss |
| Adopt DASH diet | Decrease of 8-14 mm Hg |
| Lower sodium intake | Decrease of 2-8 mm Hg |
| Increase physical activity | Decrease of 4-9 mm Hg |
| Limit alcohol intake | Decrease of 2-4 mm Hg |

*DASH,* Dietary Approaches to Stop Hypertension; *SBP,* systolic blood pressure.

**BOX 22-6**

## TIPS FOR BEST PRACTICE

### Controlling Hypertension

With few exceptions the nurse promotes healthy aging by helping people maintain their blood pressure within an acceptable range. For those with late- or end-stage illness such as dementia, the range of acceptable blood pressures is broader.

When hypertension is not adequately responsive to nonpharmacological approaches, pharmacological interventions are necessary. There are four types of antihypertensive medications that JNC 8 recommends for use: calcium channel blockers (CCB), thiazide diuretics, beta-blockers, angiotensin-converting enzyme inhibitors (ACEs), or angiotensin receptor blockers (ARBs). First-line treatment in the non-black population, including those with diabetes mellitus (DM), includes any of the previously mentioned interventions; however, in the black population thiazide-type diuretics and CCBs are recommended (Caboral-Stevens and Rosario-Sim, 2014). ACEs have renal protective qualities and should be prescribed to everyone with renal insufficiency; if not tolerated, an ARB can be substituted. Everything should be done to minimize the number of medications taken by older adults to reduce the risk of polypharmacy, to keep the regimen simple, and to use once-daily dosing (Chapter 9). Due to the high risk for orthostatic hypotension and related falls, the lowest dose is initially prescribed and the gerontological nurse checks the person and blood pressure frequently to assess for medication side effects and the need for a dose adjustment. By reducing or eliminating modifiable risk factors, hypertension can be controlled or prevented, leading to healthier aging.

# Coronary heart disease

The heart is dependent on the coronary arteries for the oxygen and nutrients it needs to survive. Although not a normal change of aging, the incidence of coronary heart disease (CHD) rises significantly with age and is the most common form of heart disease. CHD is referred to as atherosclerosis, "hardening of the arteries," *coronary artery disease* (CAD), and ischemic heart disease.

In the United States one person dies each minute from CHD, 69% of whom are older than 75 years of age (Taffet, 2014). Those who have a complete occlusion will have an acute myocardial infarction (AMI) and more than one-third will die in the 12 months following the event (Bashore et al, 2013). While the rates of death due to CHD are declining, it remains the number 1 cause of death worldwide with variation by race, ethnicity, and gender.

## Signs and symptoms

The major symptoms of CAD are shortness of breath (dyspnea) and unexplained fatigue, identical to those symptoms that are seen in many other health problems common in late life (Box 22-7). When CAD becomes ischemic but the occlusion is incomplete, the symptoms may worsen intermittently, but over time they increase in frequency, intensity, or duration and occur with less and less provocation (unstable angina). Unstable angina is associated with arrhythmias, tachycardia, and ventricular fibrillation.

**BOX 22-7**

## Signs of Potential Exacerbation of Illness in an Older Adult with Coronary Heart Disease

- Light-headedness or dizziness

- Disturbances in gait and balance

- Loss of appetite or unexplained loss of weight

- Inability to concentrate or shortened attention span

- Changes in personality or mood

- Changes in grooming habits

- Unusual patterns in urination or defecation

- Vague discomfort, frequent bouts of anxiety

- Excessive fatigue, vague pain

- Withdrawal from usual sources of pleasure

If an AMI occurs in an older adult there may be no anticipatory symptoms at all, referred to as a "silent MI." The classic symptoms such as sudden gripping chest pain with radiation to arm and chin may be present or they may be completely atypical, such as an unexplained fall or an acute change in mental status or other atypical symptoms (Table 22-4). AMIs without the classic symptoms rarely occur in younger adults. Younger adults may have no symptoms of early CAD and not know they have it until suffering an

AMI, most often with the classic complaints including shortness of breath (especially for men) and the sensation of intense indigestion (especially for women).

**TABLE 22-4**

**Key Differences in the Signs of Typical Cardiac-Related "Chest Pain" (Angina) in a Younger Adult Compared with Atypical Signs More Common in an Older Adult**

| SYMPTOM | CLASSIC | ATYPICAL |
|---|---|---|
| Chest pain | Present | Absent |
| Radiations of pain to arm or jaw | Often present | Absent |
| Sweating | Often present | Absent |
| Dyspnea | Often present | May be only symptom |
| Fatigue | Often present | May be only symptom |

Adapted from Taffet GF: Coronary artery disease and atrial fibrillation. In Ham RJ, Sloane PD, Warshaw GA, et al, editors: *Primary care geriatrics: a case-based approach,* ed 6, Philadelphia, 2014, Elsevier, pp 395–405.

## Diagnosis

The diagnosis of CAD in the older adult may be incidental to another exam that includes a resting electrocardiogram (ECG) (e.g., annual Wellness Visit covered by Medicare) or when evaluating another problem that is found to be the result of end-organ damage, such as atrial fibrillation. If abnormalities are found on the ECG of a young adult, interventions can begin immediately (e.g., smoking cessation, weight loss) before damage occurs or to reverse the existing damage. However, there are still measures that persons can take at any age to decrease the risk of CAD (Figure 22-1).

Noninvasive diagnostic measures include a stress test; invasive tests include cardiac catheterization. If a person is suspected of having an AMI, a definitive diagnosis requires the documentation of changes in biochemical markers within 24 to 72 hours of the event (Bashore et al, 2013). Life-saving measures can be initiated if they are consistent with the patient's preexpressed wishes. Definitive testing may not always be appropriate, such as those who are very frail with limited life expectancies, when the focus of care is on optimizing quality of life and in doing so fostering healthy aging even at the end of life (Chapter 35).

## Etiology

The walls of the normally pliable arteries thicken and stiffen with age; there are changes in lipid, cholesterol, and phospholipid metabolism. This may result in the formation of plaques that adhere to vessel walls and ultimately occlude the vessel or cause a spasm in the surrounding area when the heart is stressed. Once this occurs, the capacity for oxygenation of the surrounding heart tissue is reduced and will ultimately lead to tissue death (necrosis).

## Complications

The most important complication of CAD is the AMI as a result of either acute or long-term cardiac anoxia. If it is witnessed, resuscitation is desired, and an automatic defibrillator is available, both the morbidity and the mortality of the person are significantly decreased.

An AMI can cause a small or extensive amount of damage to the heart muscle. The event may be triggered by a sudden increase in myocardial oxygen demand, such as from the inability of the arteries to respond adequately to an infection or bleeding, or from a

sudden occlusion of an artery from a blood clot or plaque attempting to pass through a narrowed vessel. Tissue death occurs quickly.

In chronic CHD, the body attempts to compensate for the damage through a process called remodeling in which the heart enlarges and changes shape. This remodeling eventually leads to a decrease in cardiac pumping efficiency and the gradual onset of other cardiomyopathies.

### Treatment

Both nonpharmacological and pharmacological approaches are usually necessary to treat the person with CAD. Nonpharmacological features of treatment emphasize addressing all reversible factors. Advance practice nurses and physicians most often prescribe a combination of aspirin, clopidogrel (Plavix), and nitrates (isosorbide). Beta-blockers (e.g., metoprolol, atenolol) have been found to prolong life. Calcium channel blockers can only be used with caution (Bashore et al, 2013; Davis, 2013b). During more acute events, additional treatment is needed, usually sublingual or aerosol nitroglycerin. During intermittent chest pain (angina) or AMI, sublingual or buccal spray nitroglycerin remains the gold standard. Pharmacological interventions are geared toward minimizing symptoms and promoting health-related quality of life, including palliative care when appropriate.

## Atrial fibrillation

Atrial fibrillation (AF or afib) is an irregular heartbeat. The irregularity may have a pattern or be completely random (paroxysmal); it may occur once, intermittently, or persistently. While it may occur in younger adults, it has a high incidence and prevalence in older adults and increases with each decade (Bashore et al, 2013). The average age of onset is 67 for men and 75 for women; it is more common in white Americans compared with those in other racial groups (Davis, 2013a).

### Signs and symptoms

In many cases, AF itself is completely asymptomatic and only identified by the nurse or other practitioner as part of a thorough auscultation of the heart. If symptoms occur, they are vague, such as fatigue, and since the person already has other underlying heart disease, this is difficult to attribute specifically to the AF. The fatigue may be attributed to "old age" or the onset of frailty. Occasionally people report the sensation of "palpations" and intermittent shortness of breath, or nonspecific chest pain, especially if the fibrillation is paroxysmal (Box 22-8).

### BOX 22-8

### Sometimes I Can Feel the Palpitations

Ruth is a 75-year-old active and energetic woman with paroxysmal atrial fibrillation. Because of this condition, she takes anticoagulants—that is, she takes medication to prevent her blood from clotting and to decrease her risk of having a stroke. Most of the time Ruth's heart beats regularly and at other times it does not. When it does not, she has a sense of "chest palpitations" but they have never given her problems. One day Ruth's heart seems to be beating much more than usual. She checked it and it was at least 180 beats per minute, it was highly irregular, and she was not feeling well. She called for an ambulance and was taken immediately to the hospital where she was stabilized and then sent home.

## Diagnosis

Diagnosis is most often based on clinical findings of an irregular heartbeat on auscultation, which may be in association with recurrent falls, episodes of syncope, "dizzy spells," and worsening of heart failure. It may be acute (lasting <48 hours) or chronic. The frequency of the irregularity can be evaluated by a 24-hour Holter monitor. An ECG may confirm persistent AF, but may miss that which is paroxysmal.

## Etiology

Atrial fibrillation is the end result of diabetes, sleep apnea, thyroid disorders, alcohol abuse, and several cardiomyopathies, including CHD and hypertension. It also may be related to the use of beta-blockers (Bowker et al, 2013). However, more than half of the incidence of AF is related to inadequate control of modifiable risk factors, identical to those associated with CAD (Figure 22-1) (Davis, 2013a; Taffett, 2014). It is associated with a heightened risk for dementia and stroke-related mortality; however, in each case the rates are highly variable (Davis, 2013a). If a younger adult has AF he or she is more likely to have it in the absence of other diseases; in an older adult it is most often a complication of another disease such as CAD.

## Complications

Because the pulsations of the heart in AF are irregular to some degree, there is always a risk for pooling of blood in the atria when the time between the beats is prolonged. This pooling increases the risk for the development of emboli. The most serious complication of AF is a stroke if emboli should leave the heart and travel to the brain. In AF the risk for stroke is very high (Davis, 2013a; Taffett, 2013). If the fibrillation causes tachycardia as a compensating mechanism, then significant hypotension, myocardial ischemia, and other cardiomyopathies can develop.

## Treatment

Treatment for atrial fibrillation is twofold: (1) to control heart rate and (2) to reduce stroke risk through the prevention of blood clots forming in the atria. In 2013 the American College of Cardiology Foundation/American Heart Association recommended that there was no benefit for "strict" control (i.e., <80 bpm at rest or <110 bpm during a 6-minute walk) in asymptomatic patients with stable control (Davis, 2013a). In the outpatient setting, including long-term care facilities, rate control is usually achieved through the use of beta-blockers, but bradycardia is a potential side effect. Patients can be taught to monitor their pulses. For the person at a low risk for a stroke, aspirin along with clopidogrel (Plavix) is used. For those with any higher risk, even for intermittent AF, lifelong anticoagulation therapy remains the gold standard. The anticoagulant warfarin has long been the only medication available. It must be monitored closely and regularly to ensure that the level of anticoagulation is within an appropriate range (Chapter 8). There is always a heightened risk of bleeding. Vitamin K is the antidote and can quickly inactivate the effects of warfarin. It does interact with most antibiotics and herbal products (see Chapters 9 and 10); when these medications or supplements are taken, even closer monitoring is necessary.

Several newer anticoagulants are available that do not require monitoring, making these more acceptable to some, especially those who spend a lot of time traveling. At the time of this writing no antidotes were available should bleeding occur (Ogbonna and Clifford, 2011). A person who is taking one of these anticoagulants should be directed to promptly seek emergency support with any obvious bleeding or the potential of bleeding

(e.g., following trauma to the head following a fall).

Nurses have important roles in helping patients understand the dangers and benefits of anticoagulation therapy, the impact of medication/food/herb/nutritional supplement interactions (see Chapters 9 and 10), the need for strict adherence, and the effect of high and low vitamin K diets on warfarin. Nurses often perform point-of-care warfarin monitoring, and advanced practice nurses adjust doses as needed. Nurses are often involved in the conversations regarding the risk/benefit ratio of continuing anticoagulation therapy for the person at risk for falling or with a history of falling.

## Heart failure

Heart failure (HF) is a general term used to describe the end result of other disorders, particularly CHD, hypertension, and diabetes. It is not a normal part of aging, but like other heart diseases, it is so common that it is often considered normal. It is the most common cause for hospitalization, rehospitalization, and disability among persons older than age 65 (Ding et al, 2013) (Box 22-9).

**BOX 22-9**

### HEALTHY PEOPLE 2020

**Hospitalizations for Heart Failure**

**Goal**

Reduce hospitalizations of older adults with heart failure as the principal diagnosis.

**Ages 65-74**

**Baseline**

9.8 hospitalizations for heart failure per 1000 people aged 65 to 74 years occurred in 2007.

**Target**

No more than 8.8 hospitalizations per 1000 people aged 65 to 74 years will occur by 2020.

**Ages 75-84**

**Baseline**

22.4 hospitalizations for heart failure per 1000 people aged 75 to 84 years occurred in 2007.

**Target**

No more than 20.2 hospitalizations per 1000 people aged 75 to 84 years will occur by 2020.

**Ages 85+**

**Baseline**

42.9 hospitalizations for heart failure per 1000 people aged 85 years and older occurred in 2007.

**Target**

No more than 38.6 hospitalizations per 1000 people aged 85 and older will occur by 2020.

As more persons live longer with heart disease, more failure is seen in both men and women; more than 8 million are expected to have HF by 2030. Of the new cases each year, 75% to 80% occur in persons older than 65 and approximately 50% of these die within 5 years (Bashore et al, 2013; CDC, 2013; Ding et al, 2013). African Americans are at the highest risk for HF, both to develop it at a younger age and to die from it (NHLBI, 2014).

Clinical heart failure is categorized as systolic failure, diastolic failure, or both. End-stage HF and acute HF are known as congestive heart failure (CHF). The extent of illness is in proportion to the person's ejection fraction, or the amount of blood leaving the ventricle. A normal ejection fraction is between approximately 55% and 70% (Taffett, 2014).

Acute HF (previously referred to as CHF) can appear quickly in persons with underlying CAD, especially those who have already had at least one AMI, and more slowly in persons with long-standing hypertension. Accurately attributing the signs and symptoms reported by the patient to HF is complicated in the older adult because any one of these symptoms can also be caused by other chronic diseases, geriatric syndromes, or commonly prescribed medications. The signs and symptoms are often atypical in the older adult (Box 22-10). Heart failure symptoms are ranked by their effect on function and activity (Box 22-11).

**BOX 22-10**

## Classic and Atypical Signs of Heart Failure in Older Adults

| CLASSIC (NONCEREBRAL) | ATYPICAL | ATYPICAL (CEREBRAL) |
|---|---|---|
| Dyspnea | Chronic cough | No history |
| Orthopnea | Insomnia | Falls |
| Paroxysmal nocturnal | Weight loss | Anorexia, dyspnea |
| Peripheral edema | Nausea | Behavioral disturbances |
| Unexplained weight gain | Nocturia | Decreased functional status |
| Weakness | Syncope | |
| Poor exercise tolerance | | |
| Abdominal pain | | |
| Fatigue | | |

From Ham RJ, Sloane PD, Warshaw GA, et al, editors: *Primary care geriatrics*, ed 6, Philadelphia, 2014, Elsevier.

**BOX 22-11**

## Classification of Heart Failure by the American College of Cardiologists Combined with that of the New York Heart Association*

**Stage A**

High risk but no symptoms or structural disorder (e.g., CAD, HTN)

### Class 1 mild

*No evidence of symptoms at rest or during activity*

### Stage B

No symptoms but with structural disorder (e.g., LVH, hx MI)

### Class 2 mild

*Ordinary activities result in fatigue, palpitation, or dyspnea*

### Stage C

Current or past symptoms and structural disorder

Especially dyspnea from LVSD

### Class 3 moderate

*Less than ordinary activities cause symptoms*

### Stage D

End-stage disease

Symptomatic at rest despite optimal treatment

### Class 4 severe

*Symptoms at rest, any activity increases discomfort*

## Left-sided failure

*Left-sided failure* is that in which left ventricular (LV) *systolic* function remains within normal limits in the presence of LV *diastolic dysfunction.* The heart is unable to relax enough to allow adequate diastolic function, yet the ejection fraction remains ≥50% and persons may be only minimally symptomatic in day-to-day life. Symptoms may only occur when the heart is stressed, i.e. when there is a need to increase stroke volume.

## Right-sided failure

In contrast to left-sided failure, *right-sided heart failure* is associated with LV systolic *dysfunction;* the ejection fraction is ≤40%, and the person is always symptomatic, may be very ill, and has a poor prognosis. The typical chronic illness trajectory is one of steady

decline. Long-standing left-sided failure will eventually cause right-sided failure as well.

## Signs and symptoms

Early in left-sided failure, the only symptom may be shortness of breath, especially on exertion (dyspnea on exertion [DOE]). However, it will eventually progress to orthopnea, paroxysmal nocturnal dyspnea, and dyspnea at rest (Bowker et al, 2013). It is common for the person to find ways to compensate for declining cardiac function without realizing it. For example, a person slowly reduces their activity level saying they are "not so fit anymore," "just not feeling right," or have a case of "the dwindles," all of which the person may attribute to advancing age. It is much more likely to be a pathological condition that would benefit from treatment. The typical chronic illness trajectory of a person with left-sided failure is periods of minimal symptoms interspersed with exacerbations, often leading to hospitalizations for stabilization until this is no longer possible or desired.

The predominant signs and symptoms of right-sided failure are breathlessness, fatigue and malaise, dependent edema, sleep problems, and hepatic congestion (Ding et al, 2013). Changes in edema can be notable and the nurse works with the person to weigh himself or herself at the same time every day and look for a gain of 5 pounds as an indicator of pending changes in symptoms and the need to contact the health care provider.

## Etiology

Heart failure is the end-organ damage from preexisting conditions, especially hypertension that developed into CAD. To compensate for the damage, the heart, especially the ventricles, enlarges and dilates. The enlargement decreases heart muscle function as the walls are remodeled and weakened. Eventually, the heart cannot compensate for the lost stroke volume, and evidence of failure appears.

Secondary causes of heart failure include drug and alcohol abuse, uncontrolled hyperthyroidism, and valvular heart disease. Persons with CHD who have already had extensive damage have a very high risk of developing heart failure. Its onset can be acute —often within the first few hours or days after a myocardial infarction, but even a moderate amount of muscle damage will lead to eventual heart failure.

## Diagnosis

The diagnosis of early heart failure in older adults can be very difficult. All other diseases with similar signs and symptoms must be ruled out, such as thyroid disturbances and uncontrolled atrial fibrillation. While the working diagnosis is often made empirically, there are many false-positives, and a definitive diagnosis through an echocardiogram (to determine the ejection fraction) can be the best guide to devise a treatment plan and establish the prognosis (Ding et al, 2013). Measurement of serum levels of brain natriuretic peptide (BNP) or NT-proBNP is potentially useful in differentiating shortness of breath due to heart failure with that caused by other conditions (see Chapter 8) (Bashore et al, 2013).

## Complications

As the severity increases and heart failure advances into intermittent or chronic heart failure, the pulse pressure narrows and signs of impaired tissue perfusion develop, such as cool skin and central or peripheral cyanosis. Diminished cognition, perhaps to the point of delirium, is common. Recurrent hospitalization is usually required until the

point is reached when only palliative care is possible or desired. An episode of syncope, ventricular tachycardia, or uncontrolled fibrillation should be regarded as a harbinger of sudden death. Increased jugular venous pressure is the most reliable way to determine the prognosis (Ding et al, 2013).

### Treatment

Because heart failure is indicative of end-organ damage, the goals of treatment are to prevent more damage, control symptoms, and increase health-related quality of life to the extent possible. The nurse works with the person to find ways to minimize fatigue and teaches the person how to recognize signs and symptoms indicating the early or pending onset of acute heart failure. Nurses work with persons and their significant others to determine their wishes related to medical crises and their desire for aggressive measures, such as hospitalization, intubation, and resuscitation. For those with HF in the last stages, treatment is one of palliative care (Chapter 35). Pharmacological interventions and goals are based on the level of symptoms as recommended by the American Heart Association; levels range from A (asymptomatic) to D (Refractory).

# The aging peripheral vascular system

The younger heart propels oxygen-rich blood through highly elastic and flexible arteries that expand and contract depending on the body's need for oxygen. Deoxygenated blood returns to the heart by way of the veins, propelled by contractions of the surrounding muscles. The blood is prevented from moving backward (by the pull of gravity) by a series of valves. Several of the same age-related changes seen in the skin and muscles affect the blood vessels.

The most significant age-related changes in the arteries are reduced elasticity and narrowing. Elastin fibers fray, split, straighten, and fragment. For those without CVD or diabetes, there is little change in blood flow to the coronary arteries or brain. However, perfusion of other tissues and organs is reduced and can be significant in relationship to medication metabolism and excretion, as well as fluid and electrolyte balance (Chapters 8). The veins become stretched and the valves less efficient. Pooling of the blood leads to increased venous pressure and edema develops more quickly.

# Peripheral vascular disease

Peripheral vascular disease (PVD) is that in which there is partial or complete occlusion of the veins or arteries. The two major types of PVD are chronic venous insufficiency (CVI) and peripheral arterial disease (PAD). The reported incidence and prevalence of each disorder vary widely, but overall they increase with age (Rapp et al, 2013; Robertson et al, 2008, 2013).

## Signs and symptoms

The major signs and symptoms of CVI and PAD are pain, changes to the skin, and wounds that do not heal. Early complaints of CVI may include numbness or tingling in the affected extremity or mild edema with standing. There is a pooling of blood with venous stasis, and the affected limb is bluish or purple in lighter-pigmented persons and has a dull gray appearance in more darkly pigmented persons. The reverse blood flow through the incompetent valves results in increased hydrostatic pressure and pain

during ambulation.

Over time, long-standing stasis of blood leads to the deposition of hemosiderin, giving the skin a speckled brown appearance, especially in the lower calf. Varicosities of the superficial veins are obvious. Dependent edema, dermatitis, and firm induration are common signs of CVI. Pain is present when the extremity is dependent and during ambulation.

Because arterial disease reduces the blood flow into a limb, the early symptom of insufficiency is pain when the limb is elevated. It is classically described as an ache, numbness, or squeezing sensation, especially in the arch of the foot and toes but also in the calf, thigh, or buttocks. The pain may be instantly relieved when the limb is moved to a dependent position, when gravity helps pull the blood back into the ischemic limb. While temporarily relieved, pain returns with exertion as the tissue demands more oxygen and is relieved again by rest. This is referred to as intermittent claudication. When elevated, the extremity may be pale and cool, consistent with ischemia, and usually red or purple with dependency (Kohlman-Trigoboff, 2013). See Table 22-5 to assist with the differentiation of these two very different disorders.

**TABLE 22-5**

**Comparison of Arterial and Venous Insufficiency of the Lower Extremities**

| CHARACTERISTICS | ARTERIAL | VENOUS |
|---|---|---|
| Pain | Pain with elevation of LE<br>Pain initially relieved when legs become dependent<br>Pain returns when walking short distances (claudication) but is relieved by rest (legs still dependent) | Deep ache, relieved by elevation<br>Deep muscle pain with acute deep vein thrombosis |
| Pulses | Absent or weak | Normal |
| Skin | Thin, shiny, dry skin<br>Thickened toenails<br>Absence of hair growth<br>Cool<br>Pallor with elevation<br>Rubor with dependency | Firm ("brawny") edema<br>Reddish brown discoloration (hyperpigmentation)<br>Evidence of healed ulcers<br>Presence of varicose veins<br>Progressive edema<br>Dark erythema with acute deep vein thrombosis |
| Ulcer location | Between toes or at tips of toes<br>Metatarsal or phalangeal heads<br>Heels, sides, or soles of feet<br>Lateral malleolus<br>Pretibial area | Medial malleolus |
| Ulcer characteristics | Well-defined edges<br>Necrotic tissue<br>Deep, pale base<br>Nonbleeding | Uneven edges<br>Ruddy granulation tissue<br>Superficial<br>Bleeding |

# Etiology

The majority of the changes to both the arteries and the veins are attributable to CVD, especially hypertension and the development of plaques, superimposed on normal age-related changes and exacerbated by smoking. CVI may begin as a result of the development of varicose veins or the consequence of a deep vein thrombosis, both of which cause permanent damage to the vessel walls and the valves (Zhang and Melander, 2014). The development of varicose veins has a familial influence (Robertson et al, 2008). PAD is an atherosclerotic disease like that found in other parts of the body that impair circulation to the tissue distal to the plaque.

# Diagnosis

PVD may be completely asymptomatic early in the disease, making prompt diagnosis difficult and delaying interventions that have the potential to prevent complications. The gerontological nurse may be the first one to notice the symptoms or hear the concerns from the elder leading to a diagnosis, especially in the inpatient or other institutional setting. Diagnosis of all of the vascular disorders discussed here begins with a good history, physical, and review of "symptoms" (Chapter 7). While the type of problem appears evident, confirmatory testing includes an ankle-brachial index (ABI) to differentiate between PAD and CVI and to determine the most appropriate treatment.

## Complications

The most serious complications of peripheral vascular diseases are the development of a deep vein thrombosis (DVT) or a pulmonary embolism or an amputation from a wound that does not heal.

A DVT is the formation of a thrombus on the vein wall, most often near a valve (Johanning, 2014). It may be asymptomatic, but if it progresses to the point where it completely occludes the vein, the person will have acute pain. If a DVT is suspected, there is a difference in the circumference between the legs (Rapp et al, 2013). A venous Doppler confirms a DVT. Once the acute clot is resolved the person will have postembolic syndrome due to irreversible damage to the vessel wall, increasing the risk for another DVT. The person may require preventive extended or lifetime anticoagulation.

Any time a clot from an injured vessel or DVT is detached, a life-threatening pulmonary embolism (PE) can result. A PE should be suspected anytime the person has recently had a DVT or is at risk for one, and complains of sudden shortness of breath and has a low oxygen saturation rate. A PE will be confirmed with a chest x-ray or magnetic resonance imaging (MRI), but even the suspicion of one should be treated as a potential medical emergency. Both DVTs and PEs require hospitalization to resolve the clots.

Wounds that result from PVD may never heal. When ischemia is present long enough, especially from PAD, the surrounding tissue deteriorates, with or without trauma, and skin ulcers develop. If an ulcer is not found or treated early enough, infection may develop to the point of gangrene, necessitating amputation to save the remaining part of the limb above the lesion.

## Treatment

CVI and PAD are end-organ diseases. Consequently, prevention is tied to addressing the modifiable risk factors of the original disorders. However, there are specific strategies that can be used to reduce the risk of PVD and the nurse has a major role in working with persons to adopt day-to-day preventive care strategies. For example, the nurse can encourage weight reduction to decrease the pressure on the veins from obesity or smoking cessation to reduce arterial constriction (Zhang and Melander, 2014).

For persons with *arterial* insufficiency, exercise rehabilitation and protection of the skin are paramount. Daily skin inspection and protection against the effects of pressure, friction, shear, and maceration are essential for the early detection and prevention of wounds. The nurse is usually the leader in planning and implementing patient education related to skin care.

Nothing should be done to limit circulation to the affected limb. Wearing restrictive clothing and using compression stockings are contraindicated. Exercise rehabilitation includes establishing a walking program to slowly and steadily increase the pain-free

walking distance. The person is asked to walk until maximal tolerable pain occurs, rest, and then continue.

Although the person with chronic *vascular* insufficiency will need intermittent courses of diuretics for severe edema, the mainstay of management is the use of customized compression stockings. Compression facilitates wound healing, reduces venous dermatitis, improves sclerotic changes, and counteracts venous pressure. In addition to compression stockings, other devices that have been found useful to improve venous return include Unna boots (or equivalent), pneumatic compression pumps, and orthotic devices. Elevation of the legs above the heart for 30 minutes three to four times a day can reduce edema and improve skin microcirculation.

Although the principles of the management of PVD-related ulcers are similar to those of pressure ulcers, special care must be taken to ensure that venous stasis ulcers and arterial ulcers are differentiated and treated appropriately. Because of the potentially limb-threatening nature of these ulcers, it is recommended that the nurse consult with colleagues who are wound care specialists to develop the most appropriate treatment plans.

# Cerebrovascular disorders

The major cerebrovascular disorders include the transient ischemic attack (TIA), the ischemic stroke, and both the subarachnoid and subdural hemorrhagic strokes. All are characterized by acute-onset neurological changes from anoxic damage to the brain. Both morbidity and mortality are dependent on the type of event and the time between onset and treatment (Box 22-12). Because the immediate neurological deficits appear the same but the treatment and prognoses are dramatically different, an urgent and accurate diagnosis is essential. Only when the cause is known can appropriate therapy be implemented. All strokes are medical emergencies.

**BOX 22-12**

**Quick Assessment of the Person Who May Be Having a Stroke**

If you think someone may be having a stroke, act F.A.S.T. and do the following simple test:

**F—Face:** Ask the person to smile. Does one side of the face droop?

**A—Arms:** Ask the person to raise both arms. Does one arm drift downward?

**S—Speech:** Ask the person to repeat a simple phrase. Is the person's speech slurred or strange?

**T—Time:** If you observe any of these signs, call 9-1-1 immediately.

**Time to Treatment Is the Most Important Factor in Surviving an Acute Myocardial Infarction.** Source: (©iStock.com/flytosky11)

Worldwide, 3 million women and 2.5 million men die of strokes each year, most commonly in China, India, and the Russian Federation and least commonly in the Southern Caribbean, Guyana, and Surinam. In the United States, someone dies every 1 to 4 minutes from a stroke; this computes to about 130,000 people a year, with most older than 65 years of age. One of the goals of *Healthy People 2020* is to reduce this number (Box 22-13) (CDC, 2013b, 2014h; WHO, 2014). *Age is the most important risk factor for stroke* (CDC, 2014b). There are also racial, ethnic, and geographical differences. The U.S. death rates are highest in the 11 "stroke belt" states of the Southeast and lowest in the Northeast and Southwest. African Americans, Hispanics, American Indians, and Alaskan Natives have a greater chance of having a stroke than do non-Hispanic whites or Asians Americans. The risk of having a first stroke and to die from the stroke is nearly twice as high for African American than for non-Hispanic whites (Mozaffarian et al, 2012). The most common (85%) type of stroke is ischemic (CDC, 2014b). The risk factors are those of any of the other cardiovascular diseases, especially hypertension and atrial fibrillation. See Box 22-14 for other factors that increase the risk for stroke.

♥ **BOX 22-13**

### HEALTHY PEOPLE 2020

**Stroke Deaths**

**Goal**

Reduce stroke deaths.

**Baseline**

43.5 stroke deaths per 100,000 population occurred in 2007 (age adjusted to the year

2000 standard population).

**BOX 22-14**

## Factors for Increased Risk for Stroke (in addition to those for CVD)

Older than age 75

Previous TIA

Heart disease, especially coronary heart disease and atrial fibrillation

Prior embolic event

## Signs and symptoms

The signs and symptoms of cerebrovascular events are a large part of both the ultimate diagnosis and the prognosis. The most common symptom of an ischemic stroke is a severe headache followed by sudden weakness, tingling, and other neurological deficits consistent with the area of the brain affected, most often on one side of the body. The whole side may be affected or just a part (e.g., a side of the face or unilateral arm). The signs and symptoms last at least 24 hours (Bowker et al, 2013).

The signs of TIAs are those of ischemic strokes but transient, as little as 1 to 5 minutes or several hours, and in most cases appear to resolve completely on their own (Bowker et al, 2013; Bowling and Weinhart, 2014). The signs often resolve before the person is even seen by a health care provider. Instead, the person reports, "I think I had a small stroke last week."

The headache of some hemorrhagic strokes is both sudden and explosive. There are more focal neurological changes, a more depressed level of consciousness, and a potential for seizures. Like the ischemic stroke, the types of neurological deficits indicate the parts of the brain affected but are usually much broader. They include alterations in motor, sensory, and visual function; coordination; cognition; and language. Nausea and vomiting suggest increased cerebral edema. Loss of consciousness indicates a very poor prognosis.

## Etiology

Cerebrovascular events are the result of an occlusion in blood vessels, and therefore oxygenation, to the brain. As a result of the anoxia, brain tissues die quickly. *"One minute of brain ischemia can kill 2 million nerve cells and 14 billion synapses!"* (Luchi and Taffett,

2014, p. 427). As an embolic disorder, there are several types of contents that form the occlusions, including blood clots, plaques, or particles such as calcium or bacteria (Bowling and Weinhart, 2014).

The main causes of ischemic strokes (including TIAs) are arterial disease, cardioembolism, hematological disorders, and hypoperfusion. Arterial disease in the form of arteriosclerosis is probably most common (Figure 22-2). Cardioembolism is caused by an arrhythmia such as atrial fibrillation, frequently seen in coronary heart disease. Hematological causes include coagulation disorders and hyperviscosity syndromes. Hypoperfusion can occur from dehydration, hypotension (including overtreatment of HTN), cardiac arrest, or syncope. The blockage is complete in the ischemic stroke and will persist until it is removed or dissolved. Even though the TIA is also an ischemic event, the blockage is only partial; it lasts only a few minutes to several hours and resolves on its own (Bowling and Weinhart, 2014).
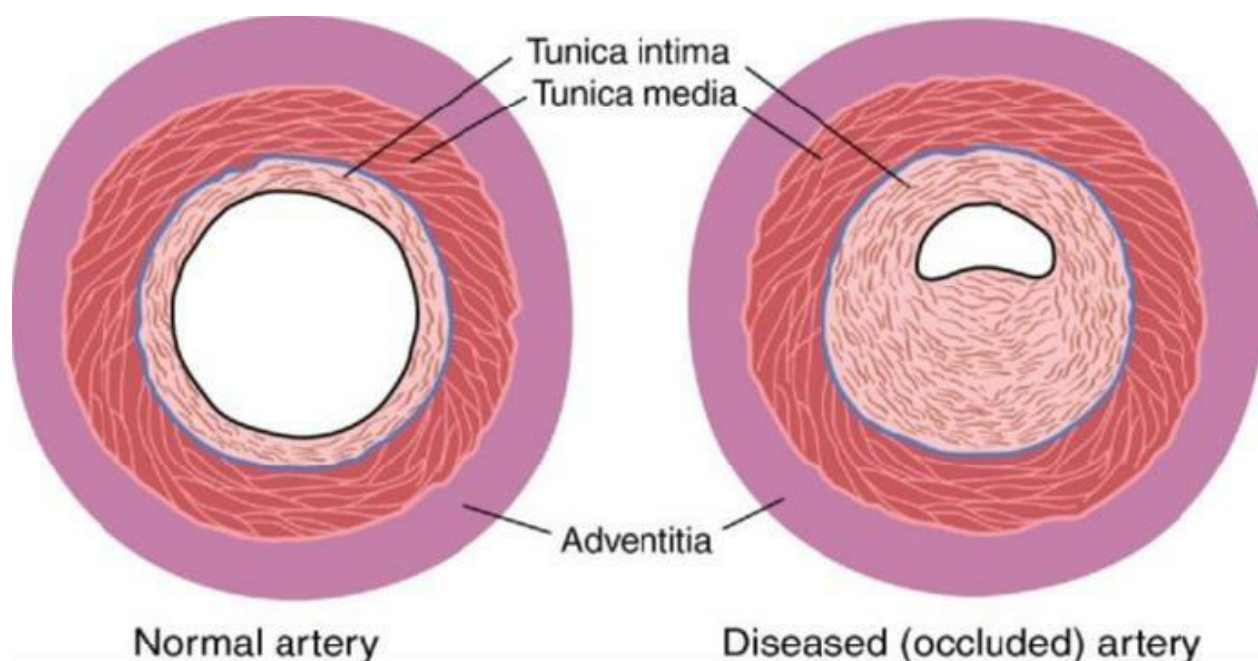


**FIGURE 22-2  Arteriosclerosis.** Source: (From Huether SE, McCance KL: *Understanding pathophysiology,* ed 5, St Louis, MO, 2012, Mosby.)

In a subdural (intracerebral) hemorrhagic stroke, a vessel ruptures within the brain and quickly fills a space between the dura and the subarachnoid matter with blood. The rupture is usually at the site of an embolus. If the person is also receiving anticoagulant medications, the bleeding will be more rapid (Bowling and Weinhart, 2014). The most important contributing factors for the incidence of hemorrhagic stroke in older adults are hypertension, the use of anticoagulants (iatrogenic strokes), acute inflammatory illness, contusions (e.g., from falls), and central cerebral thrombi.

The subarachnoid hemorrhagic stroke is triggered by an embolism as well. A blood vessel in the subarachnoid space of the brain ruptures and rapidly fills the space with blood. Either could be a small leak, especially the subdural rupture, and eventually reabsorb on its own; on the other hand, it could be a leak that advances rapidly and quickly becomes life-threatening (CDC, 2014f).

## Diagnosis and treatment

It is not possible to easily determine the treatment from the diagnosis, or even the signs

and symptoms of the differing cerebrovascular disorders; many of the early signs and symptoms are similar to those of other acute health problems, such as metabolic disturbances. The need for a simultaneous evaluation for the possibility of a stroke is done at the same time. Diagnosis begins with the analysis of the presenting signs as a clue to the cause and moves quickly to a CT scan (computed tomography) whenever possible to differentiate the hemorrhagic from the ischemic stroke. If MRI is available it will provide information about the level of damage. It is also imperative that the cause of the stroke be determined to prevent a succession of these events whenever possible (Bowling and Weinhart, 2014).

Since the TIA is self-limiting, treatment revolves around the prevention of a subsequent stroke through the adoption of any of the preventive measures discussed in this chapter or in Chapter 1 (e.g., smoking cessation or never smoking).

The initial treatment of a confirmed ischemic stroke is the administration of recombinant tissue plasminogen activator (rtPA) within 3 hours of the event to dissolve the clot (Gumbinger et al, 2014).

A very small subarachnoid hemorrhagic stroke may resolve on its own. However, as there is no treatment, a subarachnoid hemorrhage has a very poor prognosis, with death likely. In this case the goal is palliative care for the patient and support for the family. The escalating potential of any stroke as one ages increases the responsibility of the nurse to ensure that the person's wishes regarding resuscitation in such circumstances are known.

## Complications

In an ischemic stroke, the occlusion is complete; but in some cases, the occlusion is reversible with prompt treatment, even if the resultant damage may be permanent. The greater the occlusion and the longer time before treatment, the greater amount of damage to the brain (i.e., the greater the effect). Rehabilitation (third level prevention) will be necessary for any chance of restoring full function or functioning to the degree possible. While these services are available in high-income countries, they are not always available to all in lower-income countries. Although not all persons with TIAs have strokes, more than one-third have a major stroke within 1 year and 10% to 15% within 3 months without treatment (CDC, 2013b). Anticoagulation therapy is often the treatment of choice but is not without its own risk, such as potentially life-threatening bleeding with any trauma.

For those few who have survived a hemorrhagic stroke, brain edema is a problem and could result in obstructive hydrocephalus (Aminoff, 2010). The long-term effects of a stroke include depression, paralysis and hemiparesis, dysarthrias, dysphagias, and aphasias, depending on type, extent, and area affected (Hackett et al, 2014). Whenever paralysis results, the development of spasticity in the affected limb(s) is a risk. Spasticity can lead to contractures if it is not managed. Iatrogenic-type complications include DVT in a flaccid lower limb or contractures, aspiration pneumonia, and urinary tract infections (Bowker et al, 2013). The person with a period of nonresponsiveness is unlikely to survive (Boss and Brashers, 2014). Strokes are the number 1 cause of disability in the United States (Bowling and Weinhart, 2014).

## ◆ Promoting healthy aging: implications for gerontological nursing: Cardiovascular disease

Due to the prevalence and incidence of cardiovascular diseases, the role of the nurse is broad and complex. First and foremost is prevention—in individual encounters with persons in every setting; as family members, colleagues, or neighbors; and in the community at large (Chapter 1). The nurse conducts expert assessments for the early detection of both CVDs and their exacerbations.

## ◆ Assessment

The gerontological nurse participates in the accurate assessment of the person in wellness and with cardiovascular disease. In advanced practice, the nurse may have the additional responsibility of assessment for the purpose of evidence-based pharmacological interventions.

### ◆ Review of "symptoms"

The cardiovascular assessment begins with the subjective review of "symptoms." This should include the onset, location (for pain), duration, characteristics, alleviating and aggravating factors, and all measures taken to relieve them (e.g., prescribed medications, fasting, herbal and over-the-counter products, prayer). Symptoms of particular importance in the cardiovascular assessment include dyspnea, strength, fall history, dizziness, changes to usual functioning, and other signs and symptoms discussed throughout this chapter.

### ◆ Observation

The nurse is able to make informed observations: ease of movement, skin color and evidence of hemosiderin deposition, presence or absence of varicosities, presence or absence of wounds and their location, and presence of edema. If the person's heart is markedly enlarged, pulsations may be visible. While the finding of an absence of lower extremity (LE) hair is important in a younger adult, this is not a significant finding in later life due to the increasing loss of body hair in the normal course of aging. If a DVT is suspected, the assessment of a comparative measurement of calf circumference is necessary (Rapp et al, 2013).

### ◆ Palpation

The nurse examines the skin for temperature and degree of edema if present. Edema is assessed as firm or pitting and the degree of pitting. A small amount of pitting is a normal change of aging when the legs have been dependent for an extended period of time but is not expected to be present after the legs have been elevated. It is important to attempt to palpate the pulses. Testing of capillary refill time (should be <3 seconds) becomes even more important when pulses are not palpable. Unless the skin is broken, the nurse must make a judgment whether or not to wear gloves, especially for the assessment of temperature.

### ◆ Auscultation

Auscultation is the most detailed aspect of assessment of the cardiovascular system. It begins with laying the stethoscope lightly on the carotid arteries for a sign of bruits or a "swishing" sound. Peripheral pulses are palpated for presence or absence and their quality. They include the femoral, popliteal, posterior tibial, and dorsalis pedis. There are several reasons that a pulse may not be easily palpable, especially in the presence of edema; other measures of circulatory health must be used in this case. Unless the limb

has acute ischemia, it is not that there is "no pulse" but that the pulse is "not palpable."

While assessment for jugular venous pressure is standard in the complete assessment of a younger adult, this is not always possible or appropriate in the older adult due to difficulty in assuming the needed recumbent position and to changes of the neck tissue that lead to inaccurate readings.

### ◆ Auscultation of the heart.

It is important to auscultate the heart for at least 60 seconds to determine if any irregularities are heard. It is ideal to be able to auscultate all four areas (aortic, pulmonic, tricuspid, and mitral) of the heart, with the length of time in each area dependent on what is heard. For example, if a murmur or irregular rhythm is detected in the aortic area, then 60 seconds would be a reasonable time to auscultate; if the nurse auscultates for less time, the irregularity may be missed. In the older woman the first three areas are often easier to auscultate than in a younger woman because of the age-related increased laxity of the breast tissue. Due to changes in the rib cage and spine, auscultation of the mitral area may not be possible. In someone with cardiac enlargement, the point of maximal impulse (PMI) will be found more lateral than where it is in the younger adult. The quality, rate, and rhythm of the pulsations of the carefully auscultated heart are evaluated. As noted earlier, the auscultation of a mild systolic murmur is a "normal" finding in approximately 50% of older adults (Jarvis, 2014). They are heard most often in the aortic and less so in pulmonic areas. An occasional ectopic beat may be heard and is usually completely insignificant. The rhythm may be irregularly irregular (IRIRR) or regularly irregularly (RIRR) in those with atrial fibrillation.

If the person is being seen in the outpatient setting with minimal or no symptoms of active heart disease or has significant positioning problems, such as from orthopedic deformities, assessment may need to take place in the sitting position. While it is ideal to auscultate on exposed skin, this may not be possible for a number of reasons. In that case, listening through one thin layer of a smoothed cotton fabric may be adequate for the nurse with experience and advanced skills. In a symptomatic person or a person who has any positive findings, skin to stethoscope contact is required.

The assessment includes the practice of both preventive measures and those that are in the presence of disease or disease progression, such as smoking status, level of ongoing emotional distress, current intensity of exercise (and changes in this ability), and diet. Unless the person is nearing the end of life, the importance of diabetes control is often an essential point of patient education (Chapter 24).

Despite the normal age-related changes, the healthy older heart and blood vessels are able to sustain adequate function for everyday life. At the same time, the gerontological nurse must recognize that the increased heart rate expected in a younger person who is physiologically, psychologically, or emotionally distressed is not usually found in the older adult. Additionally, due to the high rate of heart disease in today's population older than 60 or 65 years of age, the gerontological nurse must be alert to signs of rapid decompensation of both the well and the fragile elder.

## ◆ Intervention: The nurse as advocate

In addition to the nursing interventions discussed throughout this chapter, the role of an advocate will advance healthy aging for persons with CVD and cerebrovascular disease and for those at risk for these diseases by promoting preventive activities and ensuring that early signs and symptoms of both disease states and exacerbations are addressed promptly. Primary prevention includes promoting smoking cessation (or never smoking),

healthy eating, exercise, and maintaining an appropriate body weight (Chapter 1). Secondary prevention includes doing everything possible to control the conditions already present (e.g., hypertension). These activities cannot be overstated and can improve health-related quality of life and in many cases slow the progression of the chronic diseases (Box 22-15 and Table 22-6). The nurse advocate is involved in introducing evidence-based programs to communities and organizations such as regional stroke centers and other programs (Box 22-16). The nurse can volunteer in mobile clinics and work with the many people with cardiovascular health problems, including older adults with more advanced disease. The nurse identifies those at high risk or stroke-prone elders. The nurse advocate serves as a healthy role model.

**TABLE 22-6**

**Promoting Healthy Aging for the Person with PVD**

| Give Legs a Rest | Take Care of the Skin |
|---|---|
| Elevate the feet above heart level while sleeping, while sitting, and several times a day. | Examine feet daily, including the soles, sides, and between the toes. |
| **Change Positions Frequently** | Wash lower legs and feet regularly with mild soap and water. |
| Avoid activities that require standing or sitting with feet dangling for long periods. | Use moisturizing cream and emollients after washing. |
| **Give Legs Support (as directed only)** | Do **not** use lanolin or petroleum-based creams when wearing support hose made with latex. |
| As directed, wear professionally made compression stockings that apply even pressure from ankles to knees or ankles to hip. | Avoid activities that can injure the legs or feet. |
| Replace hose as needed to maintain usefulness. | Monitor legs for skin changes: Persistent edema |
| Put hose on early in the morning; wear all day; remove at bedtime. | Discoloration |
| If a compression pump has been prescribed, follow the instructions. | Dryness and/or itching |
| | Any bruises or wounds that do not go away in 1 week |

**BOX 22-15**

## Nursing Interventions to Promote Healthy Aging for Persons with Heart Disease

1. Activities: pacing and tolerance

2. Exercise: strategizing adherence to prescribed program

3. Medications: timing, side effects, evaluation of effectiveness, obstacles to adherence

4. Disease self-management: signs and symptoms of exacerbation; intake, output; weight management; when to call for help and who to call with questions or questions; interpreting laboratory values; diet

5. Diet: low cholesterol, fat, and sodium

6. Fluid restriction if necessary

7. Help person develop strategies to maintain:

a. Blood pressure ≤150/90 mm Hg

8. Help the person maintain individually tailored cholesterol and triglycerides control

9. Optimal control of diabetes as appropriate

In the long-term care setting, the nurse is the key health care provider to promote healthy aging and to advocate and secure appropriate interventions for the elder who is dependent on others. The nurse alerts the resident's nurse practitioner or physician about observed changes including atypical signs and symptoms and indicators of iatrogenesis. The provider is then responsible for the prescriptive interventions that are consistent both with the latest evidence-based practice and with the patient and family wishes and advance directives.

The nurse advocate listens carefully to the stories that are being told and is often the first to identify the progression of cardiovascular disease, such as both slow and sudden decompensation of the older adult, and the prevention of these. The nurse counters the expectation that problems that have been evaluated are not attributed to "just getting older."

# Key concepts

- Cardiovascular diseases are the leading cause of death and a frequent cause of disability in the older adult.

- The presentation of many cardiovascular diseases or nuances of these in older adults differ from those in younger adults (e.g., the "silent MI").

- The goals of promoting healthy aging include minimizing risk for disease and, in the presence of disease, alleviating symptoms, delaying or avoiding the development of complications including end-organ damage, and maximizing function and quality of life.

- The gerontological nurse is involved with the assessment of persons with CVD in daily practice.

- The gerontological nurse has the potential to serve as a leader in the promotion of health and the prevention of CVD and in the improvement of the lives of those with CVD.

- Embolic and hemorrhagic strokes must be differentiated before treatment can be initiated.

## ADHERING TO MRS. LEWIS'S WISHES

Mrs. Lewis is an 85-year-old widowed woman with three sons and a daughter. Although her husband was not of the Jewish faith, she raised her children in the practices and traditions in which she had been raised. None of her children live nearby, but she does have a very close friend from her synagogue who has been at her side during a long and difficult battle with congestive heart failure. She has been admitted to the subacute unit in the skilled nursing home where you are employed. Her prognosis is very poor and death is imminent. She has a living will in place designating her friend as her decision-maker and also has a DNR order. Between breaths she tells you that most of the time in the last 2 months she has been in the hospital and has been told there was nothing left to do but to allow a natural death. She is adamant that under no circumstances should she be returned to the hospital.

• What is the priority of care for Mrs. Lewis if you are the RN assigned to provide care to her?

• What are your priorities if you are an APN providing "medical" care to her?

• After you have thought about Mrs. Lewis's situation, discuss with a classmate how you would feel about caring for her. Could you care for her and respect her wishes?

• What symptoms do you expect she will develop in the hours or days between her admission and her death? What are your responsibilities related to them?

• Is Mrs. Lewis' decision consistent with her faith?

# Critical thinking questions and activities

1. A patient's family member disagrees with that of the patient. What is the role of the nurse?

2. In a discussion with other students, describe your personal feelings about caring for someone who declines treatment.

3. In this same discussion, consider how you might reconcile personal feelings and professional responsibilities if they differ.

# Research questions

1. Are there any rituals or customs that are expected at the time nearing death or at the time of death in the Jewish faith?

2. Is a person with heart disease ever considered eligible for hospice services, and if so, under what circumstance?

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# Neurodegenerative disorders

Kathleen Jett

## Learning objectives

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

1. Differentiate Parkinson's disease from the neurocognitive disorders due to Alzheimer's disease and the presence of Lewy bodies.

2. Describe the signs and symptoms that suggest the need for neurocognitive testing.

3. Identify the key aspects of the evaluation of the person with signs of cognitive limitations.

4. Identify the key characteristics of Parkinson's disease.

5. Describe the definitive test for the presence of Parkinson's disease.

6. Describe the recent genomic advances in an understanding of the mechanisms of neurodegenerative disorders.

7. Differentiate the key pharmacological interventions and their efficacy in Parkinson's disease and the neurocognitive disorders due to Alzheimer's disease and the presence of Lewy bodies.

8. Describe the nurse's role in the promotion of healthy aging in persons with neurodegenerative disorders.

ⓔ http://evolve.elsevier.com/Touhy/TwdHlthAging

**A STUDENT SPEAKS**

It is so frustrating taking care of someone who has Parkinson's disease. Some of them just never seem to smile and seem so depressed. I try to be extra cheerful but it just doesn't seem to make any difference!
*Helen, age 20*

**AN ELDER SPEAKS**

I always kept active and healthy. I had lots of friends and we had lots of fun together. Now it seems like I am just fading away!
*Ruth, age 82*

Neurodegenerative disorders are seen in older adults more than any other age group. All are terminal conditions and characterized by a progressive decline in function. The declines may be barely noticeable in the beginning, with slight exacerbations and remissions, but the ultimate trajectory is always a downward slope. The impairments become so severe that the person cannot meet even his or her most basic self-care needs. However, there are interventions available to promote the healthiest aging possible for both the elder and significant others while the diseases progress. The three neurodegenerative disorders addressed in this chapter are the movement disorder Parkinson's disease, Alzheimer's disease, and dementia with Lewy bodies. There are several neurocognitive disorders of importance that are not necessarily terminal conditions, but they are beyond what is possible in this text (Box 23-1).

## BOX 23-1

## Examples of Other Types of Neurocognitive Disorders

Vascular NCD (also has been referred to as multi-infarct or post stroke)

Mixed (from several types such as vascular and Alzheimer's disease)

Creutzfeldt-Jakob disease

Frontotemporal dementia

Normal pressure hydrocephalus

The recently published fifth edition of the *Diagnostic and Statistical Manual of Mental Health Disorders* (American Psychiatric Association [APA], 2013) redefined dementia in a number of ways. The word "dementia" has been replaced with the phrase "neurocognitive disorder (NCD)" and further subdivided into mild versus major. NCDs occur worldwide with the majority in low- and middle-income countries (Figure 23-1).
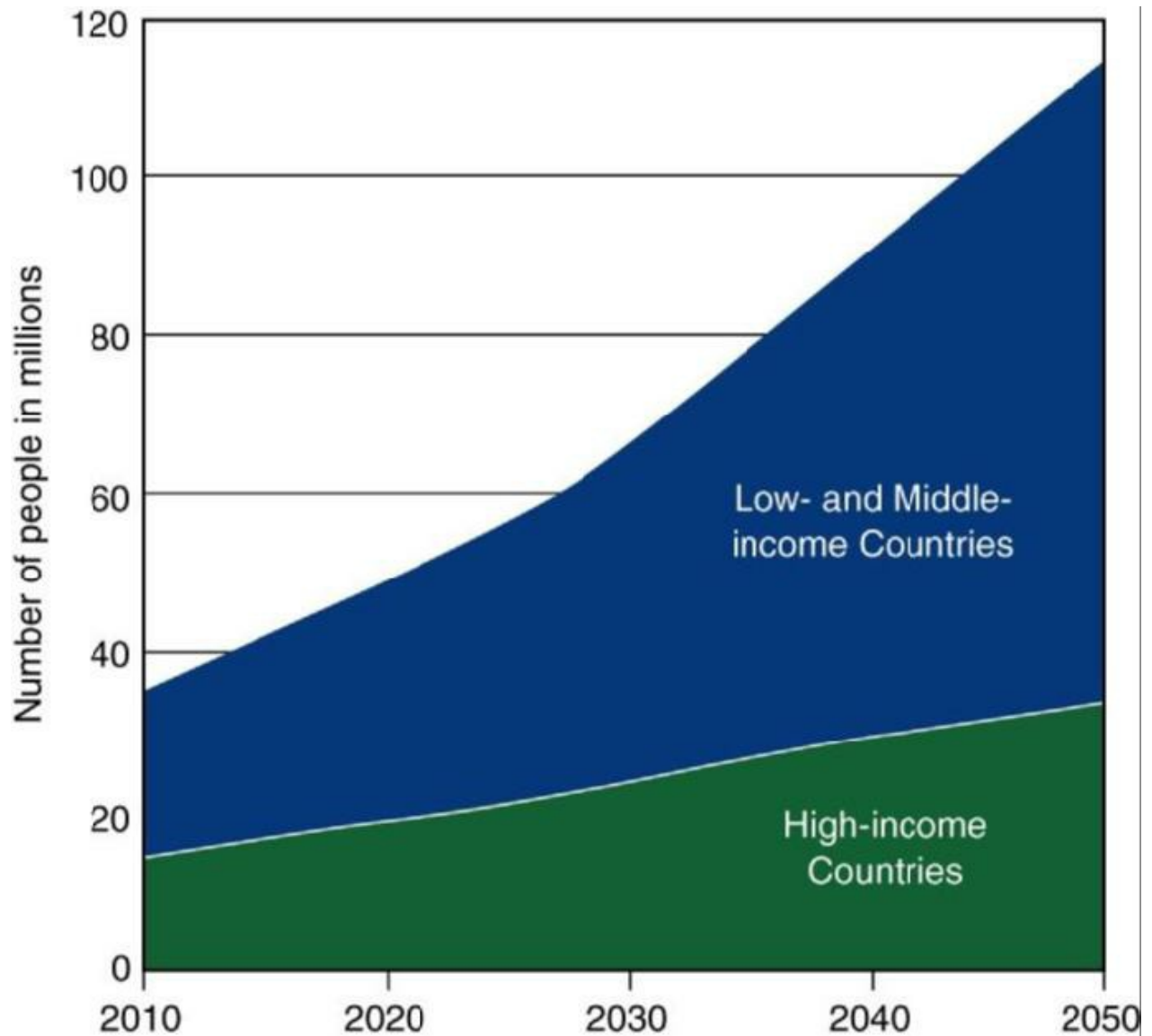


FIGURE 23-1  **Number of People with Dementia.** Source: (From Alzheimer's Disease International: *World Alzheimer report 2010: the global economic impact of dementia*, 2010. http://w w w.alz.co.uk/research/files/WorldAlzheimerReport2010.pdf. Accessed October 31, 2014.)

Although they rarely occur to persons younger than the age of 60, NCDs are not normal parts of aging (Box 23-2). The most common forms are NCD due to Alzheimer's disease (50% to 70%) and NCD due to Lewy bodies (LB) (10% to 22%) (National Institute on Aging [NIA], 2013). Both are characterized by impairments in memory, thinking, language, judgment, and behavior. A distinct difference in the two is that persons with LB will eventually develop motor symptoms as well, and the use of traditional (typical) antipsychotics (e.g., Haldol) is always contraindicated.

**BOX 23-2**

**Aging Alert**

Although the vast majority of those who develop Alzheimer's disease are persons at least 65 years of age or older, it is not a normal part of aging and should never be accepted as such.

# Diagnosis

The evaluation leading to a diagnosis of a presumed neurodegenerative disorder is initiated by the person, significant other, or a health care provider, when changes are noted in comparison to a prior state of cognition, especially memory or physical stability, such as balance or tremors. All signs are insidious in onset, often delaying diagnosis (Box 23-3). People with an undiagnosed NCD may remark that they are having a "senior moment," when it may be something far more serious than the very slight memory loss of normal aging. The symptoms that initiate the diagnostic process in Parkinson's disease (PD) are often asymmetrical resting tremor, especially in the arm or hand or unexplained falls.

**BOX 23-3**

## Signs and Symptoms of Neurocognitive Disorders

Decline from prior state with slow onset

Decline in memory and learning

Potential declines in attention, executive function, language, perceptual motor, social cognition

Fluctuating cognition*

Recurrent hallucinations*

Movement disturbances*

Possible sleep disturbances*

No evidence of reversible causes for symptoms (e.g., delirium)

*Unique to early NCD due to DLB.
From Walter C, Edwards NE, Griggs R, et al: Differentiating Alzheimer's disease, Lewy body, and Parkinson's disease using DSM-5, J Nurse Pract 10(4):262–270, 2014.

The diagnostic process begins with the assessment of all potentially reversible causes for the changes such as delirium, infection, vitamin deficiencies, or endocrine disturbances (Box 23-4). If a reversible cause is not found, or the signs remain after treatment, a more expanded, comprehensive exam is necessary to make a diagnosis and establish a baseline. This will include all of the components described in Chapter 7, tests of gait and balance (Chapter 19), and a detailed neurological and psychological examination, using highly reliable and sensitive screening instruments (see http://www.alz.org. for recommended instruments). When available, a magnetic resonance imaging (MRI) or a functional positron emission tomography (PET) scan may be done. Although diagnoses of neurodegenerative disorders cannot be confirmed until autopsy, the abilities of clinicians to do so empirically are improving.

The evaluation of people with signs or symptoms of neurodegenerative disorders increases in complexity when the person has other confounding chronic diseases, is very frail, or has sensory limitations. Expert care, including treatment of reversible conditions, may not be possible for persons with symptoms of Parkinson's disease or an NCD of any kind living in low- or middle-income countries.

# Parkinson's disease

Parkinson's disease (PD) was first described by James Parkinson in 1817. It is the fourteenth cause of death, affecting 6.3 million people worldwide (National Parkinson Foundation [NPF], 2014). In the United States, about half a million people have PD, with about 60,000 newly diagnosed each year (European Parkinson's Disease Association [EPDA], 2014; National Institute on Aging [NIA], 2012b). It is more common in men than women. Rarely occurring in those younger than age 60, the incidence increases with each decade. Persons of all races and ethnicities throughout the world are affected; however, a number of studies have found a higher prevalence in high-income countries (Khandelwal and Kaufer, 2014).

PD is the second most common *neurodegenerative* disease after Alzheimer's disease. In very late stages many develop a neurocognitive disorder as well, referred to as Parkinson disease dementia (PDD). PDD can be confused with other disorders that have parkinsonian-like symptoms, such as NCD due to Lewy bodies (Walter et al, 2014). PDD affects only 9% of those with an onset of PD before age 70 but almost 40% of those when onset is after the age of 70 (Walter et al, 2014).

## Diagnosis

As a movement disorder, the diagnosis of PD can eventually be done with a reasonable level of certainty by considering the presence or absence of classic signs and symptoms. A diagnosis is confirmed by a "challenge test"—when symptoms improve dramatically after the administration of the medication levodopa (Khandelwal and Kaufer, 2014). Early falls, poor response to levodopa, symmetry of motor symptoms, lack of tremor, and early autonomic dysfunction are characteristic of other movement disorders (Box 23-5). In particular, when cognitive impairments occur before any movement symptoms appear, NCD due to Lewy bodies must be strongly considered.

**BOX 23-5**

## Etiology

PD is the result of a deficiency of the neurotransmitter dopamine, a reduction of dopamine receptors, and the accumulation of Lewy bodies, especially in the basal ganglia. The severity of the illness is associated with the degree of neuron loss. However, by the time a person becomes overtly symptomatic, 70% to 90% of the dopamine-producing cells are lost (Boss and Huether, 2014; Nolden et al, 2014).



**Neurons.** Source: (©iStock.com/Sergey Nivens)

The epigenetic factors influencing the development of PD are speculated to include such things as head trauma (e.g., boxers), stroke, encephalitis, tumors, and exposure to toxins such as pesticides (National Institute of Environmental Health Services [NIEHS], 2014). Although several genes associated with PD have been identified, it is not yet known what causes them to be "activated" or "turned on," initiating the onset of the

disease. However, this activation may be inherited in some way; an estimated 15% to 25% of those who develop PD have a relative with PD (NIA, 2012b) (Box 23-6).

**BOX 23-6**

## An Eye into the Brain: Genetics and Parkinson's Disease

While the exact cause is not yet known for the body's destruction of the neurons in the brain that lead to PD, scientists have identified several genes that are linked to PD. One gene *(LRRK2)* is the most common cause of the disease, about 10% inherited and 4% without genetic influence. However, a mutation of this gene *(G2019S)* is thought to cause 30% to 40% of PD cases in persons of North African Arabic descent.

From National Institutes of Health: Insights into mutations that cause Parkinson's disease, 2014. http://www.nih.gov/researchmatters/april2014/04282014parkinson.htm Accessed July 2014.

## Signs and symptoms

The four core signs of PD are *resting tremor* (hands, arms, legs, jaw, face), *muscular rigidity, bradykinesia,* and *asymmetrical* onset (Box 23-7) (NIA, 2012b; Stallworth-Kolinas, 2014). Resting tremor is the first sign in 70% of those with PD. When present, tremors are asymmetrical and rhythmic, are of low amplitude, and disappear briefly during voluntary movement. The arm and hand are most commonly affected—the leg, foot, and head less often. They are not present during sleep but increase with stress and anxiety.

**BOX 23-7**

## Core Signs of Parkinson's Disease*

Resting tremor

Bradykinesia

Rigidity

Asymmetrical onset

**Plus:** responsive to levodopa

*A diagnosis of Parkinson's disease must be considered if at least two of the above symptoms are present **and** the symptoms are responsive to levodopa.
From Stallworth-Kolinas M: Parkinson's disease. In Ham RJ, Sloane D, Warshaw GA, et al, editors: *Primary care geriatrics: a case-based approach,* ed 6, Philadelphia, 2014, Elsevier, pp 554–562.

Rigidity can be assessed with passive range of motion. Instead of smooth movement, it is "cogwheel" in nature. That is, movement alternates with resistance. Severe muscle cramps may occur in the toes or hands due to lack of free and regular movement. Bradykinesia affects the person's ability to perform fine motor tasks. This early sign may have the most effect on the person's ability to independently perform day-to-day self-care functions.

As muscle rigidity and bradykinesia worsen, all of the striated muscles in the extremities, trunk, and ocular areas will ultimately be affected, including the muscles of mastication (chewing), deglutition (swallowing), and articulation (speaking). In the later stages, the person blinks infrequently and the face shows little animation, including that of emotion *(masked facies)*.

Other motor symptoms of special importance to independent functioning and safety

and the need for assistance with ADLs (activities of daily living) are related to movement and positioning. Downward gaze becomes more difficult and there is an involuntary flexion of the head and neck, a stooped posture, and postural instability. The characteristic gait consists of very short steps and minimal arm movements (festination). Initiating and restarting movement is difficult (freezing) later in the disease, but once it starts the person moves forward with small steps and a forward lean, further increasing the person's risk for falling (Chapter 19). Turning is difficult and may require many steps. If off balance, correction is very slow. There are many other symptoms that are of particular importance to persons with PD, all of which decrease their quality of life (Box 23-8).

**BOX 23-8**

## Other Symptoms Experienced by People with Parkinson's Disease

Frequent changes in body temperature

Problems with blood pressure

Dizziness

Fainting

Frequent falls

Sensitivity to heat and cold

Sexual dysfunction

Urinary incontinence

Constipation

A poor sense of smell

Sialorrhea (drooling)

Symptoms and their intensity vary from person to person; some become severely disabled early in the disease and others experience only minor motor disturbances until much later. However, the number of symptoms and the degree to which they will affect a person's life and function will always increase over time.

## Treatment

Currently there is no cure for PD, but when the symptoms are such that they interfere with the person's functioning, pharmacological interventions are initiated, sometimes providing dramatic relief. Drug therapy focuses on replacing or mimicking dopamine or slowing its breakdown.

The first-line medication is levodopa; it is especially effective in reducing bradykinesia and rigidity. It is converted to dopamine in the basal ganglia and therefore increases the amount of dopamine in the brain and inhibits hyperactive cholinergic activity. Carbidopa is usually added to the levodopa to limit peripheral breakdown of the levodopa. To

maximize effectiveness, levodopa/carbidopa must be taken on an empty stomach (30 to 60 minutes before or 45 to 60 minutes after a meal). Although it can be highly and rapidly effective, its efficacy decreases with long-term use and higher doses are needed more often, increasing the side effects, such as the risk for hallucinations. Dopamine agonists such as pramipexole and ropinirole are sometimes used early in the disease or concurrently with levodopa/carbidopa. These are usually prescribed and monitored by neurologists.

When medications do not provide relief from disabling symptoms, some persons elect surgical interventions. These include deep brain stimulation (DBS) or ablation (pallidotomy). The latter is rarely done and then only in the severest of cases. DBS is only indicated for those who had some relief from medications for their motor symptoms, but they are no longer effective. It specifically addresses motor symptoms. It is highly unlikely that these would be appropriate for persons with other serious chronic conditions as is the case with many older adults. Caring for persons with Parkinson's disease requires a combination of pharmacological and nonpharmacological approaches (Nolden et al, 2014). Early nonpharmacological approaches include gait training and muscle strengthening.

# Alzheimer's disease

Alzheimer's disease (AD) was first described by Dr. Alois Alzheimer in 1906. The incidence increases dramatically with age—from 5% of those between 65 and 75 to 50% of those 85 and older. About 5 million people in the United States have an NCD at this time, the majority of which are due to AD (Walter et al, 2014). By 2050 this number is expected to grow to 16 million (Centers for Disease Control and Prevention [CDC], 2011). It is expected that the actual number of persons diagnosed will escalate as they take advantage of the free annual wellness visit now available through the Affordable Care Act, where cognitive screening is part of the overall assessment (Chapter 30).

Researchers found distinct ethnic and racial differences among persons with AD. They may have identified a gene placing African Americans at about twice the risk for developing AD compared with their white American counterparts (Alzheimer's Association [AA], 2013). It is possible that additional risk factors are a part of this, specifically, a higher rate of cardiovascular disease (Khandelwal and Kaufer, 2014). While persons who self-identify as Hispanic are 1½ times more likely to develop AD, no known genetic factors have yet been found to explain this. Information about other groups or subgroups of people is not yet known. In the United States, AD is the sixth leading cause of death for whites, tenth for blacks, and ninth for Asian Americans and Native Hawaiian/Pacific Islanders (CDC, 2014; Office of Minority Health [OMH], 2010). The research findings regarding the effect of gender and education are mixed (NIA, 2012a).

Research has become increasingly intense in the last 30 years, fueled by the anticipation of the influx of the aging "baby boomers" (Chapter 1). Of particular interest has been the identification of a means to prevent and more adequately treat this now terminal condition. See Chapter 5 for a discussion of promoting brain health while aging.

## Etiology

Through advances in genomic science, we now know the influence of the specific genes in the development of a neurocognitive disorder due to AD. Less than 5% of all persons have what is referred to as "early onset" or familial Alzheimer's disease (FAD) that is diagnosed between 30 and 60 years of age. FAD is caused by a single gene mutation on

one of three chromosomes: 21, 14, or 1. The mutations result in the development of abnormal amyloid precursor proteins, presenilin 1 or presenilin 2. A child whose mother or father carries a genetic factor for FAD has a 50/50 chance of developing FAD (NIA, 2011).

Most AD is diagnosed in persons older than age 60, likely due to a number of factors including genetic risk. Everyone inherits one form of the *APOE* gene found on chromosome 19. There are three forms: ε2, ε3, and ε4. *APOE* ε3 is the most common and believed to be a neutral factor, neither increasing nor decreasing one's risk. The inheritance of either *APOE* ε2 or ε4 is much less common. *APOE* ε2 appears to have a protective influence, decreasing one's risk, while ε4 increases the risk, especially that of early onset. The ε4 form of *APOE* is present in about 25% to 30% of the general population but found in 40% of those with late-onset AD (NIA, 2014a). Genetic testing is now available to identify any one person's risk of developing AD by determining which *APOE* allele a person has. While testing is not recommended for general use, it may be especially helpful for those with one or both parents with AD to determine the presence of the ε4 form of *APOE*. It is important to note that not all persons with *APOE* ε4 develop AD.

Persons with neurocognitive dementia due to AD also have an increased number of beta-amyloid proteins (plaques) outside the neurons and an accumulation of abnormal tau proteins inside the neurons (neurofibrillary tangles), which damage the cortical areas of the brain. As a result, the number of synapses that normally connect the neurons decreases, and the neurons are deprived of nutrients, malfunction, and eventually die. As the number of beta-amyloid and tau proteins increases, more and more brain cells die. The initial memory loss seen in all persons with AD is the result of damage to the part of the brain where memories are stored.

While there is increasingly convincing evidence of the association between epigenetics and neurocognitive dementias, the exact influence is not yet clearly understood. Emotional stress, diet, and exposure to toxins are those factors that appear to "turn on" or "activate" the genes, which may explain why one member in a family develops AD and another does not (AA, 2014; NIA, 2014a).

## Symptoms

The initial symptom of NCD due to AD is memory loss, specifically the ability to remember new information. As time goes on, additional signs and symptoms develop. Functional decline correlates with cognitive decline. Geriatrician Barry Reisberg has developed an excellent tool to "stage" persons with NCDs to provide anticipatory guidance to both the individual and the future caregivers (see also Chapter 7, Table 7-2).

## Diagnosis

A diagnosis of an NCD due to AD requires the following: (1) there has been a decline from a previous level of functioning; (2) the onset was insidious; and (3) there has been gradual regression in cognitive abilities. Of important note is that the changes are "greater than expected for the person's age and educational background" and these changes can be documented with standardized neuropsychological testing.

Neurocognitive disorders are now categorized as possible or probable, and major or minor. Persons with a "possible" diagnosis have no genetic mutations indicative of AD or family history. Those with probable mild AD have either genetic evidence or positive family history and have only modest impairment in one or more of the cognitive domains (Walter et al, 2014). In an amnestic form, memory loss is isolated, but the person is at a

higher risk (6% to 22%) of advancing to a severe dementia, compared with those with the nonamnestic variation where the impairments are in areas other than memory (Stallworth-Kolinas, 2014). A person with any type of major NCD has a substantial impairment and is still ranked in functioning as mild (difficulty with IADLs), moderate (difficulty with ADLs), or severe (completely dependent) (Walter et al, 2014) (referred to as major cognitive impairment [MCI]).

## Pharmacological treatment

Because cure is not possible, pharmacological therapy for those with AD is aimed at slowing cognitive decline. In doing so, it has the potential to help persons continue to function to the best of their ability longer and therefore maximize their quality of life and that of their loved ones. The effectiveness of the medications varies from person to person.

First-line treatment for AD continues to be cholinesterase inhibitors (CIs). They may not only help slow the speed of cognitive decline but also help control any behavioral difficulties the person may be having as a consequence of the brain damage (NIA, 2014b) (Chapter 29). CIs are begun as soon as the person is diagnosed, even for those with mild, possible disease (Walter et al, 2014).

The CIs work by blocking the breakdown of acetylcholine, a chemical believed to be important for memory and thinking. The most common side effects of the CIs are nausea and diarrhea. Donepezil (Aricept) can be used at all stages; galantamine (Razadyne) and rivastigmine (Exelon) are indicated for mild to moderate neurocognitive decline. Exelon is now available in a patch that may be more convenient to use, has fewer side effects, and provides consistent 24-hour effectiveness.

Memantine HCl (Namenda) is approved for use in moderate to severe AD; it may be given alone or with one of the CIs. Namenda works by regulating the activity of glutamate, a brain chemical that regulates learning and memory. The major side effects are headache, constipation, confusion, and dizziness. Nonetheless, Namenda may temporarily delay worsening of symptoms (AA, 2014). Dosages are slowly titrated to decrease side effects (NIA, 2014b). Namenda has been available in both the XR (extended release) and the twice-daily formulations. However, as of the summer of 2014, only the XR was being manufactured (Forest Laboratories, 2014). As with any medications, a trial to determine both effectiveness and ability of the person to tolerate side effects should be done at repeated intervals. Depression and other mental health issues are common in persons with AD. They may go unrecognized and untreated, but the person should be monitored for these and treated appropriately and promptly should they be found (Chapters 7, 9 and 28).

# Neurocognitive dementia with lewy bodies

What has long been referred to as dementia with Lewy bodies (DLB) was named after Dr. Friederich Lewy, who discovered a new type of abnormal proteins in the brain neurons of persons with Parkinson's disease, both those who had developed a neurocognitive decline and those who had not. What we now call NCD due to LB, affects 1.3 million people in the United States and 20% of persons with cognitive disorders worldwide (Stallworth-Kolinas, 2014). It is second in prevalence to that of AD. It is often confused with PD but distinctly different in chronology of symptomatology. In PD, movement disorders always precede cognitive changes (if they occur), and in LB the cognitive changes always precede movement disorders, which *will* occur (Khandelwal and Kaufer,

2014). Men are affected slightly more than women and there is an increasing incidence with age. The life expectancy ranges broadly from 2 to 20 years, with an average of 5 to 7 years after diagnosis.

## Signs and symptoms

Although some memory may stay intact, the person with an NCD due to LB will develop severe loss of the ability to think, especially problem solving and the use of language and numerical concepts. A common symptom is fluctuating attention and alertness—that is, periods of time when the flow of ideas is illogical interspersed with periods of clarity. Unlike AD, about 80% of persons with LB have hallucinations (NIA, 2013). These may lead to delusions and paranoia. Factors contributing to psychiatric disturbances include misidentifying objects and visuospatial problems, such as in judging distance or depth.

Disordered sleep is a problem specific for persons with NCD due to LB and may appear long before other signs become obvious to anyone other than the sleep partner. The majority of the time "asleep" is spent in the REM stage (Chapter 17) in which the person actively dreams and may talk in his or her sleep, thrash about, and even fall out of bed (Mayo Clinic Staff, 2014). Restless legs syndrome (also known as Willis-Ekbom disease) may occur during nighttime sleep and there may be a significantly increased need for daytime sleep (Chapter 17). Problems in mood occur, similar to those with PD: depression, apathy, anxiety, and agitation. Some of the conditions we refer to as "geriatric syndromes" occur as the disease advances. They are the result of damage to the part of the brain controlling the autonomic nervous system (Box 23-9). It is important to recognize the difference because their treatment varies. However, clear differentiation between cognitive declines due to PD and those due to LB is necessary to avoid inadvertent but life-threatening treatment.

**BOX 23-9**

## Autonomic Signs and Symptoms of NCD Due to DLB

Frequent falls

Syncope

Orthostatic hypotension

Unexplained loss of consciousness

Incontinence

Eating disorder/risk for aspiration

## Etiology

In normal healthy brains alpha-synuclein proteins (which are estimated to comprise 1% of the cytosolic protein in the nervous system) help neurons communicate with each other at their synapse (Stefanis, 2012). However, Lewy bodies are abnormal spherical protein aggregates found within neurons in persons with both dementia and PD. Alpha-synuclein is highly expressed within these bodies, which can displace other cellular structures, and may contribute to cell death (Aminoff and Kerchner, 2013). In DLB these proteins are found in the brainstem, midbrain, olfactory bulb, and neocortex. The

progression of this disease leads to significant deficits in neurotransmitter production along the cholinergic and dopaminergic pathways. The acetylcholine deficit leads primarily to cognitive dysfunction, and the deficit in dopamine production is responsible for the motor dysfunction that appears as the disease advances (Walter et al, 2014). Although mutations have been identified that are associated with the risk for developing Parkinson's disease, neither familial nor lifestyle factors have been found to influence the development of the neurocognitive dementia due to LB; based on our knowledge at this time, the etiology of this disease is unknown (Vigneswara et al, 2013).

## Diagnosis

According to the new *DSM-5* diagnostic criteria, the person identified as one with NCDLB (neurocognitive disorder due to Lewy bodies) must first meet all of the initial mild or moderate criteria for the other NCDs and then is classified as "possible" or "probable" based on the presentation of the core features (see Box 23-3).

## Pharmacological treatment

Persons with NCDLB have a wide range of symptoms over time; changes in these symptoms result in a change in priority of treatment. Those taking a cholinesterase inhibitor (CI), especially rivastigmine (Exelon), may show more dramatic improvements in cognitive status than those with AD (Latoo and Jan, 2008). The CIs have also been found to be helpful with other symptoms more unique to DLB (e.g., fluctuations in cognition and mood, incidence of hallucinations). It may be tempting to use a dopamine medication such as Sinemet for the motor symptoms, but since these drugs on their own can cause hallucinations, their use may precipitate these and other psychotic symptoms common in NCDLB. Antipsychotics may be helpful but have been found to increase the risk for death.

### ⚡ SAFETY ALERT

Typical antipsychotics (e.g., Haldol) can never be used in persons with NCD due to Lewy bodies because of the very high rate of irreversible side effects and possible death.

Benzodiazepines may also be useful but increase the risk for falling and increased confusion. The use of clonazepam (Klonopin) at very low doses may be the most beneficial and replace the need for the antipsychotics (Walter et al, 2014).

# Complications

For patients in the late stages of neurodegenerative diseases, complications are consistent with any person in later life who is medically fragile (Box 23-10). Complications include pressure ulcers, pneumonia, dysphagia, aspiration, and other problems associated with geriatric frailty. Undernutrition and weight loss occur even with adequate caloric consumption. Weight loss is an indication that the terminal stage is approaching. Behavioral disturbances can be frightening and at times dangerous to the person affected, as well as those in the immediate environment. These are brought about by the extent of and location of brain damage, as well as side effects of medications.

**BOX 23-10**

## Potential Complications of Those with Neurodegenerative Disorders

Pneumonia

Pressure ulcers

Abuse or neglect from excess burden to caregiver

Untreated pain

Unable to report symptoms of another health problem

Unable to follow any prescribed treatment plan

Injuries from falls

Untreated depression

Malnutrition or dehydration

# ◆ Promoting healthy aging: Implications for gerontological nursing

Everyone, especially those with strong family histories of neurodegenerative disorders, would like to find ways to prevent them. Unfortunately, at this time this is not possible. For those with neurocognitive disorders due to AD and LB, factors have been proposed that may somewhat decrease the risk (Box 23-11). It is of special note that research related to the effect of preventive strategies is still inconclusive. Unfortunately factors to decrease the risk of PD have not yet been proposed.

**BOX 23-11**

## TIPS FOR BEST PRACTICE

### Decreasing Risk for Neurocognitive Disorders

• Maintain blood pressure within normal limits

• LDL cholesterol ≤100 mg/dL

• Hemoglobin $A_{1C}$ ≤7%

• Aspirin (81 mg enteric coated) for persons with risk for heart disease and without contraindications

• Maintain optimal control of heart failure

• Stop smoking or never start

From Khandelwal C, Kaufer DI: Alzheimer's disease and other dementias. In Ham RJ, Sloane D, Warshaw GA, et al, editors: *Primary care geriatrics: a case-based approach*, ed 6, Philadelphia, 2014, Elsevier, pp 201–213.

Most of the potentially preventive strategies and nonpharmacological interventions to promote healthy aging in persons with neurodegenerative disorders involve the nurse working with the individual and those who are either already providing care or will be doing so. Early comprehensive health, fall risk, and gait assessments are important to help the caregivers and nursing staff provide the highest quality and most empowering care possible. The assessment is repeated periodically to monitor changes and make modifications to the plan of care as needed. In the skilled nursing setting periodic reassessments are done through the RAI process (see Chapter 7); however, it is just as important in the outpatient setting. This information guides the discussions around end-of-life care, including legal preparation when the point of cognitive incapacity is reached (Chapter 31).

To prepare those with Parkinson's disease for anticipated changes in muscular flexibility, early training in relaxation such as modified yoga or Zen techniques and exercises may be helpful. Tai chi has been found to increase balance skills (Gao et al, 2014; Li et al, 2014; Pickut et al, 2013).

Persons with neurodegenerative disorders eventually experience changes in roles and may avoid social situations due to the accompanying signs and symptoms. For those with PD, tremors may produce embarrassing movements such as spilling food when eating in public. Drooling, a common problem with those with PD, is a socially unacceptable "behavior" in most societies. The expressionless face, slowed movement, and soft, monotone speech or aphasias may give the impression of apathy, depression, and disinterest and therefore others are discouraged to continue long-time relationships. A sensitive nurse is aware that the visible symptoms produce an undesired façade that may hide an alert and responsive individual who wishes to interact but is trapped in a body or brain that no longer cooperates.

Nowhere in the care of elders is a skilled and caring multidisciplinary team more essential than in the care of persons with neurodegenerative disorders. It includes a nurse; a neurologist; a physiatrist; speech, occupational, and physical therapists; an ophthalmologist; a rehabilitation specialist; a psychologist; a movement disorders' specialist; and the hospice team. Ideally it includes a physician and a nurse practitioner working as a primary care team. It also may include a spiritual advisor or indigenous healer. It always includes the person's significant other(s), who will be involved in day-to-day life at some point in time.

Occupational therapists can assist with teaching the person how to use adaptive equipment, such as weighted utensils, nonslip dinnerware, and other self-care aids. Speech therapy is beneficial for dysarthria and dysphagia; patients can be taught facial exercises and swallowing techniques to lower the risk for aspiration-related pneumonia and weight loss.

The nurse has an active role in prevention of complications (Clarke, 2007). The nurse works to actively prevent skin breakdown and falls and identifies exacerbation of confusion or function, which may indicate the development of a treatable condition such as an infection. The nurse is alert for problems with sleep and depression as the disease progresses.

Treatment focuses on relieving symptoms with medication, increasing functional ability, preventing excess disability, and decreasing the risk of injury. In caring for persons with neurodegenerative disorders, regular pain assessments and appropriate management are essential (see Chapter 27). In PD, rigidity, contractures, and dystonia may cause a considerable amount of pain. There is also a recognized but not well-understood central-pain syndrome associated with the disease itself. Persons with any of the NCDs may not be able to verbally express their pain but nonetheless experience it as

anyone else would under the same circumstances. The nurse is aware of this and uses alternative means to observe for potential pain (Chapter 27).

Persons with neurodegenerative disorders watch their own decline over time, challenging self-esteem. The nurse can direct the person and care partners to formal programs in stress management or group support and urge them to attempt to maintain former relationships (Chapters 29 and 34) (NIA, 2003).

The key factors in the care of those with neurodegenerative disorders are (1) appropriate use of available nonpharmacological and pharmacological interventions, (2) prompt treatment of all reversible conditions (e.g., infections) at any time, and (3) coordination between all care providers, including family members or partners.

In light of the current inability to enact a cure for any of the neurodegenerative disorders, the goals of care are to maximize quality of life, promote self-esteem, and maintain independent function for as long as possible. The goal of treatment is to preserve self-esteem, retain self-care abilities, and prevent complications.

# Key concepts

• Neurodegenerative conditions are those that have a downward trajectory and for which there is no cure. The conditions discussed in this chapter are limited to Alzheimer's disease, dementia with Lewy bodies, and Parkinson's disease (PD).

• The American Psychiatric Association has renamed several conditions: Alzheimer's disease is now referred to as Neurocognitive Disorder (NCD) due to Alzheimer's disease; dementia with Lewy bodies is called NCD due to Lewy Bodies.

• A significant number of persons with PD develop late-stage cognitive disorders.

• The diagnostic process for any of these conditions is extensive and complex.

• A key difference in an NCD due to LB and PD is timing of symptoms. An NCDLB begins with cognitive declines and movement disorders develop later. PD is a movement disorder that may or may not lead to an NCD.

• Although neurocognitive changes can be measured using currently available tools, diagnoses can only be confirmed on autopsy.

• At least some of the genes associated with each of these disorders have been identified.

• The NCD may be mild or major; all have memory loss as a signal characteristic.

• The signal characteristics of PD include a resting tremor and bradykinesia.

• Treatment of each condition must be individually tailored and will likely change over time.

• The nurse has a key role in monitoring changes that indicate increased risk for poor outcomes and in developing interventions to maximize quality of life and healthy aging at all points along the wellness continuum.

## NURSING STUDY:

### "IT IS SO HARD TO WATCH . . . HE WAS LOST TO ME SO LONG AGO!"

Helen's husband Sam had been slowly dying over a period of about 5 years from Alzheimer's disease. As it progressed, he began to have what are called "behavioral disturbances." He lashed out at those around him one moment and was affectionate the next. This was especially painful for his wife. During brief moments of lucidity he would kiss her and tell her how much he loved her, but moments later would physically hurt her in some way. Most of the time he was completely disoriented, and the nurses caring for him charted Sam as "disoriented × 4" (person, place, time, and situation). After a long and steady decline in cognitive and functional ability, one day he simply stopped eating and drinking and he began to fail rapidly. We all knew that death was imminent. His wife carefully shared that while she was glad for him that he would no longer suffer, she whispered, "and it will bring an end to my suffering as well, is that terrible to think that??? He was lost to me so long ago . . . "

• What are the subjective and objective data found in the case study?

• If you were one of the nurses caring for Sam, how would your plan of care change over time?

• If you were Helen, what would be the hardest part of your husband's illness?

• What strengths might Helen bring to such a situation?

# Critical thinking questions and activities

1. Have a classroom discussion about resources in the community that would be particularly helpful for persons with neurodegenerative disorders and the persons who care for them.

2. Discuss or write a paper about the skills the nurse must have to be able to provide expert care to persons with neurocognitive disorders of any kind.

# Research questions

1. What is the average life expectancy of someone with Alzheimer's disease?

2. Are there parts of the country that have unusually high or low rates of neurodegenerative conditions? What are the areas of the country and what might be the cause of this variation?

3. Has any genomic progress been made in understanding any of the other neurodegenerative disorders that are not addressed in this chapter?

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# Endocrine and immune disorders

*Kathleen Jett*

## Learning objectives

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

1. Discuss the effects of the aging immune system on the body's ability to respond to potential infectious agents.

2. Discuss common conditions that may be related to changes in the aging immune system.

3. Describe at least two methods of diagnosing diabetes.

4. Determine how diabetes is different in older adults compared with those who are younger.

5. Identify the nurse's response to the older adult with fluctuations in glycemic levels.

6. Identify the most common pharmacological agents used to treat diabetes and explain how their use may differ in older adults.

7. Differentiate between the two major types of thyroid disorders.

8. Describe how the signs and symptoms of thyroid disorders differ in younger adults compared with older adults.

9. Describe the nurse's role in advancing healthy aging in persons with immune and endocrine disorders.

**AN ELDER SPEAKS**

I had been wondering why I was so tired. I just could not get enough sleep. I went to my primary care provider, who did a bunch of tests and discovered I had a problem with my thyroid gland. Now that it is being treated, I cannot believe how much better I feel. Just like my old self again.
*Ruth, age 72*

**A STUDENT SPEAKS**

The immune system is so complex and affects so many other systems it is difficult to grasp. However, I see now how important my understanding is in order to provide the highest quality of care I can.
*Tamara, age 30, a nurse practitioner student*

# The immune system

The immune system functions to protect the host (the human body) from invasion by foreign substances and organisms through the activity of lymphocytes, particularly, T and B cells. T cells scan the body for invading substances such as infections and contribute to the body's immunity in a number of ways. While the total number of circulating T cells does not change with aging, the relative proportion of the types of cells does (Rote and McCance, 2014). The thymus, where T cells mature, may be only 15% of the size in late life that it was in mid-life (Rote, 2014).

B cells secrete antibodies in response to the presence of antigens such as infectious agents and other foreign substances. In aging, this function decreases, resulting in a reduced ability to produce antibodies. For example, there is a decreased ability to develop adequate immunity after an infection or after an immunization such as that for influenza (Box 24-1).

**BOX 24-1**

## TIPS FOR BEST PRACTICE

### Reduced Immune Response

Early studies found that oral temperature norms in healthy older adults were significantly lower in women younger than age 80 compared with younger women.

Older men consistently had an even lower temperature than women of comparable age. The old-old may have a temperature of 96.8° F with an average range of 95° to 97° F. By tympanic membrane thermometer, the temperature may be 96° F. These findings emphasize the need to carefully evaluate the basal temperature of older adults and recognize that even low-grade fevers (98.6° F) in the elderly may signify serious illness. Due to age-related delayed immune response, a lack of fever (temperature greater than 98.6° F) cannot be used to rule out an infection.

At the same time, there is an increase in the number of circulating autoantibodies in which the B cells are less sensitive to self-antigens; that is, they are less able to differentiate self cells from non-self cells. Although their effect is not well understood, there is an increase in the number of immunoglobulins leading to a decrease in innate immunity and more common autoimmune responses; autoimmune disorders are much more likely to occur in aging. These changes are referred to as *immunosenescence*. Although they can occur at any age, being alert for signs and symptoms of autoimmune disorders is probably as important as prevention and protection from infection for the older adult (Box 24-2).

**BOX 24-2**

## The Aging Immune System and Immune Disorders: Possible Connections

Diabetes

Insulin resistance

Hypothyroidism (chronic autoimmune thyroiditis)

Pernicious anemia

Renal insufficiency

Environmental allergies

# The endocrine system

The endocrine system works with multiple body organs through the release of hormones to regulate and integrate body activities. Hormones are responsible for, and control, reproduction, growth and development, maintenance of homeostasis, response to stress, nutrient balance, cell metabolism, and energy balance. The primary glands of the endocrine system are the pituitary, thyroid, parathyroid, adrenal, pineal, and thymus. The pancreas, ovaries, and testes are not glands, but they contain endocrine tissue. With the exception of the ovaries, age-related changes in the endocrine system are thought to be very mild and most likely due to the autoimmunity described earlier in this chapter.

Endocrine disorders can occur at any age. However, the complex interrelationships between these, the changes attributed to normal aging, and the number of concurrent chronic conditions (including frailty) make it almost impossible to specifically attribute any endocrine disease to the aging process itself. As with most other systems, the signs and symptoms of a problem are often subtle and nonspecific. Its presence may only

become known during a routine screening, laboratory exam, or the evaluation for another problem such as confusion or an unexplained fall resulting in an injury. In this chapter diabetes and thyroid disturbances as seen in the older adult are addressed.

## Diabetes mellitus

There are two main types of diabetes mellitus (DM) (type 1 and type 2) and also those related to steroid use and pregnancy. Type 1 is the result of absolute insulin deficiency due to the autoimmune destruction of beta-cells in the pancreas. Type 2 is a more complex disease and has been attributed to a combination of relative insulin deficiency and insulin resistance. It is the most common type of DM seen in older adults (Razzaque et al, 2014). Genetics, epigenetics, lifestyle, and aging are all significant contributing factors. Studies have shown that variants of the *TCF7L2* gene increase one's likelihood to develop DM type 2. If one inherits the gene from both parents, the risk of developing it is 80% higher than in those who do not carry the gene variant (National Diabetes Information Clearinghouse [NDIC], 2014).

Diabetes mellitus (DM) is now viewed on a continuum from asymptomatic prediabetic insulin resistance, to mild postprandial hyperglycemia and/or mild fasting hyperglycemia, to diagnosable diabetes (Box 24-3). The incidence of new diabetes in older adults is exacerbated by an increased resistance to insulin-mediated glucose disposal and decreased non–insulin-mediated glucose uptake (Razzaque et al, 2014). Due to the high prevalence and incidence of DM in older adults, when suspicions are suggested by clinical signs and symptoms, diagnostic testing should be done. The U.S. Preventive Services Task Force (USPSTF) recommends that screening for DM always be done for those whose blood pressure (BP) is consistently >135/80 mm Hg and with any risk factors for cardiovascular (CV) disease (USPSTF, 2008) (Chapter 22).

**BOX 24-3**

## Criteria for the Diagnosis of Diabetes: Confirmed by Repeat Testing

One fasting hemoglobin $A_{1C}$ value of ≥6.5% tested by a certified laboratory*

*or*

One random plasma glucose ≥200 mg/dL

*or*

Fasting plasma glucose (FPG) ≥126 mg/dL (**NOTE:** This does not include blood glucose levels that are obtained with a fingerstick.)

*or*

Oral glucose tolerance test (OGTT) ≥200 mg/dL 2 hours after glucose administration

*or*

When classic symptoms of hyperglycemic or hypoglycemic crisis are present

In the United States, the *total number* of persons with DM *decreases* with age; however, the *percentage increases* among those older than 65 years of age (Table 24-1) (CDC, 2014). There is a wide variation of the prevalence of diabetes among ethnic/racial groups and subgroups (Table 24-2). In the United States, American Indians alone have the highest rate of diabetes of all other groups (24.1%). This is influenced by the high prevalence of DM in the Pima Indians of the Southwest (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2002). Another group at high risk is veterans who were exposed to Agent Orange and other herbicides (Box 24-4). Although many of these individuals are younger at this time, they will expand the number of those with DM as they age.

## TABLE 24-1

### Number of People with Diabetes in the United States, 2012

|  | NUMBER (MILLIONS) | PERCENTAGE (UNADJUSTED) |
|---|---|---|
| Total number >20 | 28.9 | 12.3 |
| 20-44 | 4.3 | 4.1 |
| 45-64 | 13.4 | 16.2 |
| 65+ | 11.2 | 65.9 |

Source: 2009-2012 National Health and Nutrition Examination Survey estimates applied to 2012 U.S. Census data.

## TABLE 24-2

### Diabetes by Race/Ethnicity

| RACE/ETHNICITY | PERCENTAGE OF DIAGNOSED DIABETES |
|---|---|
| Non-Hispanic whites | 7.6 |
| Asian Americans | 9.0 |
| Chinese | 4.4 |
| Filipinos | 11.3 |
| Asian Indians | 13.0 |
| Other Asian Americans | 8.8 |
| Hispanics | 12.8 |
| Central and South Americans | 8.5 |
| Cubans | 9.3 |
| Mexican Americans | 13.9 |
| Puerto Ricans | 14.8 |
| Non-Hispanic blacks | 13.2 |
| American Indians/Alaskan Natives | 15.9 |

From American Diabetes Association: *Statistics about diabetes*, June 2014. http://www.diabetes.org/diabetes-basics/statistics. Accessed October 20, 2014.

## BOX 24-4

## Diabetes from Exposure to Toxins?

Veterans who were exposed to Agent Orange or other herbicides during their military service and who have developed diabetes are eligible to receive health care and disability compensation. Surviving spouses, children, and *parents* may be eligible for survivor benefits. For more information, see the following website below.

From U.S. Department of Veterans Affairs: *Public health*, 2013. Available at http://www.publichealth.va.gov/exposures/agentorange/conditions/diabetes.asp

Worldwide 347 million people have diabetes; 90% of those with diabetes around the world have type 2, attributed to obesity and physical inactivity (WHO, 2013). Eighty percent of those with DM live in low- and middle-income countries. The number of persons who die from the consequences of hyperglycemia is expected to double between 2005 and 2030. The World Health Organization (WHO) predicts that diabetes will become the seventh leading cause of death by 2030 (WHO, 2014).

## Signs and symptoms

The classic signs of both DM type 1 and DM type 2 are polyuria, polyphagia, and polydipsia (the three "Ps") in younger adults. However, they are rarely presenting symptoms in later life (Razzaque et al, 2014). Polyuria does not occur due to normal age-related increases in the renal threshold for glucose. Instead the person may develop urinary incontinence or find that it has worsened. Polydipsia is not present due to a normal age-related reduced thirst reflex. Any indication of polyphagia is reduced by age-related decreased appetite. Weight loss may occur instead of weight gain. Women may present with recurrent candidiasis as the first sign. Due to the absence or delayed signs and symptoms, the person may be found obtunded in a hyperglycemic-hyperosmolar nonketotic coma before an initial diagnosis is made. The older adult with DM should be screened regularly for the development of signs and complications that are more likely to occur in this population (Box 24-5).

**BOX 24-5**

## Complications of DM More Common in Older Adults

Dry eyes

Dry mouth

Confusion

Incontinence

Weight loss

Anorexia

Dehydration

Delirium

Nausea

Delayed wound healing

From Razzaque I, Morley JE, Nau KC, et al: Diabetes mellitus. In Ham RJ, Sloane PD, Warshaw GA, et al, editors: *Primary care geriatrics: a case-based approach*, ed 6, Philadelphia, 2014, Elsevier, pp 431–439.

## Complications

The development of complications in older adults with DM is compounded by the presence of multiple comorbid diseases and disorders (Box 24-6). Although the same types of macro- and microvascular complications occur in both older and younger adults, the risk of heart disease is two to four times higher and the life expectancy is up

to 15 years shorter in later life (CDC, 2014). Prolonged periods of hyperglycemia lead to glycosylation of proteins and the production of by-products, which, in turn, cause tissue damage. Functional declines are more likely unless proactive measures are taken to promote wellness (Box 24-7). Diabetes is associated with a high rate of depression, and those who are depressed have a higher mortality rate.

**BOX 24-6**

## Metabolic Syndrome (Insulin Resistance Syndrome)

A group of conditions common in persons with insulin resistance:

• Higher than normal glucose levels

• Increased waist size due to excess abdominal fat

• High blood pressure

• Abnormal levels of cholesterol and triglycerides in the blood

From National Diabetes Information Clearinghouse (NDIC): *Causes of diabetes*, 2014. http://diabetes.niddk.nih.gov/dm/pubs/causes/index.aspx Accessed August 2014.

**BOX 24-7**

## Functional Disability Associated with Diabetes

Mobility impairment

Falls

Incontinence

Cognitive impairments

Muscle weakness

Fatigue

Weight loss

From Razzaque I, Morley JE, Nau KC, et al: Diabetes mellitus. In Ham RJ, Sloane PD, Warshaw GA, et al, editors: *Primary care geriatrics: a case-based approach*, ed 6, Philadelphia, 2014, Elsevier, pp 431–439.

Too often a diagnosis is not made until evidence of end-organ damage becomes visible (Box 24-8). Worldwide, 50% of the persons with DM die of a stroke or heart disease (WHO, 2014). It is the leading cause of blindness, amputation, and kidney failure. The combined macrovascular and microvascular complications cause nerve damage ranging from peripheral neuropathy to gastroparesis and sexual dysfunction (American Diabetes Association [ADA], 2014). Impotence in men results from reduced vascular flow, peripheral neuropathy, and uncontrolled circulating blood glucose levels. Sexual dysfunction is two to five times greater in this group than in the general population.

**BOX 24-8**

## Signs of End-Organ Damage in DM

Decreased visual acuity

Paresthesia

Neuropathy

Heart disease

Stroke

Periodontal disease

From Razzaque I, Morley JE, Nau KC, et al: Diabetes mellitus. In Ham RJ, Sloane PD, Warshaw GA, et al, editors: *Primary care geriatrics: a case-based approach*, ed 6, Philadelphia, 2014, Elsevier, pp 431–439.

Persons with DM commonly have problems with their lower extremities, which can have a considerable impact on functional status. Warning signs of foot problems include cold feet and intermittent claudication, neuropathic burning, tingling, hypersensitivity, and numbness of the extremities (Chapters 23). Infections are common and difficult to treat. Both the infections and the needed antibiotics often result in unstable glucose control.

Hypoglycemia (blood glucose level <60 mg/dL) can occur from many causes, such as unusually intense exercise, alcohol intake, or medication mismanagement (Rote and McCance, 2014). Signs in the older adult include tachycardia, palpitations, diaphoresis, tremors, pallor, and anxiety. Later symptoms may include headache, dizziness, fatigue, irritability, confusion, hunger, visual changes, seizures, and coma. Immediate care involves giving the patient glucose either orally or intravenously.

Hyperglycemia in older adults is harder to detect than that in a younger adult. With aging there is a higher tolerance for elevated levels of circulating glucose. It is not unusual to find persons with fasting glucose levels of 200 to 600 mg/dL or higher. This level of unrecognized hyperglycemia increases the risk for hyperosmolar hyperglycemic nonketotic coma. This is especially important in persons who are otherwise medically frail and should be considered in any older adult with diabetes who is difficult to arouse (ADA, 2013). This is always a medical emergency.

# ◆ Promoting healthy aging: Implications for gerontological nursing

The gerontological nurse has a major role in promoting healthy aging in people with diabetes. Ideally the nurse helps the person move toward all of the goals of *Healthy People 2020* (Box 24-9) and ensures that the standards of diabetic care are obtained (Box 24-10). The focus is on prevention, early identification, and delay of complications for as long as possible. Prevention includes identifying those persons at greatest risk (e.g., obese or with a positive family history), encouraging regular exercise, and maintaining excellent control of other chronic conditions.

**BOX 24-9**

HEALTHY PEOPLE 2020

Goals

Reduce annual number of new cases.

Reduce death rate.

Reduce number of lower extremity amputations.

Improve glycemic control.

Improve lipid control.

Increase the proportion of persons with controlled hypertension.

Increase the number of persons with at least annual dental, foot, and dilated eye exams.

Increase the proportion of persons with at least biannual glycosylated hemoglobin measurement.

Increase the proportion of persons who obtain an annual micro-albumin measurement.

Perform self-monitoring blood glucose measurement at least twice a day.

Receive formal diabetes education.

Increase the number of persons who have been diagnosed.

Increase preventive measures in persons at high risk.

## BOX 24-10

### Evidence-Based Care: Minimum Standards of Care for the Person with Diabetes

*At each visit:*

• Monitor weight and BP.

• Inspect feet.

• Review self-monitoring glucose record.

• Review/adjust medications as needed.

• Review self-management skills/goals.

• Assess mood.

• Counsel on tobacco and alcohol use.

   *Quarterly visits:*

• Obtain hemoglobin $A_{1C}$ measurement for those whose medications have changed or who are unstable.

*Annual visits:*

- Obtain fasting lipid profile and serum creatinine level measurement.

- Obtain serum creatinine level to estimate glomerular filtration rate and stage level of kidney disease (Chapter 8).

- Refer for dilated eye exam (every 2 to 3 years).

- Perform comprehensive foot exam.

- Refer to dentist for annual comprehensive exam and cleaning.

- Administer influenza vaccination.

*Once in lifetime:*

- Administer pneumococcal vaccinations (consider (Pneumovax and Prevnar) repeat Pneumovax if longer than 5 to 10 years).

From National Diabetes Education Program: *Diabetes numbers at a glance,* 2012. http://ndep.nih.gov/publications/PublicationDetail.aspx?PubId=114 Pocket guide available. Accessed August 2014.

Although glycemic control is important, more emphasis is now on the prevention and treatment of cardiovascular diseases (Box 24-11). Research has indicated that it may take 8 years of glycemic control before benefits are seen, while the benefits of better control of blood pressure and lipid levels are seen as early as 2 to 3 years. Promoting cardiovascular (CV) health has the potential to be the most efficacious in the minimization of complications in persons with DM (Razzaque et al, 2014). At all times, interventions must be considered in the context of the life expectancy and cost/benefit ratio for the individual.

**BOX 24-11**

## Minimizing Cardiovascular Risk in Persons with Diabetes

Eat a healthy diet (lower carbohydrate, lower sodium).

Get regular exercise.

Keep the BP <130/80 mm Hg for most people.

Stop smoking.

Maintain Hb $A_{1C}$ <7% for most people.

Attain and maintain acceptable lipid levels:

- Cholesterol <200 mg/dL

- LDL <100 mg/dL

- HDL >40 mg/dL (men), >50 mg/dL (women)

- Triglycerides <150 mg/dL

Screening for DM by fasting plasma and random blood glucose testing is important for early identification of prediabetes or actual disease. Nurses participate in screenings at community health fairs and in clinical settings. Nurses also participate in community education about the need for early diagnosis, glycemic control, and prompt treatment of complications. Some nurses choose to develop particular expertise in working with those who have diabetes and become certified diabetes educators and clinicians.

Promoting healthy aging in the person with diabetes requires an array of interventions and an interdisciplinary team working together. This includes ancillary nursing staff and licensed nurses, nutritionists, pharmacists, podiatrists, ophthalmologists, physicians, nurse practitioners, certified diabetes educators, and counselors working in collaboration with the patient and his or her family/significant others in culturally appropriate ways (Chapter 4). The nurse serves as team leader, educator, care provider, supporter, and guide. If the person's disease is hard to control, endocrinologists are involved, and as complications develop, more specialists are utilized, such as nephrologists, cardiologists, and wound care specialists. Nurses are expected to advocate for older adults and encourage them to expect and receive quality care to prevent the devastating end results of poor management.

## ◆ Assessment

Health promotion for older adults with DM begins with a comprehensive geriatric assessment (Chapter 7). Assessment of painless neuropathy requires a careful neurological examination with an emphasis on sensation and history of functioning. Clinical guidelines suggest that the best means of testing neurological and sensory intactness is the use of the Semmes-Weinstein type monofilament (Feng et al, 2009) (Figure 24-1). The measurements of height, weight, and waist circumference may be used to calculate the body mass index (BMI) (Chapter 18); however, for the very old, BMI measurement is less useful because of the replacement of muscle mass with adipose tissue. Physical assessment includes a careful inspection of the feet, skin, and mouth for signs of injury or the presence of lesions.
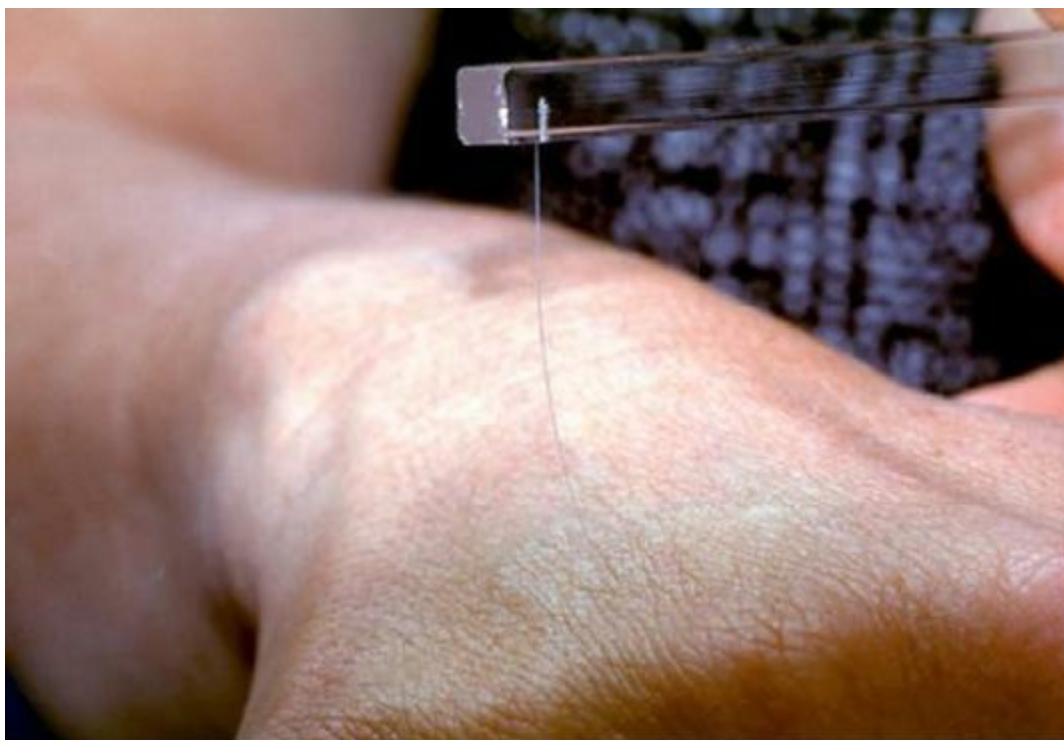
**FIGURE 24-1** **Semmes-Weinstein–type monofilament.** Source: (Courtesy AliMed, Dedham, Mass.)

Use of herbal products (Chapters 9 and 10) and nutritional supplements, over-the-counter and prescription drugs, and alcohol and tobacco are all components of the assessment of someone with diabetes (Box 24-12). All have a direct or indirect effect on renal, circulatory, neurological, and nutritional health.

## BOX 24-12

### Evidence-Based Practice: Herbs and Diabetes

One of the common herbs that is thought to help control diabetes is cinnamon. There is high-quality evidence that cinnamon has no health benefits related to diabetes or heart disease. In fact, use may worsen liver disease. Cinnamon decreases clotting time and must be used with utmost caution in persons taking blood thinners such as warfarin. Other herbal supplements that have been studied include aloe vera, bitter melon, Chinese herbal medicines, fenugreek, garlic, milk thistle, nettle, prickly pear cactus, and sweet potato. None have proven to be effective.

Available from National Complementary and Alternative Medicine at www.nih.nccam.gov search "diabetes." Accessed August 2014.

Due to the high association of depression, the assessment includes a screen for this at the time of diagnosis, at intervals thereafter, or at any time depression is suspected or reported by the patient (Chapter 7 & 28). There are depression assessment tools specific to later life available for use in persons with and without cognitive impairment (see Chapter 7).

The nurse uses the results of the assessment to work with the older adult and significant others to develop the plan of care related to both pharmacological and nonpharmacological approaches to everyday life. The regular assessment of mood and coping ensures that timely and effective interventions can be initiated.

## ◆ Management

The goals of health promotion for older adults with DM are often different than those of younger adults. Multiple factors confound decision-making about almost every aspect, including comorbid conditions, life expectancy, and ability to comply with the treatment plan. If the person is frail, management is difficult; and if there is not a consistent caregiver or one who has obtained the necessary diabetes education on behalf of, or with, the older adult, diabetes control will be impossible. The periodic measurement of a glycated hemoglobin test (Hb $A_{1C}$) is the best measure of ongoing glycemic control. While the Hb $A_{1C}$ goal in younger persons is less than 6%, a consensus panel has recently recommended that the goal is dependent on the patient characteristics (Table 24-3) (Sinclair et al, 2012).

**TABLE 24-3**

**Diabetes Treatment Goals in Consideration of Health Status**

| PATIENT HEALTH | POTENTIAL A1C (%) IN CONSIDERATION OF BURDEN AND RISK | FASTING GLUCOSE (MG/DL) | BEDTIME GLUCOSE (MG/DL) | BLOOD PRESSURE (MM HG) | USE OF STATIN | RATIONALE |
|---|---|---|---|---|---|---|
| Healthy, few coexisting conditions | <7.5 | 90-130 | 90-130 | <140/80 | Unless contraindicated | Longer life expectancy |
| Complex/intermediate coexisting illnesses with ADL impairments or mild to moderate cognitive impairments | <8.0 | 90-150 | 90-150 | <140/80 | Unless contraindicated | Intermediate life expectancy with high treatment burden |
| Very complex, poor health, long-term care or end-stage, ADL impairments, moderate to severe cognitive impairment | <8.5 | 100-180 | 100-180 | <150/90 | Consider benefit | Limited life expectancy, uncertain benefit |

From Kirkman MS, Briscoe VJ, Clark N, et al: Diabetes in older adults: a consensus report, *J Am Geriatr Soc* 60:2342–2356, 2012.

## ◆ Pharmacological management

Care of the older adult with DM requires that the bedside or community nurse develop a knowledge base of the commonly used pharmacological interventions. These include the antiglycemics and preventive adjuvant therapy, such as angiotensin-converting enzyme (ACE) inhibitors and aspirin. All have been demonstrated to improve outcomes. The advanced practice nurse is expected to have expertise in the spectrum of pharmacological approaches to assist persons in the appropriate management of their disease and its complications.

Metformin (Glucophage) is commonly prescribed as first-line therapy; it does not cause hypoglycemia or weight gain. However, it is contraindicated in persons with renal insufficiency (serum creatinine ≥1.5 mg/dL in men and ≥1.4 mg/dL in women). It is necessary to ensure that the person's creatinine level is checked annually and if the person is more than 80 years of age with reduced muscle mass, the cystatin C level (Chapter 8) should be measured instead (Razzaque et al, 2014).

Sulfonylureas have been used for many years as first-line agents for all persons with DM type 2. They increase secretion of insulin from the pancreas and increase sensitivity in the periphery. However, they are associated with hypoglycemia and can only be used in persons who can either be aware of the signs themselves or have a caregiver capable of doing so. GLP-1 agonists (e.g., Byetta) are not appropriate due to the side effects of

gastrointestinal upset and weight loss (Razzaque et al, 2014).

## SAFETY ALERT

### Do Not Use

The sulfonylureas Chlorpropamide (Diabinese) and glyburide are contraindicated due to their long half-lives and can cause prolonged hypoglycemia (American Geriatrics Society [AGS], 2012).

Insulin is used when all other strategies have failed to maintain the glycemic goals for that person. There are long-acting preparations (e.g., Lantus) now available, but they cannot be used until the required daily total dose is determined. This is done using shorter acting preparations until this is known. After that time the traditional "Sliding-scale" adjustments are not recommended (AGS, 2012). The use of insulin requires manual dexterity in the person or caregiver to ensure that glucose levels are monitored and doses are administered at the correct times. Preset syringes can be obtained and therefore could be used by someone with visual limitations; however, the cost of these is often prohibitive.

### ◆ Nonpharmacological management

The cornerstones of nonpharmacological management of DM are nutrition, exercise, and self-management.

### ◆ Nutrition.

Adequate and appropriate nutrition is a key factor in healthy living and aging with DM. An initial nutrition assessment with a 24-hour recall will provide some clues to the patient's dietary habits, intake, and style of eating (see Chapter 14). It is part of the nurse's responsibility to learn if access to appropriate food is possible, including necessary funds and a means of food preparation. The nurse works with the individual to identify culturally specific foods that can be translated into a "diabetic diet."

Helping people who have developed eating patterns over a lifetime is always challenging. If the older adult is from an ethnic group different from that of the nurse, the nurse will need to learn more about the usual ingredients and methods of food preparation to be able to give reasonable instructions related to adjustments for diets optimal for persons with DM. Meal planning with a diabetes specialist is a "covered service" under Medicare (Table 24-4) (Chapter 30) (Medicare, 2014). Healthy eating rather than weight loss is recommended since the latter has been shown to increase mortality among older persons with diabetes (Razzaque et al, 2014)

**TABLE 24-4**

**Medicare Coverage for Supplies and Services for Those with Diabetes**

| SUPPLY/SERVICE | FREQUENCY | COST |
|---|---|---|
| Screening | Twice a year for those at risk | No cost |
| Self-management training | One-time teaching of decreasing risks or managing diabetes | 20% of approved amount after deductible met |
| Equipment needed for home glucose monitoring | Some restrictions to amount of quarterly supplies | 20% of Medicare-approved amount after annual deductible |
| Flu/pneumococcal immunizations | Annually: usually once in a lifetime | No cost |
| Foot exams and treatment | For those with peripheral neuropathy | 20% of Medicare-approved amount after annual deductible |
| Glaucoma testing | Annually | 20% of Medicare-approved amount after annual deductible |
| Insulin | As needed | Per prescription plan |
| Medical nutrition services | Initial assessment and follow-up as needed | No cost |
| Therapeutic shoes or inserts | For those with severe diabetic foot disease | 20% of Medicare-approved amount after annual deductible |

For more information and details, see Centers for Medicare and Medicaid Services (CMS): *Medicare's coverage of diabetes supplies and services*, 2013. http://www.medicare.gov/Pubs/pdf/11022.pdf

### ◆ Exercise.

Exercise improves tissue sensitivity to insulin and promotes cardiac health. Walking is an inexpensive and beneficial way to exercise; however, it needs to be done in a safe location, which cannot be assumed to be in the person's neighborhood (Chapter 18). A more intensive exercise program, such as aerobics, should not be started until the health care provider has been consulted. Those who have limited mobility can still do chair exercises or, if possible, use exercise machines that enable sitting and holding onto something for support. In some cases exercise in conjunction with an appropriate diet may be sufficient to maintain blood glucose levels within normal range. If the person is using insulin, exercise needs to be done on a regular rather than an erratic basis, and blood glucose level must be checked before and after exercise to avoid, or respond promptly to, hypoglycemia.

### ◆ Self-care.

Due to the complexity of DM in late life, maximum wellness is difficult to achieve without considerable self-care skills. The nurse is often the professional who is responsible for working with the older adult in developing such skills (Box 24-13).

## BOX 24-13

### Self-Care Skills Needed for the Person with Diabetes

#### Glucose self-monitoring

Obtaining a blood sample correctly

Using the glucose monitoring equipment correctly

Troubleshooting when results indicate an error

Recording the values from the machine

Understanding the timing and frequency of self-monitoring

Understanding what to do with the results

### Medication self-administration

### Where appropriate, insulin use

Selecting appropriate injection site

Using correct technique for injections

Disposing of used needles and syringes correctly

Storing and transporting insulin correctly

### Oral medication use

Knowing drug, dose, timing, and side effects

Knowing drug-drug and drug-food interactions

Recognizing side effects and knowing when to report

### Foot care and examination

Selecting and using appropriate and safe footwear

### Handling sick days

Recognizing the signs and symptoms of both hyperglycemia and hypoglycemia

Self-management essentials for diabetes include knowing the signs of hypoglycemia and hyperglycemia, as well as actions to take if these complications arise. An identification bracelet is recommended because confusion or delirium may be a manifestation of low blood glucose level and misinterpreted as dementia, which delays treatment. Self-care also includes preventive care practices for the heart, eyes, kidneys, and feet. Nurses support patients in obtaining the needed services. Annual diabetes self-management training and a number of other diabetes-specific services are available through Medicare (Table 24-4). A large number of resources are available about diabetes through the National Diabetes Information Clearing House (http://diabetes.niddk.nih.gov/dm/a-z.aspx?control=Pubs). This site provides links to a multitude of other sites, including those specific to ethnic and racial groups and in a variety of languages.

## ◆ Implications for the frail elder and those living in residential care settings

Many of those who are frail also have DM. Due to their own limitations they are often dependent on others for various self-care activities. This may include meal preparation, assistance with exercise, or even help with physical movement of any kind. In a residential care setting such as a nursing home or assisted living facility, the nurse assesses the person for signs of hypoglycemia and hyperglycemia and evidence of complications. The nurse ensures that the standards of care for the person with DM are

met. The nurse monitors the effect and side effects of diet, exercise, and medication use. The nurse administers or supervises the safe administration of medications.

In the home care setting the nurse works with the individual if he or she is capable, and if not, the nurse identifies the caregiver(s) who are providing the support and care for the person. In this case, the caregiver is the de facto nurse with the support of professionals in providers' offices or home health staff.

# Thyroid disease

There are slight changes in thyroid function with aging, but the evidence of their effect is contradictory. The incidence of disturbances, especially hypothyroidism, is seen with increasing frequency, especially in later life. While a number of the symptoms mirror those of other nonthyroid conditions, screening for thyroid disease is a component of the primary health care assessment of older adults, especially for persons with depression, anxiety, or evidence of cognitive or cardiovascular diseases. A thyroid screen is also often done when signs of atrial fibrillation are found, but their association is equivocal (Kim et al, 2014; Tänase et al, 2013). A fully functioning thyroid gland (or its replacement) is necessary to maintain life.

Thyroid diseases are diagnosed by the clinical presentation combined with laboratory findings and considerations of the subtleties of both the total and free $T_3$ (triiodothyronine) levels, the free $T_4$ (thyroxine) levels, and the concentration of TSH (thyroid-stimulating hormone). However, the accuracy of the laboratory findings is easily affected by laboratory errors, acute illness and frailty, concurrent environmental conditions, and drug intake, making an accurate diagnosis somewhat difficult (Table 24-5).

**TABLE 24-5**

**Examples of Factors Affecting Laboratory Testing of Thyroid Functioning**

| TEST | INCREASED RESULT | DEPRESSED RESULT |
|---|---|---|
| TSH | Potassium iodide and lithium, laboratory error, autoimmune disease, strenuous exercise, acute sleep deprivation | Severe illness, aspirin, dopamine, heparin, and steroids |
| $T_3$ | Estrogen and methadone | Anabolic steroids, androgens, phenytoin, naproxen, propranolol, reserpine, and salicylates |
| $T_4$ | Estrogen, methadone, and clofibrate | Anabolic steroids, androgens, lithium, phenytoin, and propranolol (see $T_3$) |

From Chernecky CC, Berger BJ: *Laboratory tests and diagnostic procedures,* ed 6, St Louis, MO, 2013, Elsevier; Fitzgerald PA: Endocrine disorders. In Papadakis MA, McPhee SJ, editors: *Current medical diagnosis and treatment 2013,* New York, 2013, McGraw-Hill, pp 1093–1191.

*TSH,* Thyroid-stimulating hormone; $T_3$, triiodothyronine; $T_4$, thyroxine.

While the prevalence of hyperthyroidism in those older than 65 is about 2.7%, that of hypothyroidism is up to 20%, especially among older women. Many of those who are very ill and hospitalized may also have a transient elevation in TSH level. This may be in part due to the amount of iodine they are exposed to in the form of contrast products and the high use of amiodarone (Sehgal et al, 2014). If the illness resolves, many will return to a euthyroid state (Campbell, 2014).

Thyroid dysfunction, especially hypothyroidism, can have a significantly detrimental effect on the person's quality of life. If any signs or symptoms are noted, a thyroid panel should be done, which can guide the diagnosis and treatment plan in the context of other clinical findings. Diagnosis may be delayed or never made because many of the signs and symptoms are incorrectly attributed to normal aging, another disorder, a geriatric

syndrome, or to side effects of medications.

## Hypothyroidism

*Hypothyroidism,* insidious in onset, is thought to be most commonly caused by chronic autoimmune thyroiditis (previously called Hashimoto's disease). The TSH level is elevated (>10 units/mL) in definitive hypothyroidism as the pituitary gland tries to stimulate the underfunctioning thyroid (Campbell, 2014). It may be iatrogenic, resulting from radioiodine treatment, subtotal thyroidectomy, or a number of medications, especially amiodarone. It is important to always note that while there are a number of signs and symptoms of hypothyroidism, they are more subtle or vague in older adults and may be very different than those seen in younger adults (Box 24-14). The signs are often evaluated for other causes with consideration of possible hypothyroidism as a "rule out."

**BOX 24-14**

# Symptoms of Hypothyroidism

## Probably less common in older adults

• Fatigue

• Weakness

• Depression

• Dry skin

## Significantly less common

• Weight gain

• Cold intolerance

• Muscle cramps

From Campbell JW: Thyroid disorders. In Ham RJ, Sloane PD, Warshaw GA, et al, editors: *Primary care geriatrics: a case-based approach*, ed 6, Philadelphia, 2014, Elsevier, p 442.

## ⚡ SAFETY ALERT

Amiodarone is an antiarrhythmic agent that is still in use. It is associated with multiple toxicities including thyroid disease. All persons taking amiodarone must be monitored regularly for hypothyroidism (AGS, 2012).

### Subclinical hypothyroidism.

Subclinical hypothyroidism is defined as a normal serum $T_4$ level and a somewhat elevated TSH level (5 to 10 units/mL). At this time there is controversy regarding the treatment of subclinical hypothyroidism in older adults. Only a small percentage of persons have been found to convert to true hypothyroidism. Treatment is not innocuous, including a decrease in bone mass from prolonged thyroid replacement therapy (use of levothyroxine), particularly problematic for women who already have a high incidence of osteoporosis (Chapter 26). There is also some evidence that not treating subclinical

hypothyroidism will actually decrease associated mortality (Campbell, 2014).

### Hyperthyroidism

The prevalence of hyperthyroidism in older adults is low (0.5% to 4%) (Campbell, 2014). It is most often caused by the autoimmune disorder Graves' disease with multinodular or uninodular goiter. It can also result from ingestion of iodine or iodine-containing substances, such as seafood, exposure to contrast agents, and the use of certain medications, especially amiodarone. The onset of hyperthyroidism may be quite abrupt.

The manifestations of hyperthyroidism are often atypical, and it may not be diagnosed until the person has unexplained atrial fibrillation, heart failure, or even dementia. The presence of any of the geriatric syndromes such as constipation, anorexia, or muscle weakness and other vague complaints may also be noted. However, on further examination the causative factor in any of these complaints may be hyperthyroidism. On examination, the person is likely to have tachycardia, tremors, and weight loss. However, in later life, a condition known as apathetic thyrotoxicosis, rarely seen in younger persons, may occur in which usual hyperkinetic activity is replaced with slowed movement and depressed affect.

### Complications

Complications occur both as the result of treatment and as a result of delayed diagnosis; therefore, failure to treat thyroid disorders in a timely manner can be detrimental to the person's health. Myxedema coma is a serious complication of untreated hypothyroidism in the older patient. Rapid replacement of the missing thyroxine is not possible due to risk of drug toxicity. Even with the best treatment, death may ensue. Because thyroid replacement is necessary to maintain life, the person has to learn to minimize the side effects, especially increased bone loss (Chapter 26). Over-replacement with thyroxine increases myocardial oxygen consumption. It may result in exacerbation of angina in persons with preexisting coronary artery disease or precipitate congestive heart failure.

## ◆ Promoting healthy aging: Implications for gerontological nursing

As advocates, nurses can ensure that a thyroid screening test be done anytime there is a possibility of concern. The nurse caring for frail older adults can be attentive to the possibility that the person who is diagnosed with anxiety, dementia, or depression may instead have a thyroid disturbance. All persons suspected as having a depressive disorder must be checked for hypothyroidism (Demartini et al, 2013).

Although the nurse may understand that little can be done to prevent thyroid disturbances in late life, organizations such as the Monterey Bay Aquarium have launched campaigns to inform consumers of the iodine and mercury levels found in seafood (www.seafoodwatch.org) because of their association with thyroid disease.

The nurse may be instrumental in working with the person and family to understand both the seriousness of the problem and the need for very careful adherence to the prescribed regimen. If the elder is hospitalized for acute management, the life-threatening nature of both the disorder and the treatment can be made clear so that advanced planning can be done that will account for all possible outcomes.

The management of hypothyroidism is one of careful pharmacological replacement and, in the case of hyperthyroidism, one of surgical or chemical ablation followed by replacement—both with the medication thyroxine. The nurse works with the person and

significant others in the correct self-administration of medications and in the appropriate timing of monitoring blood levels and signs or symptoms indicating an exacerbation (Box 24-15).

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**BOX 24-15**

## TIPS FOR BEST PRACTICE

### Specific Instructions for Administration

Levothyroxine should always be taken early in the morning, on an empty stomach, and at least 30 minutes before a meal. It should be taken with a full glass of water to ensure it does not begin to dissolve in the esophagus. It cannot be taken within 4 hours of anything containing a mineral, such as calcium (including fortified orange juice), antacids or iron supplements. It is always dosed in micrograms, and care must be taken that it is not confused with milligrams; 12.5 to 25 mcg/day (or 0.125 to 0.25 mg/day) is the most common dose used in those older than age 50.

From Lexi-Comp: *PharMerica specialized long-term care nursing drug handbook*, Hudson, OH, 2013, Lexicomp.

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# Key concepts

- Although there are relatively few age-related changes in the immune system, the decreased ability to mount a defense against antigens increases the risk for infections.

- With aging, there is an increase in autoimmunity leading to an increase in autoimmune disorders.

- The majority of diabetes cases seen worldwide among older adults is type 2.

- The prevalence of diabetes increases with age.

- While the incidence of hyperthyroidism in late life is rare, but hypothyroidism is seen with increasing frequency, especially among older women.

- There is a high association between thyroid disease and heart disease. A person with either should be screened on a regular basis.

- Undiagnosed or inadequately treated and monitored thyroid disorders have a significant effect on the person's quality of life.

- The nurse can play active roles in the early detection of autoimmune disorders and infections.

- The nurse facilitates the person's receipt of the standards of care based on evidence-based practice and the utilization of benefits available to the person to help control and treat the disease.

## NURSING STUDY:

### "THERE IS NOTHING WRONG WITH ME, I AM JUST A LITTLE TIRED!"

Ms. P., an 82-year-old single woman, lives in a life-care community in her own apartment

but has the reassurance of knowing her medical and functional needs will be taken care of, regardless of the extent of these needs. This is the primary reason she chose to sell her home and move. She is at present independent. She has been gaining weight steadily since she moved into the community and attributes that to the fact that she eats much better now that she joins others in the congregate dining room for meals. She has diabetes, which she manages with diet, exercise, and oral medications; heart failure; and mild arthritis. Although she says she feels fine, lately she has noticed some increased fatigue and that her toes are cold and somewhat numb. The great toe on her left foot seems to be discolored. Because of the lack of feeling, she often walks around her apartment barefoot because it seems to increase the sensation in her feet. She has not needed to use the health care center and goes to the clinic only to pick up her medication. Her niece stopped by last week to see her and called the clinic and spoke with the nurse. The niece reported that her aunt seemed a little confused and lethargic. The niece accompanied Ms. P. to the clinic, where the nurses checked her blood pressure and blood sugar and found them to be 170/80 mm Hg and 280 mg/dL, respectively. Ms. P. said, "Oh, I don't think it is anything to worry about! I am just a little tired."

• Of all of the symptoms that Ms. P. reports, which one should the nurse be most concerned about related to Ms. P.'s long-term health?

• Of all of the symptoms that Ms. P. reports, which one should the nurse be most concerned about related to Ms. P.'s ability to live alone?

# Critical thinking questions and activities

1. What commonly held beliefs about aging would lead a person to believe that the changes in her health did not warrant seeking health care?

2. You are assigned to teach a patient the basics of diabetes care. You have one day to do this before the person is discharged home. When you walk in the room and begin talking with the person you find out that she is from a culture completely different from yours. How will you begin?

3. Expanding on the question above, discuss with a classmate how you would approach the same situation when you find out that your patient is responsible for cooking for the whole family

# Research questions

1. Is there any information that explains the differences in the incidence and prevalence of diabetes in various ethnic groups?

2. What types of nutritional food supplements are used by persons with diabetes?

3. Consult the latest research to determine any more current information and the implications of such, related to the increased number of circulating autoantibodies over time (page 310).

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