

CHAPTER 11

CARDIOVASCULAR DISEASE, DIABETES, AND CANCER

Reducing Your Risks

CONSIDER THIS . . .

Kassandra is an avid sunbather. She thinks the glow of a tan makes her look healthy and attractive. In fact, when she cannot get the tan she desires from the sun, she spends time in a tanning bed. This year, she has decided to get a jump on her tan and is studying for her final exams outside under the sun any minute she can. In her efforts to get tanned as quickly as possible, she has decided to not wear sunscreen.

How many others like Kassandra do you know? What is the risk of suntanning—under the sun or in tanning beds? What will it take to change the attitude that a suntan makes a person look healthy and attractive? What can a person do to reduce his or her risk of developing skin cancer? What do you know about sunscreen and how and when to apply it?

CHAPTER OBJECTIVES

- Describe the anatomy and physiology of the heart and the circulatory system.
- Identify the various types of heart disease and the risk factors for developing them.
- Describe the symptoms, causes, and risk factors of diabetes.
- Identify the various types of cancer and the risk factors for developing it.
- Explain the importance of lifestyle choices in preventing heart disease, type 2 diabetes, and cancer.

try it NOW!

Learn about your risk of developing CVD!

Right now, you can find out about your likelihood of developing CVD and take steps to modify your risk. The Heart and Stroke Foundation has a website with various online tools that identify individual risk. Visit: www.heartandstroke.com and click on "risk assessment."

Heart disease and cancer continue to be the two leading causes of death in Canada. Increasing dramatically in prevalence is type 2 diabetes, with significant personal and societal consequences. Not surprisingly, the actions you take today have a significant impact on reducing your risk for these diseases now and in the future.

CARDIOVASCULAR DISEASES

Cardiovascular disease (CVD) is a class of diseases of the heart and blood vessels, which are the leading cause of death worldwide.¹ In Canada, CVD account for more than 32 percent of all deaths.² This mortality (that is, death) rate for CVD has decreased from 47 percent in 1979.

How do health experts account for this decline? There are no simple answers. Advances in medical techniques, earlier and better diagnostic procedures and treatments, better emergency medical assistance programs, and training of people in cardiopulmonary resuscitation (CPR) have greatly aided individuals with CVD. Refinements in surgical techniques and improvements in heart transplants and artificial heart devices have enabled many to live longer lives. Despite these medical advances in treatment of CVD, the onus remains on the individual for prevention, since 80 percent of premature deaths from CVD could be prevented through a healthy dietary intake, regular physical activity, and avoiding tobacco.³ More specifically, you can reduce your risk for CVD by controlling high blood pressure and reducing your dietary intake of saturated fats and cholesterol. By maintaining your weight, decreasing your sodium intake, engaging in regular physical activity, and changing your lifestyle to reduce your stress response, you can lower your blood pressure. You can also monitor the levels of fat and cholesterol in your blood and adjust your dietary intake to prevent your arteries from becoming clogged. Understanding how your cardiovascular system works will help you to understand your risks for CVDs and what can be done to reduce these risks.

UNDERSTANDING YOUR CARDIOVASCULAR SYSTEM

The **cardiovascular system** refers specifically to the network of elastic tubes through which blood flows as it carries oxygen and nutrients to all parts of the body. It includes the heart, lungs, arteries, arterioles (small arteries), and capillaries (minute blood vessels). It also includes venules (small veins) and veins, the blood vessels through which blood flows as it returns to the heart and lungs.⁴

Under normal circumstances, the human body contains approximately six litres of blood. This blood transports nutrients, oxygen, waste products, hormones, and enzymes throughout the body. It also regulates body temperature, cellular water levels, and acidity levels of body components, and aids in bodily defence against toxins and harmful microorganisms. An adequate blood supply is essential to health and well-being.

How does the heart ensure that blood is constantly recirculated to body parts? The four chambers of the heart work together to deliver oxygenated blood where it is needed and to remove carbon dioxide (see Figure 11.1).

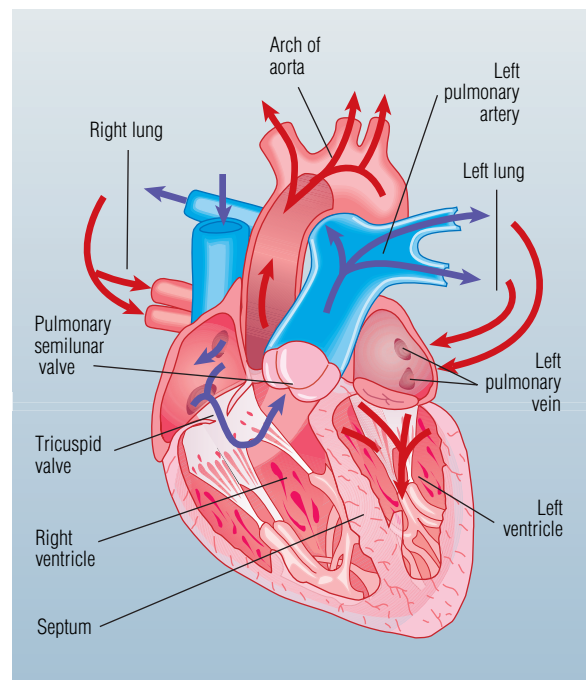


FIGURE 11.1
Anatomy of the Heart

Cardiovascular diseases (CVD): Diseases of the heart and blood vessels.

Cardiovascular system: A complex system comprising the heart and blood vessels that transports nutrients, oxygen, hormones, and enzymes throughout the body and regulates temperature, the water levels of cells, and the acidity levels of body components.

The two upper chambers of the heart, called **atria**, or auricles, are large collecting chambers that receive blood from the rest of the body. The two lower chambers, known as **ventricles**, pump the blood out again. Small valves regulate the steady, rhythmic flow of blood between chambers and prevent inappropriate backwash. The tricuspid valve, located between the right atrium and the right ventricle, the pulmonary (pulmonic) valve, between the right ventricle and the pulmonary artery, the mitral valve, between the left atrium and left ventricle, and the aortic valve, between the left ventricle and the aorta, allow blood to flow in only one direction.⁵

Heart activity depends on a complex interaction of biochemical, physiological, and neurological signals. The following is a simplified version of the steps involved:

1. Deoxygenated blood enters the right atrium after circulating through the body.
2. From the right atrium, blood moves to the right ventricle and is pumped through the pulmonary artery to the lungs, where it receives oxygen.
3. Oxygenated blood from the lungs then returns to the left atrium of the heart.
4. Blood from the left atrium is forced into the left ventricle.
5. The left ventricle pumps blood through the aorta to the body.

Different types of blood vessels are required for different parts of this process. **Arteries** carry blood away from the heart—except for pulmonary arteries, which carry deoxygenated blood to the lungs, where they pick up oxygen and drop off carbon dioxide. As they branch off from the heart, the arteries divide into smaller blood vessels called **arterioles**, and then into even smaller blood vessels called capillaries.

Capillaries have thin walls that permit the exchange of oxygen, carbon dioxide, nutrients, and waste products with body cells. Carbon dioxide and waste products are transported to the lungs and kidneys through **veins** and venules (small veins).

For the heart to function properly, the four chambers must beat in an organized manner. This is governed by an electrical impulse that directs the heart muscle to move when the impulse moves across it, resulting in a sequential contraction of the four chambers. This signal starts in a small bundle of highly specialized cells, the **sinoatrial node (SA node)**, located in the right atrium. The SA node serves as a form of natural pacemaker for the heart.⁶ People with damaged or nonfunctional natural pacemaker activity have a mechanical pacemaker inserted to ensure the smooth passage of blood through the sequential phases of the heartbeat.

At rest, the average adult heart beats 70 to 80 times per minute. A woman's resting heart rate tends to be

slightly higher than a man's. A person's heart with a high level of physical fitness beats about 50 to 60 times per minute (see Chapter 4). To supply the working muscles with the nutrients they need, the heart beats harder when engaged in physical activity. When the mind and body experience severe stress, the heart may beat over 200 times per minute, particularly in an individual who is overweight and/or with a low level of physical fitness. A healthy heart functions more efficiently and is better able to accommodate to overwork than an unhealthy one.

what do you THINK?

Do you know your resting heart rate? Do you know how to find it? What influences your heart rate? Measure your heart rate at various times throughout the day and become familiar with the settings and circumstances that influence it.

TYPES OF CARDIOVASCULAR DISEASES

Although most of us associate CVD with heart attacks, there are a number of different types. The four most common forms include:

- atherosclerosis (characterized by deposits of plaque in the inner lining of the arteries)
- coronary heart disease (a result of atherosclerotic plaque building up in the arteries such that coronary artery blood flow is reduced; when the blood flow is severely restricted or blocked a heart attack [myocardial infarction] results; when the blood flow is reduced [approximately 75 percent], but not blocked, chest pain [angina pectoris] often occurs)
- stroke (cerebrovascular accident that occurs as a result of reduced blood supply to the brain)
- hypertension (chronic high blood pressure)

Other less common forms of CVD include irregular heartbeat (arrhythmia), congestive heart failure, and congenital and rheumatic heart disease.

Irrespective of lifestyle behaviours, some individuals are at a greater risk than others for CVD.⁷ Generally, risk increases with age; men are at a greater risk than women, and individuals of African, South Asian, and First Nations descent are at greater risk than other ethnicities. Others are at risk because of their lifestyle choices. These will be discussed later in this chapter.

Atherosclerosis

Atherosclerosis is a type of arteriosclerosis. **Arteriosclerosis** is a general term for the narrowing or “hardening” of the arteries. The end result of arteriosclerosis is reduced blood flow to vital organs. Atherosclerosis is characterized by deposits of fatty substances, cholesterol, cellular waste products, calcium, and fibrin (a clotting material in the blood) in the inner lining of an artery. The resulting build-up is referred to as atherosclerotic **plaque**.⁸ Plaque may partially or totally block the blood’s flow through an artery. When plaque develops, two things can happen: (1) bleeding (hemorrhage) into the plaque or (2) formation of a blood clot (thrombus) on the plaque’s surface. If either of these occurs and an artery is blocked, the chances of a heart attack or stroke increase.⁹

Atherosclerosis does not suddenly occur. In fact, evidence suggests that atherosclerotic plaque begins to form in the womb, and worsens as the years pass. As such, atherosclerosis is not an all-or-nothing disease but occurs in varying degrees. Further, there are lifestyle choices individuals make in regard to physical activity and dietary intake that significantly influence the amount of plaque that develops. If the arteries are occluded (blocked with plaque) to about 75 percent in the heart, angina pectoris (chest pain) results. When the arteries are 90 to 95 percent occluded and a blood clot attempts to travel through them, a myocardial infarction (heart attack) or ischemic stroke (if the blood clot is in occluded arteries in the brain) occurs.

The process of plaque buildup begins when the protective inner lining of the artery (endothelium) becomes damaged, allowing fat, cholesterol, and other substances in the blood to affix to the arterial walls, eventually obstructing blood flow. The three major causes of such damage are (1) dramatic fluctuations in blood pressure, (2) elevated levels of cholesterol, triglycerides, and glucose in the blood, and (3) cigarette smoking. Viral infections may also be contributing factors. Cigarette smoke aggravates and speeds up the development of atherosclerosis, particularly in the coronary arteries, the aorta, and the arteries of the legs because of the damage caused to the inner arterial walls.¹⁰

what do you THINK?

Did you know that deposits of atherosclerotic plaque are likely forming in your arteries right now? Do you know your cholesterol and triglyceride levels? Do you know your blood pressure? Have your parents or grandparents been diagnosed with high cholesterol or high blood pressure? What actions should you take to reduce your risk for atherosclerosis?

Coronary Heart Disease

Coronary heart disease (CHD), also called coronary artery disease, is the major disease of the cardiovascular system. It is the result of atherosclerotic plaque accumulation such that a blockage occurs in one or more of the coronary arteries and blood flow is impeded. As previously mentioned, chest pain or angina pectoris results when the blockage is equivalent to 75 percent or more while complete blockage results in a heart attack.

A **heart attack**, or **myocardial infarction**, involves a blockage of the normal blood supply to an area of the heart. This condition is often brought on by a **coronary thrombosis**, or blood clot in the coronary artery. When blood does not flow readily, there is a corresponding decrease in oxygen flow. The most common symptoms of a heart attack include

- uncomfortable pressure or pain in chest lasting more than a few seconds
- mild to intense pain spreading to the shoulders, neck, or arms
- lightheadedness, fainting, sweating, nausea, or shortness of breath
- anxiety, nervousness, and/or cold, sweaty skin
- paleness or pallor
- increased or irregular heart rate
- feeling of impending doom

Atria: The two upper chambers of the heart, which receive blood.

Ventricles: The two lower chambers of the heart, which pump blood through the blood vessels.

Arteries: Vessels that carry blood away from the heart.

Arterioles: Small arteries.

Capillaries: Minute blood vessels that branch out from the arterioles; through which the exchange of oxygen, carbon dioxide, nutrients, and waste products happens.

Veins: Vessels that carry blood back to the heart.

Sinoatrial node (SA node): Node serving as a form of natural pacemaker for the heart.

Arteriosclerosis: Refers to narrowing and hardening of the arteries.

Atherosclerosis: A type of arteriosclerosis characterized by plaque deposits in the inner lining of arteries.

Plaque: Combination of fatty substances, cholesterol, cellular waste products, calcium, and fibrin.

Heart attack or Myocardial infarction: A blood clot that prevents blood from flowing through the heart.

Coronary thrombosis: A blood clot in a coronary artery.



Because 40 percent of heart attack victims die within the first two hours, immediate attention is vital to the patient's survival.

Since many women do not experience the symptoms above, in women the following may be indicative of a heart attack: unusual fatigue, shortness of breath, and sleep disturbances.

If the heart blockage is extremely minor, the otherwise healthy heart will adapt over time by using small unused or underused blood vessels to reroute the needed blood. This system, known as **collateral circulation**, is a form of self-preservation that allows a damaged heart muscle to heal itself. When heart blockage is more severe, the body is unable to adapt on its own and outside lifesaving support is critical. The two hours following a heart attack are believed to be the most critical period for treatment; more than 40 percent of heart attack victims die within this time.¹¹ Following this time period, 12 percent of Canadians who experience a heart attack die within 30 days. Long-term survival after 30 days reaches 91 to 93 percent.¹²

It is believed that normal nonatherosclerotic arteries can also go into spasm and cause circulatory impairment. Excessive calcium and potassium are among the suspected causes of these spasms.

As a result of atherosclerosis and other circulatory impairments, the heart's oxygen supply is often reduced, a condition known as ischemia. Individuals with **ischemia** often suffer from varying degrees of **angina pectoris** or chest pains. Many of these individuals experience short episodes of angina when they exert themselves physically. Symptoms of angina range from a slight feeling of indigestion to a feeling that the heart is being crushed. Generally, the more serious the oxygen deprivation, the more severe the pain.

Currently, several methods of treating angina are available. In mild cases, rest is critical. The most common treatments for more severe cases involve using

drugs that affect (1) the supply of blood to the heart muscle or (2) the heart's demand for oxygen. Pain and discomfort are often relieved with nitroglycerin, a drug used to relax (dilate) veins, thereby reducing the amount of blood returning to the heart and thus lessening its workload. Patients whose angina is caused by spasms of the coronary arteries are often given drugs called calcium channel blockers. These drugs prevent calcium atoms from passing through coronary arteries and causing heart contractions. They also appear to reduce blood pressure and to slow heart rates. **Beta blockers** are another major type of drug used to treat angina. The chemical action of beta blockers serves to control potential overactivity of the heart muscle.

When a stroke occurs, the result is the death of brain cells. Consequences of a stroke include speech impairment, memory loss, and loss of motor control. Although some strokes affect parts of the brain that regulate heart and lung function and result in death within minutes, others are mild and result in temporary dizziness or slight weakness or numbness. Mild strokes are called **transient ischemic attacks** and often indicate an impending major stroke. The key to surviving a stroke is to obtain medical treatment within three hours of the first symptom.¹³ Although almost three-quarters of Canadians recognize at least one warning sign of stroke, only half would call 9-1-1 if they or someone they knew was experiencing the warning sign.¹⁴ The most common symptoms include

- sudden weakness or numbness of the face, arm, or leg on one side of the body
- sudden dimness or loss of vision, particularly in only one eye

- loss of speech, or trouble talking or understanding speech
- sudden, severe headache with no known cause
- unexplained dizziness, unsteadiness, or sudden fall, especially with any of the previous symptoms

Stroke

Like the heart muscle, brain cells must have a continuous and adequate supply of oxygen in order to survive. A **stroke** (also called a cerebrovascular accident) occurs when the blood supply to the brain is cut off. Strokes (see Figure 11.2) may be caused by a **thrombus** (blood clot), an **embolus** (a wandering clot), or an **aneurysm** (a weakening in a blood vessel that causes it to bulge and, in severe cases, burst).

Hypertension

Hypertension or chronic high blood pressure is unique because it is a CVD itself, and a risk factor for CHD and stroke. When blood pressure is chronically elevated, the workload on the heart is greater, which may damage the heart's ability to pump blood effectively throughout the body and result in heart muscle damage.¹⁵ High blood pressure may also damage the interior walls of the arteries, which facilitates atherosclerotic plaque accumulation.¹⁶

Sustained high blood pressure, or **hypertension**, that cannot be attributed to any specific cause is known as **essential hypertension**. Approximately 90 percent

of all cases of high blood pressure fit this category. **Secondary hypertension** refers to high blood pressure caused by specific factors, such as kidney disease, obesity, or tumours of the adrenal glands.

Blood pressure is measured in two parts and is expressed as two numbers separated by a slash—for example, 120/80, or 120 over 80. Both values are measured in millimetres of mercury (mmHg). The first number refers to **systolic pressure**, or the pressure on the walls of the arteries when the heart contracts, pumping blood to the rest of the body. The second value refers to **diastolic pressure**, or the pressure on the arterial walls during the heart's relaxation phase. During this phase, blood re-enters the chambers of the heart, preparing for the next heartbeat. As shown in Table 11.1, a blood pressure reading of 120 over 80 mmHg is generally considered normal. Systolic values between 120 and 139 mmHg or diastolic values of 80 to 89 mmHg are usually considered pre-hypertensive, and a blood pressure reading greater than 140 over 90 mmHg is classified as hypertensive.¹⁷ Research indicates that risk for CVD doubles for each increase of 20/10 mmHg above 115/75.¹⁸

Collateral circulation: Following the complete occlusion of a coronary artery, rerouting of needed blood through unused or underused blood vessels.

Ischemia: Insufficient blood flow relative to the demand of the tissue which results in a decrease in oxygen

Angina pectoris: Severe chest pain occurring as a result of reduced oxygen flow to the heart.

Beta blockers: A type of drug used to treat angina; controls potential overactivity of the heart muscle.

Transient ischemic attacks: Mild form of stroke; often an indicator of impending major stroke.

Stroke: Results when the blood supply to the brain is severely reduced or cut off.

Thrombus: Blood clot.

Embolus: Blood clot forced through the circulatory system.

Aneurysm: A weakened blood vessel that may bulge under pressure and, in severe cases, burst.

Hypertension: Chronic high blood pressure; 140/80 mmHg or greater.

Essential hypertension: Hypertension as a result of unknown causes.

Secondary hypertension: Hypertension as a result of another condition such as kidney disease, obesity, or tumours of the adrenal glands.

Systolic pressure: The upper number in the blood pressure fraction, refers to the pressure on the walls of the arteries when the heart contracts.

Diastolic pressure: The lower number in the blood pressure fraction, refers to pressure on the walls of the arteries during the relaxation phase of heart activity.

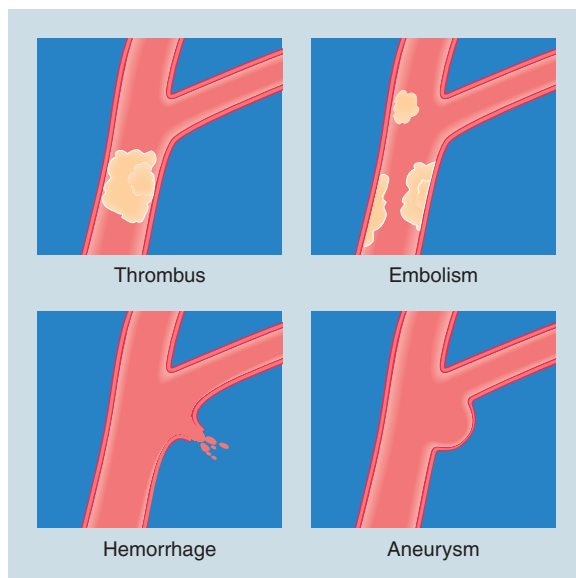


FIGURE 11.2
Common Blood Vessel Disorders

TABLE 11.1

Blood Pressure Classifications

Classification	Systolic Reading (mmHg)	Diastolic Reading (mmHg)
Normal	< 120	< 80
Prehypertension	120–139	80–89
Hypertension		
Stage 1	140–159	90–99
Stage 2	≥ 160	≥ 100

Note: If systolic and diastolic readings fall into different categories, treatment is determined by the highest category. Readings are based on the average of two or more properly measured, seated readings on each of two or more health care provider visits.

Source: National Heart, Lung, and Blood Institute, *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure* (NIH Publication No. 03-5233) (Bethesda, MD: National Institutes of Health, May 2003).

Arrhythmia, Congestive Heart Failure, and Congenital and Rheumatic Heart Disease

Arrhythmia refers to an irregular heartbeat. It may be suspected, for instance, when a person complains of a racing heart in the absence of physical activity or anxiety; *tachycardia* is the medical term for an abnormally fast heartbeat. On the other end of the continuum is *bradycardia*, or abnormally slow heartbeat. When a heart goes into **fibrillation**, it exhibits a sporadic, quivering pattern of beating resulting in extreme inefficiency in moving blood through the cardiovascular system. If untreated, this condition may be fatal. Not all arrhythmias are life-threatening. Excessive caffeine or nicotine consumption can trigger arrhythmia. For the most part, in the absence of other symptoms, arrhythmias are not serious. However, severe cases may require drug therapy or an external electrical stimulus to prevent further, more serious complications.

Congestive heart failure occurs when the heart muscle is damaged or overworked and lacks the strength to continue the blood circulating process. Individuals afflicted with rheumatic fever, pneumonia, or other cardiovascular problems in the past often have weakened heart muscles. In addition, the walls of the heart and the blood vessels may be damaged from previous radiation or chemotherapy treatments for cancer. These weakened muscles respond poorly when stressed; blood flow

out of the heart is diminished, and the return flow of blood through the veins begins to back up, causing congestion in the tissues. This pooling of blood causes enlargement of the heart and decreases the amount of blood that can be circulated. Blood begins to accumulate in other body areas, such as in the vessels in the legs and ankles or the lungs, causing swelling or difficulty in breathing. If untreated, congestive heart failure results in death. Most cases respond well to diuretics (water pills) for relief of fluid accumulation, digitalis, a drug that increases the pumping action of the heart, and a vasodilator that expands blood vessels and decreases resistance, allowing blood to flow more easily, thus reducing the workload on the heart.

Approximately 1 out of every 125 children is born with some form of **congenital heart disease** (heart disease present at birth). These diseases range from slight murmurs caused by valve irregularities which some children outgrow, to serious complications in heart function that can only be corrected with surgery. The underlying causes of congenital heart diseases are unknown but believed to be related to hereditary factors; maternal diseases, such as German measles (rubella), occurring during fetal development; or chemical intake (particularly alcohol) by the mother during pregnancy. Due to advances in pediatric cardiology, the prognosis for children with congenital heart defects is better now than ever before.

Rheumatic heart disease is attributed to rheumatic fever, an inflammatory disease caused by an unresolved streptococcal infection of the throat (“strep throat”) that may affect many connective tissues of the body, especially those of the heart, the joints, the brain, or the skin. In a small number of cases, the streptococcal infection can lead to an immune response in which antibodies attack the heart as well as the bacteria.

* CONTROLLING YOUR RISKS FOR CARDIOVASCULAR DISEASES

The four primary risk factors for CVD are high blood pressure (hypertension), high blood fats (hyperlipidemia), smoking, and physical inactivity. Secondary risk factors include, stress, obesity, and diabetes. These primary and secondary risk factors are primarily under your control. There are other risk factors, such as age, sex, ethnicity, and hereditary factors that you cannot control.

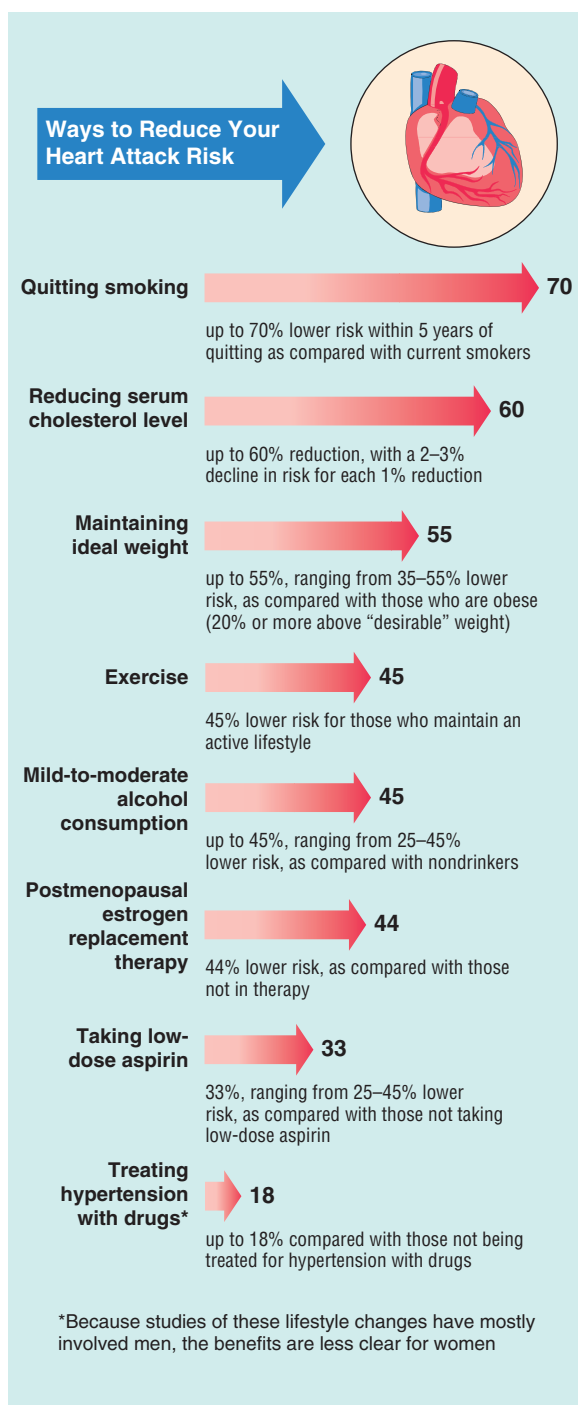


FIGURE 11.3
Estimated Average Reduction in Risk for Heart Attack*

*Estimated risk reductions refer to the independent contribution of each risk factor to heart attack and do not address the wide range of known or hypothesized reactions among them.

Source: Adapted from information appearing in J. E. Mason, "Medical Progress: The Primary Prevention of Myocardial Infarction," *New England Journal of Medicine* 326 (May 21, 1992): 1406–1416.

Knowledge of the factors that contribute to CVD and how to make lifestyle changes that reduce your risk may motivate you to make the necessary health-promoting lifestyle changes. Figure 11.3 summarizes known ways to reduce your risk for heart attack. These risks have an elevated impact when combined. For example, if you have high blood pressure, high cholesterol, a family history of heart disease, and smoke cigarettes, you run a much greater risk of having a heart attack or other CVD than someone with only one risk. To assess your risks for heart disease, see the Rate Yourself box.

Risks You Can Control

✿ High Blood Pressure

As mentioned previously, high blood pressure (hypertension) is a unique risk factor for CHD because it is also a CVD itself. It is considered the leading risk for stroke and a major factor for heart disease.¹⁹ In general, the higher your blood pressure, the greater your risk for CHD. High blood pressure is known as the "silent killer," because it usually has no symptoms. The latest data available from Statistics Canada (2005)²⁰ indicate that 14.9 percent of the population 12 years of age or older have been diagnosed by a health professional with high blood pressure. Overall, more women (15.7%) than men (14.1%) have been diagnosed, though this may relate to women living longer than men. Very few 12- to 19-year-olds (0.5 percent) or 20- to 34-year-olds (2.5 percent) have high blood pressure. In the 35- to 44-year-old age group, 6.6 percent have high blood pressure. Rates more than double in the 45- to 54-year-old age group, with 15.6 percent having high blood pressure. In the older age groups, rates of high blood pressure increase dramatically, with 29.8 percent of 55- to 64-year-olds, 42.3 percent of 65- to 74-year-olds and 46.6 percent of all individuals over the age of 75 having high blood pressure. After the age of 65, more females than males have high blood pressure, with the greatest difference noted in the over-75 group (50.8 versus 40.3 percent). Individuals of African and South Asian descent are not only three

Arrhythmia: An irregularity in heartbeat.

Fibrillation: A sporadic, quivering pattern of heartbeat resulting in inefficient moving of the blood.

Congestive heart failure: Occurs when the heart muscle is damaged or overworked and lacks the strength to maintain blood circulation.

Congenital heart disease: Heart disease present at birth.

Rheumatic heart disease: A heart disease caused by unresolved streptococcal infection of the throat.

Understanding Your Risk for CVD



Each of us has a unique level of risk for various diseases. Some of these risks you can take action to change; others are risks that you need to consider as you plan a lifelong strategy for overall risk reduction. Respond to each of the following, then total your points in each section. The higher your score, the greater your risk. If you answer "don't know" for any question, talk to your parents or other family members as soon as possible to find out if you have any unknown risks.

PART I: ASSESS YOUR FAMILY RISK FOR CVD

1. Do any of your primary relatives (mother, father, grandparents, siblings) have a history of heart disease or stroke?

Yes ____ (1 point) No ____ (0 points) Don't Know ____

2. Do any of your primary relatives (mother, father, grandparents, siblings) have diabetes?

Yes ____ (1 point) No ____ (0 points) Don't Know ____

3. Do any of your primary relatives (mother, father, grandparents, siblings) have high blood pressure?

Yes ____ (1 point) No ____ (0 points) Don't Know ____

4. Do any of your primary relatives (mother, father, grandparents, siblings) have a history of high cholesterol?

Yes ____ (1 point) No ____ (0 points) Don't Know ____

5. Would you say that your family consumed a high-fat diet (lots of red meat, dairy, butter/margarine) during your time spent at home?

Yes ____ (1 point) No ____ (0 points) Don't Know ____

Total ____

PART II: ASSESS YOUR LIFESTYLE RISK FOR CVD

1. Is your total cholesterol level higher than it should be?

Yes ____ (1 point) No ____ (0 points) Don't Know ____

2. Do you have high blood pressure?

Yes ____ (1 point) No ____ (0 points) Don't Know ____

3. Have you been diagnosed as prediabetic or diabetic?

Yes ____ (1 point) No ____ (0 points) Don't Know ____

4. Do you smoke?

Yes ____ (1 point) No ____ (0 points) Don't Know ____

5. Would you describe your life as being highly stressful?

Yes ____ (1 point) No ____ (0 points) Don't Know ____

Total ____

PART III: ASSESS YOUR ADDITIONAL RISKS FOR CVD

1. How would you best describe your current weight?

- a. Lower than what it should be for my height and weight (0 points)

- b. About what it should be for my height and weight (1 point)

- c. Higher than it should be for my height and weight (1 point)

2. How would you describe the level of exercise that you get each day?

- a. Less than what I should be exercising each day (1 point)

- b. About what I should be exercising each day (0 points)

- c. More than what I should be doing each day (0 points)

3. How would you describe your dietary behaviours?

- a. Eating only the recommended number of calories per day (0 points)

- b. Eating less than the recommended number of calories per day (0 points)

- c. Eating more than the recommended number of calories per day (1 point)

4. Which of the following best describes your typical dietary behaviours?

- a. I eat from the major food groups, trying hard to get the recommended amount of fruits and vegetables. (0 points)

- b. I eat too much red meat and consume too much saturated fat from meats and dairy products each day. (1 point)

- c. Whenever possible, I try to substitute olive oil or canola oil for other forms of dietary fat. (0 points)

5. Which of the following best describes you?

- a. I watch my sodium intake and try to reduce stress in my life. (0 points)

- b. I have a history of Chlamydia infection. (1 point)

- c. I try to eat 5 to 10 milligrams of soluble fibre each day and to substitute a soy product for an animal product in my diet at least once each week. (0 points)

Total ____

Source: Lab 9.2, pp. 277–278, from *Total Fitness and Wellness*, 4th ed., by Scott Powers, Stephen L. Dodd, and Virginia J. Noland. Copyright © 2006 by Pearson Education, Inc. Reprinted by permission.



Controlling the amount and type of fat you eat is one thing you can do to lower your risk for heart disease

times more likely to become hypertensive than the general population, but they are also more likely to develop the problem at younger ages.²¹

Normal blood pressure varies for different individuals, depending on weight, physical fitness, sex, and ethnicity. As previously mentioned, 120 over 80 mmHg is a normal blood pressure level and a blood pressure of 140/90 mmHg or greater is considered hypertensive. Recently, Canadian blood pressure guidelines suggested that a blood pressure of more than 135/85 measured at home may also indicate high blood pressure.²² Further, these guidelines indicated that a blood pressure reading between 130/85 and 139/89 mmHg should be considered high-normal blood pressure. Currently it is estimated that more than 2.5 million Canadians have high-normal blood pressure and approximately 1 million of them will develop full-blown high blood pressure over the next four years.²³

If your blood pressure exceeds 140 over 90, you should make lifestyle changes to lower it (engage in regular physical activity, eat healthily, manage your stress, and attain a healthy body weight). Regular aerobic exercise normally lowers blood pressure by 5 to 15 mmHg.²⁴ Controlling your sodium intake can also reduce your risk since it contributes to approximately 17 000 cases of stroke and heart disease in Canada each year.²⁵ Even though the average Canadian consumes more than 3100 mg of sodium per day, the adequate daily intake has been set at between 1200 and 1500 mg each day.²⁶ Since the majority of the sodium we consume comes from processed foods, reducing consumption of these would assist in lowering your intake. (See also Chapter 5.) If these lifestyle changes do not reduce your blood pressure to more normal values, you may need to take medication. Similarly, if your blood pressure is pre-hypertensive (that is, between 120/80 and 140/90), you should adjust your lifestyle in an attempt to lower your blood pressure to what is considered normal.

✿ Blood Fat and Cholesterol Levels

You do not actually consume LDLs or HDLs directly in your diet, rather a dietary intake high in saturated fats raises your LDL cholesterol levels. This sends the body's blood-clotting system into high gear, increasing the viscosity of the blood in just a few hours, which in turn increases risk for heart attack or stroke. A fatty diet also elevates the amount of cholesterol in the blood, contributing to atherosclerosis. Foods particularly high in saturated fat include coconut oil, palm kernel oil, butter, cream, whole milk, and beef. Regular physical activity, reducing saturated and trans fat intake, and increasing monounsaturated fat and omega-3 fat intakes can benefit your blood lipid profile and reduce risk for heart disease (see Chapter 5 for more details). A total cholesterol concentration of less than 5.2 millimoles per litre (mmol/L) or 200 milligrams per decilitre (mg/dL) indicates a low risk for heart disease, while values greater than 5.2 mmol/L (or 240 mg/dL) indicate high risk.²⁷ Values between 200 and 240 mg/dL are considered moderate risk.

Although risk values are established for total cholesterol, it is really the individual components that you need to be concerned about. **Low-density lipoproteins (LDLs)** are often referred to be “bad” cholesterol because they tend to build up or accumulate on artery walls. In contrast, **high-density lipoproteins (HDLs)** or “good” cholesterol remove cholesterol from artery walls, thus serving as a protector. In theory, if LDL levels get too high (greater than or equal to 3.4 mmol/L) or HDL levels too low (less than 0.9 mmol/L)—largely because of too much saturated fat in the diet, lack of physical activity, high stress, or genetic predisposition—cholesterol will accumulate on the arterial walls and lead to CVD. The goal then is to manage the ratio of HDL to total cholesterol by lowering LDLs or raising HDLs or both. Regular physical activity and a healthy dietary intake low in saturated and trans fat (see also Chapter 5 for more details) continue to be the best method for maintaining healthy ratios.

Triglycerides, the type of fat we normally consume, are also manufactured by our bodies. As people get older or fatter or both, their triglyceride and cholesterol levels tend to rise. According to the Heart and Stroke Foundation of Canada,²⁸ a triglyceride level greater than or equal to 2.3 mmol/L increases risk for CVD.

Low-density lipoproteins (LDLs): A combination of protein, triglycerides, and cholesterol in the blood that accumulate on arterial walls.

High-density lipoproteins (HDLs): A combination of protein, triglycerides, and cholesterol in the blood that facilitate the transport of LDLs to the liver for metabolism and elimination from the body.

Triglycerides: The most common form of fat in the body, consumed and manufactured in the body.

Obesity Link to Heart Disease Confirmed

Dr. Jean-Pierre Després, Director of Research Cardiology at Laval's University Hospital in Quebec, is a member of the International Day for Evaluation of Abdominal Obesity (IDEA) study, which examined the relationship of abdominal obesity to cardiovascular disease in 170 000 individuals in 63 countries. The results of this study confirmed that abdominal obesity, as measured by waist circumference in men and women, was associated with the presence of cardiovascular disease. More specifically, it was found that a 14- or 14.9-centimetre increase in waist circumference, in men and women respectively, increased the risk of cardiovascular disease from 21 to 40 percent. Furthermore, this study showed that a 16-year increase in age tripled the likelihood of an adult developing cardiovascular disease.

Dr. Després commented, "this is the first time a study of this magnitude has been conducted worldwide in a primary care population," and "these figures show that patients do not feel that having their waist measured is intrusive. The importance and the clinical significance of these results will stimulate initiation of additional studies that will aid us in identifying patients most at risk and help us to evaluate the impact that new treatments will have on the overall cardiometabolic risk of these patients."

Source: "Obesity Link to Heart Disease Confirmed," report by Jennifer Tryon, *Global National*, March 14, 2006. Retrieved March 20, 2009, from www.canada.com/nationalpost/news/story.html?id=5ee25c66-9c9b-4fe7-a05a-be485d60cddc&k=95067.

Cigarette Smoking

The link between cigarette smoking and heart disease has been firmly established. The risk for CVD is 70 percent greater for smokers than for nonsmokers. Further, the more a person smokes, the greater his or her risk of developing heart disease. Smokers who have a heart attack are more likely to die suddenly (within one hour) than non-smokers. Evidence also indicates that chronic exposure to environmental tobacco smoke (passive smoking or secondhand smoke) also increases risk of heart disease.²⁹ If the effects of smoking are combined with other risk factors, the danger is greater than the sum of the added effects.

Cigarette smoking increases the risk of heart disease in several ways. First, the drug nicotine, a central nervous system stimulant, increases heart rate, heart output, blood pressure, and oxygen use by heart muscles. In other words, nicotine causes the heart to work harder. Second, the carbon monoxide in cigarette smoke displaces oxygen in heart tissue, resulting in the heart being forced to work harder to get enough oxygen to the working tissues. Third, nicotine can lead to irregular heart rates (that is, arrhythmias) that may result in sudden death. Finally, cigarette smoke damages the lining of the arteries, allowing plaque to accumulate more easily. This additional accumulation constricts the vessels, increasing blood pressure and forcing the heart to work harder.

Physical Inactivity

Inactivity is another primary risk factor for CVD. The good news is that you don't have to be an exercise fanatic to reduce your risk for CVD. Even moderate

levels of low-intensity physical activity are beneficial if done regularly and on a long-term basis. Such activities include walking for pleasure, gardening, housework, and dancing. See also Chapter 4 for more appropriate physical activity suggestions.

Engaging in physical activity on a regular basis reduces risk for heart disease in a number of ways. First, physical activity of a sufficient intensity strengthens the heart, improves circulation, and improves your blood profile by increasing HDLs. Because of the increases in HDL, there is a reduced level of atherosclerotic plaque development. Third, physical activity plays an important role in reducing hypertension, maintaining body weight, and managing and preventing the stress response.

Obesity

Obesity also may increase risk for CVD. A body with excessive fat causes strain to the heart in its efforts to push blood through the many kilometres of capillaries that supply each kilogram of fat with needed nutrients. As such, people who are overweight or obese and sedentary are more likely to develop heart disease and stroke even if they have no other risk factors. Moreover, evidence indicates that where fat accumulates or is distributed on the body may affect a person's risk for CHD. Specifically, if excess fat accumulates around your upper body and waist (apple-shaped), you are at a greater risk than if your excess fat accumulates around your hips and thighs (pear-shaped). A waist girth greater than 102 centimetres for men and 88 centimetres for women significantly relates to elevated triglyceride levels, low HDL concentrations, and hypertension.³⁰

Diabetes

Individuals with diabetes, particularly those who have taken insulin for a number of years (that is, individuals with type 1 diabetes), have an increased risk for CVD. In fact, heart disease is the leading cause of death among individuals with diabetes. Because people who are obese have a higher risk for diabetes, distinguishing between the effects of the two conditions is difficult. Individuals with diabetes also tend to have elevated blood fat levels, increased atherosclerosis, and a tendency toward deterioration of small blood vessels, particularly in the eyes and extremities. Through a prescribed regimen of diet, physical activity, and medication, individuals with diabetes can control much of their increased risk for heart disease.

Individual Response to Stress

Some people react to stress on a daily basis. These stress reactions occur because of or in reaction to normal, usual daily activities. Consequently, these people typically have inconsistent, yet high, blood pressure when it is taken in an “unrested” state. However, when these people are asked to lie down and stay in a “rested” state for 10 minutes or more, their blood pressure often normalizes.³¹ In one study, one out of five people had an extreme cardiovascular reaction to stressful stimulation (see Chapter 3).³² These people experience alarm and resistance so strongly that, when under stress, their bodies produce large amounts of stress chemicals, which in turn lead to tremendous strain for the cardiovascular system. These people are called “hot reactors.” Although their blood pressure may be normal when they are not under stress—for example, in a doctor’s office—it increases dramatically in response to even small amounts of everyday tension. “Cold reactors” are those who are able to experience stress without harmful cardiovascular responses. Cold reactors may internalize stress, but their self-talk and perceptions about the stressful events lead them to a non-response state in which their cardiovascular system remains virtually unaffected. Other research investigating the relationship of personality to heart disease suggests that personality plays a role in effective coping of the stress response. See Chapter 3 for tips on managing your stress response that are effective for cold, hot, and more neutral reactors.

✓ Risks You Cannot Control

There are some risk factors for CVD that you cannot prevent or control. These include

- Heredity: Having a family history of heart disease increases risk significantly.

- Age: Eighty percent of all fatal heart attacks occur in people over the age of 65. The risk for CVD increases with age for both sexes.³³
- Sex: Men are at a greater risk for CVD until older age. Women under 35 years of age generally have a fairly low risk for CVD. (For a more detailed discussion, see the next section.)
- Ethnicity: First Nations and Inuit people have three times the rate of heart problems of Canadians in general.³⁴ Also at greater risk for heart disease are individuals of African and South Asian descent.³⁵

what do you THINK?

Complete the “Understanding Your Risk” box. What is your greatest risk factor for heart disease right now? What is your second biggest risk factor? What action will you take immediately to reduce your risk? Will it be difficult to take this action? Why or why not?



WOMEN AND CARDIOVASCULAR DISEASE

Many more women die from heart disease and stroke than from breast cancer. Currently, two in three women have one or more of the major risk factors for heart disease.³⁶ While men have more heart attacks and have them earlier in life, women have a much lower chance of survival. Although we understand the mechanisms that cause heart disease in men and women, their experiences in the health-care system, their reactions to life-threatening diseases, and a host of other technological and environmental factors may play a role in their survival rates.

Risk Factors for Heart Disease in Women

Premenopausal women are unlikely to have a heart attack unless they also have diabetes, high blood pressure, kidney disease, or a genetic predisposition to high cholesterol levels. Family history, oral contraceptive use, and smoking also increase the risk for heart disease in premenopausal women.

Once her estrogen production drops with menopause, a woman’s chance of developing heart disease rises rapidly. In fact, a 60-year-old woman has the same heart attack risk as a 50-year-old man, and by her late 70s, a woman has the same heart attack risk as a man her age.

Cholesterol is another factor to consider in women's increased risk for heart disease as they age. Although women aged 25 and over tend to have lower cholesterol levels than men of the same age, when they reach 45 years things change. Most men's cholesterol levels become more stable, while LDL and total cholesterol levels in women rise, with the gap widening after the age of 55. Studies of men indicate that for every 1-percent drop in cholesterol, there is a 2-percent decrease in CVD risk. If this holds true for women, prevention efforts focusing on dietary interventions and physical activity may significantly help postmenopausal women reduce their risk for CVD.

When data from seven cycles of the National Population Health Survey from 1994/1995 to 2006/2007 were examined in a longitudinal format, results indicated that women's risk of heart disease was significantly elevated if she also had depression—even after adjusting for other risk factors (for example, marital status, income, high blood pressure, diabetes, BMI, smoking, leisure-time physical activity, alcohol consumption, and use of hormone replacement therapy).³⁷ This same relationship was not found in men.

Recognizing Heart Disease in Postmenopausal Women

Postmenopausal women often do not display the same recognizable symptoms of heart disease as men. The first sign of heart disease in men is generally a myocardial infarction. In women, the first sign is usually uncomplicated angina pectoris. Because chest discomfort rather than pain is the common manifestation of angina in women, and because angina has a much more favourable prognosis in women than in men, many physicians ignore the condition in their female patients or treat it too casually.

A heart attack also causes different symptoms in women than in men. In men, a heart attack usually manifests itself as crushing chest pain radiating to the shoulders, arms, neck, jaw, or back as well as dizziness, paleness, difficulty breathing, sweating, nausea, vomiting, or anxiety.³⁸ In women, a heart attack results in much more vague symptoms such as pain in the neck, jaw, or arms; heaviness in the shoulders, back, or the pit of the stomach; and feeling out of breath, tired, sweating, nausea, or vomiting.³⁹ If these symptoms are experienced for two minutes or longer, it is critical to seek help immediately (call 9-1-1) or get to the nearest hospital that offers emergency cardiac care.

In the past decade, three main reasons why signs of heart disease in women may be overlooked have been postulated: (1) physicians may often be sex-biased in their delivery of health care, tending to concentrate on women's reproductive organs rather than on the whole

body; (2) physicians tend to view heart disease in men as a more severe problem because they traditionally have a higher incidence of the disease; and (3) women decline major procedures more often than men. Other explanations for diagnostic and therapeutic difficulties encountered by women with heart disease include⁴⁰

- Delay in diagnosing a possible heart attack, due to the complexity of interpreting chest pain in women because symptoms of heart attack are vague and much different than in men.
- Typically less aggressive treatment of women who have had a heart attack.
- Their older age, on average, and frequency of other health problems.
- Women's coronary arteries are often smaller than men's, making surgical or diagnostic procedures more difficult technically.
- Their increased incidence of post-infarction angina or heart failure.

what do you THINK?

How do men and women differ in their experiences with heart disease? How might women play a role in the under-diagnosis of their heart disease? What actions do you think individuals can take to help improve this situation for women? What actions can communities and medical practitioners take?

NEW WEAPONS AGAINST HEART DISEASE

The victim of a heart attack today has a variety of options not available a generation ago. Medications can strengthen heartbeat, control arrhythmias, remove fluids in cases of congestive heart failure, and relieve pain. Further, bypass surgery and angioplasty have become relatively commonplace procedures in hospitals throughout the nation.

Techniques of Diagnosing Heart Disease

Several techniques can be used to diagnose heart disease, including electrocardiogram, angiography, and positron emission tomography scans. An **electrocardiogram** is a record of the electrical activity of the heart measured during a stress test. Patients walk or run on treadmills while their hearts' functions are monitored. Another method of testing for heart disease is **angiography** (often referred to as "cardiac

catheterization”), in which a needle-thin tube called a catheter is threaded through blocked heart arteries, a dye is injected, and an X-ray is taken to discover which areas are blocked. A more recent and even more effective method of measuring heart activity is **positron emission tomography**, also called a **PET scan**, which produces three-dimensional images of the heart as blood flows through it. During a PET scan, a patient receives an intravenous injection of a radioactive tracer. As the tracer decays, it emits positrons that are picked up by the scanner and transformed by a computer into colour images of the heart.

Other tests include the following:

- Radionuclide imaging (includes such tests as thallium test, multinucleated gated angiography scan, and acute infarct scintigraphy). In these procedures, substances called radionuclides are injected into the bloodstream. Computer-generated pictures can then show them in the heart. These tests can show how well the heart muscle is supplied with blood, how well the heart’s chambers are functioning, and which part of the heart has been damaged.
- Magnetic resonance imaging (MRI). This test uses powerful magnets to look inside the body. Computer-generated pictures can show the heart muscle, identify damage from a heart attack, diagnose certain congenital heart defects, and evaluate disease of larger blood vessels such as the aorta.
- Ultrafast computed tomography (CT). This is an especially fast form of X-ray of the heart designed to evaluate bypass grafts, diagnose ventricular function, and measure calcium deposits.
- Digital cardiac angiography. This modified form of computer-aided imaging records pictures of the heart and its blood vessels.

Angioplasty versus Bypass Surgery

During the 1980s, **coronary bypass surgery** seemed to be the ultimate technique for treating patients who had coronary blockages or suffered heart attacks. In coronary bypass surgery, a blood vessel taken from another site in the patient’s body (usually the saphenous vein in the leg or the internal mammary artery) is implanted to transport blood by bypassing blocked arteries. The effectiveness of bypass operations, particularly for elderly people, has been questioned, particularly with less invasive treatment options now available.

A procedure called **angioplasty** (also called balloon angioplasty) has fewer risks and is believed by many to be more effective than bypass surgery in selected cardiovascular cases. This procedure is similar to angiography. A needle-thin catheter is threaded through blocked heart arteries. The catheter has a balloon at the tip,

which is inflated to flatten fatty deposits against the artery walls, allowing blood to flow more freely. Angioplasty patients are generally awake but sedated during the procedure and spend only one or two days in the hospital after treatment. Most people can return to work within five days. Only about 1 percent of all angioplasty patients die during or soon after the procedure. Risks of this procedure include spontaneous collapse of the vessel worked on in 3 to 7 percent of cases, and in about 30 percent of all angioplasty operations, the treated arteries become clogged again within six months. Some patients may undergo the procedure as many as three times within a five-year period. Some surgeons argue that given angioplasty’s high rate of recurrence, bypass may still be a more effective method of treatment.

Other research suggests that in many instances, drug treatments may be as effective in prolonging life as invasive surgical techniques, but it is critical that doctors follow an aggressive drug treatment program and more important that patients comply. Among the most effective treatments are beta blockers and calcium channel blockers, used to reduce high blood pressure and treat other symptoms. Cholesterol-lowering medications are also effective.

Research indicates that low doses of Aspirin (80 milligrams daily or every other day) are beneficial to heart patients because of their blood-thinning properties. It should be pointed out that higher doses do not provide additional protection. Aspirin is even recommended as a preventive strategy for individuals without current heart disease symptoms. However, given the additional risks from emergency surgery or accidental bleeding, Aspirin should be taken as a preventive measure only if your physician recommends it.

Thrombolysis

Whenever a heart attack occurs, prompt action is the key factor in the patient’s eventual prognosis. When a

Electrocardiogram: A record of the electrical activity of the heart measured during a stress test.

Angiography: A technique for examining blockages in heart arteries. A catheter is inserted into the arteries, a dye injected, and an X-ray taken to find the blocked areas.

Positron emission tomography (PET scan): Method for measuring heart activity by injecting a patient with a radioactive tracer scanned electronically to produce a three-dimensional image of the heart and arteries.

Coronary bypass surgery: A surgical technique in which one or more blood vessels are implanted to bypass one or more clogged coronary arteries.

Angioplasty: A technique in which a catheter with a balloon at the tip is inserted into a clogged artery; the balloon is inflated to flatten fatty deposits against artery walls, allowing blood to flow more freely.

coronary artery gets blocked, the heart muscle doesn't die immediately, but time determines how much damage occurs. If a victim gets to an emergency room and is diagnosed fast enough (within two hours), a form of reperfusion therapy called **thrombolysis** can sometimes be performed. Thrombolysis involves injecting an agent such as TPA (tissue plasminogen activator) to dissolve the clot and restore some blood flow, thereby reducing the amount of tissue that dies from ischemia. These drugs must be used within one to three hours of a heart attack for best results, and once again, the importance of dialling 9-1-1 when the symptoms of a heart attack are first noticed cannot be over-emphasized.

what do you THINK?

With all the new diagnostic procedures and treatments for prevention and intervention of CVD, how can a health consumer ensure that he or she will get the best treatment when needed? Where can one go for information? Why might women, members of certain minority groups, and the elderly need a "health advocate" who can help them get through the system?

DIABETES: INCIDENCE AND MORTALITY

Diabetes is a serious, widespread, and costly chronic disease. It is characterized by high blood sugar (glucose) levels. Untreated diabetes results in numerous health problems, including blindness, amputation, and kidney dysfunction. From 1996/1997 to 2005 (the most recent data available), the number of Canadians 12 years and older diagnosed with diabetes almost doubled.⁴¹ These estimates indicate that 4.9 percent of the Canadian population has diabetes. At all ages except for 15 to 19 years and 20 to 35 years, males are more likely to have diabetes than females. Further, diagnoses increase with age, particularly after the age of 54 years, with 10.1 percent of people between the ages of 55 to 64 years and 14.6 of all individuals over the age of 65 years having a positive diagnosis.

What causes diabetes? In healthy people, the pancreas, a powerful enzyme-producing organ, produces the hormone insulin in sufficient quantities to allow the body to use or store glucose. When the pancreas fails to produce enough insulin to regulate sugar metabolism or when the body fails to use insulin effectively, diabetes develops. Individuals with diabetes exhibit hyperglycemia, or elevated blood sugar levels, and high glucose levels in their urine. Other symptoms include excessive thirst,

frequent urination, hunger, a tendency to tire easily, wounds that heal slowly, numbness or tingling in the extremities, changes in vision, skin eruptions, and in women, a tendency toward vaginal yeast infections.

Type 1 diabetes, also called insulin-dependent diabetes and formerly referred to as juvenile-onset diabetes, is an autoimmune disease in which the immune system destroys the insulin-making beta cells. It most often appears in childhood or adolescence, with rare cases diagnosed in early to mid-adult years. People with type 1 diabetes typically depend on insulin injections or oral medications because their body does not produce the insulin it needs.

In type 2 diabetes, also called non-insulin dependent diabetes and formerly called adult-onset diabetes, insulin production is deficient or the body is unable to utilize all available insulin. Type 2 diabetes accounts for 90 to 95 percent of all diabetes cases and in the past did not appear until after the age of 40 years—hence the term "adult-onset." Currently, type 2 diabetes is diagnosed across the age spectrum, including children and adolescents, and because of the frequency of diagnoses in younger individuals (reflective of current Canadian lifestyle), it can no longer be considered an adult-onset disease. Specifically, type 2 diabetes is linked to obesity and physical inactivity, both of which can be modified to control and prevent diabetes and improve health. Further, if people with type 2 diabetes change their lifestyle (that is, become more physically active, eat well, lose weight), they may be able to avoid the need for oral medications or insulin indefinitely.

A third type of diabetes, gestational diabetes, can develop in women during pregnancy. Although once believed to be only a transient event that disappeared after pregnancy, today experts realize that women with gestational diabetes have an increased risk of developing type 2 diabetes within 5 to 10 years of giving birth.⁴² This is particularly true for women who do not lose the weight they gained during pregnancy and for those with subsequent pregnancies and weight gain with each one.

Understanding Risk Factors

Diabetes tends to run in families.⁴³ As previously mentioned, being obese, coupled with low levels of physical activity, dramatically increases risk of type 2 diabetes. This, too, often runs in families—not because of a genetic link, but rather an environmental or lifestyle link. Older persons and mothers of babies weighing more than 4 kilograms at birth are also at increased risk. About 80 percent of all individuals with type 2 diabetes are obese at the time of diagnosis. Weight loss, better nutrition, control of blood glucose levels, and regular physical activity are important factors in lowering blood sugar and improving the efficiency of cellular

use of insulin. These lifestyle improvements can also help to prevent overwork of the pancreas and the development of diabetes. In fact, recent findings indicate that regular, moderate intensity physical activity and a healthy diet can reduce one's risk of type 2 diabetes significantly.⁴⁴ Individuals of African Canadian descent and First Nations and Inuit Canadians have much higher rates of type 2 diabetes than others, which is most likely related to lifestyle factors such as low levels of physical activity and poor dietary intakes.

Controlling Diabetes

Most physicians attempt to control type 1 and latter stages of type 2 diabetes with a variety of insulin drugs. Most drugs are taken orally, although self-administered hypodermic injections are prescribed when other treatments are inadequate. Recent breakthroughs in individual monitoring, implantable insulin monitors and pumps, and insulin inhalers have given many people with diabetes the opportunity to lead more normal lives. Some people with type 2 diabetes can manage their diagnoses effectively by losing weight, engaging in regular physical activity, and eating foods rich in complex carbohydrates, low in sodium, and high in fibre.

Physical activity, particularly walking, is often prescribed to assist with the management of type 2 diabetes.⁴⁵ These recommendations should be individualized and should specifically identify the quantity and quality of walking required. More than 10 000 steps may be needed, as well as a walking speed that elicits improvements in cardiorespiratory fitness.⁴⁶

Complications Associated with Diabetes

Depending on the type and severity of the disease, diabetes results in many complications and increases the severity of existing conditions, including

- CVD. Heart disease and stroke cause about 65 percent of deaths among people with diabetes. More than 70 percent of people with diabetes have hypertension.
- Eye disease and blindness. Diabetes is the leading cause of blindness.
- Kidney disease. The kidneys in many people with diabetes often fail. Dialysis is a common treatment for these individuals.
- Amputations. More than 60 percent of nontraumatic amputations of lower limbs are a result of diabetes. Foot care programs that include regular exams and patient education could prevent as many as 85 percent of these amputations.

- Pregnancy complications. Poorly controlled diabetes can cause major birth defects in 5 to 10 percent of all pregnancies and accounts for 15 to 20 percent of spontaneous abortions.
- Flu- and pneumonia-related deaths. People with diabetes have a threefold increase of dying as a result of complications from the flu or pneumonia compared to people without diabetes.

CANCER INCIDENCE AND MORTALITY

An estimated 171 000 new cases of cancer and 75 300 deaths from cancer will occur in Canada in 2009.⁴⁷ It is projected that 40 percent of women and 45 percent of men will develop cancer in their lifetime and that one of every four Canadians will die of cancer (24 percent of women; 29 percent of men). The greater number of new cases of cancer is primarily due to an aging population. Mortality from cancer is declining for males of all ages, for women under the age of 70, and most rapidly in children and adolescents.

Lung cancer continues to be the leading cause of premature death due to cancer, accounting for 28.3 percent of all cancer deaths in men and 26.3 percent in women.⁴⁸ It is expected that 23 400 new cases (12 800 for males and 10 700 for females) of lung cancer will be diagnosed in 2009.⁴⁹ It should be pointed out that although lung cancer is the number one cancer killer of men and women, it is only the second highest for new cases. In men there are more new cases of prostate cancer (25 500) expected in 2009, while in women more new cases of breast cancer (22 700) are expected. The third-highest expected cancer incidence for 2009 for men and women is colorectal cancer, with 12 100 and 9900 new cases, respectively.

Not everyone is equally at risk for all types of cancers. Cancer incidence and mortality vary greatly by age, sex, ethnicity, and socioeconomic status. Because cancer risk is strongly associated with lifestyle and behaviours, differences in ethnic and cultural groups can provide clues to factors involved in its development. Culturally influenced values and belief systems can also affect whether or not a person seeks care, participates in screenings, or follows recommended treatment options. In Canada, cancer incidence and mortality are higher in the Atlantic provinces and Quebec and lowest in British Columbia.⁵⁰

Thrombolysis: Injection of an agent to dissolve clots and restore some blood flow, thereby reducing the amount of tissue that dies from ischemia.

What Is Cancer?

Cancer is the name given to a large group of diseases characterized by the uncontrolled growth and spread of abnormal cells. It may be hard to understand how normal, healthy cells become cancerous, but if you think of a cell as a small computer, programmed to operate in a particular fashion, the process may become clearer. Under normal conditions, healthy cells are protected by the immune system as they perform their daily functions of growing, replicating, and repairing body organs. When something interrupts normal cell programming, uncontrolled growth and abnormal cellular development result in a new growth of tissue. This new tissue serves no physiological function and is called a **neoplasm**. When this neoplastic mass forms a clump of cells it is known as a **tumour**.

Not all tumours are **malignant** (cancerous); in fact, most are **benign** (non-cancerous). Benign tumours are generally harmless unless they grow to obstruct or crowd out normal tissues or organs. A benign tumour of the brain, for instance, is life-threatening when it grows and causes blood restriction resulting in a stroke. The only way to determine whether a given tumour or mass is benign or malignant is through **biopsy**, or microscopic examination of cell development.

Benign and malignant tumours differ in several key ways. Benign tumours are generally composed of ordinary-looking cells enclosed in a fibrous shell or capsule that prevents their spreading to other body areas. Malignant tumours are usually not enclosed in a protective capsule and can therefore spread to other organs. This process, known as **metastasis**, makes some forms of cancer particularly aggressive in their ability to overcome bodily defences. By the time they are diagnosed, malignant tumours have frequently metastasized throughout the body, making treatment extremely difficult. Unlike benign tumours, which merely expand to take over a given space, malignant cells invade surrounding tissue, emitting clawlike protrusions that disrupt chemical processes within healthy cells. More specifically, malignant cells disturb the ribonucleic acid (RNA) and deoxyribonucleic acid (DNA) within the normal cells. Tampering with these substances that control cellular metabolism and reproduction produces mutant cells that differ in form, quality, and function from normal cells.

What Causes Cancer?

After decades of research, most cancer epidemiologists believe that the majority of cancers are preventable and can be avoided by healthier choices in lifestyle and environment.⁵¹ In fact, the recently released “Policy and Action for Cancer Prevention Food Nutrition, and

Physical Activity: A Global Perspective,” by the World Cancer Research Fund in conjunction with the American Institute for Cancer Research, clearly stated that two-thirds of all cancers could be prevented based on lifestyle changes.⁵² One-third could be prevented by not using tobacco and another one-third could be prevented by being physically active and eating well. Many specific causes of cancer are well documented, the most important of which are smoking, obesity, and a few organic viruses. Most research supports the idea that cancer is caused by external (chemicals, radiation, viruses, and lifestyle) and internal (hormones, immune conditions, and inherited mutations) factors. These causal factors may act together or in sequence to promote cancer development. We do not know why some people have malignant cells in their body and never develop cancer while others may take 10 years or more to develop the disease. Many factors are believed to cause cancer, and a combination of these factors can dramatically increase one’s risk of the disease.

One theory proposes that cancer results from spontaneous errors during cell reproduction. Perhaps cells that are overworked or aged are more likely to break down, causing genetic errors that result in mutant cells. Another theory suggests that cancer is caused by some external agent or agents that enter a normal cell and initiate the cancerous process. Numerous environmental factors, such as radiation, chemicals, hormonal drugs, immunosuppressant drugs (drugs that suppress the normal activity of the immune system), and other toxins are considered possible **carcinogens** (cancer-causing agents) (see Figure 11.4); perhaps the most common carcinogen is the tar found in cigarettes. The greater the dose or exposure to environmental hazards, the greater the degree of risk. Thus, people forced to work, live, and pass through areas that have high levels of environmental toxins may be at greater risk of cancer.

A third theory came out of research on certain viruses believed to cause tumours in animals. This research led to the discovery of **oncogenes**, suspected cancer-causing genes present on chromosomes. Although oncogenes are typically dormant, scientists theorize that certain conditions, such as age, stress, and exposure to carcinogens, viruses, and radiation may activate these oncogenes. Once activated, they begin to grow and reproduce in an out-of-control manner. Scientists are uncertain whether only people who develop cancer have oncogenes or whether we all have **proto-oncogenes**, genes that can become oncogenes under certain conditions. Many **oncologists** (physicians who specialize in the treatment of malignancies) believe that the oncogene theory may lead to a greater understanding of how individual cells function and may bring us closer to developing an effective treatment for cancer.



FIGURE 11.4
Suspected Causes of Cancer

Risks for Cancer

✱ Lifestyle

Anyone can develop cancer; however, most cases affect adults beginning in middle age. In fact, nearly 80 percent of cancers are diagnosed at ages 55 and over. Cancer researchers refer to one's cancer risk when they assess risk factors. *Lifetime risk* refers to the probability that an individual, over the course of a lifetime, will develop cancer or die from it. In 2009, as noted previously, 45 percent of men and 40 percent of women have a lifetime risk of developing cancer.⁵³

Relative risk is a measure of the strength of the relationship between risk factors and a particular cancer. Basically, relative risk compares your risk if you engage in certain known risk behaviours with that of someone who does not engage in such behaviours. For example, if you smoke, you have a 20-fold relative risk of developing lung cancer compared to a nonsmoker. In other words, the chances of getting lung cancer are about 20 times greater in a smoker than in a nonsmoker.⁵⁴

Over the years, researchers have found that certain behaviours result in a higher incidence of cancer. In particular, dietary intake, sedentary lifestyle (and resultant obesity), consumption of alcohol or cigarettes,

stress, and other lifestyle factors seem to play a role. Further confirming this theory is that colon and rectal cancer occur more frequently among persons with a high-fat, low-fibre dietary intake, in those who don't eat enough fruits and vegetables, and in those who are physically inactive.

Keep in mind that a high relative risk does not guarantee cause and effect. It merely indicates the likelihood of a particular risk factor being related to a particular outcome. In other words you can modify your lifestyle behaviours to reduce your risk.

Smoking

Of all the potential risk factors for cancer, smoking is among the greatest; it is the leading cause of preventable death in the world today. In developing countries, smoking is responsible for 80 percent of all deaths from lung cancer.⁵⁵ In Canada, tobacco is responsible for nearly one in five deaths annually. Recent declines in smoking have likely had a direct effect on the overall decrease in lung cancer rates; however, as previously noted, lung cancer remains the leading cause of cancer death in men and women.

Researchers once believed that cigarettes caused only cancers of the lung, pancreas, bladder, and kidney, and (synergistically with alcohol) the larynx, mouth, pharynx, and esophagus. However, recent evidence indicates that several other types of cancer are also related to tobacco use. Most notably, cancers of the stomach, liver, and cervix are directly related to long-term smoking.

Cancer: A large group of diseases characterized by the uncontrolled growth and spread of abnormal cells.

Neoplasm: A new growth of tissue that serves no physiologic function, resulting from uncontrolled, abnormal cellular development.

Tumour: A neoplastic mass that grows more rapidly than surrounding tissues.

Malignant: Very dangerous or harmful; refers to a cancerous tumour.

Benign: Harmless; refers to a non-cancerous tumour.

Biopsy: Microscopic examination of tissue to determine if a cancer is present.

Metastasis: Process by which cancer spreads from one area to different areas of the body.

Carcinogens: Cancer-causing agents.

Oncogenes: Suspected cancer-causing genes present on chromosomes.

Proto-oncogenes: Genes that can become oncogenes under certain conditions.

Oncologists: Physicians who specialize in the treatment of malignancies.

Obesity

It is difficult to sort through the volumes of evidence about the role of nutrients, obesity, sedentary lifestyle, and related variables in the development of cancer. That said, cancer is more common among people who are obese, and risk increases as level of obesity increases. A study of more than 900 000 adults indicates a significant relationship between a high body mass index (BMI) and death rates for cancers such as that of the esophagus, colon, rectum, liver, kidney, and pancreas.⁵⁶ Women with a high BMI have a higher mortality rate from breast, uterine, cervical, and ovarian cancers; men with a high BMI have higher death rates from prostate and stomach cancers. In this study, 34 percent of all cancer deaths were attributable to overweight and obesity. Other findings relevant to the obesity–cancer link are as follows:

- The relative risk of breast cancer in postmenopausal women is 50 percent higher for women who are obese.
- The relative risk of colon cancer in men is 40 percent higher for men who are obese.
- The relative risks of gallbladder and endometrial cancer are five times higher in individuals who are obese compared to those at a healthy weight.

Biologic Factors

Some early cancer theorists believed that we inherit a genetic predisposition toward certain forms of cancer.⁵⁷ Cancers of the breast, stomach, colon, prostate, uterus, ovaries, and lungs do appear to have a heredity link. Specifically, a woman has a much higher risk of developing breast cancer if her mother, sisters, or daughters (i.e., primary relatives) had the disease, particularly if they had it at a young age. Hodgkin's disease and certain leukemias also show familial patterns. Whether these familial patterns are attributable to genetic susceptibility or to the fact that people in the same families experience similar environmental risks remains uncertain.

Sex also affects the likelihood of developing certain forms of cancer. For example, breast cancer occurs primarily among females, although men occasionally get breast cancer. Of the 22 900 new cases expected in 2009, 180 will be in males.⁵⁸ Obviously, factors other than heredity and familial relationships affect which sex develops a particular cancer. In the 1950s and 1960s, for example, women rarely contracted lung cancer. But with increases in the number of women who smoked and the length of time they smoked, lung cancer became a leading cause of cancer deaths for Canadian women in the 1980s. Although sex plays a role in certain cases, other variables, such as lifestyle, are probably more significant in other cases.

Occupation and Environment Factors

Various occupational hazards are known to cause cancer when exposure levels are high or exposure is prolonged. Overall, however, workplace hazards account for only a small percentage of all cancers. One of the most common occupational carcinogens is asbestos, a fibrous substance once widely used in the construction, insulation, and automobile industries. Nickel, chromate, and chemicals such as benzene, arsenic, and vinyl chloride have been shown to be carcinogens for humans. Also, people who routinely work with certain dyes and radioactive substances may have increased risks for cancer. Working with coal tars, as in the mining profession, or working near inhalants, as in the auto-painting business, is also hazardous. Those who work with herbicides and pesticides also appear to be at higher risk, although the evidence is inconclusive to date for low-dose exposures.

Because people are sometimes forced to work near hazardous substances, it is imperative that worksites enact policies and procedures designed to minimize or eliminate toxic exposure.

Ionizing radiation—radiation from X-rays, radon, cosmic rays, and ultraviolet radiation (primarily UV-B radiation)—is the only form of radiation linked to cancer. (See the section on skin cancer.)

While reports about cancer-case clusters in communities around nuclear power facilities have raised public concerns, studies show that clusters do not occur more often near nuclear power plants than they do by chance in wider geographical areas.⁵⁹

Social and Psychological Factors

Although orthodox medical personnel are skeptical of overly simplistic prevention centres that focus on humour and laughter as the way to prevent cancer, we cannot rule out the possibility that negative emotional states contribute to disease development. People who are lonely, depressed, and lack social support are more susceptible to cancer than their mentally and emotionally healthy counterparts. Similarly, people under chronic stress and those with poor nutrition or sleep habits develop cancer at a slightly higher rate than the general population. Experts believe that severe depression or prolonged stress may reduce the activity of the body's immune system, thereby wearing down bodily resistance to cancer.

Chemicals in Foods

Among the food additives suspected of causing cancer is sodium nitrate, a chemical used to preserve and give colour to red meat. Research indicates that the actual carcinogen is not sodium nitrate but nitrosamines,

Canadian Cancer Statistics 2006: Cancer Screening in Canada Not Realizing Full Potential

TORONTO—Fewer Canadians would die from cancer if cancer screening in Canada was enhanced and expanded, according to a special report in *Canadian Cancer Statistics 2006* released by the Canadian Cancer Society.

The report also states that some screening tests can help prevent cancer (for example, cervical and colorectal cancers) as they detect pre-cancerous conditions, which can then be treated or removed.

"We have solid scientific evidence that screening through an organized program can reduce cancer deaths and, in some cases, even the incidence of certain cancers," says Heather Logan, Director, Cancer Control Policy, Canadian Cancer Society. "Existing cancer screening has helped reduce the cancer toll in Canada. However, we need to do more to make the most of this opportunity, which has the potential to significantly reduce the cancer burden in this country."

The special report—*Progress in Cancer Control: Screening*—says that cancer screening in Canada is not reaching its full potential because:

- participation in existing cervical and breast cancer screening programs needs to be enhanced. Barriers have to be identified so that effective methods to reach out to women can be developed.
- an organized colorectal cancer screening program has not been implemented in any province or territory in Canada, despite scientific evidence showing it would be an effective way to reduce both incidence [of] and death [from] this common cancer.

In addition, the special report states more research is needed to identify effective screening tests for prostate, lung, and ovarian cancers.

Screening is the early detection of cancer by testing or checking for disease in people who don't show any symptoms of the disease. Detecting cancer early usually improves the likelihood of successful treatment, which leads to fewer Canadians dying from the disease. Screening can also help prevent some cancers by detecting pre-cancerous stages of the disease.

BREAST CANCER

Current evidence suggests that breast cancer deaths could be reduced by as much as one-quarter if 70 percent of women in the target age group (50–69 years) participated in organized screening programs. Every province and territory (except Nunavut) had an organized breast-screening program by 2003. However, none of the organized programs have achieved the nationally established target of 70 percent participation.

"While it's encouraging that the proportion of women in organized breast cancer screening programs has increased

over time, in 2003 participation was only 34 percent nationally," says Logan.

The special report also says that about 61 percent of Canadian women reported having a screening mammogram within two years. This is likely because mammography is also available through centres not affiliated with organized programs.

"The percentage of women who have been screened is probably somewhere between 34 and 61 percent, and this is too low," says Logan. "However, breast cancer death rates have been declining and screening is one reason for this downward trend."

The Canadian Cancer Society recommends that women between the ages of 50 and 69 have a screening mammogram and a clinical breast exam every two years.

Women report that barriers to screening include not having a regular doctor or living in rural areas. "It's important to understand the barriers so that effective methods to reach out to women can be developed. For example, for women living in rural areas, a portable mammography unit may encourage women to get screened," says Logan

COLORECTAL CANCER

In Canada, scientific evidence shows that colorectal cancer deaths could be reduced by 17 percent if 70 percent of Canadians between the ages of 50 and 74 had a fecal occult blood test (FOBT) every two years.

"This is a potentially significant drop in deaths from colorectal cancer," says Logan. "Although some informal screening is taking place, there is no organized colorectal screening program in Canada."

In addition, FOBT screening could have an impact on incidence of colorectal cancer as this test can detect blood in the stool from pre-cancerous polyps. Once identified, these polyps can be removed by colonoscopy or sigmoidoscopy before they become cancerous.

CERVICAL CANCER

Largely as a result of "ad-hoc" (not organized) screening for cervical cancer with the Pap test, incidence rates have declined by 50 percent and death rates by 60 percent since 1977. The Pap test can identify pre-cancerous lesions that can then be treated, and can identify cancer at an early stage when treatment is most effective.

"Because of the long history of high-quality cervical cancer screening in Canada, the benefit achieved so far may be close to the maximum," says Logan. "However, it might be possible to see even further reductions in both incidence and death for this cancer if all elements of an organized screening

program are incorporated, which would include identifying opportunities to increase participation.”

The special report says that screening in Canada could be enhanced and improved if:

- Canada’s capacity to review scientific evidence about screening was strengthened so that appropriate health policy recommendations could be developed in a timely fashion;
- adequate funding and support was provided for screening programs that scientific evidence shows are effective at reducing cancer death rates;
- more research was done to identify screening tests for those cancers for which there is not yet sufficient evidence to support an organized cancer screening program (for example, the prostate specific antigen [PSA] test for prostate cancer and CT scans for those at high risk of lung cancer).

“Many Canadians have been touched personally by cancer, and millions more have supported friends and family members in their fight against this devastating disease,” says the Honourable Tony Clement, Minister of Health. “This is why the Government of Canada is committed to implementing a five-year Canadian Strategy for Cancer Control.

“We recognize the enormous contribution the Canadian Cancer Society and others in the cancer community have made,” he adds. “We are proud to again partner with them in developing this report, and we are pleased to continue our work with the provinces and territories on national quality standards and targets for cancer screening programs.”

If funding is allocated from provincial governments, implementing organized cancer screening programs is the responsibility of provincial cancer agencies (not every province has a cancer agency). The federal government is supportive of the development of screening policies and guidelines.

“Achieving maximum benefit from cancer screening across Canada requires continued work by all levels of government, cancer organizations, experts and Canadians,” says Logan. “The Canadian Strategy for Cancer Control provides an effective mechanism to bring these groups together so this important issue can be dealt with in a coordinated and collaborative way. By working together we can identify gaps, develop ways to provide more opportunity for people to get screened, and target funding to areas with the most need.

“The Canadian Cancer Society is looking forward to working with the government to implement this important health initiative for Canadians.”

For individual Canadians, Logan urges them to take full advantage of current cancer screening programs. “Talk to your doctors about what cancer screening tests are best for you,” says Logan. “It could save your life.”

Logan adds that the Society will continue its work in developing screening recommendations, getting this information to Canadians, and advocating governments to ensure appropriate screening programs are implemented.

Screening is delivered in two ways in Canada—through organized programs or through what is called “ad-hoc” screening. Screening is most effective and cost-efficient when offered through an organized screening program. There are defined elements for an organized program, which include follow-up guidelines, recruitment strategies, and monitoring and evaluation. Ad-hoc screening may include some of these elements, but not all.

Source: Canadian Cancer Society. Media Release, April 11, 2006. Retrieved August 28, 2009, from www.cancer.ca/ccs/internet/mediareleaselist/0,,3172_615815452_943322260_langId-en,00.html. Used with permission of the Canadian Cancer Society/National Cancer Institute of Canada: *Canadian Cancer Statistics 2006*, Toronto, Canada, 2006.

substances formed when the body digests sodium nitrates. Sodium nitrate has not been banned, primarily because it kills the bacterium *Clostridium botulinum*, which is the cause of the highly virulent food-borne disease called botulism. It should also be noted that the bacteria found in the human intestinal tract may contain more nitrates than a person could ever take in when eating cured meats or other nitrate-containing food products. Nonetheless, concern about the carcinogenic properties of nitrates has led to the introduction of meats that are nitrate-free or contain reduced nitrates.

There is also concern about the possible harm caused by pesticide and herbicide residues. While some of these chemicals cause cancer at high doses in experimental animals, the very low concentrations found in some foods are well within government-established safety levels. Continued research regarding pesticide and herbicide use is essential for maximum

food safety and the continuous monitoring of agricultural practices is necessary to ensure a safe food supply. It is important to find a balance between chemical use and the production of quality food products. Policies protecting consumer health and ensuring the continued improvement in food production through development of alternative, low-chemical pest and herbicide control and reduced environmental pollution should be the goal of prevention efforts.

Infectious Diseases

According to recent estimates, 17 percent of new cancers worldwide will be attributable to infections.⁶⁰ Infections are thought to influence cancer development in several ways, most commonly through chronic inflammation, suppression of the immune system, or chronic stimulation.

HBV, HCV, and Liver Cancer

Viruses such as hepatitis B (HBV) and C (HCV) are believed to stimulate cancer cells in the liver because they are chronic diseases that cause inflammation of liver tissue. This may prime the liver for cancer or make it more hospitable for cancer development. Global increases in HBV and HCV rates and concurrent increases in liver cancer rates provide evidence of such an association.

HPV and Cervical Cancer

Nearly 100 percent of women with cervical cancer have evidence of human papilloma virus (HPV) infection, believed to be a major cause of cervical cancer. HPV is a group of more than 100 different types of viruses, of which 40 are transmitted through sexual activity.⁶¹ In fact, it is estimated that at least 75 percent of sexually active men and women in Canada will have at least one HPV infection in their lifetime. HPV types 16 and 18 are responsible for 70 percent of all cervical cancers while HPV types 6 and 11 are responsible for 90 percent of genital warts.⁶² A vaccine that protects against these HPV types is available for young women in Canada and should be viewed as a complement to cervical cancer screening (that is, the Pap test), not a replacement.⁶³

what do you THINK?

Given what you've read and heard about the immunization available to reduce your risk of developing cervical cancer, would you take it? Why or why not? If you have the immunization, what lifestyle behaviours will you still have to incorporate to (1) further reduce your risk for and/or ensure early detection of cervical cancer, and (2) to prevent the transmission of other sexually transmitted infections?

Medical Factors

Some medical treatments increase a person's risk for cancer. One famous example is the widespread use of the prescription drug diethylstilbestrol (DES), widely used from 1940 to 1960 to control problems with bleeding during pregnancy and to reduce the risk of miscarriage. It was not until the 1970s that the dangers of this drug became apparent in daughters of mothers who took it during their pregnancy, as they were found to have an increased risk for cancers of the reproductive organs. Another example is the use of estrogen replacement therapy for postmenopausal women because of the potential risk of increased uterine cancer. Ironically, chemotherapy, which is used to treat cancer, may also increase risk for other forms of cancer.

TYPES OF CANCER

As noted previously, the term *cancer* refers to hundreds of different diseases. Four broad classifications are made according to the type of tissue from which the cancer arises.

- **Carcinomas**—Epithelial tissues (tissues covering body surfaces and lining most body cavities) are the most common sites for cancers. Carcinoma of the breast, lung, intestines, skin, and mouth are examples. These cancers affect the outer layer of the skin and mouth as well as the mucous membranes. They metastasize through the circulatory or lymphatic system initially and form solid tumours.
- **Sarcomas**—Sarcomas occur in the mesodermal, or middle, layers of tissue—for example, in bones, muscles, and general connective tissue. They metastasize primarily via the blood in the early stages. These cancers are less common but generally more virulent than carcinomas. They also form solid tumours.
- **Lymphomas**—Lymphomas develop in the lymphatic system—the infection-fighting regions of the body—and metastasize through the lymph system. Hodgkin's disease is one type of lymphoma. Lymphomas also form solid tumours.
- **Leukemia**—Cancer of the blood-forming parts of the body, particularly the bone marrow and spleen, is called leukemia. A non-solid tumour, leukemia is characterized by an abnormal increase in the number of white blood cells.

The seriousness and general prognosis of a particular cancer are determined through careful diagnosis by trained oncologists. Once laboratory results and clinical observations have been made, cancers are rated by level and stage of development. Those diagnosed as “carcinoma in situ” are localized and are often curable. Cancers given higher level or stage ratings have spread farther and are less likely to be cured.

Lung Cancer

Symptoms of lung cancer include a persistent cough, blood-streaked sputum, chest pain, and recurrent attacks of pneumonia or bronchitis. Treatment depends on the type and stage of the cancer. Surgery, radiation therapy, and chemotherapy are treatment options. If the cancer is localized, surgery is usually the treatment of choice. If the cancer has spread, surgery is used in combination with radiation and chemotherapy. Despite advances in medical technology, survival rates for lung cancer have improved only slightly in recent years. Just 15 percent of people with lung cancer

(13 percent for men; 18 percent for women) live five or more years after diagnosis.⁶⁴

Prevention

Smokers, especially those who smoked for more than 20 years, and people exposed to certain industrial substances such as arsenic and asbestos or to radiation from occupational, medical, or environmental sources, are at the highest risk for lung cancer.⁶⁵ Exposure to secondhand cigarette smoke increases the risk for nonsmokers. Some researchers have theorized that as many as 90 percent of all lung cancers could be prevented if people did not smoke. Quitting smoking—or not starting—are the best measures you can take to prevent lung cancer. Any time is a good time to quit smoking, with health improvements noted almost immediately (see Chapter 10 for more details).

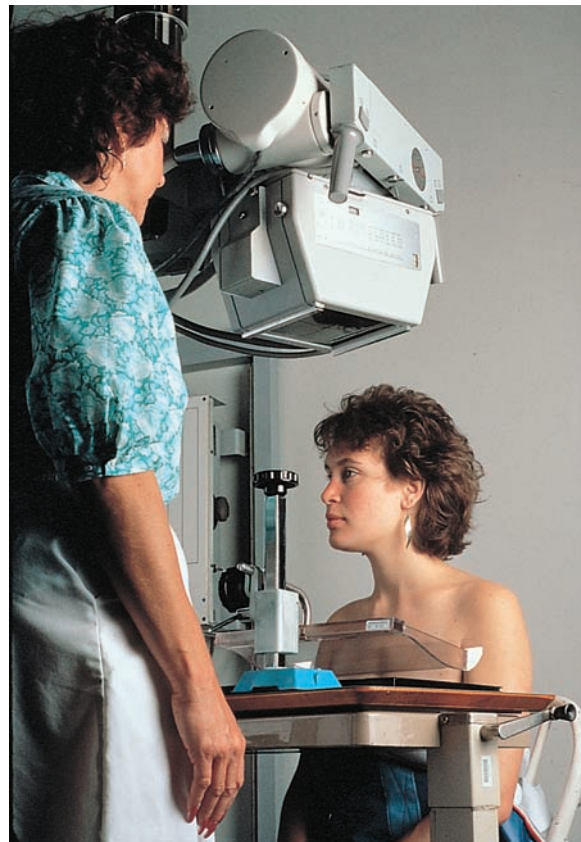
Breast Cancer

About one in nine women will develop breast cancer at some time in their lives and one in 27 will die as a result of it.⁶⁶ Although this oft-repeated ratio has frightened many women, it represents a woman's lifetime risk. Thus, not until the age of 80 does a woman's risk of breast cancer rise to one in nine.⁶⁷ Risks at earlier ages include:

- Age 50: 1 in 50
- Age 60: 1 in 24
- Age 70: 1 in 14

Breast cancer incidence among women rose steadily over the past three decades—although the rate of increase is declining somewhat—whereas mortality rates for breast cancer declined slightly since 1986 and particularly since 1990. This pattern of divergent trends is consistent with benefits achieved through screening programs and improved treatments.⁶⁸

Breast cancer can and does occur in men too. About 1 percent of all estimated breast cancer cases will occur in men.⁶⁹ Men and women share the same risk factors for breast cancer and the same warning signs.⁷⁰ Warning signs of breast cancer include persistent breast changes such as a lump, thickening, swelling, dimpling, skin irritation, distortion, retraction or scaliness of the nipple, nipple discharge, pain, or tenderness. Risk factors for breast cancer may vary considerably.⁷¹ Typically, risk factors include being over the age of 40, having a primary relative (a mother, sister, or daughter) who had breast cancer, never having had children or never having breastfed, having your first child after age 30, early menarche, a late age of menopause, obesity after menopause, consuming two or more drinks of alcohol per day, and a higher education and socioeconomic



Mammography and other early detection techniques greatly increase a woman's chance of surviving breast cancer.

status. Other potential risk factors include a dietary intake high in saturated fats; exposure to pesticides and other chemicals; weight gain, particularly after menopause; physical inactivity; and a genetic predisposition.

Although risk factors are useful tools, they do not always adequately predict individual susceptibility. However, because of increased awareness, better diagnostic techniques, and improved treatments, individuals with breast cancer have a better chance of surviving today. A key factor in survival rests with individual recognition of early symptoms.⁷²

Prevention

Research on the role of physical activity in reducing the risk for breast cancer has generated excitement in the scientific and lay communities. In one study of more than 1000 women aged 40 or younger (545 with breast cancer, 545 without), physical activity patterns were examined. The women who averaged four hours of physical activity per week since menstruating had a 58 percent lower risk. Researchers speculated that physical activity may protect women by altering the production of the ovarian hormones estrogen and progesterone during menstrual cycles.⁷³

try it NOW!

Get familiar with your breasts! The survival rate for individuals with breast cancer increased with early detection and treatment. Make a commitment to look at your breasts at least once per month (see “Know Your Breasts” for the best method to do so). It is by taking a proactive role in your health that you can be involved in cancer prevention.

Regular self-examination (see Figure 11.5) and mammography offer the best hope for early detection of breast cancer. Although breast cancer screening with mammography and clinical breast exam could reduce mortality by nearly one-third in most women aged 50 to 69 years if they were regularly screened, only 34 percent participate in organized screening in Canada.⁷⁴ All women, regardless of age, should become familiar with their breasts, how they feel, and what is normal for them (see Textbox 11.5 for more details). Despite the controversy over the cost-effectiveness and usefulness of a mammogram before the age of 40, many health professionals recommend that if you have any of the risk factors listed above, are prone to fibrous breasts, and are worried about your condition, a mammogram may be warranted. Consult with your physician if you are in doubt, as it is generally best to be a proactive health consumer.

Treatment

Today, people with breast cancer (similar to any other type of cancer) have many treatment options. Fortunately, there are services available to help you get the best information, even if you live in a fairly remote area of the country. The important thing to remember is that, in most instances, taking the time to thoroughly check your physician’s track record and his or her philosophy on the best treatment is always a good idea. Often, cancer support groups can give you invaluable information and advice. Treatments range from the simple lumpectomy to radical mastectomy to various combinations of radiation or chemotherapy. Figure 11.5 reviews these options. Remember that it is always a good idea to seek more than one opinion before making a decision.

what do you THINK?

Why do you think so few women get examined for breast cancer? Do you think men are better at obtaining recommended screenings for cancers? Why or why not? Are you familiar with your breasts? Would you recognize any changes?

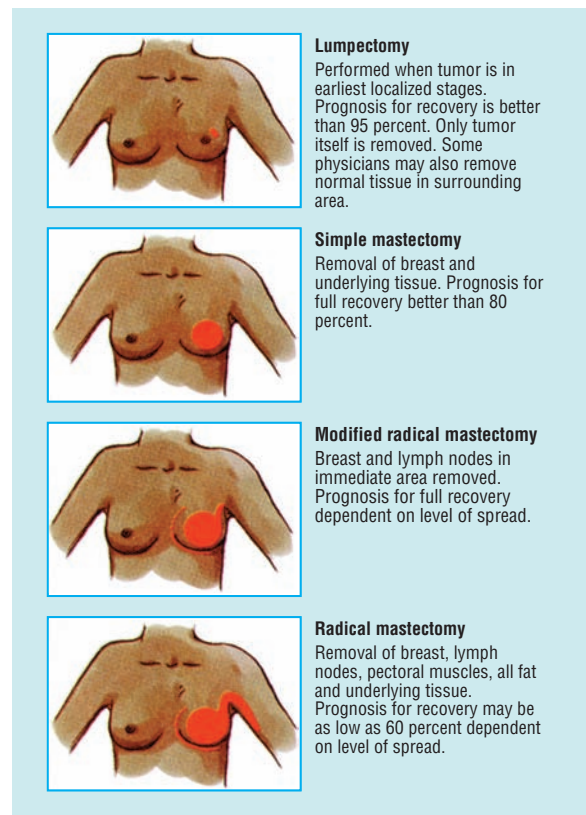


FIGURE 11.5
Selected Surgical Procedures for Diagnosed Breast Cancer

Colorectal Cancers

Although colorectal cancers are the second leading cause of cancer deaths in men and women, many people are unaware of their potential risk. Bleeding from the rectum, blood in the stool, and changes in bowel habits are the major warning signals. People over the age of 40, with a family history of colorectal cancer, a personal or family history of polyps (benign growths) in the colon or rectum, or inflammatory bowel problems such as colitis have an increased risk. Canadian and international researchers discovered four new genes related to colorectal cancer.⁷⁵ This adds to the previous six already identified, and together these genes indicate an up to six-fold increase in lifetime risk of developing colorectal cancer. Further, a dietary intake high in fats or low in fibre may also increase risk.⁷⁶

Because colorectal cancer tends to spread slowly, the prognosis is quite good if it is caught in the early stages. Treatment often consists of radiation or surgery. Chemotherapy, although not used extensively in the past, is a possibility today. A permanent colostomy, the creation of an abdominal opening for

Know Your Breasts

No matter what your age, breast health starts with knowing your breasts. You should be aware of what is normal for your breasts even if you are having regular screening tests. Many women discover their own breast cancer through changes in the look and feel of their breasts.

Breast tissue covers an area larger than just the breast. It extends up to the collarbone and from the armpit across to the breastbone in the centre of the chest. The breasts sit on the chest muscles that cover the ribs.

Become familiar with your breast tissue by looking at and feeling your breasts. Experts used to suggest that this should be done by following a particular method every month. Research has shown that this isn't necessary. There really isn't a right or wrong way to check your breasts, as long as you get to know the whole area of your breast tissue—up to your collarbone, under your armpits and including your nipples—well enough to notice changes. So get to know your breasts and what is normal for you, any way that works best for you.

It may be normal for your breasts to be lumpy or tender before your period. Breast tissue changes with age, too. Understanding what is normal for you will help you recognize changes and know what to report to your doctor.

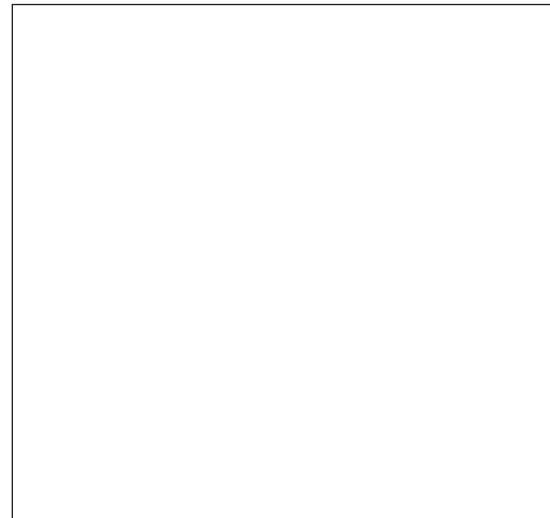
WHAT TO LOOK FOR

Remember, lumps in the breast are very common, especially just before your period. Most lumps are not breast cancer.

Most often breast cancer is first noticed as a painless lump in the breast or armpit. You or your partner may discover the lump, or your doctor may find it during a routine physical exam or screening mammogram.

Other signs might include:

- lump or swelling in the armpit
- changes in breast size or shape
- dimpling or puckering of the skin—thickening and dimpling skin is sometimes called orange peel



- redness, swelling, and increased warmth in the affected breast
- inverted nipple—nipple turns inwards
- crusting or scaling on the nipple

Often, these symptoms are not caused by cancer. Other health problems can cause them. Testing is necessary to make a diagnosis.

Source: "Know Your Breasts," and "Signs and Symptoms of Breast Cancer," 2008 Canadian Cancer Society. Retrieved December 2, 2008 from www.cancer.ca/canada-wide/prevention/get%20screened/know%20your%20breasts.aspx?sc_lang=eng. All rights reserved.

the elimination of body wastes, is seldom required for people with colorectal cancer.⁷⁷

Prostate Cancer

Cancer of the prostate continues to be the most frequently occurring cancer for men. It is the third leading cause of cancer deaths in males. In 2008, it is estimated that 24 700 Canadian men will be diagnosed with prostate cancer and about 4300 will die of the disease.⁷⁸ Beginning in 1994, the incidence of prostate cancer began to decline after increasing

rapidly for several years. It was noted in 2008 that mortality rates due to prostate cancer continued to decline.⁷⁹

Most signs and symptoms of prostate cancer are nonspecific—that is, they mimic the signs of infection or enlarged prostate. Symptoms include weak or interrupted urine flow or difficulty starting or stopping the urine flow; the need to urinate frequently; pain or difficulty in urinating; blood in the urine; and pain in the lower back, pelvis, or upper thighs. Many males mistake these symptoms for other non-specific conditions, such as infections, and delay treatment.



Prevention of skin cancer includes keeping a careful watch for any new pigmented growths and for changes to any moles. Melanoma symptoms, as shown in the left photo, include scalloped edges, asymmetrical shapes, discolouration, and an increase in size. Basal cell carcinoma and squamous cell carcinoma (middle and right photos) should be brought to your physician's attention but are not as deadly as melanoma.

Fortunately, even with so many generalized symptoms, most prostate cancers are detected while they are still localized and have not progressed. Men with prostate cancer have an average five-year survival rate of 95 percent.⁸⁰ Because the incidence of prostate cancer increases with age, every man over the age of 40 should have an annual prostate examination.⁸¹

Skin Cancer

Skin cancer may be one of the most underrated of all cancers, particularly among young people. Although it is true that most people do not die of the common, highly curable basal or squamous cell skin cancers, many people do not know that another, highly virulent form of skin cancer known as **malignant melanoma** has become a major killer of young women. Rates for men over 50 are also increasing. Estimates for 2009 indicated that 5000 Canadians will be diagnosed with melanoma (2700 men; 2300 women), with 940 deaths expected.⁸² Yet many people still bask unprotected on beaches, apparently not making the connection between death from melanoma and sunlight overexposure. The perception that health and a well-tanned body go together couldn't be farther from the truth.

Symptoms

Many people do not have any idea what to look for when considering skin cancer. Any unusual skin condition, especially a change in the size or colour of a mole or other darkly pigmented growth or spot, should be considered suspect. Scaliness, oozing, bleeding, the appearance of a bump or nodule, the spread of pigment beyond the border, change in sensation, itchiness, tenderness, and pain are all warning signs of the basal and squamous cell skin cancers. However, melanoma symptoms are slightly different. Often there is a sudden or progressive change in a mole's appearance from a small, mole-like growth to a

large, ulcerated, and easily-prone-to-bleeding growth. A simple ABCDE rule outlines the warning signals of melanoma:

- **A** is for *asymmetry*. One half of the mole does not match the other half.
- **B** is for *border irregularity*. The edges are ragged, notched, or blurred.
- **C** is for *colour*. The pigmentation is not uniform.
- **D** is for *diameter* greater than 6 millimetres.
- **E** is for *evolving*. The skin condition evolves/changes over time.

Any one of these symptoms should cause you to visit a physician.⁸³

Testicular Cancer

Testicular cancer is currently one of the most common types found in young adult men. Men between the ages of 17 and 34 are at greatest risk. There has been a steady increase in diagnoses over the past several years in this age group. It is estimated that 900 new cases of testicular cancer will be found in 2009 and 30 men will die as a result of it.⁸⁴

try it NOW!

Get in the habit of doing self exams. The survival rate for individuals with testicular cancer increases with early detection and treatment. Make a commitment to perform a testicular exam once per month (see Figure 11.6 for the best method to do so). It is by taking a proactive role in your health that you can be involved in cancer prevention.

Malignant melanoma: A virulent cancer of the melanin (pigment-producing portion) of the skin.

Follow the instructions in the diagram carefully and examine your testes immediately after your next hot bath or shower. Heat causes the testicles to descend and the scrotal skin to relax, making it easier to find unusual lumps.

Examine each testicle by placing the index and middle fingers of both hands on the underside of the testicle and the thumbs on the top. Gently roll the testicle between your thumb and fingers, feeling for small lumps.

Changes or anything abnormal will appear at the front or side of your testicle. Did you find any unusual lumps? Are there any unusual signs of any kind? Are there any markings or lumps at any site?

Keep in mind that not all lumps are a sign of testicular cancer. Unusual lumps at any location, however, should be checked by a physician. Early detection greatly increases your chances of a complete cure. Repeat the examination every month and record your findings.

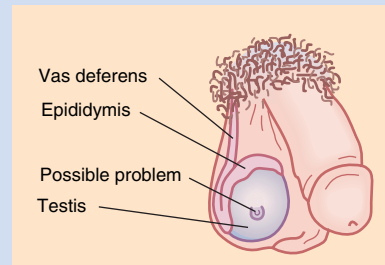


FIGURE 11.6
Testicular Self-Exam

Although the exact cause of testicular cancer is unknown, several possible risk factors have been identified. Men with undescended testicles appear to be at greatest risk. In addition, some studies indicate that there may be a genetic influence. In general, testicular tumours are first noticed as a painless enlargement of the testis or as an apparent thickening in testicular tissue. Because this enlargement is often painless, it is extremely important that all men, particularly those between the ages of 17 and 34 years, practice regular testicular self-examination (see Figure 11.6). If a suspicious lump or thickening is found, medical follow-up should be sought immediately.

Ovarian Cancer

Current estimates are that 2500 new cases of ovarian cancer will be diagnosed in 2009, with 1750 women succumbing to the disease.⁸⁵ Ovarian cancer is often silent, showing no obvious signs or symptoms until late in its development. The most common sign is enlargement of the abdomen (or a feeling of bloating) in women over the age of 40. Other symptoms include vague digestive disturbances, such as gas and stomach aches that persist without explanation.⁸⁶

The risk for ovarian cancer increases with age, with the highest rates found in women in their 60s. Women who never had children are twice as likely to develop ovarian cancer as those who have. The main risk factor appears to be exposure to the reproductive hormone estrogen. Women who have multiple pregnancies or use oral contraceptives, which inhibit estrogen, are at lower risk. In addition, having one or more primary relatives (mother, sisters, grandmothers) who had the disease increases individual risk. With the exception of Japan, the highest incidence rates are reported in industrialized countries.⁸⁷

Prevention

One study indicated that dietary intake may play a role in ovarian cancer.⁸⁸ Researchers found that when comparing 450 Canadian women newly diagnosed with ovarian cancer with 564 demographically similar, healthy women, the women without ovarian cancer had a dietary intake lower in saturated fat. Such results, particularly when combined with cardiovascular risks and other health risks, may provide yet another reason to reduce your overall intake of saturated fats.

The best way to protect yourself from ovarian cancer is with annual, thorough pelvic examinations. **Pap tests,**

part of a pelvic exam, although useful in detecting cervical cancer, do not reveal ovarian cancer. Women over the age of 40 should have a cancer-related checkup every year. If you have any of the symptoms of ovarian cancer and they persist, see your doctor.

Uterine Cancer

Most cervical and endometrial (that is, uterine) cancers develop in the body of the uterus, usually in the endometrium (lining). The rest develop in the cervix, located at the base of the uterus. The overall incidence of early-stage uterine cancer—that is, cervical cancer—has decreased 50 percent since 1977, although it is estimated that 4400 new cases will still be diagnosed in 2009.⁸⁹ Further, invasive, later-stage forms of the disease appear to be decreasing, and mortality rates from cervical cancer have declined by 60 percent since 1977. Much of this apparent trend may be due to more effective regular screenings of younger women using the Pap test, a procedure in which cells taken from the cervical region are examined for abnormal cellular activity. Although these tests are very effective for detecting early-stage cervical cancer, they are less effective for detecting cancers of the uterine lining and not at all effective for detecting cancers of the fallopian tubes or ovaries.⁹⁰

Risk factors for cervical cancer include early age of first vaginal intercourse, multiple sex partners, cigarette smoking, and sexually transmitted infections such as the herpes virus and HPV (the cause of genital warts). For endometrial cancer, a history of infertility, failure to ovulate, obesity, and treatment with tamoxifen or unopposed estrogen therapy are major risk factors.⁹¹ Early warning signs of uterine cancer include bleeding outside the normal menstrual period or after menopause or persistent unusual vaginal discharge. These symptoms should be checked by a physician immediately.⁹²

Leukemia

Leukemia is a cancer of the blood-forming tissues that leads to proliferation of millions of immature white blood cells. These abnormal cells crowd out normal white blood cells (which fight infection), platelets (which control hemorrhaging), and red blood cells (which prevent anemia). As a result, symptoms such as fatigue, paleness, weight loss, easy bruising, repeated infections, nosebleeds, and other forms of hemorrhaging occur. In children, these symptoms can appear suddenly.⁹³

Leukemia can be acute or chronic in nature and can strike both sexes and all age groups. Chronic

leukemia can develop over several months and have few symptoms. Although many people believe that leukemia is a childhood disease, leukemia strikes more adults than children.⁹⁴ Estimates for 2009 are that 4700 new cases of leukemia will be diagnosed (2700 in men; 1950 in women).⁹⁵ Further 2500 deaths are expected in 2009 from leukemia even though there has been a dramatic increase in the survival rate of patients with acute lymphocytic leukemia since the 1970s.

Oral Cancer

Cancer may develop in any part of the oral cavity. Most often it is found on the lips, the lining of the cheeks, the gums, and the floor of the mouth. The tongue, the pharynx, and the tonsils are other common sites. Current estimates (from 2009) are that there will be 3400 new cases (2200 in men; 1150 in women) of oral cancer diagnose in Canada with 1150 deaths forecasted.⁹⁶ Tobacco use—smoking, chewing, or dipping—is the most common risk factor for oral cancer.

what do you THINK?

What types of cancers are you and your friends at greatest risk for right now? What part(s) of your lifestyle put you most at risk? What are you willing to change?

FACING CANCER

As previously mentioned, 45 percent of men and 40 percent of women are likely to develop cancer in their lifetime, with approximately one in four Canadians dying as a result. At the current rates, cancer mortality will soon surpass mortality from CVD. Many factors have contributed to the rise in cancer mortality—one being simply longer life expectancies—but the increase in the incidence of lung cancer is probably the most important reason. However, recent advances in diagnosis and treatment have reduced much of the fear and mystery that surround cancer. Further, research continues with

Pap test: A procedure in which cells taken from the cervical region are examined for abnormal cellular activity.

various studies, including a large, population-based prospective study in Alberta, called The Tomorrow Project.⁹⁷

Detecting Cancer

The earlier a person is diagnosed with cancer, the better his or her prospect for survival. Various high-tech diagnostic techniques exist to detect cancer. New high-technology diagnostic imaging techniques have replaced exploratory surgery for some cancer patients. **Magnetic resonance imaging (MRI)** is one example of such technology. In MRI, a huge electromagnet is used to detect hidden tumours by mapping the vibrations of the various atoms in the body on a computer screen. **Computerized axial tomography scanning (CAT scan)** uses X-rays to examine parts of the body. In both of these painless, noninvasive procedures, cross-section pictures can show a tumour's shape and location more accurately than conventional X-rays.

These medical techniques, along with regular self-examinations and checkups, play an important role in the early detection and secondary prevention of cancer. See the Building Communication Skills text box for recommendations regarding regular cancer screening. Familiarize yourself with the Seven Warning Signals of cancer, as shown in Figure 11.7. If you notice any of these signs, and they do not appear to be related to anything else, you should see a doctor immediately. Make sure that appropriate diagnostic tests are completed whenever any warning signs

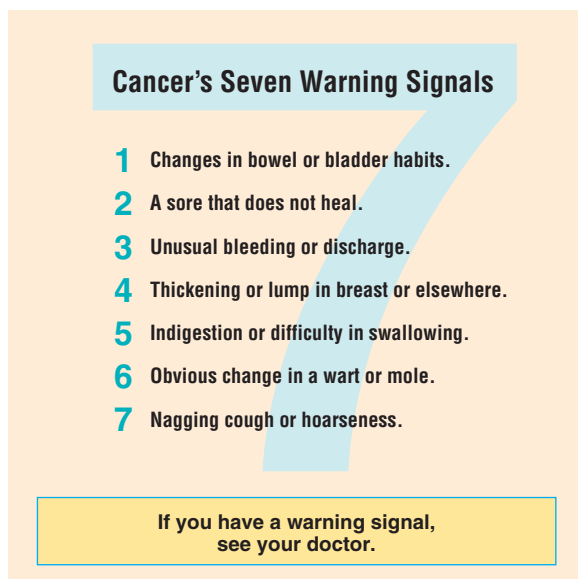


FIGURE 11.7
Cancer's Seven Warning Signs

appear. Also make a realistic assessment of your individual risk factors and try to avoid those you have control over.

New Hope in Cancer Treatments

Although cancer treatments have changed dramatically over the last 25 years, surgery, in which the tumour and surrounding tissue are removed, is still most common. Today's surgeons tend to remove less surrounding tissue than previously and to combine surgery with either **radiotherapy** (the use of radiation) or **chemotherapy** (the use of drugs) to kill cancerous cells.

Radiation works by destroying malignant cells or stopping cell growth. It is most effective in treating localized cancer masses. In the process of destroying malignant cells, radiotherapy also destroys healthy cells.

When cancer has spread throughout the body, it is necessary to use some form of chemotherapy. Similar to radiation therapy, chemotherapy attacks and kills cancerous and healthy cells. Ongoing research will result in new, less toxic drugs more effective at attacking cancerous cells only.

Whether used alone or in combination, radiotherapy and chemotherapy have possible side effects, including extreme nausea, nutritional deficiencies, hair loss, and general fatigue. Long-term damage to the cardiovascular system and many other systems of the body can be significant. It is important that you discuss these matters fully with your doctor.

Psychosocial and behavioural research has become increasingly important as health professionals seek answers to questions concerning complex lifestyle factors that appear to influence risks for cancer, as well as the survivability of patients with particular psychological and mental health profiles. Also, health-care practitioners have become more aware of the psychological needs of patients and families and have begun to tailor treatment programs to meet the diverse needs of different people. In particular, individuals with cancer indicate higher levels of satisfaction and obtain better health outcomes when they are able to discuss their experience with health professionals.⁹⁸ Research by Bender et al.⁹⁹ indicates that women with breast cancer have many questions about the pain they will experience as a result of their treatment and of the cancer itself.

Life after Cancer

Heightened public awareness and an improved prognosis for people with cancer has made the cancer experience less threatening and isolating than it once

Screening Guidelines for the Early Detection of Cancer in Asymptomatic People

CANCER-RELATED CHECKUP

For individuals undergoing periodic health examinations, a cancer related checkup should include health counselling and, depending on a person's age, might include examination for cancers of the thyroid, oral cavity, skin, lymph nodes, testes, and ovaries, as well as for some nonmalignant diseases.

BREAST

Women 40 and older should have an annual mammogram and an annual clinical breast exam (CBE) performed by a health care professional and should perform monthly breast self-examination (BSE). Ideally, the CBE should occur before the scheduled mammogram.

Women aged 20–39 should have a clinical breast exam performed by a health care professional every three years.

Women should know how their breasts normally feel and report any breast change promptly to their health care providers. Breast self-exam is an option for women starting in their twenties.

Women at increased risk (for instance, those with a family history, genetic tendency, or past breast cancer) should talk with their doctors about the benefits and limitations of starting mammography screening earlier, having additional tests (that is, breast ultrasound and MRI), or having more frequent exams.

COLON AND RECTUM

Beginning at age 50, men and women should follow one of the examination schedules below:

- A fecal occult blood test (FOBT) every year, or a flexible sigmoidoscopy (FSIG) every five years, or both annual fecal occult blood test and flexible sigmoidoscopy every five years*
- A double contrast barium enema every 5 to 10 years
- A colonoscopy every 10 years

*Combined testing is preferred over either annual FOBT or FSIG every five years alone. People who are at moderate or high risk for colorectal cancer should talk with a doctor about a different testing schedule.

PROSTATE

The American Cancer Society recommends that both the prostate-specific antigen (PSA) blood test and the digital rectal examination be offered annually, beginning at age 50, to men who have a life expectancy of at least 10 more years.

Men at high risk (African Canadian men and men with a strong family history of one or more first-degree relatives diagnosed with prostate cancer at an early age) should begin testing at age 45. Information should be provided to patients about what is known and what is uncertain about the benefits and limitations of early detection and treatment of prostate cancer so that they can make an informed decision.

UTERUS

- **Cervix:** Screening should begin approximately three years after a woman begins having vaginal intercourse but no later than 21 years of age. Screening should be done every year with Pap tests or every two years using liquid-based tests. At or after age 30, women who have had three normal tests in a row may get screened every two to three years, unless they have certain risk factors, such as HIV infection or a weak immune system. Screening after total hysterectomy (with removal of the cervix) is not necessary unless the surgery was done as a treatment for cervical cancer.
- **Endometrium:** The American Cancer Society recommends that all women be informed about the risks and symptoms of endometrial cancer and be strongly encouraged to report any unexpected bleeding or spotting to their physicians. Annual screening for endometrial cancer with endometrial biopsy beginning at age 35 should be offered to women with or at risk for hereditary nonpolyposis colon cancer (HNPCC).

Source: From *Cancer Facts and Figures 2007*. Copyright © 2007, American Cancer Society. Used with permission from American Cancer Society, Atlanta, GA.

was. Assistance for individuals with cancer is more readily available than ever before. Cancer support groups, cancer information workshops, and medical consultation are just a few of the forms of assistance now offered in many communities. Increasing efforts in cancer research, improvements in diagnostic equipment, and advances in treatment provide hope for the future.

Magnetic resonance imaging (MRI): A device that uses magnetic fields, radio waves, and computers to generate an image of internal tissues of the body for diagnostic purposes without the use of radiation.

Computerized axial tomography (CAT scan): A machine that uses radiation to view internal organs not normally visible on X-rays.

Radiotherapy: The use of radiation to kill cancerous cells.

Chemotherapy: The use of drugs to kill cancerous cells.

Gilda's Club: A Support Community for Thousands Living with Cancer

Gilda's Club is named in honour of the late comedian Gilda Radner, who, when describing the emotional and social support she received when she had cancer, called for such places of participation, education, hope, and friendship to be made available for people with cancer and their families and friends everywhere.

WHAT IS GILDA'S CLUB?

A free, non-residential, emotional and social support community for men, women, and children living with cancer. It includes not only people affected with cancer, but their families, caregivers, significant others and friends—because cancer affects everyone, not only the person with the physical disease. Unlike a social service agency, Gilda's Club is a community centre that is driven by its membership. It is open to all, without referral and at no cost. Funding is solicited from private individuals, corporations, and foundations.

THE UNIQUE VISION OF GILDA'S CLUB

Gilda's Club provides a meeting place where people with cancer can come together to learn how to live with cancer and celebrate the challenges and opportunities of everyday life. Its philosophy is premised on the belief that people gather strength and knowledge from support groups and social interaction in a cancer support community.

The first Gilda's Club, including a worldwide training centre, opened its signature red door in New York City in 1995. Many affiliates are open or under development in different parts of the world. Canada has one in Toronto and one in Montreal. Since 1995, thousands of members now attest to the fact that Gilda's Club has helped change their lives by restoring control and enabling them to plan their own emotional and social support, thus strengthening and enriching the entire family.

Source: Retrieved on March 21, 2006 from www.gildasclubtoronto.org.

Managing Your Health



Although it is easy to read through a chapter like this and learn what we should be doing to keep ourselves healthy, few of us ever really think about what it takes to prevent serious illness. Relationships, financial worries, grades, time for fun, and other issues often take precedence over our long-term commitments to wellness.

MAKING DECISIONS FOR YOU

List the five things that matter to you most right now. Is appearance part of your list? Is being able to get through a day without feeling tired or unusually fatigued important? Are you motivated to change your health behaviours and take action to reduce your heart disease, diabetes, and cancer risks by engaging in more physical activity, reducing stress, and eating well? Was there anything about this chapter that made you think you should make a change now? Why is this important? What actions do you plan to take?

CHECKLIST FOR CHANGE: MAKING PERSONAL CHOICES

- Determine your hereditary risks. If they are high, outline the steps that you can take to reduce your overall risk, focusing on lifestyle and the factors you can control.
- Learn about the normal CVD risk changes that occur with age. Take the extra steps needed to minimize these risks.
- If you smoke, quit. If you don't smoke, don't start. Avoid secondhand smoke.
- If you chew, dip, or use snuff, quit. If you don't, don't start.
- Find out your cholesterol levels, including HDL and LDL levels.
- Reduce saturated and trans fat in your diet and take steps to reduce your triglyceride and cholesterol levels.
- Get out and do some physical activity. Every day. Even a relaxing walk every day is effective at reducing risk. Nobody says you have to run until you drop. Take it easy, but keep it up.
- Control your blood pressure. Monitor it regularly and see your doctor if you have high blood pressure.
- Manage your weight. Obesity is a significant risk factor for CVD, diabetes, and cancer.
- Manage your stress.
- Avoid excessive sunlight. When in the sun, wear sunscreen that contains at least SPF 15.
- Avoid excessive alcohol consumption.
- Monitor estrogen use—in the form of oral contraceptives or hormone replacement therapy, for instance—carefully.
- Avoid occupational exposures to carcinogens. Exposure to several different industrial agents (nickel, chromate,

asbestos, vinyl chloride, and so on) increases risk for various cancers.

- Eat your vegetables and fruits. Eat at least seven or eight servings of fruits and vegetables every day to reduce your risk for lung, colon, pancreatic, stomach, bladder, esophageal, mouth, and throat cancer.
- Be happy; take care of your spiritual self.

CHECKLIST FOR CHANGE: MAKING COMMUNITY CHOICES

- Take a class in CPR. Your local Red Cross likely offers them; courses may also be available on campus. Be prepared to offer bystander CPR.
- Consider becoming an emergency medical technician (EMT). You don't have to make a career of it. But you could be prepared to save people in your dorm, your office building, and your community.
- Does your community have any major sources of carcinogens (toxic waste dumps, chemical factories, and so on)? What precautions are taken to ensure that any environmental risks are reduced?
- Does the Canadian Cancer Society have a local office at which you could volunteer some time?
- Does your community have cancer support groups that you could join if you were found to have cancer? Where would you find out about such support groups?

CRITICAL THINKING

You've been good friends with one of your 30-something neighbours for some time. Recently, after spending a good deal of time working on a community project together, you start to date. After a few terrific dates, during which you really hit it off socially, you find out that your friend had cancer two years ago, and that there is a 50-percent chance it will return within five years. You love this person, but wonder what to do. What if you commit yourself to this relationship and the cancer returns? You've always wanted to have children, but are concerned about what would happen if your partner died of cancer while your children are young. On the other hand, there is a 50-percent chance that the cancer will not return.

Using the DECIDE model described in Chapter 1, decide whether or not you would continue the relationship. Does it make any difference to you whether the person who survived cancer is male or female? Explain why or why not.

✿ DISCUSSION QUESTIONS

1. List the different types of cardiovascular diseases. Compare and contrast their symptoms, risk factors, prevention, and treatment.
 2. Discuss why age is such an important factor in women's risk for CVD. What can be done to lower women's risks in later life?
 3. Describe the role of healthy eating in preventing CVD.
 4. Describe the unique role of physical activity in preventing and treating CVD.
 5. What is diabetes? Why are more people currently being diagnosed with type 2 diabetes?
 6. What is cancer? What is the difference between a benign and a malignant tumour?
 7. Describe the general risks for developing cancer. Which of these factors relate to you? What can you do to reduce this risk?
 8. Why are breast and testicular self-exams important?
 9. What symptoms signal that you have cancer instead of a minor illness? How soon should you seek treatment for any of the seven warning signs?
-

APPLICATION EXERCISE

Reread the “Consider This . . .” scenario at the beginning of the chapter and answer the following questions.

1. Consider Cassandra's case in the chapter opener. Why do you think so many young Canadians deny their risk for skin cancer?
 2. As a friend of Cassandra's, what advice might you give her?
 3. Think about close friends or people in your family who also are at risk for developing skin cancer or any other form of cancer. What could you do to help them become aware of their risks without preaching to them about their lifestyle choices and turning them off?
 4. What kinds of community efforts are needed to change the perceptions that a “healthy glow” results from suntanning?
-

MYSEARCHLAB EXERCISE

1. Log on to www.MySearchLab.com.
2. Find an article to share with the class that discusses risk factors for cardiovascular diseases, type 2 diabetes, or cancer. Share what you learn with your group or class. With your group, make suggestions to reduce these particular risks. Share these suggestions with the class and create a master list for the class to learn to live by.