

“He who says he can, and he who says he can’t are both right.”

— Henry Ford



# Maximizing Your Heart Health

## objectives

After reading this chapter, you will be able to:

1. Identify the five primary heart disease risk factors.
2. Identify the seven secondary heart disease risk factors.
3. Identify the controllable and uncontrollable risk factors for coronary heart disease (CHD).
4. Define *arteriosclerosis*, *atherosclerosis*, *angina pectoris*, *myocardial infarction*, and *stroke*.
5. Identify the symptoms of a heart attack and stroke.
6. Identify the role of cholesterol and saturated fats in the development of atherosclerosis.
7. Explain the roles of HDL and LDL in heart health.
8. Explain why smoking cigarettes increases heart disease risk.
9. Identify normal blood pressure range and the blood pressure reading that indicates hypertension.
10. Identify the cholesterol reading that indicates high blood cholesterol.
11. Recognize the personality traits of Type A behavior that increase heart disease risk.
12. Recognize five of eight heart disease risk factors that are positively affected by exercise and identify the two trends that will affect cardiovascular disease in the future.

## terms

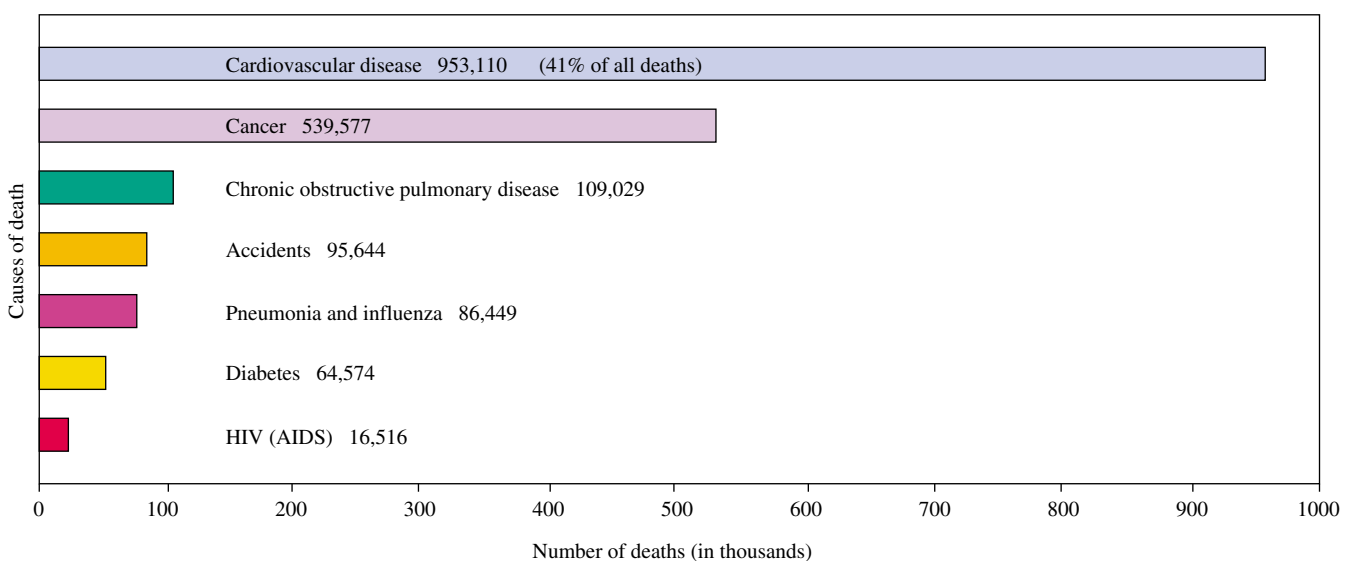
- Angina pectoris
- Arteriosclerosis
- Atherosclerosis
- Cardiovascular disease
- Cholesterol
- Collateral circulation
- Diabetes mellitus
- Diastolic pressure
- High-density lipoprotein (HDL)
- Homocysteine
- Hot reactors
- Hypercholesterolemia
- Hypertension
- LDL cholesterol receptors
- Low-density lipoprotein (LDL)
- Myocardial infarction
- Plaque
- Primary risk factors
- Risk factors
- Secondary hypertension
- Secondary risk factors
- Stroke
- Systolic pressure
- Triglycerides
- Type A, B, and C emotional behavior patterns

The number one killer in America is not cancer, accidents, or AIDS. It is heart disease (Fig. 7-1). Make no mistake, cancer and other diseases are real threats, but cardiovascular diseases kill almost twice as many victims as all other leading causes of death. The tragedy is compounded because cardiovascular diseases are often inaccurately perceived as diseases of the elderly. On the contrary, based on data from the Framingham Heart Study (Chapter 1); approximately 45 percent of heart attack victims are under the age of 65, and 5 percent are under the age of 40. Adolescents, those aged 12 to 17, are not exempt from the grim heart disease picture either. Now it is revealed that most teenagers (63 percent) already have two or more risk factors for heart disease. The American Heart Association revealed that one in six teenagers and one in three people in their 20s showed evidence of atherosclerosis. This information was obtained from autopsies of young accident victims. This is alarming information and confirms that the disease process starts early in life. These diseases demand attention because they are killing too many Americans in the prime of their lives. Don't become complacent! The way you are living your life now determines your future heart health. Many coronary heart disease deaths are preventable. You can reduce your chances of developing coronary heart disease by assessing your current level of risk and by learning ways to reduce those identified risk factors. We realize that education and behavior change are the keys.

Read the "Top Ten Ways to Protect Your Heart." This chapter will provide you with valuable information about each of the items and guide you toward maximizing your heart health.

## Impact of Cardiovascular Disease

Cardiovascular disease (CVD) accounts for nearly 41 percent of deaths in the United States according to the American Heart Association (AHA) statistics. In other words, 1 out of 2.4 Americans who die each year does so from CVD. How do the death rates from cancer, accidents, and AIDS compare to that from CVD? See Figure 7-1. **Cardiovascular disease** (from *cardio* meaning "heart" and *vascular* meaning "blood vessels") is a condition in which either blood flow through the heart and body is impeded or the electrical impulse of the heart muscle is interrupted. Common forms of CVD include heart attack, stroke, high blood pressure, angina pectoris, irregular heartbeat, congestive heart failure, rheumatic heart disease, and congenital heart disease. More than one in five Americans suffers from these related disorders. See Figure 7-2 to see the toll taken by these various forms of CVD. Studies show that lower educational levels are directly associated with increased incidence of death from heart disease. Look at Figures 7-3, 7-4, 7-5, 7-6 and 7-7. What is the leading cause of death for each group?



**figure 7-1** Leading causes of death for men and women in the United States, (1997 estimates). There is no question about it, heart disease continues to be a serious health threat.

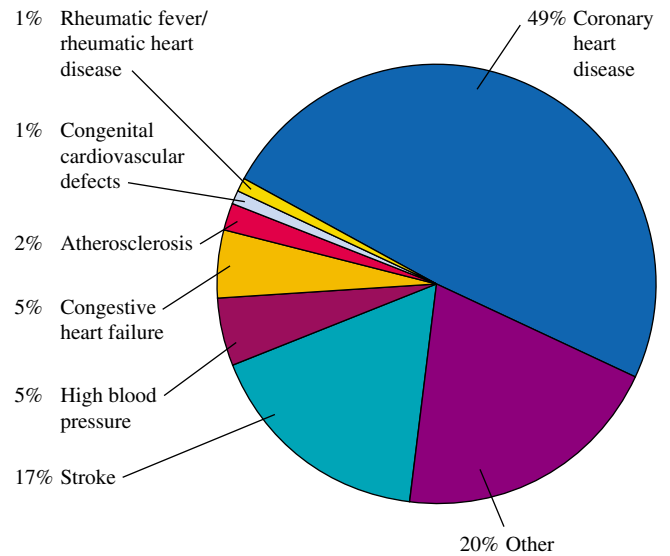
# top ten list

## Top Ten Ways to Protect Your Heart

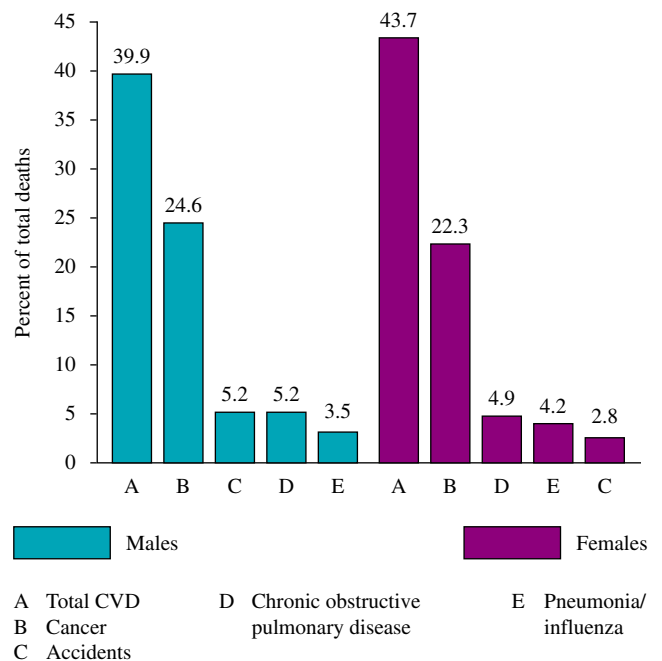
1. Exercise regularly. Aim for 30 minutes 5 days per week. Performing aerobic exercise regularly helps protect coronary arteries by reducing heart rate, blood pressure, cholesterol level, and body fat.
2. Maintain blood pressure level within normal limits.
3. Maintain blood cholesterol levels within acceptable limits.
4. Don't smoke.
5. Keep your weight within reasonable limits. Weighing too much (especially if you carry the extra pounds in your waistline) raises the risk of heart attack.
6. Keep blood sugar (glucose) level close to normal.
7. Don't let your triglyceride level exceed 200 mg/dl (or 100 mg/dl if you have other coronary risk factors).
8. Control stress and hostility. Learn and practice stress management strategies and how to diffuse anger/hostile behaviors.
9. Know the early warning symptoms of angina pectoris and the symptoms of a heart attack and stroke.
10. Be aware of your genes. If several close blood relatives have had a heart attack before age 60, your risk rises substantially. Accordingly, the need to control the primary risk factors for coronary heart disease is heightened.

Note: In addition to the “Top Ten Ways to Protect Your Heart”, eat healthy. This will provide added protection against coronary heart disease. Recommendations include: reduce homocysteine levels by eating five servings of fruits and vegetables and six servings of grains per day. Also, consuming foods high in antioxidants (vitamin C, E, and beta carotene) helps prevent heart attacks by preventing LDL oxidation (which increases clotting and plaque rupture).

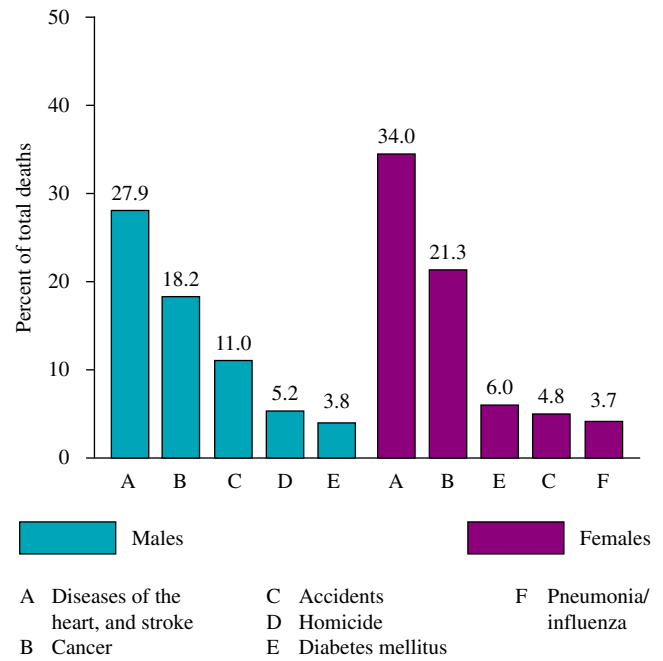
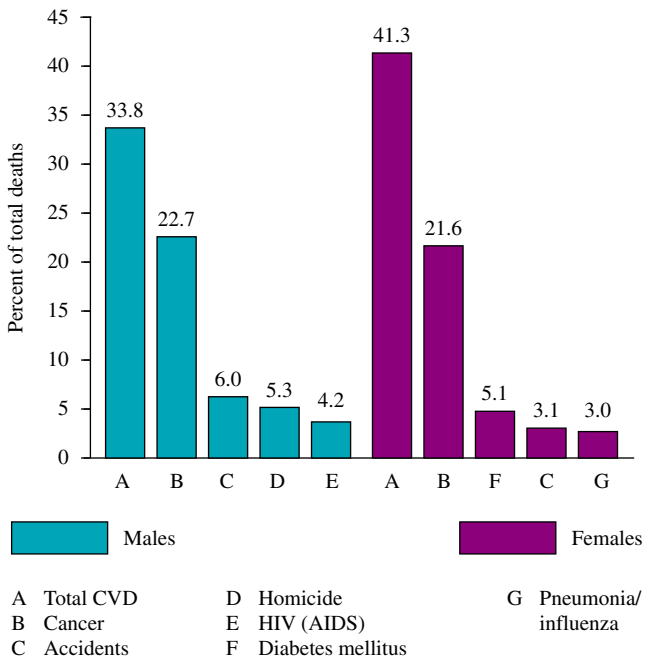
Heart attack, the most prevalent form of CVD, is still the single largest killer of American men and women (about one of every five deaths). The cost of CVD in 2000 was estimated by the AHA at \$326.6 billion. This figure includes the costs of physician and nursing services, hospital and nursing home services, medications, and lost productivity resulting from disability. While costs for treatment of CVD are spiraling upward, the death rate for these diseases appears to be declining. Advances in medical treatment and education and healthy lifestyle changes can be credited for the declining death rate. However, don't become too complacent about these facts. We still have a long way to go. Cardiovascular



**figure 7-2** Percentage breakdown of deaths from cardiovascular diseases. United States: 1997  
Source: CDC/NCHS and the American Heart Association.

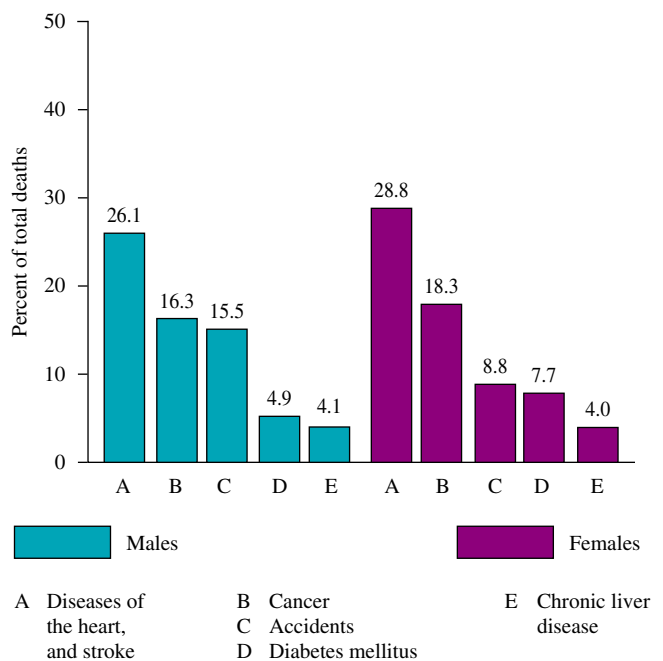
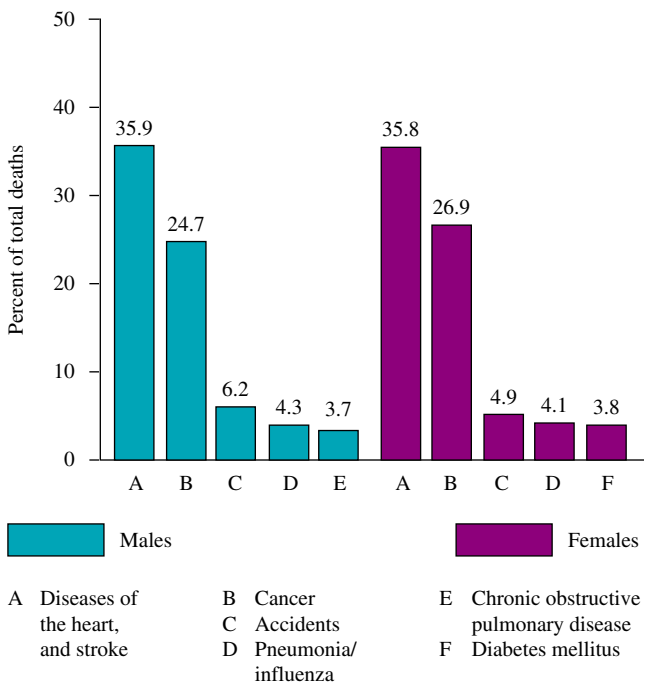


**figure 7-3** Leading causes of death for white males and females. United States: 1997  
Source: CDC/NCHS and the American Heart Association



**figure 7-4** Leading causes of death for African American males and females. United States: 1997  
 Source: CDC/NCHS and the American Heart Association.

**figure 7-5** Leading causes of death for Hispanic males and females. United States: 1997  
 Source: CDC/NCHS and the American Heart Association.



**figure 7-6** Leading causes of death for Asian/Pacific Islander\* males and females. United States: 1997  
 \*Note: This is a heterogeneous category that includes both high-risk (South Asian) and low-risk (Japanese) people. More specific data are not available.  
 Source: CDC/NCHS and the American Heart Association.

**figure 7-7** Leading causes of death for American Indian/Alaska native males and females. United States: 1997  
 Source: CDC/NCHS and the American Heart Association.

disease is the *number one* health concern in the United States. It is a killer; someone still dies every 33 seconds, more than 2,600 Americans die each day of CVD.

## Coronary Heart Disease (CHD)

The heart is a muscle that works all the time. It never stops beating. Each day, the average heart beats 100,000 times and pumps about 2,000 gallons of blood. Besides providing oxygen and other nutrients to all tissues of the body, the heart must supply itself with oxygen. It has a separate circulatory system, which nourishes only the heart muscle. This system has two coronary arteries, each about the size of a pencil, that subdivide and encircle the entire heart muscle (Fig. 7-8). What is commonly known as “hardening of the arteries” is **arteriosclerosis**, a general term for the thickening and hardening of arteries. Some hardening of arteries normally occurs as we age. Coronary heart disease is most commonly the result of atherosclerosis. **Atherosclerosis** (*athero* from the Greek work for “paste” and *sclerosis* for “hardness”) is a type of arteriosclerosis. It is a progressive condition in which deposits of cholesterol and other lipids, along with cellular waste products, accumulate on the inner walls of coronary arteries. This buildup is called **plaque**. As the condition progresses, the inner walls of blood vessels become more and more inelastic and clogged and may become hardened and



**figure 7-8** If your heart beats 72 times per minutes, by the time you turn 65, your heart will have beat about 2.5 billion times.

## wellness flash

Your heart rests between beats. If the length of time of these rest periods over your lifetime were added up, you would find that your heart stands still for about 20 years.

blocked. Sometimes, a blood clot forms on the plaque buildup and blocks the entire artery. A heart attack or stroke may result.

There are a variety of causes of atherosclerosis, many of which are related to unhealthy lifestyle choices. One theory attributes atherosclerosis to minor injuries of the inner wall of coronary arteries, which create a roughened region where debris and materials in the blood can attach. This begins the atherosclerotic buildup. What injures the lining of our coronary arteries? High blood cholesterol levels, excessive dietary cholesterol and saturated fat, high blood pressure, your reaction to perceived emotional stress, and nicotine are often responsible. All are influenced by lifestyle. Besides causing damage to the smooth lining of our blood vessels, lifestyle factors also contribute to excess plaque in the bloodstream. Atherosclerosis does not suddenly develop at age 65. It is a long, progressive process beginning in childhood.

## Angina Pectoris

Atherosclerosis may lead to **angina pectoris**, or chest pain. This pain occurs when a coronary artery becomes partially blocked, causing an oxygen debt in the heart muscle. Often, angina pectoris is brought on by sudden exertion or vigorous exercise when the blood flow to the heart is insufficient to meet its oxygen demands. The American Heart Association estimates that over 6 million people suffer from angina pectoris with 350,000 new cases occurring each year.

## Myocardial Infarction

*Myocardial infarction*, or heart attack, results when one or more of the coronary arteries is partially blocked by atherosclerotic deposits called plaque. When one of the deposits suddenly breaks open, a blood clot (thrombus) forms and chokes off the supply of blood to the heart muscle.

The portion of heart muscle beyond the blockage is deprived of oxygen, resulting in injury or death of that portion of the heart muscle. If a damaged area is large enough or in a vital area of the heart, the individual will die. However, many people do survive a heart attack and are capable of living productive lives (Table 7-1).

table 7-1

## Warning Signs of a Heart Attack

## "Classic" or more common signs:

- Uncomfortable pressure, fullness, squeezing, or pain in the center of the chest lasting more than a few minutes or that goes away and comes back.
- Pain spreading to shoulder, neck, jaw, arms, or back.

## Less common signs:

- Atypical chest pain, stomach or abdominal pain.
- Nausea or dizziness.
- Shortness of breath and difficulty breathing.
- Unexplained anxiety, weakness, or fatigue.
- Palpitations, cold sweat, or paleness.

Not all of these signs occur in every heart attack. If some of these symptoms do occur, don't wait. Get help immediately!

Source: American Heart Association. 1997 *Heart and Stroke Facts Statistical Update*.

A number of studies have shown that, in some damaged hearts, new blood vessels develop to nourish the area that is being starved of oxygen and other nutrients. This is called **collateral circulation**. Everyone has collateral blood vessels, which are microscopic and closed under normal conditions. However, in some people with coronary heart disease, these seem to enlarge and form a detour around the blockage to provide alternate routes for the blood. Exercise appears to be one practical way to increase myocardial oxygen demand, which in turn may stimulate the development of collateral vessels. In some cases, coronary angiography (X ray) has revealed increased collateralization after exercise training.

## Stroke (Brain Attack)

A **stroke** occurs when blood flow to the brain is interrupted either by a blockage (ischemic stroke) or by a burst blood vessel (cerebral hemorrhage). The brain needs a continuous supply of oxygen-rich blood to function. When a blood clot interrupts the flow of oxygen, the brain does not receive the nourishment it needs, and brain cells die. Stroke, primarily caused by atherosclerosis, is the *third* leading killer of Americans (behind heart attack and cancer). On the average, someone suffers a stroke in the United States every 53 seconds or every 3.4 minutes, someone dies of one. See Table 7-2 for the warning signs of stroke. It is the chief cause of serious disability and a major contributor to later-life dementia. A stroke can result in paralysis of one side of the body, loss of ability to speak or to understand the speech of others, loss of memory, and behavioral change. Because brain cells can't heal, modification of risk factors is important in the prevention of this disease that affects 600,000 Americans every year, killing about 160,000. It is not solely a disease of the elderly;

table 7-2

## Most Common Warning Signs of Stroke

- Sudden numbness or weakness of face, arm, or leg, especially on one side of the body.
- Sudden confusion, trouble speaking or understanding.
- Sudden trouble seeing in one or both eyes.
- Sudden trouble walking, dizziness, loss of balance or coordination.
- Sudden severe headaches with no known cause.

more than 28 percent of stroke victims are under age 65. Your risk of stroke increases with these factors:

- *Hypertension*: If you have high blood pressure, you are two to four times more likely to have a stroke than is someone with normal blood pressure. It is the most important risk factor for stroke.
- *Heart disease*: Sometimes, blood clots forming in the heart can move up to the brain and block blood flow.
- *Gender*: About 19 percent more men than women have strokes.
- *Diabetes*: Those with diabetes have almost double the risk of stroke.
- *Age*: The incidence more than doubles in each decade after age 55.
- *Race*: African Americans have nearly twice as many fatal strokes as whites and more than twice as many as other minorities. Hypertension and sickle-cell anemia are the suspected causes.
- *Lifestyle*: These factors can be controlled: high-fat, high-cholesterol diet; alcohol or cocaine abuse; smoking; and sedentary lifestyle.

## Risk Factors

Risk factors are the conditions, situations, and behaviors that increase the likelihood that an undesirable outcome (injury, illness, or death) will occur. The risk is established by multiple scientific studies. A risk factor does not cause the undesirable outcome 100 percent of the time, but of those people who engage in the behavior (or experience the condition), a certain number of them will experience the undesired outcome. The stronger the risk factor's link with a negative outcome, the more likely it is that an individual will experience the undesired result.

The riskiness of various behaviors is determined in part through epidemiological research, which involves studying large populations to investigate the causes and control of diseases. The famous Framingham Study is an example of this type of research. Research studies on animals and humans, in which conditions are carefully set up to test hy-

potheses, are often needed to confirm relationships among behaviors, conditions, illness, and death. Over time, clearer and clearer pictures emerge about the degree of danger or risk in a particular situation until health experts can say, “If you do this, chances are good that this will occur.”

Coronary heart disease (CHD) researchers have identified several risk factors that may lead to the development of atherosclerosis. The more risk factors you possess, the greater your chances are of developing coronary heart disease. While no one can accurately predict whether you will have a heart attack, you can estimate your odds by evaluating your risk factors. Take the *Are You At Risk?* test in Lab Activity 7-1 to determine your risk and how to reduce it.

**Primary risk factors** are linked directly to the development of CHD; they increase the possibility of having a heart attack. *All primary risk factors are controllable.*

#### Controllable Factors

1. Inactivity
2. High blood pressure
3. High blood lipid level
4. Cigarette smoking
5. Obesity

The **secondary risk factors** for heart disease contribute to the development of coronary heart disease but not as directly as the primary risk factors.

#### Controllable Factors

1. Stress
2. Emotional behavior

#### Uncontrollable Factors

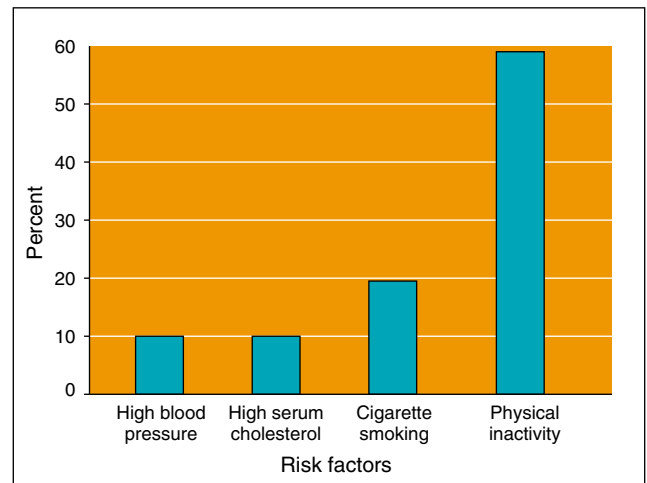
3. Age
4. Gender
5. Race
6. Positive family history
7. Diabetes mellitus

Notice that some of these secondary risk factors are *controllable*. The choices you make or the way you live have a profound impact in reducing these risk factors. If you possess several uncontrollable risk factors, it is imperative that you adopt a healthy lifestyle.

## Primary Risk Factors

### 1. Inactivity

Countless studies have linked inactivity to coronary heart disease. A surgeon general’s report confirmed that physical inactivity is a major health problem in the United States. The report warns couch potatoes, “Beware, sitting around is hazardous to your health.” Additionally, the Centers for Disease Control and Prevention (CDC) in Atlanta has named physical inactivity as our nation’s most common cardiac threat. Why? Because only 15 percent of Americans engage



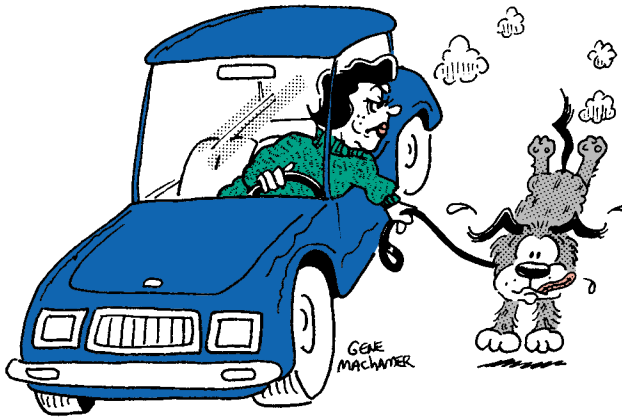
**figure 7-9** Estimated percentage of U.S. population having selected risk factors for coronary heart disease. More Americans are at risk for heart disease because of physical inactivity than because of any other manageable risk factor.

in physical activity at intensity levels recommended for fitness and health benefits. This leaves close to 85 percent of our population either entirely sedentary or not active enough to reap health benefits. Consequently, it is not surprising to learn that approximately 250,000 deaths (12 percent of deaths) every year in the United States can be attributed to lack of exercise. Many experts believe today’s best buy in the prevention of heart disease is *exercise* (Fig. 7-9).

In yet another ongoing inquiry into the relationship between physical activity and mortality, the Harvard Alumni Study continues to produce results that have led its director Dr. Ralph S. Paffenbarger to conclude that “There’s no doubt whatever that insufficient activity will shorten your life.” Even exercise of moderate intensity (brisk walking or gardening) is beneficial in improving health and well-being. It is vigorous exercise (using the FITT prescription), however, that produces the greatest health benefits and is linked to increased longevity.

The American lifestyle is sedentary. We no longer have to hunt and grow our food, build our homes, or walk to school and work. Our ancestors did not have to build physical activity into their daily lives; it was a part of their lifestyle. Modern conveniences and technology have eliminated physical activity from our lives. The culprits are the automobile, television (with remote control), elevators, escalators, riding lawn mowers, portable telephones, as well as computers and computer games. You can probably add more to this list.

Vigorous physical exercise is essential to a healthy cardiovascular system. Equally important, however, is overall lifestyle and how long you have been exercising. News from the U.S. surgeon general’s report provides strong support for physical activity in the prevention of heart disease,



Americans are ingenious at avoiding activity. Dr. Steven Blair compares the dangers of sedentary living to smoking one pack of cigarettes a day. "Improving low fitness seems to be as important as stopping smoking in terms of reducing the risk of dying," he said.

high blood pressure, high cholesterol, diabetes, obesity, and cancer. The report recommends 30 minutes of moderate-intensity physical activity on most days of the week. This would include dancing, playing volleyball and basketball, gardening, and brisk walking. The old saying, "Use it or lose it!" is true. You don't have to run marathons to be physically active. Small increases in daily activity can significantly burn up excess calories, make the heart muscle a stronger and more efficient pump, lower blood pressure, alleviate stress, increase HDL levels, and build self-confidence.

The American Heart Association reports that regular vigorous exercise protects against coronary heart disease and even improves the survival rate after a heart attack. That is life insurance that money cannot buy. The most important thing you can do to improve your health and well-being is to *exercise*.

Health benefits appear to be proportional to the amount of activity, rather than to intensity of the exercise. If health maintenance is the goal, the surgeon general suggests a minimum of 150 calories expended per day in physical activity (about 30 minutes a day).

To increase longevity, Ralph Paffenbarger suggests expending between 300 and 500 calories a day (about 3,500 calories per week). This he calls the Longevity Zone and it represents roughly an hour of exercise per day. Ride your bike, walk to school, play tennis instead of watching others doing these activities. Park at the back of the parking lot instead of right next to the building. There are many ways to add activity to your daily life. Remember, it doesn't have to be exhausting!

## 2. High Blood Pressure (Hypertension)

Blood pressure is the force exerted by the heart while pumping blood through the body. It is also the pressure of blood against the arterial walls.



Have your blood pressure checked regularly.

There are two blood pressure levels, recorded as two separate numbers in fraction form (for example, 120/80). When the heart contracts and pumps blood into the arteries, the pressure increases. This is the **systolic**, or pumping, **pressure**, recorded as the upper number. The **diastolic**, or resting, **pressure** is the force of the blood against the arteries when the heart relaxes between beats. It is recorded as the lower number. Both the systolic and diastolic numbers are important. High levels of either or of both mean greater risk for heart attack and stroke. Average blood pressure is 120/80, and the acceptable range is 90/60 up to 139/89. High blood pressure, **hypertension**, is acknowledged as blood pressure equal to or greater than 140/90. Doctors once called this level of blood pressure *borderline* or *mild* hypertension. This language is falsely reassuring—mild weather is pleasant, but mild hypertension is not. The new term *Stage 1 hypertension* describes it better. Even *high normal* calls for lifestyle changes and monitoring. Look at the four stages of hypertension listed in Table 7-3.

High blood pressure causes the heart to overwork. Over a period of time, the overworked heart weakens, enlarges, and has a difficult time keeping up with the demands of the body. High blood pressure also causes blood vessels to become inelastic, severely reducing the amount of blood flow to the body's vital organs. Decreased levels of oxygen and other nutrients can produce heart, brain, and kidney damage. Remember, high blood pressure also leads to heart attacks and strokes.

One in four American adults has high blood pressure, and in 90 percent of the cases there is no known cause. However, factors that can increase your chances of developing high blood pressure are heredity, cigarette smoking, male

table 7-3

Blood Pressure Stages

Category	Systolic/Diastolic	Recommendation
Normal	less than 130/85	Recheck in 2 years.
High normal	130–139/85–89	Recheck in 1 year; begin lifestyle modifications.
Hypertension		
Stage 1	140–159/90–99	Confirm in 2 months; begin lifestyle modifications.
Stage 2	160–179/100–109	Medical evaluation; begin treatment within 1 month
Stage 3	180–209/110–119	Medical evaluation; begin treatment within 1 week.
Stage 4	210/120 and over	Immediate medical evaluation and treatment.

gender, age, African American, obesity, sensitivity to sodium, heavy alcohol consumption, use of oral contraceptives, and a sedentary lifestyle. In a small number of cases, hypertension is caused by a specific condition, such as kidney disease, a tumor of the adrenal gland, or a defect of the aorta. This is called **secondary hypertension**. The cause of secondary hypertension can be identified and treated successfully.

How do you know if your blood pressure is too high? The only way of knowing is to have it checked. You cannot feel high blood pressure—and usually there are no symptoms until complications develop. You can be hypertensive for years and be unaware of the damage occurring; of those with high blood pressure, over 32 percent do not know they have it. Even warning signs associated with advanced hypertension may go unnoticed but may include headaches, sweating, rapid pulse, shortness of breath, dizziness, and visual disturbances. It is imperative that you know your blood pressure, because high blood pressure, while it cannot be cured, can be controlled or prevented by specific lifestyle changes: See the “Top Ten Nondrug Approaches for Preventing or Managing Hypertension.”

### 3. High Blood Lipid Profile (Cholesterol and Triglycerides)

Research has firmly linked high levels of cholesterol and other blood fats to the development of arterial plaque, a major cause of atherosclerosis and coronary heart disease. **Cholesterol** is not a true fat but a waxy substance found in the bloodstream. Because it is soluble in fats rather than in water it is classified as a lipid, as fats are. About 80 percent of total body cholesterol is manufactured in the liver, while 20 percent comes from dietary sources—mainly from foods of animal origin.

Cholesterol is not all bad. It is needed by the body for cell structure and for the manufacture of hormones and in the digestive process. The problem with cholesterol is that your body makes most of what it needs, and the normal American diet adds much more. Most people consume 400 to 500 milligrams of dietary cholesterol per day. As a result, one-half of all adult Americans have cholesterol levels high enough to require treatment. Health experts recommend



### Top Ten Nondrug Approaches for Preventing or Managing Hypertension

1. *Maintain a healthy weight.* Losing even 5 or 10 pounds, if you are overweight, can reduce blood pressure.
2. *Exercise regularly.* Exercise helps you lose weight and keep it off.
3. *Do not smoke.* Smoking does not cause hypertension but does promote heart disease. A hypertensive who smokes is at serious risk.
4. *Keep your sodium intake low (below 2,400 milligrams daily).* Many people are salt-sensitive, meaning that salt (sodium chloride) elevates their blood pressure.
5. *Avoid alcohol or if you drink alcohol, do so in moderation.* Drink no more than one drink daily if you are a woman or two if you are a man.
6. *Eat a well-balanced diet rich in fruits, grains, and vegetables.* This will help you cut back on the consumption of fats and high calorie foods and lose some excess weight. Reduce caffeine intake.
7. *Increase your calcium intake.* Calcium has been linked to reduction in blood pressure. A daily consumption of 800–1,500 milligrams is recommended. (One glass of milk has approximately 300 mg.)
8. *Increase your intake of potassium.* Studies have documented a blood pressure lowering effect of increased potassium intake in people with mild hypertension. Do not exceed 6,000 mg. Per day. (Bananas are high in potassium)
9. *Increase fiber intake.* Plant fiber has been observed to lower blood pressure in hypertensive individuals by an average of four to eight points.
10. *Practice a stress management technique such as meditation,* or one of those discussed in Chapter 8. Harvard Medical School studies have confirmed the value of stress management in the reduction of high blood pressure.

that we keep dietary cholesterol consumption to less than 300 milligrams per day (less than 200 if you have high blood cholesterol). **Hypercholesterolemia** is the term for high cholesterol levels in the blood.

Ninety-five percent of the fats in the body are in the form of triglycerides, a true fat stored in the fat cells and found in the blood. Both high cholesterol and triglycerides increase the risk of developing atherosclerosis.

When evaluating your blood lipid profile for risk of heart disease, there are two factors to consider: (1) the total amount of cholesterol/triglycerides found in the blood and (2) the way cholesterol/triglycerides are transported in the bloodstream.

**Total Amount of Lipids.** Knowing your total cholesterol level provides you with a *rough* estimate of your heart disease risk. Blood cholesterol is measured by analyzing a small blood sample in a laboratory. Total cholesterol level includes the amount of cholesterol carried by high-density lipoprotein, low-density lipoprotein, and very low-density lipoprotein. The National Heart, Lung, and Blood Institute relates blood cholesterol level to heart disease risk as illustrated in Table 7-4. A reading above 200 milligrams per deciliter of blood (mg/dl) indicates increased risk of developing heart disease.

**Transportation of Lipids.** Like oil and water, cholesterol and blood do not mix. Cholesterol must attach to a protein molecule to be carried through the bloodstream. This combination is called a *lipoprotein*. A lipoprotein analysis gives a more accurate picture of your heart disease risk than does total cholesterol alone. A lipoprotein analysis breaks down the total cholesterol into its components, or lipoproteins, of which there are two main types—one that protects and one that damages coronary arteries:

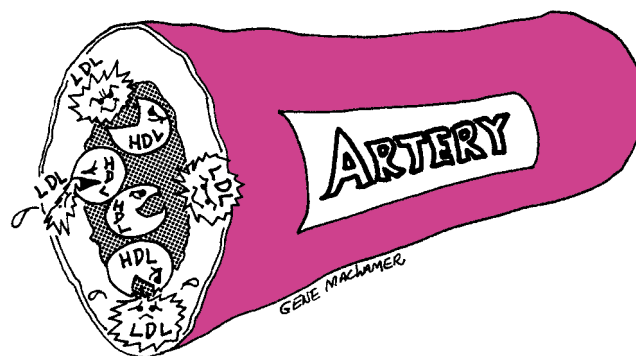
1. **Low-density lipoprotein (LDL).** LDLs are considered “bad” because they carry a large amount of cholesterol. The lower density of the lipoprotein allows it to easily attach to the inner wall of the blood vessel, thus accelerating the atherosclerotic process. A *high* LDL cholesterol level increases your risk for heart disease (Table 7-4). It is recommended that LDL levels should be kept below 130 mg/dl. See

Figure 7-10. Cigarette smoking, emotional stressors, and diets high in saturated fat have been shown to increase the LDL level. Very low-density lipoproteins (VLDL) are even more dangerous.

2. **High-density lipoprotein (HDL).** HDL is considered to be a “good” form of cholesterol because of the dense structure of the lipoprotein. It is thought that HDL acts as a garbage collector in clearing away plaque and other debris as it flows through the bloodstream to the liver to be excreted from the body. The higher your HDL cholesterol level, the better and the more protection from heart disease it provides. See Table 7-4. HDL levels above 35 mg/dl are recommended. See Figure 7-11. How can you increase your level of HDL?

- Exercise regularly
- Don’t smoke
- Reduce weight and/or maintain a normal weight
- High-fiber and low-fat diets may also increase the HDL cholesterol level
- Use monounsaturated fats (i.e., olive oil, canola oil, sunflower oil) as primary fat, while keeping total fat intake low.

Alcohol consumption has received attention as a protective factor against heart attack because it is thought to raise HDL cholesterol in the blood and it might help prevent clotting that leads to plaque buildup inside arteries. “*Moderate*” consumption of alcohol (one drink for women per day



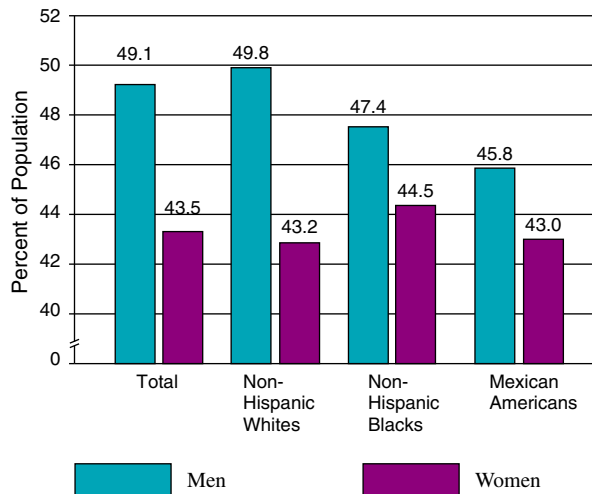
HDL cholesterol clearing away plaque in arteries.

table 7-4

Cholesterol

Risk	Total Cholesterol (mg/dl)	LDL (mg/dl)	HDL (mg/dl)
Desirable	<200	<130	>60
Borderline High	200–239	130–159	NA
High	≥240	≥160	<35

Source: National Heart, Lung, and Blood Institute U.S. Department of Health and Human Services. Note: The levels apply to anyone 20 years of age or older.



**figure 7-10** Estimated age-adjusted (2000 standard) prevalence of Americans age 20 and older with LDL cholesterol of 130 mg/dl or higher by race and sex.

United States: 1988–91

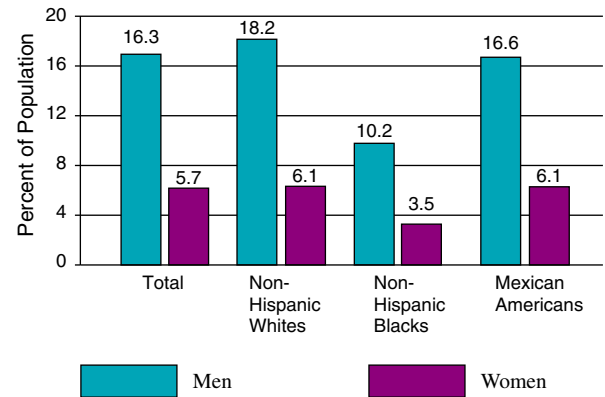
Source: NHANES III (1988–91), CDC/NCHS and American Heart Association.

or two drinks for men per day) is the amount associated with a reduction in the rate of heart attacks. The following amounts are examples of one drink:

- 1½ oz. of bourbon, scotch, vodka, gin
- 4 oz. wine
- 12 oz. beer

Consuming more than two drinks a day is known to damage the heart. A protective effect of alcohol consumption has not been proven, but many adverse effects are well documented. Besides causing automobile accidents and social disruption, excess intake of alcohol can raise blood pressure and triglyceride levels and cause diseases of the liver, pancreas, and nervous system. Even though alcohol consumption above moderate levels adversely affects blood pressure and triglycerides and can damage the heart, alcohol is still *not* considered a primary or secondary heart disease risk factor. To put the benefit of moderate drinking in proper perspective, the reduction in heart disease risk is comparable to what you might achieve by exercising regularly or by cutting blood cholesterol levels through a low-fat diet.

Scientists believe that the ratio of total cholesterol to HDL cholesterol is a better indicator of risk for cardiovascular disease than the total value alone. To determine your ratio, take a laboratory blood test that will reveal your total cholesterol and HDL cholesterol levels. Next, divide the total cholesterol level by the HDL cholesterol level to find the ratio. For example, if the total cholesterol were measured to be 160 and the HDL cholesterol 40, your ratio would be four ( $160 \div 40 = 4$ ). This would place you at lower than average risk, as you can see in Table 7-5. A 4.5 or lower ratio (total



**figure 7-11** Estimated age-adjusted (2000 standard) prevalence of Americans age 20 and older with HDL cholesterol of 35 mg/dl or lower by race and sex.

United States: 1988–91

Source: NHANES III (1988–91), CDC/NCHS.

cholesterol/HDL cholesterol) is excellent for men, and 4.0 or lower is best for women.

Average HDL levels in adult Americans are about 45 to 65 mg/dl, with women averaging higher than men. The female sex hormone, estrogen, tends to raise HDL levels, which may explain why premenopausal women are usually protected from heart disease. Studies suggest that HDL levels above 70 may protect against heart disease, while those below 35 signal coronary risk. In summary, if you have a cholesterol reading of 200, with HDL at 80 and LDL at 120, you are considered at low risk for heart disease. On the other hand, even if you have a total cholesterol level well under 200, if your HDL level is under 35, you would still be considered at increased risk of developing CHD.

There is genetic variability in how efficiently (or inefficiently) a person metabolizes dietary saturated fat and cholesterol. Some people can eat almost anything and their blood cholesterol levels remain stable. Others find that even a small amount of dietary fat makes their blood cholesterol levels increase. Most of us are somewhere in between on this spectrum.

Drs. Michael Brown and Joseph Goldstein won the Nobel Prize in Medicine in 1985 for their discovery of **LDL cholesterol receptors**. Located primarily in liver cells, these receptors bind and remove cholesterol from the blood. The more cholesterol receptors you have, the more efficiently you can remove cholesterol from the blood. The number of cholesterol receptors is, in part, genetically determined. Lifestyle factors also influence the number. A diet high in saturated fat and cholesterol produces what Brown and Goldstein termed “double trouble.” It not only saturates the receptors, it also decreases their number—a bad combination. Only about 5 percent of the population has genetically high cholesterol levels that remain elevated regardless of lifestyle.

table 7-5

## Ratio of Total Cholesterol and HDL Cholesterol to Risk of CHD

Risk of Heart Disease	Ratio of TC/HDL-C Men	Ratio of TC/HDL-C Women
Very low	under 3.43	under 3.27
Low	4.97	4.44
Moderate	9.55	7.05
High	more than 23.39	more than 11.04

Source: The Wellness Encyclopedia, University of California, Berkeley.

**Triglycerides** are manufactured in the body to store excess fats. They are also known as *free fatty acids*, and in combination with cholesterol, they accelerate the formation of plaque. Triglycerides are carried in the bloodstream by very low density lipoprotein (VLDL). These fatty acids are found in poultry skin, lunch meats, and shellfish. However, they are mainly manufactured in the liver from alcohol, starches, and refined sugars (honey included). Alcohol, starches, and sugars are not fat, but the body can convert them into fats and then dump those fats into the bloodstream. Ways to lower triglycerides include:

- Decrease alcohol and sugar consumption.
- Reduce weight, if overweight.
- Reduce consumption of animal fats in the diet (poultry skin, lunch meats, shellfish).
- Get regular aerobic exercise.
- If necessary, take prescribed medications.

As a general rule, you should keep your triglyceride level below 200 mg/dl of blood. However, some reports indicate triglyceride levels over 100 should be cause for concern. See Table 7-6.

You should know your cholesterol level and have it checked annually, especially if you have a positive family history of heart disease. The best way to do this is to have a 12-hour fasting blood test that is analyzed by a reputable laboratory. The over-the-counter tests that don't require fasting are not as reliable. The National Heart Savers Association states that only 8 percent of Americans know their cholesterol level and more than 50 percent have a level that is too high. Since cholesterol levels are greatly influenced by diet and lifestyle, follow these guidelines to reduce high levels:

- A diet rich in cholesterol—or worse, one rich in saturated fat (saturated fat is highest in vegetable oils such as tropical and palm, and in meat and high fat dairy products) and trans fatty acids (hydrogenated oils in many crackers, cookies, cakes, pies, pastries)—can increase your blood cholesterol level. Keep total fat less than 30 percent of total calories per day and dietary cholesterol below 300 mg per day. This small

table 7-6

## Triglycerides

Normal	Less than 200 mg/dl
Borderline High	200–400 mg/dl
High	400–1,000 mg/dl
Very high	above 1,000 mg/dl

modification in dietary fat can reduce cholesterol levels by 10 percent to 15 percent. (See Chapter 10 for other dietary strategies that affect heart health.)

- Reduce body weight if overweight. Weight reduction alone can lower cholesterol and triglyceride levels.
- Lowering your stress level also helps offset high cholesterol. See Chapter 8.
- Increase daily aerobic exercise. Try to walk more, use escalators and cars less, be a participant rather than a spectator.
- Reduce alcohol, sugar, and caffeine consumption.
- Increase consumption of fiber-rich foods, such as: oatmeal, dried beans and peas, whole grain breads and cereals, raw fruits and vegetables.
- Take your medication, if prescribed.

## 4. Cigarette Smoking

Cigarette smoking is a primary risk factor. Nicotine increases heart rate and blood pressure and constricts blood vessels. Carbon monoxide also creates cardiovascular stress by impairing the transport of oxygen in the blood. About one in five deaths from CVD is attributable to smoking. Tobacco useage begins early. Of adults who smoke, 80 percent started before they turned 18. See Figure 7-12. Every cigarette package is required by law to carry a consumer warning. One such warning is “Cigarette Smoking Can Kill You.”

Even Ann Landers, the nationally syndicated columnist, gives warning: “Beware, cigarettes are killers that travel in packs.” In 1998, four million humans (one every 7 seconds) died because of tobacco. Numerous studies have proven that cigarette smoking causes oral cancer, lung can-



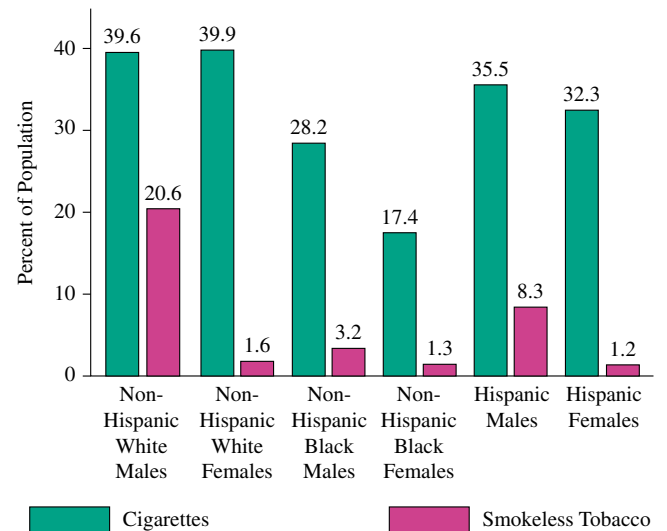
Every cigarette a person smokes reduces his or her life by 11 minutes. Each carton of cigarettes thus represents a day and a half of lost life. Every year of smoking a pack a day shortens life by almost 2 months. Smoking in the teenage years causes permanent genetic changes in the lungs and forever increases the risk of lung cancer even if the smoker quits.

cer, and emphysema, and in women it is linked to cervical cancer, early menopause, and damage to the fetus during pregnancy. It also leads to the development of wrinkles in men and women. The number of Americans killed each year from smoking is greater than the number killed during World War II and the Vietnam War combined. No level of smoking is safe!

The American Heart Association reports that smokers have more than twice the risk of heart attack of nonsmokers. Even limited smoking (four to five cigarettes per day) increases CHD risk. Also, smoking increases the risk of developing peripheral vascular disease (narrowing blood vessels in the arms and legs), which may lead to the development of gangrene and eventually amputation.

Passive smoke, synonymous with secondhand smoke, is the cigarette smoke inhaled by nonsmokers from environmental air. Research has shown there are plenty of reasons to worry about secondhand smoke:

1. Nonsmokers may be *more* susceptible to heart and vascular damage from secondhand smoke than smokers are, even though they absorb much smaller doses of the smoke's toxins. That is because smokers develop compensatory responses to some of the adverse cardiovascular effects of cigarette smoke—but nonsmokers do not get the “benefit” of these adaptive responses.
2. Repeated exposure to secondhand smoke causes permanent damage to the heart and arteries.



**figure 7-12** Percentage of high school students smoking cigarettes or using smokeless tobacco within the last 30 days by race and sex. United States: 1997

Source: *Morbidity and Mortality Weekly Report*, Vol. 47, No. SS-3, Aug. 14, 1998 (Youth Risk Behavior Survey, 1997).

2000 *Heart and Stroke Statistical Update*, American Heart Association

3. The cardiovascular system is extremely sensitive to the chemicals in secondhand smoke (i.e., carbon monoxide, nicotine, and hydrocarbons).
4. Carbon monoxide, a substance in secondhand smoke (and in inhaled cigarette smoke), damages the smooth inner lining of blood vessel walls. This accelerates the atherosclerotic buildup. Carbon monoxide, higher in the blood of smokers but also found in nonsmokers, decreases the amount of oxygen carried in the blood. It also reduces the heart's ability to use the oxygen it does receive.
5. Even low levels of secondhand smoke increase the stickiness of blood platelets in nonsmokers, making it more likely that a clot will form in the narrowed arteries, which can ultimately lead to a heart attack.
6. Cigarette smoking (as well as secondhand smoke) *decreases* the HDL levels in the bloodstream (the “good” type of cholesterol). Both cause heart rate and blood pressure to rise.
7. Secondhand smoke (and smoking) worsens the damage done by free radicals (i.e., destructive oxygen compounds) to heart muscle cells.
8. When a heart attack occurs, prior exposure to secondhand smoke worsens the damage and makes the outcome more serious.
9. Nonsmokers who live with smokers or work where environmental smoke is present have between 58 percent and 91 percent higher risk of dying from heart disease than do other nonsmokers.

10. Heavy smoking in the same workplace or study area gives the nonsmoker the equivalent of mainstream smoking two to three cigarettes a day.
11. Secondhand smoke is a human carcinogen, killing about 3,000 nonsmokers a year through lung cancer. Smoking is everyone's business!
12. The population burden associated with passive smoking and heart disease is estimated to be 60,000 deaths annually in the United States. The simplest and most cost-effective control measure to reduce cost is to *mandate* smoke-free workplaces, schools, and public places.

While studies show that smoking has declined by more than 42 percent since 1965, this downward trend appears to be leveling off, and smoking may be on the upswing again, especially among college students. Smoking promotes heart disease. A nonsmoker should not begin to smoke. Smokers should stop *now*. Ninety percent of smokers who quit do so on their own!

## 5. Obesity

Obesity has escalated to epidemic proportions in the United States and is continuing to increase at an alarming rate. See Figure 7-13 and 7-14. Obesity is uncomfortable; increases the burden on the vital organs, especially the heart, and is directly linked to coronary heart disease.

It is especially risky to have excess body fat in the waist and abdominal area. The distance around the waist and body mass index (BMI) are recommended ways to estimate one's body fat. A high-risk waitline is 35 inches or more for women, 40 inches or more for men. See Chapter 3 and 11 for instructions on how to measure BMI. Skinfold calipers

(discussed in Chapter 3) more accurately measure percent of body fat. The CDC considers anyone above 30 pounds over target weight to be obese.

Over one-half of the U.S. population is obese or overweight. Childhood obesity rates have doubled since the late 70s with 25 percent of 12 to 19 year olds (one in four teens)—significantly overweight. Hypertension is nearly six times higher in overweight people aged 20 to 44, and high cholesterol levels are twice as frequent in the obese. Ninety percent of people with Type 2 diabetes are overweight. Obesity, considered a chronic disease, causes more than 300,000 premature, preventable deaths per year.

In addition, obesity puts women in particular at increased risk of heart disease. A study conducted by the Harvard Medical School of 115,000 women ages 30 to 55 found that of all the women in the 8-year study who developed heart disease, 40 percent had no other risk factors except being 20 percent or more over their ideal weight. Women who had been slim at age 18 and gained weight in adulthood seemed to be at increased risk. The first step in medical treatment for these conditions is usually weight reduction. Obesity is controllable and can be reversed. You can eliminate the obesity risk factor by maintaining reasonable weight (see Chapter 11). Even modest weight reduction (5 to 10 percent of body weight) can help reduce your risk of CVD and stroke.

Physical inactivity is a major factor in the development of obesity in men, women, and children. Watching too much television is one of the main culprits. The number of television hours watched per person in this country averages about four per day. Americans should limit TV viewing to about 1 hour a day to prevent physical and mental inactivity. Of course, consuming more calories than are used in daily activity also contributes to obesity.

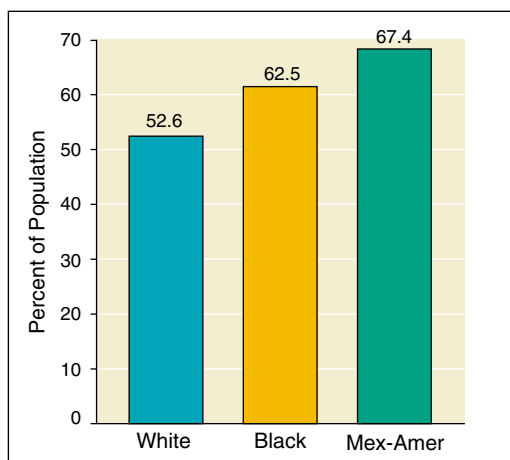


figure 7-13 Prevalence of overweight.

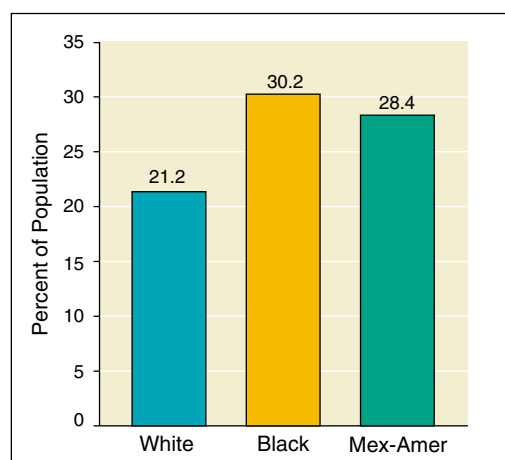


figure 7-14 Prevalence of obesity.



Performing several tasks at the same time is an excellent example of how hectic life in the twenty-first century has become.

## Secondary Risk Factors

These are factors associated with increased risk of heart disease, though not as directly as the primary risk factors.

### 1. Stress

Stress is unavoidable. It includes happy, wonderful, and positive events as well as sad, destructive, and negative ones. For example, the death of a family member and the birth of a child, while perceived differently, are stressors that produce the same physiological response in the body. Job stress may be particularly unhealthy. High blood pressure is three times more common among people who have jobs with high demands but little control (assembly line worker, waitress). Stress has been found to cause a rise in heart rate, blood pressure, and blood cholesterol, and it can lead to excessive smoking or eating—all linked to coronary heart disease. The type of stress is not that important. Indianapolis 500 race car drivers have higher cholesterol levels after they race than before. Tax accountants have increased cholesterol around April 15. Students have higher cholesterol levels during exams. Stress causes chemical wear and tear on the body by releasing stress hormones into the bloodstream (adrenaline). Large amounts of stress hormones are found in the bloodstreams of people who react to stressful situations with hostile and angry behavior. However, low levels of stress hormones are found in the bloodstreams of people who react normally to stressful events. How you react to stress seems to be the critical factor. You should recognize

stress in your life (the positive and the negative) and learn to handle the stressful situations in a healthful manner. Coping with stress successfully is vital in today's hectic, in-the-fast-lane lifestyle. Exercise, relaxation techniques, and behavioral modification have been found to be excellent methods for reducing stress. We need to change the way we look at stressful situations. Problems are to be solved, not worried about. Read more about ways to reduce stress in Chapter 8.

### 2. Emotional Behavior

Several studies have linked emotional behavior to increased risk of heart disease. There are basically three **emotional behavior patterns**—**Type A, B, and C**. The Type A individual exhibits aggressiveness, competitiveness, and impatience and is easily annoyed. Type As demonstrate a high degree of time urgency—a tendency to do two or three things at the same time. These behaviors may lead to angry, cynical, and hostile behavior. The Type B individual is more relaxed, noncompetitive, patient, and slow to anger. A third emotional behavior pattern, Type C, has been identified recently. Type Cs are actually classified as Type As but they learn to cope with emotional stress by using the five Cs: control, commitment, challenge, choices in lifestyle, and connectedness. Such people welcome change, considering it a challenge. They are committed to goals, gaining confidence as a result (see Chapter 8). Type Cs are called “*hardy*” stress resisters.

Early studies identified Type A people as the ones at greater risk of having heart attacks. However, more recent research indicates it is only when the Type A exhibits the behaviors of *hostility* and *anger* that a serious risk is apparent. These behaviors arouse the fight-or-flight response, significantly elevate blood pressure, overstimulate the production of stress hormones, and have been documented to increase coronary artery atherosclerosis. The other Type A behaviors do not seem to be as significant but may be factors in overall poor health and may eventually lead to hostile, angry reactions to stress. Type Bs with these negative behaviors will also suffer adverse health consequences. Twenty percent of apparently healthy people suffer extreme surges in blood pressure when confronted with the challenges of everyday life. They are called **hot reactors** because their systolic blood pressure can rise from 120 to a deadly 300 when stressed. They often go untreated until felled by a stress-induced heart attack or stroke. Hot reactors can be found in all emotional behavior types.

We are not born with hot reacting, angry, and hostile behaviors. These behaviors are learned and, for the sake of our health, we can unlearn them. Learning to modify Type A personality behaviors, especially hostility, anger, and hot reacting, is not difficult, and doing so may add years to your life. How does a “hostile heart” become less angry and cynical—and become a “trusting heart”?

Carry a notebook and record every time you feel angry and/or hostile. Once you have done this for a while, you will start to recognize the situations that provoke these reactions and be able to head off the troublesome behavior. Other suggestions follow:

1. *Stop angry, cynical thoughts.* Every time you have a cynical thought, think to yourself, “STOP!” This is called *thought stopping* and is an effective behavior modification technique when practiced regularly.
2. *Practice laughing at yourself.* Once you realize how silly your anger is in many situations, laughing at yourself will quickly replace fuming.
3. *Be empathetic.* Put yourself in the other person’s shoes. Often the other individual is a victim of circumstances, too.
4. *Reason and understand your anger.* There will be times when anyone would be angry in that same situation, but you must say, “I have this trait, and it is bad for my health.” Decide if the situation warrants your attention and if you have an effective response. If not, take a “time out” from the situation.
5. *Learn to relax.* Practice the excellent “stress busters” in Chapter 8.
6. *Practice patience and trust.* Instead of getting irritated while standing in a line, concentrate on a relaxing word (such as “quiet”) until your anger subsides. Trust that others are not out to cheat you.
7. *Become a good listener.* Pay attention to what others are saying and do not interrupt. This may help you understand the situation better *before* you jump to an angry response.
8. *Live as if you have a serious disease.* You will soon see that the little problems that once riled you up aren’t really so important.
9. *Learn to forgive.* Compassion is the strongest medicine for anger. Blame leads to anger; forgiveness heals.

### 3. Age

Being older has some advantages (wisdom and experience), but protection from CHD is not one of them. As you age, your risk for developing heart disease increases. This does not mean that coronary heart disease is *only* a disease of the old. You don’t just suddenly drop dead one day at age 45 from a “heart attack.” At any age and certainly at age 18, you have atherosclerotic plaque in your arteries. It accumulates over time, and by the time you’ve gained “age,” you’ve also increased the private stash of cholesterol in your arteries. There is little that can be done to stop the calendar. Adopting a healthy lifestyle early in life may add years to your life and life to your years.

### 4. Male Gender

Males have a higher risk of coronary heart disease and stroke throughout their lives than do females. Even after menopause,

when women’s death rate from heart disease increases, it is less than men’s. The increased male risk is not clearly understood. Some credit the increased risk to the male sex hormone testosterone, which triggers production of low-density lipoproteins, thereby clogging blood vessels. Others say a male’s lifestyle may be the culprit. We do know that a female’s hormonal makeup is protective until menopause. Female hormones signal the liver to produce more “good” cholesterol (HDL) and make blood vessels more elastic than male’s blood vessels, especially during childbearing years.

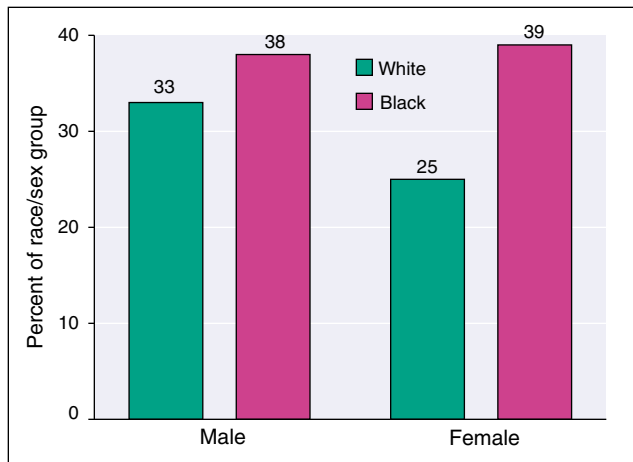
It is imperative that males modify other risk factors to protect their cardiovascular systems. (i.e., increase physical activity, maintain a healthy weight, don’t smoke, keep blood pressure and cholesterol levels at recommended levels, manage stress, and modify emotional behaviors).

### 5. Race

According to the American Heart Association, African Americans have the greatest risk of all races for heart attack and stroke. It is estimated that due to high blood pressure African Americans have more than 60 percent greater chance of death and disability from strokes than do whites (Fig. 7-15). One explanation for this higher incidence is that many African Americans share a mutation in a gene that helps control blood pressure. A hereditary intolerance to sodium may also account for the danger. African Americans and Mexican Americans risk of diabetes and obesity is twice that of any other ethnic groups in the United States. Social and economic stresses may also contribute to increased cardiovascular disease risk. It is paramount that early heart health intervention and education programs be supported for African-American populations. Also, being aware of these risks, African Americans should adopt a healthy lifestyle early. See the Diversity Issues Box for additional population information.



African American have increased risk for heart attack, stroke, and diabetes.



**figure 7-15** Estimated percentage of population with hypertension by race and sex in U.S. adults. Hypertensives are defined as persons with a systolic level  $\geq 140$  and/or a diastolic level  $\geq 90$  or who reported using antihypertensive medication.

Heart disease and stroke risks are high among Mexican Americans, American Indians, and native Hawaiians, also. Again, this increased risk is due to higher rates of obesity and diabetes.

## 6. Positive Family History

A family history of heart disease in brothers, sisters, parents, or grandparents increases your risk of developing coronary artery disease. Tendencies toward high blood pressure, stroke, peripheral blood vessel disease, rheumatic fever, high blood lipid levels, obesity, and early heart attack appear to be somewhat hereditary. This is why your physician is so interested in your family history. A family's lifestyle also may contribute to heart disease and stroke. For example, family members may be overweight, smoke, eat large amounts of cholesterol and saturated fat, or be physically inactive. You should find out as much as possible about your family's medical history. You can be alerted early to a possible risk and take preventive measures.

## 7. Diabetes Mellitus

What do blindness, gangrene, kidney failure, heart attack, and stroke have in common? They can all result from diabetes, which eventually strikes one in three people in the United States.

**Diabetes mellitus** (which includes both Types 1 and 2) is a condition characterized by the body's inability to produce enough of the hormone insulin or to use it properly. The body's ability to process sugars (glucose) is slowly destroyed and sugar-laden blood soon begins to damage the circulatory system. In the normal digestive process, sugars, starches, and other foods are changed to a form of sugar called *glucose*. The bloodstream carries glucose to the body



Diabetes increased at an alarming rate in the United States in the past decade—rising 70 percent among people in their 30s. Health experts are blaming the wired-up, couch potato culture of the 1990s.

cells. There, with the help of insulin, a hormone produced in the pancreas, it is converted to quick energy for immediate use or stored for future needs. In diabetes, this normal process is interrupted. Glucose accumulates in the blood until some of the surplus is eliminated by the kidneys, passing it off in the urine. Too much sugar in the urine and in the blood are classic signs of diabetes.

Diabetes is found in two forms. In insulin-dependent diabetes (IDDM), also known as Type 1 or juvenile onset, the pancreas makes little or no insulin. The diabetic must receive insulin injections every day to stay alive and must carefully watch his or her diet and exercise regularly. (See Fig. 7-16) It occurs most often in children or young adults. Symptoms develop rapidly, usually within a period of months or even weeks.

More common (85 to 90 percent of diabetics) is non insulin-dependent diabetes (NIDDM), also known as Type 2 or adult onset, in which the pancreas makes insulin but either the amount is insufficiently released or the body cannot properly use what is available. This type of diabetes can often be controlled without insulin injections through other medications, diet, and weight management. This form of the disease usually occurs in people over 40 years old and is associated with aging and obesity. New data however shows a dramatic rise of Type 2 in children and young adults making



## Who Smokes?

	Men	Women
All	27.1%	22.2%
White	27.3%	23.9%
African American	32.3%	22.3%
Hispanic	25.4%	13.9%
Asian/Pacific Islander	20%	11.7%
American Indian/ Alaska Native	41%	29.8%

Studies show that smoking prevalence is several times higher among those with less than 12 years of education than it is among those with more than 16 years of education.

### Who Has High Blood Pressure (HBP)?

- Men have a greater risk of HBP than do women until age 55. Beyond age 55, the percentage of women is higher.
- African Americans, Puerto Ricans, and Cuban and Mexican Americans are more likely to suffer from HBP than are whites.
- Compared to whites, African Americans develop high blood pressure at an earlier age, and it is more severe at any decade of life.
- Death rates for HBP in 1997 were 14% for white males and 12.8% for white females; 50.0% for African American males and 40.6% for African American females.
- 36.7% of African American males and 36.6% of African American females have HBP.
- 25.2% of white males and 20.5% of white females have HBP.
- 22.8% of Cuban American males and 15.5% of Cuban American females have HBP.
- 24.0% of Mexican American males and 22.4% of Mexican American females have HBP.
- 15.6% of Puerto Rican males and 11.5% of Puerto Rican females have HBP.
- 9.7% of Asian American and Pacific Islander men and 8.4% of Asian American/Pacific Island women have HBP.
- HBP is 2 to 3 times more common in women taking oral contraceptives, especially in

obese and older women, than in women not taking them.

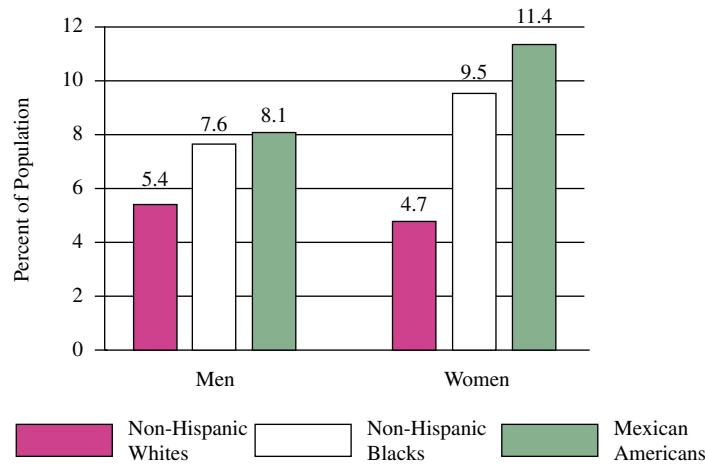
### Who Is Physically Inactive?

- People with lower incomes and less than a 12th-grade education are more likely to be sedentary.
- Regular exercise is more prevalent among men (44%) than women (38%).
- African American women, the less educated, overweight persons, and the elderly are the most inactive groups.
- In general, whites are more likely to exercise or play sports regularly than are African American or Hispanics.
- Non-Hispanics are more likely to exercise or play sports regularly (41%) than are Hispanics (35%).

### Who is Overweight (BMI of 25.0% or higher = Overweight; 30.0% or higher = Obese)

- For whites, 61.5% of men and 46.8% of women are overweight; 20.8% of men and 23.2% of women are obese.
- For African Americans, 58.4% of men and 68.3% of women are overweight; 21.3% of men and 38.2% of women are obese.
- For Mexican Americans, 69.3% of both men and women are overweight; 24.8% of men and 36.1% of women are obese.
- For Cuban Americans, 57.5% of men and 52.0% of women are overweight, 12.8% of men and 17.8% of women are obese.
- For Puerto Ricans, 60.5% of men and 58.5% of women are overweight; 12.2% of men and 24.6% of women are obese.
- For Asian/Pacific Islanders, 10.8% of men and 10.1% of women are overweight.

Source: American Heart Association, *1997 Heart and Stroke Facts Statistical Update* (National Center, 7272 Greenville Ave., Dallas, TX 75231-4596).



**figure 7-16** Age-adjusted (2000 standard) estimated prevalence of physician-diagnosed diabetes in Americans age 20 and older by sex and race.

United States: 1988–94

Source: *Prevalence of Diabetes, Impaired Fasting Glucose, and Impaired Glucose Tolerance in U.S. Adults*, The Third National Health and Nutrition Examination Survey, 1988-1994, *Diabetes Care*, Vol. 21, No. 4, April 1998.

the term “adult-onset diabetes” obsolete. Because the onset of Type 2 is gradual, the disease may go undetected for years. Diabetes seriously increases the risk of developing cardiovascular disease. More than 80 percent of people with diabetes die of some form of heart or blood vessel disease. Part of the reason is that diabetes affects cholesterol and triglyceride levels by producing a different kind of LDL that is even worse for the arteries than is ordinary LDL. This accelerates atherosclerosis. Even so, Type 2 diabetes can be delayed or averted by weight management and physical activity. One condition shared almost universally by Type 2 diabetics is obesity. Not all obese people become diabetic, but 90 percent of people with Type 2 diabetes are overweight or obese. The risk of diabetes is two times greater in people who are mildly overweight (20 percent above ideal weight), five times greater in the moderately overweight (20 percent to 30 percent above ideal weight) and ten times greater in the obese (30 percent above ideal weight).

The surge in youth obesity in this country has paralleled a rise in childhood Type 2 diabetes. At one time Type 2 diabetes was almost unheard of in children. They almost always had Type 1. A new advisory from The American Academy of Pediatrics and the American Diabetes Association calls for diabetes testing of overweight children with any two other risk factors starting at age 10 or at puberty, if it comes earlier.

Many people know their blood pressure and their cholesterol levels, but few know their glucose level, a simple sugar found in the blood. A substantially elevated glucose level is the chief diagnostic sign of diabetes. Unfortunately, far too few people are properly tested. As a result, researchers say that nearly half of the estimated 16 million people who have diabetes don’t know it.

But detecting even a minimally elevated glucose level has become important, too, according to the new guidelines issued by the American Diabetes Association (ADA). That’s because this signals a metabolic disorder called *insulin resistance*, which affects up to 30 percent of adults. Insulin resistance greatly increases the risk of developing diabetes and almost surely raises the risk of hypertension, coronary heart disease, stroke, and possibly cancer.

There is another reason why public health experts are urging wider glucose testing. It is the only way to catch diabetes early. The disease usually causes no symptoms for a decade or more, even though it is silently festering this entire time. That’s 10 to 12 years that diabetes quietly eats away at your vision, injures your kidneys and nerves, and sets the stage for heart disease. This is damage that’s preventable if only people learned sooner that they have Type 2 diabetes.

According to the ADA’s new guidelines, all people age 45 and older should have their fasting blood-glucose level tested at least every three years. Several groups of people are at greater risk and should be checking for diabetes at least once a year. Get tested, starting at age 35, if you:

- Are overweight, especially with extra belly fat.
- Have a brother, sister, or parent with diabetes.
- Are not White (i.e., African American, Hispanic, and Native American).
- Had a baby weighing more than 9 pounds or had gestational diabetes (diabetes during pregnancy).
- Have an HDL cholesterol of 35 or less or a triglyceride level of 250 or more.
- Have hypertension or take antihypertension drugs.
- Had a minimally elevated glucose level on a previous test.

## wellness flash

Diabetes causes about 86,000 amputations nationwide each year. The ailment can deaden nerves in the arms and legs, allowing sores, and infections to develop into gangrene.

## wellness flash

Every 90 seconds someone is diagnosed with diabetes. The disease kills 180,000 Americans each year.

Two readings of 126 mg/dl or more on a fasting blood-glucose test, taken on different days, means you have diabetes. Less-elevated reading, from 110-125, indicate impaired fasting glucose, which means you are insulin resistant and face a sharply increased risk of diabetes. Regardless of your glucose level, you are probably resistant if you have low HDL, high triglycerides, high blood pressure, or excessive abdominal fat.

Certain lifestyle changes such as:

- Regular moderate exercise
- Losing weight
- Stopping smoking
- Eating a high-fiber diet
- Eating a diet low in sugar and other sweets

can improve insulin resistance; they may also help improve the associated HDL, triglyceride, and blood pressure prob-

lems. Those steps can also help people who have Type 2 diabetes (and sometimes even Type 1) control their glucose level.

Symptoms of both types can include

- hazy vision
- excessive thirst
- frequent urination
- frequent hunger
- a weight loss or weight gain
- dry skin
- a tired washed-out feeling
- slow healing wounds
- itching, tingling, or numbness in the extremities
- frequent vaginal or skin infections
- combinations of these symptoms.

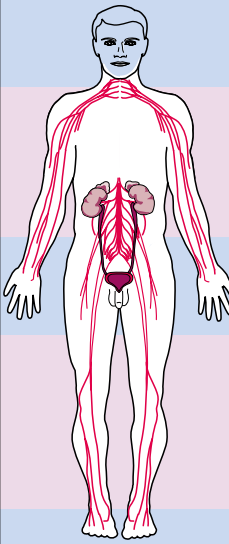
Unless detected and controlled, diabetes can ultimately lead to stroke, heart disease, kidney failure, blindness, amputation of limbs from gangrene, and death. See Table 7-7. According to the American Diabetes Association, the disease

table 7-7

Complications of Diabetes

Over time, untreated or poorly controlled diabetes can cause debilitating, even life threatening complications.

	What Happens	Complications
Eyes	The small blood vessels of the retina become damaged.	Decreased vision and ultimately blindness. Diabetes is the leading cause of blindness in people 20 to 74.
Blood vessels	Plaque builds up and blocks arteries in major organs, such as the heart and brain. The walls of blood vessels are damaged so that they cannot transfer oxygen normally.	Poor circulation causes wounds to heal poorly and can lead to heart disease, stroke, gangrene of the feet and hands, and infections. Diabetics suffer 2 to 4 times the usual rate of CVD.
Kidneys	Blood vessels thicken; protein leaks into urine; blood isn't filtered normally.	Poor kidney function; kidney failure. Nearly one-half of new cases of end-stage kidney disease stem from diabetes.
Nerves	Nerves are damaged because glucose isn't metabolized normally and blood supply is inadequate.	Leg weakness; reduced sensation, tingling, and pain in the hands and feet; chronic damage to nerves. Nerve damage and poor blood vessel circulation may lead to leg amputations.
Genitals	Poor circulation in blood vessels in genitals can lead to impotence.	Eighty percent of diabetic men suffer from impotence.



is a leading cause of death in this country and diabetics are 2 to 4 times as prone to heart attack and stroke as are nondiabetics. Assess your risk of developing diabetes by completing “Are You at Risk for Diabetes?” Lab Activity 7-4.

## Treatment for Blocked Coronary Arteries

As you have discovered, most of the risk factors linked to coronary heart disease can be controlled. The way you live, the choices you make, can have a profound impact on the health of your cardiorespiratory system. When coronary arteries do become blocked, usually the first treatments prescribed are diet modification (low fat) and exercise therapy. These are two major areas of one’s life that, if maximized, can have positive results. When these methods are unsuccessful, the following procedures may be required.

### Drug Therapy

This involves drug treatment affecting the supply of oxygen to the heart muscle or the heart’s demand for oxygen. Some drugs (coronary vasodilators) cause the blood vessels to relax, enlarging the opening inside them. Blood flow then improves and more oxygen reaches the heart. Nitroglycerine is the most commonly used drug in this category. Another category of drugs slows down the heart rate or reduces blood pressure, thus decreasing the heart’s need for oxygen, reducing its workload.

### Angioplasty (or Balloon Angioplasty)

The American Heart Association describes this treatment as a nonsurgical procedure that improves the blood supply to the heart by dilating a narrowed coronary artery. The blocked part of the coronary artery must be identified before this technique is performed. During this process (cardiac catheterization), a doctor guides a thin plastic tube (catheter) through an artery from the arm or leg into the coronary arteries. A liquid dye, visible in X rays, is injected into the catheter and X-ray movies are taken as the dye flows through the arteries. Doctors can identify obstructions in the arteries by tracing the flow of the dye. Once obstructions are identified, another catheter having a balloon tip is inserted inside the first; the balloon tip is inflated at the obstruction site. This compresses the plaque and enlarges the opening of the blood vessel. The balloon is deflated and both catheters are removed. The process injures the vessel wall, causing the area to grow new cells. Some people grow too many cells, relogging the artery. About 25 percent of the people who have this technique have renarrowed arteries within 6 months. The introduction of stents (cylinders that prop the arteries open) has substantially reduced the



The cost of cardiovascular diseases and stroke was an estimated \$326.6 billion. This figure includes health care expenditures and lost productivity for the year 2000. Each year these costs increase.

risk of arteries closing again. However, the reclosure risk is still 10 to 20 percent within the first year.

### Coronary Bypass Surgery

This is a surgical technique in which doctors take a blood vessel from another part of the body (usually the leg) and use it to detour around a blockage in the coronary artery. Blood flow to the heart is restored.

### New Techniques

What follows are new techniques under research and showing great promise:

1. *Enzyme therapy*: In this nonsurgical process, enzymes are injected into the blockage, dissolving it.
2. *Laser beam treatment*: This is used to break up the plaque, after which the particles of debris are vaporized.
3. *Vaccination*: Because a virus has been identified in the blocked arteries of heart patients during autopsy, a vaccine might be given early in life (like the polio vaccine) to treat some forms of coronary artery disease.
4. *Insertion of a cancer gene*: A gene that slows cancer growth may also help prevent heart patients’ arteries from relogging after angioplasty. The retinoblastoma gene is inserted into an ordinary cold virus, it is genetically modified so it cannot spread, and then angioplasty is performed with the virus-coated balloon. The gene does its work until the virus dies; both then become inactive. Relogging has been reduced in early trials.

## The Future . . . Focus on Lifestyle

The cost of treating cardiovascular diseases in this country is staggering. Many scientists believe we will be more successful if we focus on prevention rather than rely on expensive, high-tech treatments. “An ounce of prevention is worth a pound of cure” will, in all likelihood, be the slogan of the twenty-first century. Heart disease prevention in our future will focus primarily on lifestyle changes and approaches that involve “mind and body” concepts. Many scientists are already substantiating these trends in their research and medical practices.

One example is Dr. Dean Ornish, cardiologist, clinical professor of medicine at the University of California at San Francisco, and pioneer in the treatment of coronary heart disease. He found that after treating his patients with the current, recommended medical procedures—medication, angioplasty (balloon technique), and coronary bypass surgery, all expensive and dangerous—most did not stay well. Despite the procedures, some died and many returned for further treatment. He began to question the wisdom of such dramatic medical care for coronary heart disease. He found it interesting that lifestyle factors could trigger all mechanisms known to cause CHD. The lifestyle choices we make each day, such as about what we eat, how we respond to stress, how much we exercise, and whether we use tobacco, have a profound impact on our heart’s health. With this concept in mind, he developed a plan that focused on lifestyle. His new program, “Reversing Heart Disease,” is having significant success in reducing atherosclerosis without medication or surgical procedures. The program involves the following lifestyle changes:

1. A special diet is recommended. The Reversal Diet is 10 percent fat, 70 to 75 percent carbohydrate, 15 to 20 percent protein, and 5 milligrams of cholesterol per day. In comparison, the typical American diet is 40 to 45 percent fat, 25 to 35 percent carbohydrate, 25 percent protein, and 400 to 500 milligrams of cholesterol per day. The Reversal Diet allows, but does not encourage, moderate alcohol consumption (less than 2 oz. per day). It excludes caffeine, allows moderate use of salt and sugar, and is not restricted in calories.
2. Smoking is prohibited.
3. Thirty minutes a day or one hour every other day of moderate exercise is prescribed.
4. Stress management methods are prescribed every day. These include yoga stretches, progressive relaxation, abdominal breathing, meditation, and imagery.
5. Psychological support should be enhanced. This involves increased time spent talking about feelings with friends and family and participating in spiritual and religious activities.

## Mind and Body Connection

The traditional risk factors explain only a portion of the known causes of heart disease. Why do some people develop heart disease and others do not? Clearly, all the risk factors are important, but could there be something more? Are there common psychological—and perhaps even spiritual—factors that lead to or prevent coronary heart disease? Is there an unconscious connection between mind, body, and spirit that would explain the unknown causes of heart disease?

Scientists are beginning to examine these questions: Is laughter good for you? Can prayer bring down blood pressure? Does a bad marriage or divorce suppress your immune system? Does listening to others lower blood pressure? Is a cynic more likely to have heart trouble? To each of these questions there is a scientist able to answer “YES!” and provide data to back it up. There is a whole field of mind/body research tapping into the interaction between our immune systems and our bodies, mind, moods, and spirit. Just as we learned the importance of exercise and nutrition to our health, we are discovering ways to go deeper into inner wellness. Ponder these studies that support the mind/body concept:

- Norman Cousins, author, philosopher, and former professor at the Department of Psychiatry and Biobehavioral Sciences at UCLA Medical School, (now deceased) found that laughter heals because it replaces fear and stress with serenity and homeostasis. He taught others to never underestimate the capacity of the human mind and body to regenerate, even when the prospects seemed most dismal. His research confirmed that positive emotions boost health.
- Larry Scherwitz, professor of psychology at the University of California, found that people who overuse the self-centered pronouns “I,” “me,” or “mine” are twice as likely to have heart attacks. These people are hostile, have a low level of trust in others, and put their self-centered interests and pleasures ahead of others.
- Redford Williams of Duke University found that cynics, being full of contempt for other people, and angry hostile people have more than their share of heart trouble.
- Many scientists have developed psychological tests to measure levels of anger that bring on heart attacks. Studies linking social support (i.e., loving family, happy marriage, one or two close friends, support groups) to vitality, longevity, lowered blood pressure, and healthier immune systems confirm that emotions may regulate health. These head and heart factors are powerful medicine.
- Dean Ornish, M.D., is convinced that one cause of blocked coronary arteries stems from three kinds of loneliness (or isolation): (1) we feel isolated from

ourselves, (2) we lack “connectedness” and intimate relationships with others, (3) we have a cosmic loneliness of the spirit (or higher part of ourselves). He feels that isolation leads to chronic stress and to illnesses such as heart disease, and that real intimacy and feelings of connectedness with others can be healing. He argues that the ability to be intimate with ourselves, with others, and with a higher spirit—within ourselves—is the key to emotional health and essential to the health of our hearts as well.

- Mind/body connection authority, Jon Kabat-Zinn, author of *Full Catastrophe Living*, advocates

meditation as a technique to bridge the gap between the mind and the heart to improve health, ease pain, and reduce stress.

- Another authority on the mind/body connection, Bill Moyers, author of *Healing and the Mind*, explored the latest research in the field of medicine known as psychoneuroimmunology. He found evidence supporting the ways in which thoughts, feelings, and emotions influence our health. Moyers documents the importance of mind/body interactions in the prevention and the treatment of illness.



## frequently asked questions

Q. Is it really OK to eat eggs two or three times a week even though I’m on medication to keep my cholesterol down?

A. Yes, it is. Research shows that two or three eggs weekly are not apt to raise blood cholesterol. The real villain is saturated animal fat, found in whole milk, fatty meat, cheese, and butter. A Harvard study of 120,000 men and women found that a daily egg did not boost the risk of heart disease or stroke. Eggs are rich in choline, needed for proper brain functioning, and the antioxidant lutein, believed to help protect eyes from macular degeneration.

Q. What is homocysteine, and how is it related to CHD?

A. **Homocysteine** is an amino acid in the blood and a natural by-product of protein metabolism. The consumption of protein from meat or vegetable sources (such as soy) starts a series of biochemical reactions that ultimately leads to the production of homocysteine. Studies have shown that too much homocysteine in the blood is related to a higher risk of CHD, stroke, and peripheral vascular disease. Additionally, evidence suggests that homocysteine may have an effect on atherosclerosis by damaging the inner lining of arteries and promoting blood clots. A high homocysteine level is considered to be the “new” risk factor for CHD and to be in the same league as cholesterol.

Homocysteine levels in the blood are strongly influenced by diet, as well as genetic factors. The dietary components with the greatest positive effects are folic acid and vitamins B6 and B12. Folic acid and the B vitamins help break down homocysteine and thereby lower concentrations in the blood. Also, studies reveal that low blood levels of folic acid are linked with higher risk of fatal CHD and stroke.

Along with diets high in protein and low in B vitamins, heavy smoking has been linked to high homocysteine levels. Heavy smokers, have up to 50 percent higher homocysteine levels than nonsmokers. Homocysteine levels above 15.8 micromoles/liter have a threefold greater risk of heart attack than those with lower levels.

Although evidence for the benefit of lowering homocysteine levels is lacking, people with high risk should be strongly advised to be sure to get enough folic acid and vitamins B6 and B12 in their diet. Foods high in these nutrients include green leafy vegetables, fruits, and grain and cereal products fortified with folic acid.

It has been suggested that laboratory testing for homocysteine levels can improve the assessment of CHD risk. It may be particularly useful in people with a personal or family history of CVD, but in whom the well-established risk factors (inactivity, smoking, high blood pressure, high blood pressure, obesity) do not exist.

Q. Why does exercise prevent heart disease?

A. Here’s at least part of the answer. In addition to lowering blood pressure, cholesterol, and body fat, certain components in the blood stream called cytokines act either to promote atherosclerosis (atherogenic) or prevent it (atheroprotective). Research published in the *Journal of the American Medical Association* studied the effect of long-term exercise on those blood factors. The participants worked out for an average of 2 1/2 hours per week for 6 months. After the exercise program, production of the atherogenic blood factors fell by 58.3 percent and the level of atheroprotective factors rose by 35 percent. In any individual, the amount of change was proportional to the level of activity. In other words, those participants who exercised more, enjoyed more of the beneficial effects in their blood levels. Those who exercised less had a smaller response. It appears that with every extra minute you exercise, your body is producing more protection and less destruction of your arteries. Although there is likely an upper limit (or point of diminishing returns), this study gives you one more reason to exercise.

Q. Don’t more women die from breast cancer than heart disease?



## frequently asked questions

- A. No. Across nearly all racial and ethnic groups, heart disease is the number 1 killer of women just as it is the number 1 killer of men.
- Q. I know my HDL and LDL. Why don't they add up to my total cholesterol?
- A. Certain blood fats known as triglycerides also figure into the equation:  

$$\text{Total cholesterol} = \text{HDL} + \text{LDL} + (\text{triglycerides} \div 5)$$
 LDL is not measured directly, but derived as follows:  

$$\text{LDL} = \text{total cholesterol} - \text{HDL} - (\text{triglycerides} \div 5)$$
- Q. How often should I have my blood cholesterol measured?
- A. Adults should be screened at *least* once every 5 years, but more frequently if the total cholesterol is elevated, if HDL is low, and/or they have other cardiac risk factors.
- Q. How many people in the United States adhere to a lifestyle that reduces their risk of coronary heart disease?
- A. It is somewhat difficult to pinpoint the exact number but findings from the Nurse's Health Study (involving more than 80,000 women) may give us some insight. The study revealed that women in this low risk category make up only 3 percent of the population . . . a pitifully low number. The

study confirmed that the risk of heart disease can almost be eliminated if we follow a few rules. The heart-healthy lifestyle defined in this study involves:

- Engaging in moderate-to-vigorous physical activity for at least half an hour per day.
- Not smoking.
- Eating healthy and consuming a diet:
  - low in saturated fat (found in animal products) and trans fat (found in cookies, crackers, pies, cakes, donuts, candy, margarine)
  - high in fiber
  - high in folate (found in green leafy vegetables, orange juice, fortified cereals, legumes, and whole grains)
  - high in omega-3 fatty acids (found in fish)
  - low in glycemic foods (found in sweets, etc., which raise glucose levels)
- averaging at least half a drink of an alcoholic beverage a day
- avoid being overweight (a body mass index of 25 or under).

## summary

Heart disease is the number 1 killer in the United States. Extensive studies have identified twelve factors that increase the risk of developing coronary heart disease. These factors lead to the development of atherosclerosis. The most significant factors are inactivity, high blood pressure, high blood lipid profile, cigarette smoking, and obesity. These five are labeled *primary* and can be controlled. There are seven additional contributing factors labeled *secondary*. The first two of these are controllable. They are stress and emotional behavior (especially negative emotional behaviors, such as hostility and anger). The other five secondary risk factors, which cannot be controlled, are age, male gender, race, positive family history, and diabetes. The more risk factors you have and the longer they are present, the greater the chance you have of developing heart disease. By age 20, you already have fatty deposits present in your coronary arteries. If your risk of CHD is low, keep up the good

work by maintaining a healthy lifestyle. However, if your coronary risk is high, now is the time to act. You can't do anything about heredity, sex (gender), or age. However, you can choose to act on those risk factors under your control.

If the coronary arteries become blocked due to advanced atherosclerosis, there are several treatments available. These include exercise and diet modification, drug therapy, angioplasty, and coronary bypass surgery. The cost of treating CVD continues to spiral upward every year. To counter this trend, many scientists are convinced that preventing CVD through lifestyle change is the key to maximizing heart health.

Adopting a healthy lifestyle early in life can add years to your life and life to your years. In addition, great discoveries await us as the field of mind and body research gains wider acceptance in the quest for increased well-being.

## additional information resources

American Diabetes Association, Inc.  
Two Park Avenue  
New York, NY 10016  
(212) 683-7444

American Heart Association  
7272 Greenville Avenue  
Dallas, TX 75231-4596  
(800) AHA-USA1

[www.americanheart.org](http://www.americanheart.org)

National Diabetes Information  
Clearinghouse  
Box NDIC  
Bethesda, MD 20205  
(301) 496-7433

National Heart, Lung, and Blood  
Institute Information Center  
4733 Bethesda Avenue, Suite 530  
Bethesda, MD 20814-4820  
(301) 251-1212

<http://www.nhlbi.nih.gov>

National Stroke Association  
1565 Clarkson Street  
Denver, CO 80218  
(303) 839-1992

The Juvenile Diabetes Foundation International  
23 East 26th Street  
New York, NY 10010  
(212) 889-7575



## internet resources

<http://www.ama-assn.org>  
American Medical Association—Access to full-text articles from  
medical journals

<http://www.healthfinder.gov>  
Healthfinder, U.S. Government

<http://www.medscape.com>  
Medscape—A commercial collection of full-text journal articles

[http://healthlink.stanford.edu/with health news](http://healthlink.stanford.edu/with%20health%20news)  
AFAA/Your Body

[http://www.afa.com/your\\_body/yourbody.html](http://www.afa.com/your_body/yourbody.html)  
American Heart Association

<http://www.americanheart.org>  
American Lung Association

<http://www.lungusa.org/asthma>

Cardiology Compass

<http://www.cardiologycompass.com>  
Centers for Disease Control and Prevention  
<http://www.cdc.gov.cdc.html>

Cooper Institute for Aerobics Research  
<http://www.cooperinst.org>

Dietary Approaches to Stop Hypertension (DASH)  
<http://dash.bwh.harvard.edu>

Franklin Institute Science Museum/The Heart: An On-line  
Exploration

<http://www.fi.edu/biosci/heart.html>  
*Healthy People 2010*

<http://www.odphp.osophs.dhhs.gov/pubs/hp2010/>  
HeartInfo—Heart Information Network

<http://www.heartinfo.org>  
Medline (This vast, government-operated database of medical  
journal abstracts is open to anyone)

<http://www.nlm.nih.gov/databases/medline.html>

National Institute of Health  
<http://www.nih.gov>

National Stroke Association

<http://www.stroke.org>  
*New England Journal of Medicine*

<http://www.nejm.org>

St. John's Cardiovascular Research Center

<http://heartct.humc.edu>  
Shape Up America

<http://www.shapeup.org>

<http://www.health.gov/healthypeople>

*Healthy People 2020*



Name \_\_\_\_\_

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# lab activity

## 7-1

## Are You at Risk?



Your chances for developing heart disease depend on a variety of habits and risk factors. Smoking, physical activity, stress management, blood pressure, and cholesterol are important prognosticators for heart disease. Read the question, and circle the most appropriate response as it relates to your lifestyle. Finally, add the points associated with your response to obtain your total score and your risk of developing heart disease.

1. Do you smoke cigarettes?	Yes	12
	No	0
2. Do you use other tobacco products (pipe, cigars, chewing, snuff)?	Yes	3
	No	0
3. Do you usually exercise vigorously at least three times per week for 20 to 30 minutes?	Yes	0
	No	10
4. How would you describe your lifestyle?	Sedentary (inactive)	6
	Somewhat active	2
	Very active	0
5. What is your blood pressure?	High 140/90 +	9
	Normal or low	0
	Don't know	2
6. What is your total cholesterol?	High 240 mg/dl+	9
	Normal	0
	Don't know	2
7. Has anyone in your family ever been told they had any form of heart disease (parents or siblings #55 years)?	Yes	5
	No	0
8. Have you ever had any of the following?		
a. Pain or discomfort in chest and surrounding areas?	Yes	2
	No	0
b. Unaccustomed shortness of breath with mild exertion?	Yes	2
	No	0
9. What is your gender?	Female	0
	Male	4
10. Have you ever been told you have diabetes?	Yes	4
	No	0

11. Have you suffered a personal loss or misfortune in the past year that had a serious impact on your life? (i.e., job loss, disability, separation/divorce, jail term, or the death of someone close to you)	No	0
	Yes, 1 serious loss or misfortune	1
	Yes, 2 or more	2
12. Do you feel you handle everyday stress well?	Yes	0
	No	2
13. Would you describe yourself as a Type A person (i.e., aggressive, competitive, time-conscious)?	Yes	4
	No	2
14. If you are male, what is your age?  If you are female, what is your age?	Under 40	1
	40+	3
	Under 50	0
	50+	3
15. What is your race?	White	0
	African American	3
	Hispanic	1
	Other	1
16. How would you describe your weight?	Normal/below	0
	Normal to +30 lbs.	1
	+30 lbs. or more	2
17. Do you consume meat, eggs, cheese, butter, whole milk, and fried foods?	0 to 5 times/week to	0
	10 times/week daily	2
	2 to 3 servings/day	3
	over 3 servings/day	6
<b>Your Total Score</b>		_____

### Scoring

#### Scores of 0 to 16

Your risk is **low** for developing heart disease at this time. Evaluate your risk every year since risk factors such as blood pressure, cholesterol levels, and age change from year to year. If you have any uncontrollable risk factors, you would be wise to modify other risk factors to protect your cardiorespiratory system.

#### Scores of 17 to 29

Your risk is **average** or moderate. Your score indicates there is room for improvement on some risk factors. If you have any uncontrollable risk factors, it is imperative that you modify other risk factors to protect your cardiorespiratory system.

#### Scores of 30+

You have a **high** risk of developing heart disease. You should take action **immediately** to modify all controllable risk factors.







5. "I saw that his cholesterol was 280, his HDL level was 28, and his LDL level was 174. His cholesterol and HDL ratio was 10, and his triglycerides were 325. What do each of these mean? What is normal or desirable for each?"
- a.
  - b.
  - c.
  - d.
  - e.
6. "Rob doesn't want to quit smoking—he's smoked for 20 years. Why is smoking bad for his heart?"
7. "A nurse said Rob needs a special exercise program to aid in recovery. Won't exercise strain his heart? What good will it do?" (Give three benefits.)
8. "Rob enjoys having an occasional beer. Will he have to give this up?"

Name \_\_\_\_\_

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# lab activity

## 7-4



## Are you at Risk for Diabetes?

**Directions:** Answer the questions in Part I to evaluate your risk for developing diabetes. Complete Part II to learn more about diabetes and the connection it has to heart disease.

### Part I

Yes	No	
_____	_____	1. I am overweight (Body-mass index greater than 27. To calculate your BMI, multiply your weight in pounds by 705; divide the result by your height in inches, then divide that result by your height in inches again.)
_____	_____	2. I get little or no exercise.
_____	_____	3. I have a parent with diabetes.
_____	_____	4. I am African American, Hispanic American, or Native American.
_____	_____	5. I am over 40 years of age (counts as one “yes” answer; if over 65 years of age, counts as two “yes” answers).
_____	_____	6. I am a women who had diabetes during pregnancy or delivered a baby weighing more than 9 pounds.
_____	_____	7. I have a brother, sister, or parent with diabetes.
_____	_____	8. I have high blood pressure and/or high cholesterol.
_____	_____	9. I had a minimally elevated glucose level on a previous test (110–125 mg/dl)

Scoring: Each “yes” answer you have increases your risk of developing diabetes.

### Part II

1. How many “yes” answers did you have? \_\_\_\_\_
2. Discuss your potential risk for developing diabetes. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. List the warning symptoms of Type 1 and Type 2 diabetes. \_\_\_\_\_

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4. Discuss the difference between Type 1 and Type 2 diabetes. \_\_\_\_\_

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5. What can you do to prevent or reduce your risk of developing diabetes? \_\_\_\_\_

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6. Why is diabetes such a serious disease? \_\_\_\_\_

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7. Why does diabetes increase the risk for heart disease? \_\_\_\_\_

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8. What segments of the U.S. population are at increased risk of diabetes? \_\_\_\_\_

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Name \_\_\_\_\_

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# lab activity

## 7-5

## Using Healthquest



Directions: Insert CD. When the table of contents screen appears, click on “Cardiovascular Health.” Click on “Wellness Activities,” then “Heart Attack Risk:”

I. Read “Introduction.”

1. What is the number one killer in America? \_\_\_\_\_
2. Why is heart disease a national concern? \_\_\_\_\_

II. Assess yourself. Answer the questions on the self-assessment.

A. “Risk Assessment”:

1. What was your risk on the “Risk Assessment” section? \_\_\_\_\_
2. What was your total number of points? \_\_\_\_\_
3. Discuss your findings. \_\_\_\_\_
4. What were your weaknesses? \_\_\_\_\_

B. “Knowledge Inventory”:

1. What was your “Knowledge Inventory” ranking? \_\_\_\_\_
2. What was your score in this section? \_\_\_\_ Discuss the findings. \_\_\_\_\_
3. What were your weaknesses?

C. Additional Feedback:

1. Do you agree that high blood pressure, smoking, and high blood cholesterol are the three most important risk factors for heart disease? \_\_\_\_ Why or why not? \_\_\_\_\_
2. Discuss how physical inactivity influences an individual’s risk for heart disease. \_\_\_\_\_
3. List three lifestyle behaviors that you could change or implement that would reduce your heart disease risk.  
\_\_\_\_\_

