2 DISEASE AND LIFE EXPECTANCY

OBJECTIVES

After reading the chapter, you should be able to do the following:

- List the leading causes of death in 1900 and today
- Discuss the effect of sanitation on disease
- Describe how lifestyle affects disease
- List the risk factors for coronary heart disease
- Describe cancer, stroke, chronic lower respiratory disease, and list their risk factors

During the last century, many advances in sanitation and healthcare have improved the lives of Americans, tremendously. In fact, the average life span of Americans has nearly doubled, and average individuals can expect to live well into their upper 70s or low 80s.[1] The expanded life expectancy is the result of several factors, including improved healthcare, refrigeration, vaccinations, and better sanitation practices.

In the early 1900s, communicable diseases were the leading causes of death. Viruses and bacteria were the principal killers, drastically reducing longevity and the overall wellness of millions. Today, Americans are their own worst enemy, with lifestyles characterized by inactivity, poor eating habits, and tobacco, drug, and alcohol abuse. These lifestyle habits directly result in today's leading causes of death: heart disease, cancer, chronic lower respiratory diseases, and stroke.[1] Americans today are committing

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indirect suicide, slowly destroying their health, day by day, simply by the way they choose to live. For the first time in history, children today are projected to have a shorter life expectancy than their parents.[22]

HEALTH IN THE EARLY 1900s

In the early 1900s, communicable diseases caused by infectious organisms were the main causes of death. Tuberculosis, pneumonia, and diarrhea were three of the worst killers. Antibiotics were not yet available, and with public sanitation systems being virtually non-existent, cities were essentially cesspools and breeding grounds for deadly microorganisms.

Many describe this time period as "The good ol' days." Yet, they were far from being "good" in terms of the quality of life, principally because of poor sanitation practices.

The main problem revolved around the disposal of human and animal waste. At the time, horses were the main means of transportation. Though they were an excellent means of travel, they produced one major and detrimental side-effect: manure. The average horse produced approximately 20 pounds of manure a day. To place that in perspective, at the beginning of the twentieth century, New York City had more than 120,000 horses.[2] That equates to 2.4 million pounds of manure a day! Obviously, that was a lot of manure, and it is safe to say, the city streets were not exactly clean. Additionally, city residents routinely emptied their chamber pots out the window, making the city streets all the messier. The use of chamber pots, and their emptying practices, made things very difficult for a gentleman of the era.

When America moved from being an agrarian to an industrialized nation, it resulted in a sedentary society of "couch potatoes."

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Etiquette demanded that he escort a lady curbside to protect her from mud being splashed up by carriage wheels or horses' hooves. So the gentleman had a choice: protect the lady from debris from the streets, or protect her from the contents of a chamber pot. Chivalry was, indeed, a messy proposition.

If horse manure and human waste were not enough, residents also emptied food wastes (e.g., husks, peels, rinds) and other garbage on the street.[2] The combination of manure and rotting garbage made the perfect environment for bacteria and viruses to proliferate. Such deplorable sanitary conditions directly resulted in rampant outbreaks of communicable diseases, and these diseases were the leading causes of death at the time.

But as the century progressed, technology began to improve these conditions. City health departments were established. Public works projects (e.g., sewage treatment, water sanitation) were developed. Refrigeration became popular, and helped to reduce food spoilage. Industrial pollution was curtailed. As a result, many of the cities became much cleaner, and the death rates from communicable diseases began to fall. Lastly, the development of penicillin and vaccines, coupled with improved sanitation, greatly reduced the death rates from infectious disease.

FIGURE 2.1

Leading Causes of Death

1900	Today
1. Pneumonia	1. Heart Disease
2. Tuberculosis	2. Cancer
3. Diarrhea/enteritis	3. Chronic Lower Respiratory Disease
4. Heart Disease	4. Stroke
5. Stroke	5. Accidents (Unintentional Injuries)

Source: National Center for Health Statistics[1]

HEALTH IN THE LATTER 1900s TO TODAY

The latter 1900s were characterized by technological change and innovation. This technological progress dramatically changed the way Americans lived. For example, no longer did the farmer have to plow his field with a mule; tractors did the job much faster and more efficiently. Similarly, many other jobs were becoming more sedentary, that is, less active. America was no longer an agrarian society; industrialization and mass production removed people from the farm and placed them in factories and offices. The jobs

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individuals undertook were quite often less physically demanding, and commonly referred to as "desk jobs." Most recently, the employment sector experiencing the greatest growth has been that of information services, involving computers and data manipulation. Though certainly challenging, these positions are sedentary and require little in the way of physical activity.

Such inactivity has taken a toll on the general wellness of the American public (along with other lifestyle choices, such as diet, substance abuse, and stress). Americans simply are no longer active enough to burn off the calories they consume. The average weight of Americans is increasing, and most of that weight gain is fat. Obesity rates have risen throughout the century, but most markedly in the past 25 years. Today, a majority of the population is considered overweight, and obesity is now a major health issue.[3] In fact, obesity is a leading, contributing factor in the declining health and early death of millions each year.[4] Obesity-related diseases are estimated to cost the United States over $100 billion annually and is projected to rise up to $957 billion annually by 2030.[5] So, obesity is extremely costly in both human and monetary capital.

CURRENT LEADING CAUSES OF DEATH

Today, the leading causes of death are heart disease, cancer, chronic lower respiratory diseases, and stroke.[1] These diseases are not caused by bacteria or virus-

U.S. LIFE EXPECTANCY RISES

Simple exercise and the consumption of a proper diet can increase longevity rates.

American life expectancy is on the rise. The National Center for Health Statistics reports that the average American can expect to live to 78.7 years of age—a record high, up from 47 years in 1900. Moreover, incident rates for the five leading causes of death (i.e., heart disease, cancer, chronic lower-respiratory disease, stroke, and unintentional injury) all have declined in recent years, helping to increase life expectancy. The infant mortality rate is now 6.07 deaths per 1,000 live births. But increased life expectancy does not come free. Healthcare costs have skyrocketed. Roughly one-half of the adult population leads an inactive lifestyle, increasing arthritis and musculoskeletal conditions. Caloric intake by men has increased significantly from 1971 and, causing obesity rates to soar, with some two-thirds of the adult population now being overweight or obese. Improved medications and healthcare have increased longevity, but more can be done. Simple exercise and the consumption of a proper diet would increase longevity rates even further. And these come at no extra cost, but yield the greatest results.

es, as were the leading causes of death in 1900; instead, they are caused by lifestyle, in particular physical inactivity (See Figure 2.1). These diseases are known as hypokinetic diseases—named for "hypo" meaning too little and "kinetic" for movement—and are caused by "too little movement."

Multiple factors affect an individual's health daily. However, the most important factor is personal behavior. In fact, the majority of cases involving heart disease, cancer, chronic lower-respiratory disease, and stroke are influenced directly by the way a person lives. Simply put, these are self-inflicted diseases that are generally preventable.

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STUDY TIP:

Multiple factors affect an individual's health daily. However, the most important factor is personal behavior.

CARDIOVASCULAR DISEASE

Without a doubt, cardiovascular disease (CVD)—an encompassing term used to describe various diseases of the heart and its circulatory system—accounts for the greatest number of deaths in the United States today.[6] In fact, CVD has been the leading cause of death in the United States every year since 1900, with the exception of 1918, when a rare influenza pandemic ravaged the world.[5] In addition to the human cost of life, CVD is responsible for some $475.3 billion in direct and indirect costs,[18] proving that it is, indeed, a costly disease. But CVD is not just an American problem. According to the World Health Organization, some 17.3 million worldwide deaths are attributed to CVD each year, showing it has "no geographic, gender, or socio-economic boundaries."[7]

Coronary heart disease, a major form of CVD, is the leading cause of death in the United States, reportedly attributing to more than 700,000 deaths annually.[1] The fourth leading cause of death is stroke, also a CVD.[1] Thus, it is easy to see that CVD is quite pervasive, and, in fact, it affects nearly one-half of the American population.[5]

The high rate of CVD is directly attributable to the lifestyle most Americans live. Americans are simply too inactive, eat too much fat, smoke too many cigarettes, and fail to manage their stress effectively. This is not an exclusively American problem, however. The World Health Organization writes:

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> *The rise in CVDs reflects a significant change in diet habits, physical activity levels, and tobacco consumption worldwide as a result of industrialization, urbanization, economic development and food market globalization. People are consuming a more energy-dense, nutrient-poor diet and are less physically active. Imbalanced nutrition, reduced physical activity and increased tobacco consumption are the key lifestyle factors. High blood pressure, high blood cholesterol, overweight and obesity—and the chronic disease of Type 2 diabetes—are among the major biological risk factors. Unhealthy dietary practices include the high consumption of saturated fats, salt and refined carbohydrates, as well as low consumption of fruit and vegetables. These risk factors tend to cluster.*[7]

Personal lifestyle habits aside, some individuals simply have a higher genetic predisposition for developing CVD. Even for these individuals, modifying lifestyle behaviors significantly reduces the risk of CVD. To fully understand why this is so, it is also necessary to understand how CVD develops.

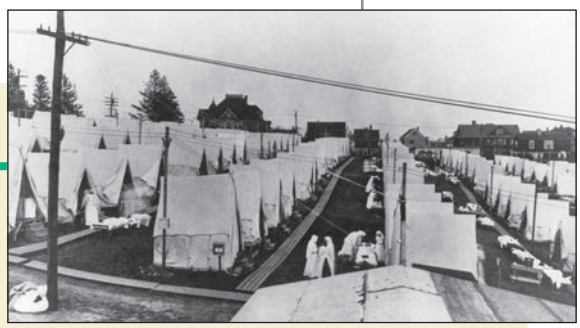
The cardiovascular system (i.e., the heart, blood, and blood vessels) circulates blood throughout the entire body. The heart is simply a four-chamber muscular organ, pumping more than 1,000 gallons of blood a day through 60,000 miles of blood vessels. The four chambers of the heart are divided into the atria (i.e., the two upper chambers) and the ventricles (i.e., the two lower chambers), labeled as either the left or right. The chambers are divided by the septum.

Blood flows through the heart itself, starting in the right atrium to the right ventricle, and out to the lungs for oxygenation. This process is known as pulmonary circulation. Blood then flows back to the heart, through the left atrium and left ventricle, and out to the body via the aorta, the largest artery of the body. This process is known as systemic circulation. It is a very efficient system, circulating approximately 5 quarts of blood every minute.

The cardiovascular system is effective and quite efficient. However, problems arise with the accumulation of fatty deposits on the arterial walls. This process is known as atherosclerosis, or clogging of the arteries. This is most problematic when it develops in the coronary arteries—the arteries that feed the heart its oxygen and nutrient supply. Atherosclerosis is known to begin early in life and proceed gradually until the artery is narrowed enough that blood can no longer travel through it effectively. When this develops in the coronary arteries, myocardial ischemia (i.e., inadequate oxygen supply to the heart) occurs. The signs of this are tightness and pain in the chest, or angina pectoris. If left untreated, this can result in a myocardial infarction: a heart attack.

CVD, even though quite pervasive, is a preventable disease. The World Health Organization suggests the following intervention strategies to prevent CVD:

- *Substitute nonhydrogenated unsaturated fats (especially polyunsaturated fat) for saturate and trans fats;*
- *Increase consumption of omega-3 fatty acids from fish oil or plant sources;*
- *Consume a diet high in fruits, vegetables, nuts and whole grains, and low in refined grains;*
- *Avoid excessively salty or sugary foods;*
- *Get at least 30 minutes of regular physical activity daily;*
- *Avoid smoking;*
- *Maintain a healthy weight.*[7]



Close military living quarters contributed to the spread of the deadly Spanish Flu during the first World War.

THE SPANISH FLU OF 1918

In 1918, one of the deadliest influenza pandemics occurred with an outbreak of what was widely called the Spanish Flu. An unusually severe and deadly strain of the H1N1 Influenza A virus was responsible for the pandemic, which ultimately killed more than 50 million individuals worldwide and some 675,000 individuals in the United States. Unlike typical influenza infections, the H1N1 virus was extremely deadly. The global mortality rate from this strain was estimated to be around 5 percent of the human population, and some 20 percent of the world's population contracted the disease. The disease spread quickly throughout Europe during the first World War, mainly because of the close living quarters of the soldiers and the mass movement of troops. The social repercussions of the disease were immense, as it spread rapidly around the world. In the initial six months of the pandemic, the disease is thought to be responsible for some 25 million deaths. In India, some 17 million died, and the Indian army suffered a mortality rate of nearly 22 percent. Great Britain and France had 200,000 and 400,000 deaths, respectively, attributed to the Spanish Flu. In remote areas, complete villages are known to have perished. The strain was unusual in killing many young and healthy victims, unlike common influenzas that kill mostly newborns and the elderly. The disease was also fast-acting. Reports indicate that individuals were struck suddenly with the disease and within hours were too frail to even walk; many died within 24 to 48 hours after infection. The cause of death typically resulted from uncontrollable hemorrhaging of the lungs, wherein individuals ultimately drowned in their own bodily fluids. With the disease being so deadly, many cities, states, and countries enforced restrictions on public gatherings and travel. Quarantines were strictly enforced, but many times they had little success. Armed guards were used in some communities at the borders to either turn back travelers or quarantine them. Many took to wearing masks, and some cities even required it by law. In the end, the Spanish Flu pandemic was the deadliest outbreak in human history. It was responsible for more deaths than the Black Plague, as well as all the deaths in the wars of the twentieth century combined.

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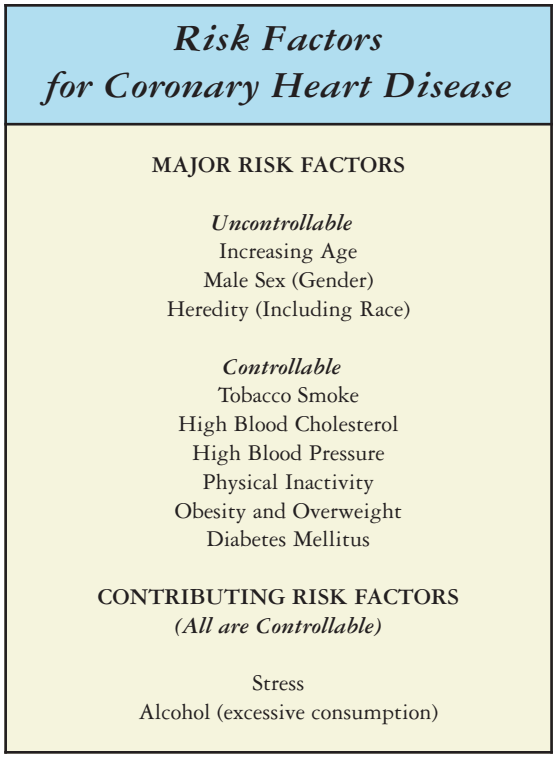
The American Heart Association has its own CVD-prevention program entitled, "ABCs of Heart Attack Prevention." The A stands for Avoid Tobacco, the B reflects Be More Active, and the C is for Choose Good Nutrition.[5]

Figure 2.2 Risk Factors for Coronary Heart Disease



Source: American Heart Association[5]

CORONARY HEART DISEASE

As stated previously, coronary heart disease is the leading cause of death in the United States today. Numerous factors are associated with the development of coronary heart disease (See Figure 2.2). These risk factors are not viewed as direct causes, because everyone who exhibits these risks does not necessarily develop the disease; rather, the risk factors are viewed as characteristics that may increase the chance of one developing coronary heart disease.

The risk factors fall into two categories: major and contributing. Some of the risk factors are controllable (e.g., physical inactivity, smoking); others are not (e.g., increasing age, heredity).

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MAJOR RISK FACTORS FOR CORONARY HEART DISEASE

UNCONTROLLABLE

Increasing Age. As a person ages, the likelihood of having a heart attack increases, especially after age 65.[4] But it is not uncommon for some, especially men who have a family history of coronary heart disease, to have heart attacks in their 40s. Furthermore, older women who have heart attacks are more likely to die within a few weeks after the cardiac episode than are men.

Male Sex (Gender). Men have a much higher risk of developing coronary heart disease than do women, at least until women reach their mid '70s; then the risk begins to close between the sexes, but men are still at a higher risk.[4] Estrogen is believed to be a protective factor for women, but this protective factor diminishes after menopause. Even though women have a reduced risk for developing coronary heart disease, it is still their leading cause of death.

Heredity (including Race). Family history affects the predisposition for coronary heart disease. If individuals' parents or grandparents had coronary heart disease, they are at a higher risk for developing it as well. However, they are not destined to develop coronary heart disease just because of an inherited genetic predisposition. They simply need to be aware of their increased risk and change their lifestyles accordingly. African Americans tend to have a higher incidence of heart disease than other races, mainly because of more severe high blood pressure. Hispanics tend to have a higher risk of developing coronary heart disease than Caucasians, and Asians tend to have the lowest risk.[4]

CONTROLLABLE

Tobacco Smoke. Smoking cigarettes can be one of the most damaging habits to one's health. Smokers run two to four times the risk of developing coronary heart disease than non-smokers, depending on the number of packs smoked per day.[5] Cigar and pipe smokers seem to have a higher risk of death from coronary heart disease, but their risk is not as great as that of cigarette smokers. Even more troubling is the fact that women who smoke and take "the pill" or other estrogen-based methods for birth control are at a much greater risk of suffering a stroke or heart attack than are non-smokers.[5]

Smoking is problematic for several reasons. First, nicotine and carbon monoxide, both found in smoke, cause harmful effects to the body. Nicotine is a stimulant and causes vasoconstriction, i.e., narrowing of the

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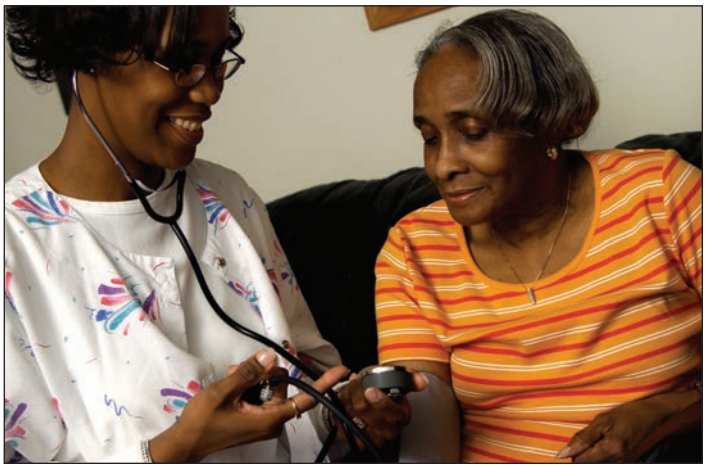
blood vessels, resulting in an increase in blood pressure and heart rate. Carbon monoxide binds with hemoglobin—the oxygen-carrying component of blood—and, thus, reduces the amount of oxygen in the bloodstream, further taxing the heart. Second, smoking also exacerbates atherosclerosis by promoting the build-up of lipids on the arterial walls.[8] In addition, individuals exposed to second-hand smoke can be at a high risk for developing coronary heart disease.[5] In the past 20 years, major legislation and policy have been developed to mandate that buildings, restaurants, and other businesses become "smoke free." While controversial, these efforts have led to more smoke-free areas to prevent individuals from having to breathe second-hand smoke (www.no-smoke.org).

High Blood Cholesterol. Cholesterol is a fatty substance found in the blood that is used for cell membrane maintenance and other bodily functions. It is synthesized within the body by the liver and, additionally, is found in dietary sources. Cholesterol is a necessary requirement for the body to function optimally. However, in excessive levels, cholesterol can be damaging to the body by increasing atherosclerosis. As blood cholesterol rises, so does the risk of coronary heart disease.

Cholesterol is carried by classes of lipoproteins: very-low-density lipoproteins (VLDLs), low-density lipoproteins (LDLs), and high-density lipoproteins (HDLs). Lipoproteins shuttle cholesterol throughout the bloodstream to and from the cells and the liver. VLDLs and LDLs carry cholesterol from the liver to the cells that need it; conversely, HDLs transport unused cholesterol back to the liver. If an excessive number of LDLs are present in the blood, fat is deposited on the blood vessels. Thus, VLDLs and LDLs are known as the "bad" cholesterol because they promote atherosclerosis. HDLs are considered the "good" cholesterol because they carry the unused fat back to the liver, and, thus, reduce the amount of available fatty plaque that can adhere to the arterial walls. Cholesterol



High blood pressure damages the heart and arteries, leading to heart attack and stroke.

TYPE 2 DIABETES – ROBERT RYAN, MA, ATC

Nearly 24 million individuals in the US are diabetic, with 90 percent of them being classified as Type 2 diabetes. Unlike Type 1 diabetes (also known as insulin dependent or juvenile onset diabetes), where the body no longer produces insulin, in Type 2 diabetes (also known as non-insulin dependent or adult onset diabetes) the body continues to produce insulin, but the cells become resistant to it and do not react in the normal fashion. Both conditions result in elevated blood glucose levels (bgl) because the glucose cannot move from the blood into the cells. A consistently elevated bgl will lead to kidney damage, eye damage, and cardiovascular disease, so it is a serious condition.

The diagnosis of Type 2 diabetes usually occurs after 40 years of age, but it is becoming more common in younger individuals and is even seen in children today. The primary criteria for diagnosis is the presence of Hemoglobin A1c (HbA1c) at a level greater than 6.5 percent. When the hemoglobin on a red blood cell comes in contact with a free glucose molecule in the blood, the two bind to each other, making the hemoglobin glycated. The average life span of a red blood cell is 120 days. The higher the average bgl is during a 120 day period, the higher the number of glycated hemoglobin molecules present. The HbA1c assay measures the percentage of hemoglobin in the blood that has been glycated and can be used to estimate what the average bgl has been over the last 3-4 months. A HbA1c value of 6 indicates an average bgl or 126 (100-152) mg/dl.

While some ethnic groups (American Indians, African Americans, Native Hawaiians, and Hispanics/Latinos) have a genetic predisposition to the disease, the main factor in the development of Type 2 diabetes is diet and physical inactivity. The best method to prevent developing Type 2 diabetes is also the best way to manage the disease: maintain a healthy Body Mass Index (BMI) with a proper diet and regular exercise. In the event that the disease cannot be controlled with diet and exercise alone, there are a variety of oral medications available that have one or more of the following effects: 1) stimulate release of more insulin, 2) reduce cell resistance to insulin, 3) inhibits the release of glucose from the liver, or 4) inhibit the absorption of glucose from the small intestine. Some individuals with Type 2 diabetes also may use insulin injections to control their bgl.

Sources: National Diabetes Information Clearinghouse http://diabetes.niddk.nih.gov/dm/pubs/overview/
Center for Disease Control http://www.cdc.gov/diabetes/pubs/factsheet11.htm

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levels must be maintained within their proper ranges in order to reduce the risk of developing atherosclerosis and coronary heart disease. Total cholesterol should be below 200 mg/dl. Over 240 mg/dl is considered high and places one at an increased risk for coronary heart disease[5] (See Figure 2.4). Further, triglycerides, i.e., free fatty acids, make up much of the fat in one's diet, as well as the fat that is circulated in the blood. Triglycerides typically are carried in the bloodstream by VLDLs and are known to promote atherosclerosis, so an acceptable level of triglycerides in the bloodstream should be below 125 mg/dl.

HIGH BLOOD PRESSURE (HYPERTENSION). Blood pressure is the amount of force applied to the arterial walls by the heart when it beats. It is measured in millimeters of mercury (mm HG) and is expressed as one number over another

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(e.g., 120/80 mm HG, commonly pronounced 120 over 80).[9] The top number is the systolic blood pressure, the amount of force exerted on the arterial wall when the heart beats. The force exerted on the arterial walls when the heart is at rest is the diastolic blood pressure. "Normal" blood pressure is considered less than 120/80 mm HG. (NOTE: Some, particularly women, may have lower blood pressure, yet still be very healthy.) A reading between 120/80–139/89 is classified as "Prehypertension." Anything over 140/90 mm HG is considered hypertension or "high" blood pressure, and is broken down into Stage 1 and Stage 2 Hypertension (See Figure 2.3). Hypertension is known as the "silent killer" because it rarely has any early warning signs. Over 34 percent of the adult population in the United States each year is hypertensive, and many do not know that they have it.[19] Another 36 percent of the adult population rates as prehyptertensive,[20] so it is easy to see that hypertension is a very common problem in the United States. It is very dangerous because increased blood pressure means the heart must work harder. When the heart is strained repeatedly, it is often damaged. Further, hypertension damages the arteries, causing them to harden, and increases the risk for a heart attack and stroke.[5]

A low-fat diet can help prevent high cholesterol, high blood pressure, obesity, and diabetes.

Physical Inactivity. Physical inactivity, or sedentary living, greatly increases the chances of developing coronary heart disease. Exercising regularly helps reduce high blood pressure, increases high-density lipoproteins (the "good" cholesterol commonly referred to as HDLs), and helps control obesity and diabetes, thus reducing the overall risk of coronary heart disease.

Obesity and Overweight. Obesity is classified as a disease according to the American Medical Association. Persons who have excess body fat—especially if it is stored around the waist—are more likely to develop heart disease, even if they have no other risk factors. Obese individuals typically have higher rates of hyperlipidemia—elevated fat levels in the blood—higher blood pressure, increased risk of diabetes, and are more sedentary, which results in the increased risk. Obesity in and of itself is not necessarily the problem; it is the by-products of obesity (e.g., atherosclerosis, hypertension) that increase one's probability of developing coronary heart disease. Obesity is defined for men as being greater than 20 percent body fat and for women as being greater than 30 percent body fat.[10]

Diabetes Mellitus. Diabetes mellitus is a medical condition wherein the body has difficulty properly controlling blood glucose levels. Although it is often managed through medication or the injection of insulin, it seriously increases one's risk of developing coronary heart disease. Diabetes affects the balance of lipoproteins in the blood, often promoting atherosclerosis. Moreover, diabetes is associated with obesity, which can

place additional stress on the heart. Diabetics must be cognizant of these facts and make a conscious effort to reduce all other coronary heart disease risk factors, especially considering the fact that some three-quarters of diabetics die from some form of heart or blood vessel disease.[5]

Figure 2.3 Classification of Blood Pressure

Classification of Blood Pressure	
<120/80 mm Hg	Normal
120-139/80-89 mm Hg	Prehypertension
140-159/90-99 mm Hg	Stage 1 Hypertension
160+/100+ mm Hg	Stage 2 Hypertension

Source: National Heart, Lung, and Blood Institute[9]

CONTRIBUTING RISK FACTORS FOR CORONARY HEART DISEASE

STRESS. Stress has a negative effect upon the body. It can increase blood pressure, which can overwork the heart, leading to the development of coronary heart disease. Further, stress may lead individuals to overeat or start smoking, or to smoke more than they normally would, all increasing one's chances of developing coronary heart disease.

ALCOHOL. Excessive alcohol consumption can increase blood pressure, contribute to high triglycerides, and cause heart failure. Nonetheless, the risk of heart disease in moderate drinkers (i.e., 1 drink for women and 2 drinks for men per day) has been shown to reduce one's risk for coronary heart disease. A drink is defined as 1.5 fluid ounces of 80-proof spirits, 1 fluid ounce of 100-proof spirits, 4 fluid ounces of wine, or 12 fluid ounces of beer. That said, the American Heart Association does not recommend that nondrinkers start using alcohol or that drinkers increase their alcohol consumption to decrease their risk of coronary heart disease.[5]

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While excessive alcohol consumption can lead to health problems, research has shown that 1-2 drinks per day can actually decrease the risk of coronary heart disease.

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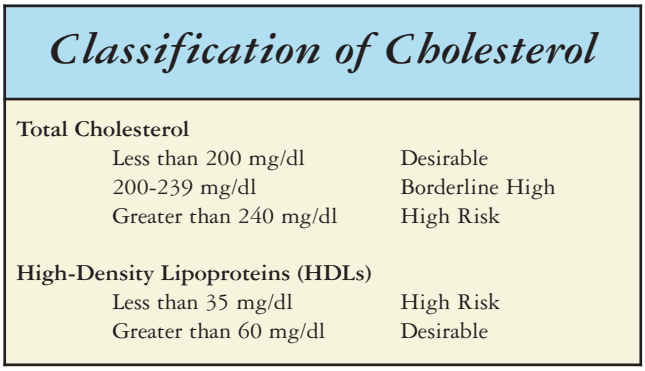
Figure 2.4 Classification of Cholesterol



Classification of Cholesterol

Total Cholesterol		
	Less than 200 mg/dl	Desirable
	200-239 mg/dl	Borderline High
	Greater than 240 mg/dl	High Risk
High-Density Lipoproteins (HDLs)		
	Less than 35 mg/dl	High Risk
	Greater than 60 mg/dl	Desirable

Source: American Heart Association[5]

STROKE

As mentioned previously, stroke is a leading cause of death in the United States,[1] and since stroke is a CVD, its inclusion here is warranted. Some 700,000 Americans each year suffer from a stroke; roughly one every 40 seconds.[5] The majority of strokes are preventable. According to the National Stroke Association, a stroke, or "brain attack," occurs when blood flow to an area of the brain is disrupted or stopped. Without blood, the cells are deprived of much-needed oxygen and die within a few minutes, resulting in an infarct, an area of dead cells. To compound the problem, when brain cells die, they release chemicals into neighboring cells, which results in a process called an ischemic cascade. The ischemic cascade reduces the blood flow to the neighboring cells, often causing them to die. However, if prompt medical attention is given, the ischemic cascade can be attenuated, thus reducing cellular death. The "window for opportunity" is roughly 6 hours. So, prompt medical attention is needed. Furthermore, the reason that strokes are so damaging is that brain cells have extremely limited rejuvenating ability.

When areas of the brain die, many functions (e.g., speech, balance) can be lost. The function lost depends upon the location of the brain that is affected and the severity of the stroke. Basically, the more cells that die during the stroke, the more pronounced the effects. Strokes can be mild—producing minor side effects, such as slurred speech and dizziness—to major—creating debilitating effects, such as paralysis and even death.

A stroke typically is caused by a blood clot, technically known as a thrombus, blocking blood from reaching the brain. Strokes also occur when blood vessels rupture in the brain, causing bleeding, or hemorrhaging.

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A thrombus can form in an artery that supplies blood to the brain. If the thrombus grows too large, it can block the supply of blood to the brain and result in a stroke. When a thrombus breaks loose and flows through the blood vessels, it is called an embolus. The embolus can then become lodged in an artery and result in a stroke.

Atherosclerosis and hypertension often increase the likelihood of a stroke. If fatty plaque builds up on the arterial wall, as occurs with atherosclerosis, a thrombus is much more likely to develop. This becomes further complicated if the individual is hypertensive, because an embolus can become lodged much easier in a narrowed artery.

Lastly, strokes can occur because of an aneurysm, a bulging area of the artery that bursts and empties blood into the brain. This type of stroke, a hemorrhagic stroke, is the most severe, yet the least common.

STROKE SYMPTOMS AND RISK FACTORS

Strokes are very serious. When someone is having a stroke, it is an emergency situation. If an individual is exhibiting the symptoms of a stroke, e.g., sudden numbness or weakness of the face, arm, or leg, especially on one side of the body; sudden confusion or trouble speaking; sudden trouble walking or dizziness; or sudden severe headache, emergency personnel should be called immediately.[11] Time is of the essence. The sooner the individual gets medical attention, the sooner a physician can treat the individual and maybe prevent further brain tissue damage. The National Stroke Association recommends that individuals "act F.A.S.T." if they suspect someone is having a stroke. Strokes are caused primarily by the way individuals live and are largely preventable. Stroke risk factors are classified as either uncontrollable, e.g., high blood pressure, or controllable, e.g., age (See Figure 2.5).

Act F.A.S.T.	
FACE	Ask the person to smile. Does one side of the face droop?
ARMS	Ask the person to raise both arms. Does one arm drift downward?
SPEECH	Ask the person to repeat a simple sentence. Are the words slurred? Can he/she repeat the sentence correctly?
TIME	If the person shows any of these symptoms, time is important. Call 911 or get to the hospital fast. Brain cells are dying.

Source: The National Stroke Association

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Figure 2.5 Stroke Risk Factors

Stroke Risk Factors

Uncontrollable

- Age
- Sex (Gender)
- Race
- Family History
- Previous Stroke or Transient Ischemic Attack (TIA)

Controllable

- High Blood Pressure
- Atrial Fibrillation (AF)
- High Cholesterol
- Heart Disease
- Diabetes
- Sleep Apnea

Lifestyle Choices That Increase Stroke Risk

- Tobacco Use/Smoking
- Alcohol Use
- Obesity/Excessive Weight

STROKES ARE INCREASING IN THE YOUNG

The number of strokes in young and middle-aged Americans is increasing. After analyzing the number of stroke hospitalizations from 1994 to 1995 with the ones from 2006 to 2007, researchers reported that the number of strokes is increasing dramatically among the young and middle-aged in America. The increase possibly is linked to the alarming increase in obesity of today, and it shows just how lifestyle can affect one's health negatively.

Tong et al. report that the biggest increase in strokes occured in males aged 15-34 years old. An increase of 53 percent (from 9.8 per 10,000 hospitalizations in 1994-1995 to 14.8 per 10,000 hospitalizations in 2006-2007) was found. Other increases were alarming as well. A 47-percent (from 36.0 per 10,000 hospitalizations to 52.9 per 10,000 hospitalizations) and 36-percent (from 21.9 per 10,000 hospitalizations to 30.0 per 10,000 hospitalizations) increase, respectively, for males and females aged 35-44 years old. These numbers are alarming. Strokes have long been viewed, mostly erroneously, as a disease of the "old," especially by the general population, but these figures show us just how wrong that assumption is. The alarming increase in the number of strokes in young adults is a serious matter. Everyone should become more aware of the risk factors for stroke, especially the controllable factors such as high blood pressure, high cholesterol, and, especially, obesity.

Source: Tong, X., E. V. Kuklina, C. Gillespie, M. G., George. Trends of Acute Ischemic Stroke Hospitalizations by Age and Gender in the United States: 1994-2007. Presentation at the International Stroke Conference 2011.

UNCONTROLLABLE STROKE RISK FACTORS

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Age. As one ages, the risk of having a stroke increases. In fact, after age 55, the risk for stroke doubles each decade; the majority of strokes occur in individuals who are over age 65.

Sex (Gender). Men have a higher risk for stroke than women, but more women than men die from stroke.

Race. African Americans have the highest stroke risk among all races, followed by Hispanics, Asians/Pacific Islanders, and then Caucasians.

Family History. Individuals who have a family history of stroke are at a higher risk.

Previous Stroke or Transient Ischemic Attack (TIA). Individuals who have had a previous stroke or a transient ischemic attack (ministroke) have a 25-40 percent chance of having another stroke in the next 5 years.

CONTROLLABLE STROKE RISK FACTORS

High Blood Pressure (Hypertension). Controlling high blood pressure, or hypertension, is the most important risk factor for preventing a stroke. Being hypertensive increases one's stroke risk by nearly six-fold. Most individuals who suffer from a stroke have high blood pressure.

Atrial Fibrillation (AF). Atrial fibrillation (AF) results when the two upper chambers of the heart (i.e., atria) beat rapidly and unpredictably, producing an irregular heartbeat and allowing blood to pool in the heart. Blood pooling substantially increases one's risk of having a stroke, because pooling blood is more likely to clot. Furthermore, long-term AF weakens the heart, leading to heart failure.

High Cholesterol. High cholesterol levels affect one's risk of stroke both directly and indirectly. Directly, high cholesterol affects stroke risk by promoting atherosclerosis, or clogging of the arteries. Indirectly, clogged arteries put an individual at higher risk of heart disease, thus increasing stroke risk.

Heart Disease. Stroke risk is increased up to six times in those who have heart disease. The primary reason for the six-fold increase in stroke risk is atrial fibrillation (AF). During AF, the atria (i.e., the upper chambers of the heart) contract rapidly and inefficiently, allowing blood to "pool," where it can clot, be carried to the brain, and result in a stroke.

Diabetes. Diabetics have a higher stroke risk. Circulation problems and high blood sugar levels are believed to be contributing factors for an increased risk of stroke, often as high as 2 to 4 times that of non-diabetics.

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Sleep Apnea. Sleep apnea, or sleep disordered breathing, increases stroke risk by increasing blood pressure and reducing blood oxygen levels. Both factors are thought to promote blood clots.

LIFESTYLE CHOICES THAT INCREASE STROKE RISK:

Tobacco Use/Smoking. Smoking promotes atherosclerosis by damaging the arterial walls and increasing blood pressure, both causing the heart to work much harder and doubling stroke risk. Women smokers have an extreme risk of stroke, especially if they take oral contraceptives or use other estrogen-based methods, which can increase stroke risk by as much as 34 times that of non-smoking women.

While moderate alcohol consumption of roughly 1 to 2 drinks a day reduces the risk of stroke, excessive alcohol consumption increases stroke risk by as much as 50 percent.

Alcohol Use. While modest alcohol consumption (e.g., 1 to 2 drinks per day) reduces the risk of stroke, it is believed that excessive alcohol consumption increases stroke risk by as much as 50 percent.

Obesity/Excessive Weight. When someone is excessively overweight, the circulatory system is overly taxed and stroke risk increases. Being obese increases the likelihood of having high cholesterol, high blood pressure, and diabetes, thus increasing stroke risk indirectly.

Strokes are preventable. The National Stroke Association lists the following as its means of "reducing risk and recognizing (stroke or "brain attack") symptoms.

1. *Know your blood pressure. Have it checked at least annually. If it is elevated, work with your doctor to keep it under control.*
2. *Find out if you have atrial fibrillation.*
3. *If you smoke, stop.*
4. *If you drink alcohol, do so in moderation.*
5. *Know your cholesterol number*
6. *If you are diabetic, follow your doctor's recommendations carefully to control your diabetes.*
7. *Include exercise in the activities you enjoy in your daily routine.*
8. *Enjoy a lower-sodium, lower-fat diet.*
9. *Ask your doctor if you have circulation problems that increase your risk for stroke.*
10. *If you experience any stroke symptoms, seek immediate attention.*

With modifications in lifestyle, one easily can reduce the risk for stroke. Simply by eating a well-balanced diet, maintaining proper body weight, being active, and not smoking, the odds of suffering a stroke are decreased dramatically.

KNOW THE FACTS

African American women have a higher prevalance of stroke, high blood pressure, obesity, physical inactivity, and diabetes than Caucasian women.

Heart disease and stroke are major health risks for all people. But African Americans are at particularly high risk. Consider this:

- African Americans have almost twice the risk of first-ever strokes compared to Caucasians.
- African Americans have higher death rates for stroke compared to Caucasians.
- The prevalence of high blood pressure in African Americans in the United States is the highest in the world.
- Among non-Hispanic African Americans aged 20 and older, a majority is overweight or obese.
- Heavy cigarette smoking approximately doubles a person's risk for stroke when compared to light smokers.
- African American women have higher prevalence rates of high blood pressure, obesity, physical inactivity, and diabetes than Caucasian women.

Source: American Stroke Association

CANCER

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The second leading cause of death in the United States is cancer, with more than 560,000 deaths each year.[1] Approximately 40 percent of Americans, at some point during their life, shall be diagnosed with some form of cancer.[21] In addition, it is estimated to cost Americans more than $239.5 billion annually.[18] Cancer has a high price tag, indeed, both in human and monetary terms.

Cancer is a group of diseases characterized by uncontrolled growth and spread of abnormal cells. Normal cells are changed by a carcinogen—a catalyst for the development of cancer—and begin to divide, forming a tumor, being either benign or malignant. Benign tumors typically pose no major health concerns because they are enclosed in a membrane and do not invade neighboring tissue. They only become dangerous if they impair the proper functioning of other cells, e.g., a tumor in the throat inhibiting breathing. Malignant tumors are a different story, however. They are cancerous, typically grow rapidly, and spread throughout the surrounding tissue and to other areas of the body.

Eating more fruit in the diet is an excellent way to help prevent certain diseases, especially cancer. The American Cancer Society recommends eating five or more servings of fruits and vegetables daily.

Cancers are named for the area of the body in which they first develop, even if they spread to other areas. Cancer spreads through a process

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called metastasis. Cancer cells do not stay together like normal cells, but break loose and invade other tissues by traveling through the lymphatic system and the blood vessels. Once cancer begins to invade the lymphatic system, it is very difficult to stop. Early detection is a must. If cancer cells are removed before they metastasize, the chances of recovery are high.

The incidence of cancer differs in males and females. Outside of curable cancers of the skin, the highest incidence of cancer in males is in the prostate; whereas, breast cancer has the highest incidence rate in females.[12] The other leading incidences of cancers are quite similar between males and females and are as follows: lung, colon and rectum, and lymphomas (See Figure 2.6).

U.S. CANCER DEATH RATE DROPS

According to the National Cancer Institute (NCI), cancer death rates in the United States have declined over the last few years. The decline is attributed to Americans taking precautions to help prevent cancer, as well as being screened more frequently in an effort to detect cancers early. Dr. Andrew C. von Eschenbach, Director of NCI, states, "The evidence that I have seen convinces me that we are poised to make dramatic gains against cancer in the near future." The death rate for all cancers has dropped to 173.8 per 100,000 deaths. For the four most common cancers the death rates are as follows:

Cancer:	Number of Deaths
Prostate:	29,480
Breast (Female):	40,000
Lung and Bronchus:	159,260
Colon and Rectum:	50,310

The incidence of cancers of the breast in women and of the prostate and testicles in men has increased, though, according to the NCI. Further, the incidence rate of leukemia, non-Hodgkin lymphoma, myeloma, melanoma of the skin, and cancers of the thyroid, kidney, and esophagus have increased, as well. But some behaviors have improved that should help reduce the incidence rate of cancers in the future, particularly reductions in smoking and declines in alcohol and fat consumption. Youth smoking rates, which had been growing in the 1990s, have been declining since 1997, which is good news. The use of screening tests for breast and cervical cancers is high and remains stable. In 2003, nearly 70 percent of women over the age of 40 had a mammogram, up from just 29 percent in 1987, and some 80 percent had a Pap test for screening cervical cancer, up from roughly 74 percent. But not all screening-test usage is increasing. Colorectal cancer screenings remain low. Only 43 percent of adults over age 50 have had an endoscopy, up from 27 percent in 1987, but still far too low. With respect to sun exposure, individuals are protecting themselves more now, with 60 percent reporting that they have taken steps to limit sun exposure, compared with 54 percent in 1992.

Figure 2.6 Incidence of Cancer in Males and Females

Incidence of Cancer in Males and Females

Males		Females	
Prostate	27%	Breast	29%
Lung and bronchus	14%	Lung and bronchus	13%
Colon and rectum	8%	Colon and rectum	8%
Urinary bladder	7%	Uterine corpus	6%
Melanoma of the skin	5%	Thyroid	6%
Kidney and renal pelvis	5%	Non-Hodgkin lymphoma	4%
Non-Hodgkin lymphoma	4%	Melanoma of the skin	4%
Oral cavity and pharynx	4%	Kidney and renal pelvis	3%
Leukemia	4%	Pancreas	3%
Liver and intrahepatic bile duct	3%	Leukemia	3%

Source: American Cancer Society[12]
NOTE: Curable forms of skin cancer are not listed.

RISK FACTORS FOR CANCER

The risk factors for cancer include anything that increases an individual's chance of developing the disease. Some risk factors can be changed, while others cannot. The American Cancer Society states the risk factors for cancer can include a person's age, sex, and family history, as well as environmental factors (e.g., radiation) and lifestyle choices (i.e., tobacco and alcohol use, diet, and sun exposure). One of the greatest risk factors for cancer is smoking, as it is believed to be responsible for one-third of all cancers. Further, having one or more risk factors does not mean one would automatically develop cancer; it just means the person has an increased risk for the disease's development. Evidence suggests that there is a strong genetic link for the development of cancer. Thus, individuals who have a family history of cancer should be very careful to lessen any other known risk factors.

Everyone is at risk of developing cancer. The American Cancer Society estimates that the risk for men developing cancer over the course of their entire life is 1 in 2, and for women, 1 in 3. However, modifying one's lifestyle can lessen the risk of developing cancer.

Controllable cancer risk factors are the external ones. Approximately 75 percent of all cancer is related to external factors, such as smoking, diet, and disease. The risk from lifestyle choices far outweighs the risk from

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environmental pollutants. So modifying one's lifestyle is key to reducing the risk of cancer.

Smoking. By far, smoking is the most health-damaging habit humans practice. More preventable deaths are related to smoking than any other factor.[13] Additionally, more than one-half of all smokers die prematurely.[14] Further, smoking-related deaths and disease cost over $200 billion annually.[18]

Smoking is the most health-damaging habit that humans practice.

A major health concern associated with smoking is lung cancer. The American Cancer Society reports that 90 percent of lung cancers are related to smoking. It is not fair, however, to say that smoking directly causes cancer, because all smokers do not necessarily develop cancer. Nonetheless, the mortality rates for those who smoke and develop lung cancer are higher than for non-smokers. In fact, the life expectancy for non-smokers is over 10 years longer than for smokers (www.cdc.gov/tobacco).[14] Thus, smoking must be viewed as a contributory factor for the development of cancer, though not necessarily a cause. In addition, smoking has been associated with approximately 30 percent of all cancers (e.g., esophageal, pancreatic, cervix, mouth) and is a contributing factor to a variety of illnesses from heart disease to emphysema.[14]

The American Cancer Society reports that second-hand smoke is dangerous, as well. Approximately 3,000 deaths occur each year from lung cancer attributed to second-hand smoke. Second-hand smoke is attributed to nearly another 40,000 deaths from heart disease. Smoking is not only dangerous to smokers' health, but to non-smokers' health, as well.

The benefits of quitting smoking are numerous. The U.S. Surgeon General[16] lists the following statistics concerning smoking cessation:

- Individuals who quit smoking outlive those who continue to smoke.
- Quitting smoking before the age of 50 reduces an individual's risk of dying by half compared to those who continue to smoke.
- Individuals who quit smoking reduce their risk of developing other cancers, as well as heart disease, dramatically.

Individuals smoke for many reasons. Some start as teenagers because they view it as a "right of passage" into adulthood. Others begin because of peer pressure, and some because of a "nervous" habit. No matter the reason, the dangers involved should more than convince someone to stop.

Chemicals. A variety of chemicals are viewed as carcinogens. Asbestos, arsenic, and benzene, to name a few, are known to be carcinogenic with repeated exposure. Reducing one's exposure to known carcinogenic chemicals greatly reduces the risk of developing cancer.

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Radiation. Ionizing radiation (e.g., X-rays, radon) and ultraviolet radiation (i.e., sunlight) have been shown to cause cancer in humans. Ionizing radiation affects the entire body, but particularly the thyroid and bone marrow.[9] Skin cancer is quite simply caused by overexposure to ultraviolet radiation. Limiting exposure to radiation is highly recommended to reduce one's risk of developing cancer.

Diet. Diet plays a significant role in cancer prevention. The American Cancer Society states that approximately one-third of all cancer deaths can be attributed to diet. The type and variety of food, plus its preparation and portion size, affect an individual's risk of cancer.

The American Cancer Society recommends the following diet considerations to reduce the risk of cancer:

- Choose foods and drinks in amounts that help you get to and maintain a healthy weight.
- Limit how much processed meat and red meat you eat.
- Eat at least 2½ cups of vegetables and fruits each day.
- Choose whole grains instead of refined grain products.

The risk of developing cancer can be reduced greatly by diet. Eating a well-balanced diet—more fruits and vegetables and reduced high-fat foods—in the proper portions to maintain optimal body weight can dramatically reduce the risk of developing cancer. Further, phytochemicals (e.g., sulforaphane, genistein, flavonoids, chlorogenic acid) and fiber, commonly found in abundance in fruits and vegetables, are thought to help prevent cancer by blocking tumor formation.

A healthy diet and regular exercise can greatly reduce the risk of developing cancer.

Physical [In]Activity. Physical activity helps prevent cancer indirectly by reducing obesity. Obesity increases the risk of certain cancers, e.g., colon/rectal, prostate, endometrium, breast. So maintaining proper body weight through physical activity can markedly reduce cancer risks. The American Cancer Society recommends that every U.S. adult "get at least 150 minutes of moderate intensity or 75 minutes of vigorous intensity activity each week or a combination of these, preferably spread throughout the week."[16]

Internal factors such as hormones, immune conditions, and genetic mutations also play a role in cancer risk. But these factors are highly related to inheritance, and are not readily controllable by lifestyle modifications. So individuals should be aware of their family health history. If they have a high familial incidence of cancer, caution should be taken to reduce all known cancer risk factors.

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Figure 2.7 Seven Warning Signs of Cancer

Seven Warning Signs of Cancer	
C	hange in bowel or bladder habits
A	sore that does not heal
U	nusual bleeding or discharge
T	hickening or lump in the breasts or elsewhere
I	ndigestion or difficulty swallowing
O	bvious change in a wart or mole
N	agging cough or hoarseness

Source: American Cancer Society[12]

DETECTING CANCER

Detecting cancer early in its development is requisite for a full recovery. If cancer is discovered early, before it metastasizes throughout the body, especially the lymphatic system, it is much easier to treat, and the odds for a full recovery are higher. The American Cancer Society recommends self-monitoring as the first step in cancer detection, and it involves looking for the seven warning signs of cancer, which can be remembered by the acronym CAUTION (See Figure 2.7).

Both men and women should perform monthly self-examinations with respect to the seven warning signs of cancer. However, some cancers are sex-specific (e.g., prostate, uterine) and have high incident rates, so special consideration to prevention efforts and site-specific self-examinations must be employed.

PROSTATE CANCER

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Prostate cancer is only found in men and has one of the highest incidence rates of all cancers. The prostate gland is small, about the size of a walnut, and is located beneath the bladder. The urethra (i.e., the tube that carries urine from the bladder and out the penis) runs through the prostate gland. The prostate gland's function is to produce part of the ejaculatory fluid. Additionally, the nerves around the prostate are partly responsible for eliciting the erection of the penis. Men with prostate cancer often have difficulty urinating and achieving an erection.

Prostate cancer is typically a slow-growing cancer. In fact, through autopsies, physicians have found that many elderly men had undiagnosed prostate cancer at the time of their deaths. At times, however, it can metastasize very quickly and possibly enter the lymphatic system. The cancer can then easily spread throughout the body very quickly. Early detection is critical.

The exact cause of prostate cancer is unknown. But the factors of age, race, diet, and family history are known to affect a man's chance of getting this disease. The American Cancer Society reports the following concerning each of these factors:

Age. As men age, they are at an increased risk of developing prostate cancer. In fact, most cases are found in men over age 50, and 80 percent of cases are in men over age 80.

Race. Prostate cancer is more prevalent in African Americans than other races, being about twice as common.

Diet. High-fat diets are believed to be a precipitating factor in the development of prostate cancer.

Family History. Heredity plays a role in prostate cancer. Men with close relatives who had prostate cancer have a higher risk of developing it, as well.

A self-examination for prostate cancer is not available. So it is recommended that men over the age of 50 undergo a Prostate-Specific Antigen (PSA) blood test annually. In addition, a physician should perform a digital prostate exam to check for lumps in the prostate. If a man is at high risk because of family history, he should undergo a PSA at age 45. But in the

STUDY TIP:

Regular physical exams can provide early detection and treatment of cancers in both men and women.

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meantime, before age 45-50, all men should eat a well-balanced diet, full of fruits and vegetables and low in fat, to possibly reduce their risk of developing prostate cancer.

BREAST CANCER

Breast cancer primarily occurs in women, but a few cases do occur rarely in men. The breast is formed from fatty, connective, and lymphatic tissue, and milk-producing glands, or lobules. The lobules are connected to the nipples via ducts. The outer area surrounding the nipple is called the areola.

If a tumor develops in the breast, it can either be benign or malignant. Most breast tumors are benign–that is, not cancerous–are called cysts, and are not life threatening. On the other hand, malignant tumors are very dangerous and are prone to spreading to other tissues. If they spread into the lymph nodes located in the underarms, the cancer is likely to spread to other parts of the body and could be fatal. So, early detection of malignant tumors is a necessity.

The American Cancer Society recommends that women perform the following three tests for the prevention and early detection of breast cancer: 1) breast self-examinations; 2) clinical breast examinations; and 3) mammography. These tests can help a woman find a cancerous tumor early, before it has the opportunity to metastasize throughout her body and affect other tissues and organs. The earlier a tumor is found, the sooner a woman can begin treatments, and the better her chance for a full recovery. Early detection efforts save thousands of women every year. So be sure to follow the American Cancer Society's recommendations for the prevention and early detection of breast cancer.

Monthly Breast Self-Examination. All women should perform the breast self-examination (BSE) monthly. If a woman regularly performs the BSE, she begins to understand how her breasts feel normally and is much more adept at detecting any signs or symptoms of cancer. A woman should perform the BSE about a week after her menstrual period ends so that her breasts are not swollen or tender and so that she can accurately perform the examination. She should look for changes in her breasts. If a lump, swelling, redness, irritation, dimpling, nipple pain or retraction (i.e., turning inward), or non-milk discharge is found, a woman should see her physician immediately. Her physician can perform a more thorough examination and other necessary clinical tests, such as a biopsy (i.e., a minor surgical procedure where the tumor or part of it is removed and analyzed to determine if it is benign or malignant), to ascertain if she does, in fact, have cancer. If a woman does not have regular periods, she should perform a BSE on the same day every month. Women who are pregnant, breastfeeding, or have breast implants also need to do regular breast self-examinations.

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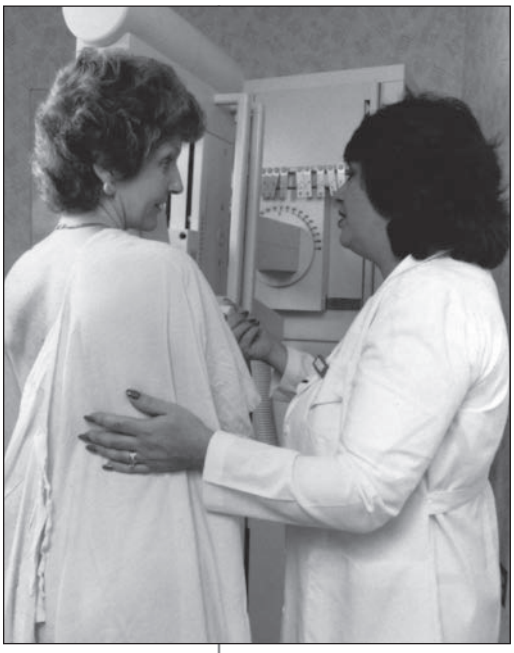
To properly perform a BSE, a woman should do the following:

- *Lie down on her back and place her right arm behind her head.*
- *She should use the pads of the first three middle fingers on the left hand to feel for lumps in the right breast. She should use a circular motion, about the size of a dime, to feel for any lumps in the breast tissue. She should use three different levels of pressure to fully examine all the breast tissue at different depths. Light pressure should be used for the surface tissues. Medium pressure should be used for tissue that is not directly under the skin, and firm pressure should be used to examine the area close to the ribs. If she is unsure of the exact pressure to use, she should consult her personal physician. She should use all three levels of pressure to examine a specific spot before examining another area.*
- *She should examine the breast in an up-and-down fashion from the collar bone to the ribs. She should examine the entire breast.*
- *She should repeat the above steps on the left breast by placing her left arm behind her head and using her fingers on her right hand.*
- *She should visually examine her breasts by looking in a mirror and by placing her hands on her hips and pushing her hands down firmly to contract the chest muscles. She should look for any changes to her breasts, especially with respect to the size, the shape, and the contour of the breasts, or for any dimpling of the breast tissue. She should pay attention to any redness or scaliness of the nipples or areolae (i.e., the colored portion of the skin surrounding the nipples).*
- *She should examine her underarm area of each arm while sitting or standing and with her arm slightly raised. She should NOT raise her arm straight up because it causes the tissues to tighten under the arms.*
- *She should see her personal physician immediately if she finds any lumps, sees any changes in the size, the shape, or the contour, of the breasts, or any dimpling of the breast tissue as well as if she notices any redness or scaliness to the nipples (For more information, see the website of the American Cancer Society at www.cancer.org).*

Clinical Breast Examination. A clinical breast examination is performed by a trained health professional, such as a physician or nurse, and should occur every three years for women aged 20-39. Here, the physician or nurse physically examines the breasts, looking for any abnormalities or signs of cancer. Once a woman is 40, she should have a clinical breast examination annually.

Mammography. All women over the age of 40 should have an annual mammogram. Mammograms help physicians find tumors while they are still small, often too small to feel during a self-examination. Mammograms are very helpful in the early cancer detection process, and are responsible for saving thousands of women's lives each year. Therefore, getting a mammogram each year is a must for women over age 40; yet it is still only the third line of defense against breast cancer. Mammograms do not replace regular



Mammograms should be performed annually after age 40, but self-examination and clinical examinations must be performed regularly to ensure a woman the best odds of discovering breast cancer early.

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breast self-examinations or clinical examinations. The self-examination and clinical examination must be performed regularly, as recommended, to ensure a woman the best odds of discovering breast cancer as early as possible.

LUNG CANCER

Lung cancer is one of the most prevalent forms of cancer today for both men and women. The inhalation of tobacco smoke, especially from cigarettes, is considered one of the greatest contributing factors for lung cancer, both directly from a tobacco product itself or indirectly from second-hand smoke. According to the American Cancer Society, some 87 percent of lung cancers are related to smoking. The Centers for Disease Control and Prevention state emphatically, "Cigarette smoking causes lung cancer."[14] Technically this is incorrect, because if it were true, all individuals who smoked would develop cancer, which is simply not the case. Nonetheless, smoking, especially cigarettes, enhances one's odds of developing cancer tremendously, and the mortality rates for those who smoke and develop lung cancer are 23 times higher for males and 13 times higher for females, respectively, than for non-smokers.[15] Smoking is, indeed, a contributory factor for the development of cancer, though not necessarily a direct cause in every case. The risk for cancer is directly related to the length of time and the number of cigarettes smoked per day; the more a person smokes, the more likely the person is to develop cancer. That said, quitting smoking reduces one's risk of developing cancer considerably, but not as low as if the person had never smoked.

Two other risk factors for lung cancer are chemical agents (e.g., asbestos, radon) and personal traits, such as family history. One such chemical agent is radon—an odorless, colorless gas that emanates from rocks and dirt, which occasionally gets caught in houses and buildings. The inhalation of radon is considered highly dangerous and carcinogenic. Other substances that are known carcinogens and that should not be inhaled are asbestos, arsenic, silica, and chromium. Care should be taken to avoid inhaling these substances; this is especially true for those who smoke, as the risk of developing lung cancer from exposure to these substances is even higher for smokers than it is for non-smokers.[14] One runs a greater risk of developing lung cancer if an immediate family member (i.e., parent, sibling, child) has had cancer. The increased risk is in all likelihood related to

genetics, but it could be related to shared experiences like smoking or living in an area that is exposed to known carcinogens, such as radon.

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STUDY TIP:

The inhalation of tobacco smoke, especially from cigarettes, is considered one of the greatest contributing factors for lung cancer.

Smoking is a contributory factor for the development of cancer. However, many young individuals have started smoking in recent years, and that trend is rising. Why?

TESTICULAR CANCER

Another specific cancer is testicular cancer. The testicles, also called testes, are part of the male reproductive system and are responsible for producing sperm. They are enclosed in the scrotum and are located hanging beneath the penis.

Testicular cancer typically affects males between the ages of 15 and 40. However, any male is susceptible. The top risk factor for testicular cancer is having an undescended testicle, a condition called cryptorchidism. A male fetus develops his testicles within his abdomen, and they typically descend or "fall" into the scrotum while he is still in his mother's womb. Occasionally, however, a testicle will fail to fall. Often during the first year, the testicle will descend on its own. However, it sometimes remains in the abdomen of the boy, or if it begins to fall, gets lodged in the groin. If the testicle does not descend to the scrotum, surgery is often necessary to correct the problem.

Males who have had a testicle remain in the abdomen are more likely to get testicular cancer. And the risk of testicular cancer is higher in males if the testicle remains in the abdomen rather than attempts to descend at least partly.

Race seems to play a role in testicular cancer. Caucasian males are at a much higher risk for developing testicular cancer. Caucasians are five times more likely than African Americans and twice as likely as Asians to develop testicular cancer. The reason for this is unknown.

Testicular cancer is similar to breast cancer in that it is usually forecasted by a lump, or nodule. Many men will find a lump on a testicle, others will have some pain in the scrotum or lower abdomen, while some notice swelling within the scrotum or a testicle that seems enlarged. If any of these symptoms are present, a man should see his physician immediately.

The benefits of regular testicular self-examinations are somewhat ambiguous. The American Cancer Society states, "that for men with average testicular cancer risk, there is [no] medical evidence to suggest that monthly examination is any more effective than simple awareness and

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prompt medical evaluation. However, the choice of whether or not to perform this examination should be made by each man." Performing a monthly self-examination seems reasonable, especially since it costs nothing but a few minutes a month and could possibly save a man his life.

To perform a testicular self-examination, a man would want to take a shower or bath first. This helps to relax the skin of the scrotum and makes performing the self-examination easier. Then, proceed with the following steps:

1. Be sure to check each testicle by itself.
2. Gently roll the testicle between your thumbs and fingers and feel for any lumps or nodules such as smooth, rounded bumps. Realize that part of the testicle is made up of the epididymis, and it can feel like a lump. It is located on the upper and outer side of the testicle. This is normal.
3. Check for any change in the size, shape, or consistency of each testicle.
4. Understand that the testicles are made up of blood vessels, supporting tissues, and other tube-like structures that can be mistaken as cancerous growths. These are normal structures of the testicles.

If you notice any lumps or a change in the size, shape, or consistency of either testicle, visit your personal physician immediately. It is important to have any anomalies examined by your personal physician (for more information, please consult the American Cancer Society at www.cancer.org).

SKIN CANCER

The most common type of cancer, yet the easiest typically to cure, is skin cancer, with an estimated 5 million cases annually.[10] (NOTE: These forms of skin cancer are not included in the overall incidence rate statistics because they are usually easily curable.) However, of these cases, nearly two percent will be malignant melanoma, the most dangerous form of skin cancer. The other major form of skin cancer is called nonmelanoma.[12]

The skin covers the entire body and is its largest organ. In the average adult, it covers more than 3,000 square inches. It has many functions—protecting the body against infectious agents, regulating body temperature, perception of stimuli, excretion, and synthesis of vitamin D. The skin has three layers: epidermis, dermis, and subcutaneous, or the top, middle, and bottom layers, respectively.

Skin cancer typically affects the epidermis. The epidermis is usually made of four layers, unless the area is exposed to friction, such as in the hands and feet, where it has five layers. The layers are named for the types of cells that form the area.

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Nonmelanoma skin cancer is divided up into groups based upon the type of skin cell that is affected in the epidermis. The two major groups are basal cell carcinoma and squamous cell carcinoma, and they account for about 95 percent of all cancers.[12]

The best prevention for skin cancer is protection. Cover up when in the sun, and use a broad-spectrum sunscreen. Children need extra protection from the sun.

Basal cells make up the deepest layer of the epidermis. Basal cell carcinoma accounts for about 70 percent of all skin cancer, and usually affects the face, neck, hands, and arms—the chronically sun-exposed areas. This type of cancer is usually slow growing and rarely spreads to other parts of the body; however, if left untreated, it can spread.

Additionally, even after being removed, basal cell carcinomas have been known to recur. So prevention is very important.

Squamous cell carcinoma affects the top layer of the epidermis, and also appears on sun-exposed areas. Twenty percent of skin cancers are this type. Squamous cell carcinomas are more dangerous than basal cell carcinomas because they are known to spread to deeper layers of skin and to other tissues. Luckily, they rarely invade the lymphatic system or other organs within the body, and are easily treated.

The least-common form of skin cancer is melanoma. It begins in the melanocytes, the melanin-producing cells in the skin, and is considered the most dangerous form of skin cancer. Melanoma is very dangerous because it frequently spreads to other parts of the body, unlike the other forms of skin cancer. One alarming statistic shows just how dangerous melanoma is: One person dies of melanoma every 57 minutes.[12] As one can see, melanoma is a very serious disease. The incidence of melanoma has increased substantially over the last decade.

The American Cancer Society states the following are risk factors for skin cancer:

Ultraviolet (UV) radiation. UV radiation has been shown to be the primary catalyst for skin cancer development. The major source for UV radiation is from sunlight; however, artificial tanning lamps and beds also emit UV radiation. Limiting one's exposure to UV radiation is considered the single-most important criterion for reducing the risk of skin cancer. However, modest exposure to sunlight is important for good health, especially for the production of vitamin D. How much sunlight is enough, though? It depends. Several factors are involved here, but the two main ones are the time of year it is (the Sun must be high enough in the sky for the UV rays to penetrate the atmosphere, so the late spring, summer, and early fall are best) and the skin pigmentation of the individual (the darker one's skin color is, the longer the skin needs to be exposed to the Sun for

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the proper amount of vitamin D synthesis). Generally, a person with very fair skin would need 10 minutes outside exposed to sunlight, preferably in the middle of the day, while wearing shorts and a T-shirt (obviously if the person were wearing less, the time required would be less). If a person is tanned or of Hispanic ancestry, then he or she would need to be exposed longer, say 20 minutes. Lastly, Blacks would need even longer. In the end, modest Sun exposure is not only okay, it is necessary to be healthy. That said, do not confuse a recommendation of a few minutes of daily exposure with excessive Sun bathing. At no time should one ever be exposed to the Sun so long that one's skin would become burned from the Sun's rays.

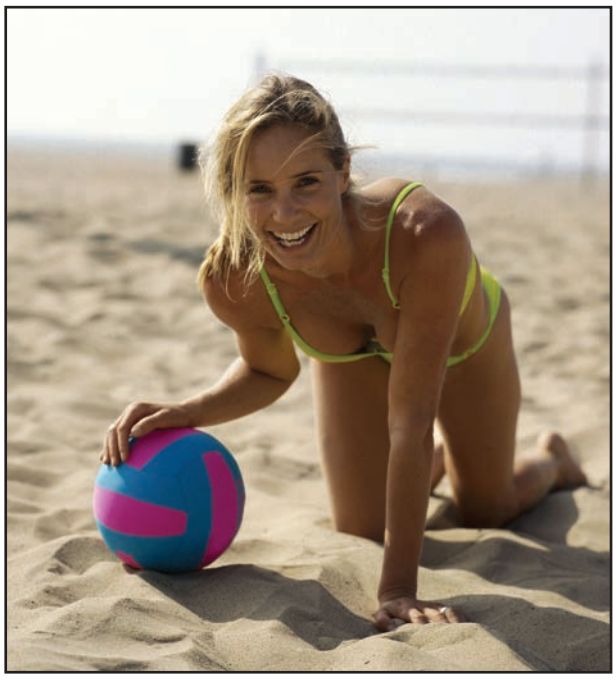
Fair skin. Caucasians are 20 times more likely to develop skin cancer than African Americans. In addition, Caucasians with red or blond hair, coupled with skin that freckles and burns easily, are at an exceptionally high risk.

Family history. If a close relative has had skin cancer, one's risk is greater.

Moles. The presence of moles on the body increases the likelihood of developing skin cancer, particularly melanoma.

Sex (Gender). Men are more than twice as likely to develop basal cell cancer and three times more likely to have squamous cell cancer than women.

Age. As an individual ages, the odds increase for skin cancer.



Individuals with fair skin, blond hair, and blue eyes are more susceptible to developing skin cancer.

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Figure 2.8 "ABCD" Rule for Early Detection of Melanoma

"ABCDE" Rule for Early Detection of Melanoma

The ABCDE rule is a guide to the usual signs of melanoma. Be on the look out, and notify your physician about any changes in the following factors:

A — **A is for ASYMMETRY:**
One-half of a mole or birthmark does not match the other.

B — **B is for BORDER:**
The edges are irregular, ragged, notched, or blurred.

C — **C is for COLOR:**
Coloring may be of differing shades of brown or black, with patches of red, white, or blue.

D — **D is for DIAMETER:**
The area is larger than 6 millimeters (about the size of a pencil eraser) or is growing larger.

E — **E is for EVOLVING:**
The area has been changing, particularly growing larger over time.

The most important warning sign for skin cancer is a spot on the skin that is changing in size, shape, or color over a period of time.

PREVENTING SKIN CANCER

Steps can and should be taken to reduce the risk of developing skin cancer, especially melanoma. The American Cancer Society recommends that individuals between the ages of 20 and 40 have a medical examination, which includes a skin-examination, every three years, and annually after 40. Additionally, everyone should perform a monthly self examination, looking for changes in moles, freckles, and other marks on the skin. The self-examination is easily performed by standing nude in front of a full-length mirror. For areas that are too difficult to see, a family member or friend can help.

Special attention must be given to freckles and moles, but especially moles. A normal mole is evenly colored, either brown, tan, or black, usually round or oval, and not larger than 1/4-inch in diameter (i.e., about the size of a pencil eraser). Normal moles typically differ from melanoma in several ways. The American Cancer Society's ABCDE rule is a guide

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individuals can use during their monthly self-examinations to determine if a mole is possibly cancerous (See Figure 2.8).

To reduce one's overall risk of developing skin cancer, the American Cancer Society has developed its education and awareness theme, "Slip! Slop! Slap! Slip on a shirt; Slop on sunscreen; Slap on a hat…and look for shade in the middle of the day." Additionally, individuals are encouraged to, "Wrap on sunglasses" when they are outdoors to help protect the eyes and the skin around them.

Excessive sunbathing damages the skin.

Because cancer is a leading cause of death in the United States, killing more than a half-million individuals each year, its prevention is very important. In addition to regular self-examinations—using the seven warning signs denoted by the acronym CAUTION—for cancer, everyone should visit a physician for a check-up every three years until the age of 40, then annually, thereafter. Prevention and early detection are key in the battle against cancer.

CHRONIC LOWER RESPIRATORY DISEASE

Chronic lower respiratory disease, also known as CLRD, generally includes chronic bronchitis, emphysema, and asthma. CLRD is a leading cause of death in the USA today, and it burdens American society to the tune of over $100 billion a year.[23]

The combination of chronic bronchitis and emphesyma is a condition known as chronic obstructive pulmonary disease (COPD). COPD leads to a high rate of morbidity and mortality because it damages the tissue within the lungs where oxygen exchange occurs. This makes breathing increasingly more difficult as the disease worsens. COPD is associated with a cough, mucus production, wheezing, and breathlessness.[24]

Risk factors for COPD mainly center around smoking tobacco, especially from cigarettes, but exposure to air pollution and chemical fumes, recurrent infections, poor diet, and other genetic factors play a role as well. While

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COPD can be prevented, it is not curable. The National Heart, Lung, and Blood Institute (www.nhlbi.nih.gov) states that treatment of COPD can slow the progress of the disease and relieve symptoms. Most treatment revolves around lifestyle changes such as quitting smoking; eating a nutritious diet, often via small, frequent meals, coupled with taking vitamins and other nutritional supplements, is recommended for those who have trouble eating because of their symptoms. Medicines such as bronchodilators and inhaled glucocorticosteroids along with pulmonary rehabilitation and oxygen therapy are used as well during the treatment of COPD.

SUMMARY

Over the last 100 years, the life expectancy of Americans has nearly doubled, largely because of improved sanitation and other technological innovations. The leading causes of death today are not due to infectious diseases, as was the case in the early 1900s; instead, Americans now die in record numbers from lifestyle-related diseases, such as heart disease and cancer, which are preventable. With a few modifications in lifestyle, nearly all Americans could both lengthen and improve the quality of their lives, a goal well worth the extra effort.

CHECK YOUR UNDERSTANDING

REVIEW QUESTIONS

1. What were the three leading causes of death in 1900? What are they today? How do they differ?
2. How does sanitation affect the death rate?
3. What role does lifestyle play in disease?
4. What are the risk factors for coronary heart disease? How can individuals reduce their risk of coronary heart disease?
5. What is a stroke? What are the risk factors for stroke? How can strokes be prevented?
6. What is cancer? How can cancer be prevented?
7. What is the difference between a benign and malignant tumor?
8. What cancers are sex-specific?
9. What is chronic lower respiratory disease? How can it be prevented?

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RELATED WEBSITES

American Cancer Society
www.cancer.org

American Diabetes Association
www.diabetes.org

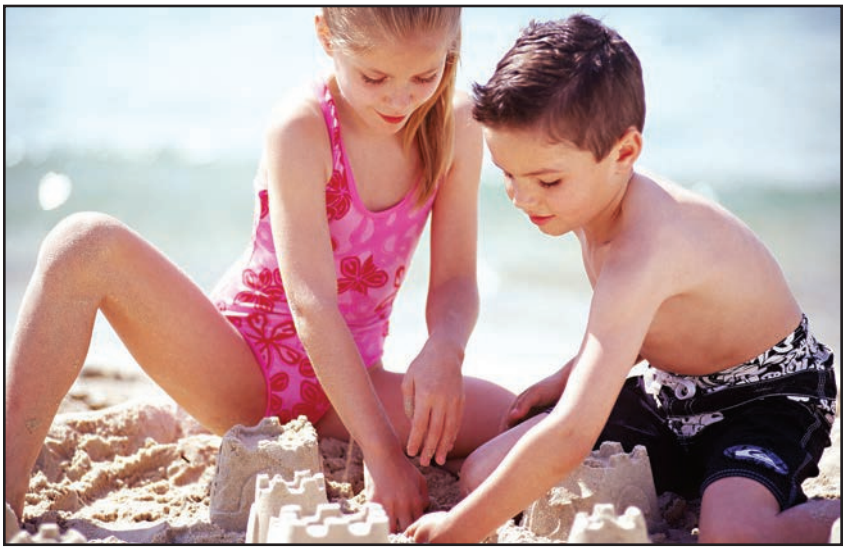
American Heart Association
www.americanheart.org

American Medical Association
www.ama-assn.org

American Stroke Association
www.strokeassociation.org

Centers for Disease Control and Prevention
www.cdc.gov

Combined Health Information Database
www.chid.nih.gov



Children need extra protection from the sun. Encourage children to play in the shade and to apply sunscreen when going outside.

Go Ask Alice—Columbia University Health Center
www.goaskalice.columbia.edu

Mayo Clinic Health
www.mayoclinic.com

National Cancer Institute
www.nci.nih.gov

National Center for Health Statistics
www.cdc.gov/nchs

National Heart, Lung, and Blood Institute
www.nhlbi.nih.gov/index.htm

National Institute of Health
www.nih.gov

National Women's Health Information Center
www.4woman.gov

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