
CHAPTER 1

EXERCISE, FITNESS and HEALTH

CHAPTER OVERVIEW

THE PRIMARY FOCUS of this book is on the interrelationship between exercise, fitness, and health. Exercise is beneficial. It not only gives you strength and stamina, and makes you look and feel better, it also improves and maintains your health. Being fit and having a healthy body composition (i.e., percent body fat) affects your risk of developing many diseases and even dying prematurely. The medical terms for disease is morbidity and death is mortality. Being active, physically fit, and maintaining a desirable level of percent body fat can influence at least three major health problems: 1) cardiovascular disease; 2) obesity; and 3) musculoskeletal injuries, particularly low back problems. This chapter discusses the major causes morbidity and mortality of Americans and describes the role of exercise and physical fitness in reducing morbidity and mortality. As you will discover, sedentary lifestyle and obesity are major risk factors for several diseases, including the number one cause of death of Americans, cardiovascular diseases.

The latter section of this chapter focuses on other general health issues, many of these are not directly affected by exercise and fitness, but are important health concerns. This information provides important, guidelines for health promotion. Combining this information with knowledge of proper exercise, nutrition, and physical fitness, you can make the appropriate lifestyle modifications to maximize the quality and quantity of your life. The educational outcomes of Chapter 1 are to help you understand:

1. The major causes of death of Americans.
2. The primary risk factors for developing cardiovascular disease.
3. The beneficial role of exercise and fitness on your risk of developing cardiovascular disease.
4. Steps you can take to reduce your risk of other important health problems.

LEADING CAUSES OF DEATH AND INJURY

Cardiovascular disease, primarily coronary heart disease and stroke, is the number one public health hazard for Americans. Figure 1-1 shows the 1950 to 1990 trend of cardiovascular disease and compares the change with cancer. In 1900, cardiovascular disease accounted for less than 10% of deaths, but by 1950 the rate had steadily increased to

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nearly 50%. Fortunately, better prevention and treatment has caused it to drop under 40% of all deaths. While cardiovascular disease is still the leading cause of death, cancer deaths are steadily growing.

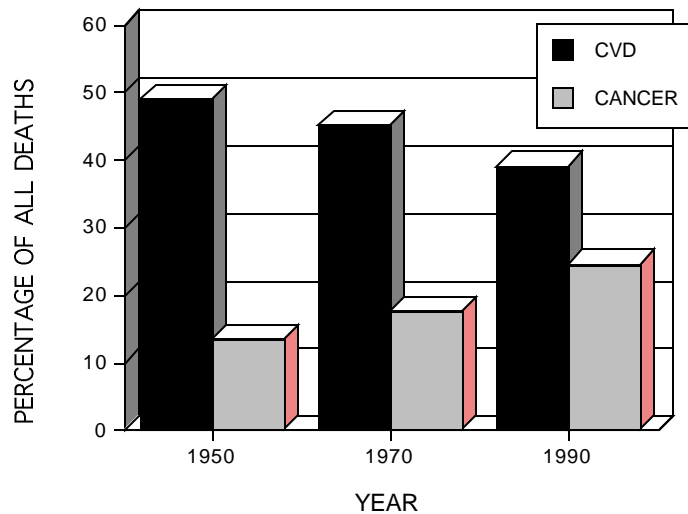
Public health research has documented that an unhealthy lifestyle is a major cause of morbidity and mortality. While tobacco use is the most important single preventable factor causing death in Americans, sedentary lifestyle and poor diet are of almost equal importance. A conclusion advanced in the “Healthy People 2000 report” is that altering the American diet and increasing physical activity could have the same impact on public health as the elimination of tobacco use.

If tobacco use in this country stopped entirely today, an estimated 390,000 fewer Americans would die before their time each year. If all Americans reduced their consumption of foods high in fat to well below current levels and engaged in physical activity no more strenuous than sustained walking for 30 minutes a day, additional results of a similar magnitude could be expected. [8]

FIGURE 1-1.

Changes in two major causes of death for the years 1950 to 1990. Cardiovascular disease (CVD) mortality rate dropped while cancers increased. Data from: Health United States 1987, U.S. Public Health Service, Department of Health and Human Services, March 1988. DHHS Pub. No. (PHS) 88-1232.

Heart disease and strokes are the leading cause of death of Americans, but cancer is increasing.



CARDIOVASCULAR DISEASE

Coronary heart disease and stroke are most often due to atherosclerosis. This disease process causes the arteries to become narrow, stiff, and abnormal. If an artery becomes critically blocked, blood can cease to flow, causing death to some of the tissue dependent upon the blood. When this occurs in the heart, the person suffers a heart attack. It is a stroke when blood flow ceases to the brain.

Coronary Heart Disease

Figures published by the American Heart Association reveal that about 1.5 million Americans will have a heart attack this year, and of these people, more than 750,000 will die. Ten percent of American males between 40 and 60 years of age will develop symptoms

of heart disease. In about 50% of these men, the first indication will be an unexpected heart attack, of which only half will survive. If this current trend continues over the next 20 years, the first indication of heart disease for 15 million men will be sudden death. These frightening statistics underscore the need for early detection and prevention before the onset of symptoms.

The coronary arteries supply the heart muscle (myocardium) with nutrients and oxygen. As atheromatous plaques build on the intimal wall, the lumen decreases in diameter. The coronary arteries may continue to supply adequate blood to the heart even after considerable narrowing has taken place. Eventually, the atheromatous encroachment on the lumen of the coronary artery reaches a point that the demand for oxygen can sometimes exceed the supply. This is often during exercise. This is the advanced stage of coronary heart disease that can lead to angina, myocardial infarction, cardiac arrhythmias, or even sudden death.

Angina is a “heart cramp” that usually persists as a feeling of pressure in the chest, neck, or arms. The pressure is often associated with shortness of breath. The episode usually lasts a few moments and then fades away. Exercise often brings on angina because during exercise the heart muscle needs more blood, but the blocked coronary arteries restrict blood flow. Angina rarely occurs in people under the age of 35.

A myocardial infarction occurs when there is total blockage of blood flow to part of the heart, leading to death of some heart muscle. The symptoms are similar to angina, but usually are more severe and last longer. Either angina or myocardial infarction may cause the electrical activity of the heart to be disrupted, causing an irregular heartbeat. The medical term for this is an “arrhythmia,” or “out of rhythm.” If the arrhythmia is severe, the heart may not be able to pump blood adequately. This can lead to a loss of consciousness or even sudden death.

Stroke

Atherosclerosis can also affect the arteries to the brain. The lack of sufficient blood to the brain is the most common cause of a stroke, the second leading cause of death from cardiovascular disease. A stroke may cause visual problems, difficulty with speech, or weakness in the limbs. These may be transient or permanent. Unlike angina, strokes usually do not occur during exercise, because unlike the heart, the brain does not need more blood during exercise. Strokes now account for 5% of American deaths.

CARDIOVASCULAR DISEASE RISK FACTORS

Risk factors are statistical characteristics that identify groups of people at higher risk for a disease than normal. To illustrate, smoking is an established risk factor of lung cancer. About 95% of lung cancer patients have a history of smoking, while only 35% of the total population smoke. This would establish smoking as a risk factor in the development of lung cancer. That is, if you are a smoker, you are more likely than the general population to develop lung cancer.

The identification of individuals at risk is an important public health goal because this allows scientist to target those people who are most at risk. The risk factors may actually be causal in the disease process. If this is the case, reducing the risk factors enhances health. Risk factors tend to be stable and predictive of future events. Using data collected on entering college students, the risk factors present in their teens were predictive of coronary heart disease 20 to 40 years later (Figure 1-2). The risk of cardiovascular disease for those students who were overweight, smoked, and hypertensive

(i.e., high blood pressure) was 200% higher than the risk of those who did not have these characteristics.

Risk factors can be assessed with self-report form termed *health risk appraisal questionnaires*. These instruments are simple, and can be used to identify individuals at high risk. Lab 1.0 (Appendix B) includes a general risk analysis. We will now discuss cardiovascular disease risk factors.

Age and Gender

The incidence of cardiovascular disease increases with age, and at any age, men experience more heart disease and strokes than women. With lifestyles of women changing, their rates are now on the rise while the rates for men are declining. You cannot change your age or gender, but it is important to be aware of the groups at greatest risk.

Heredity - Family History

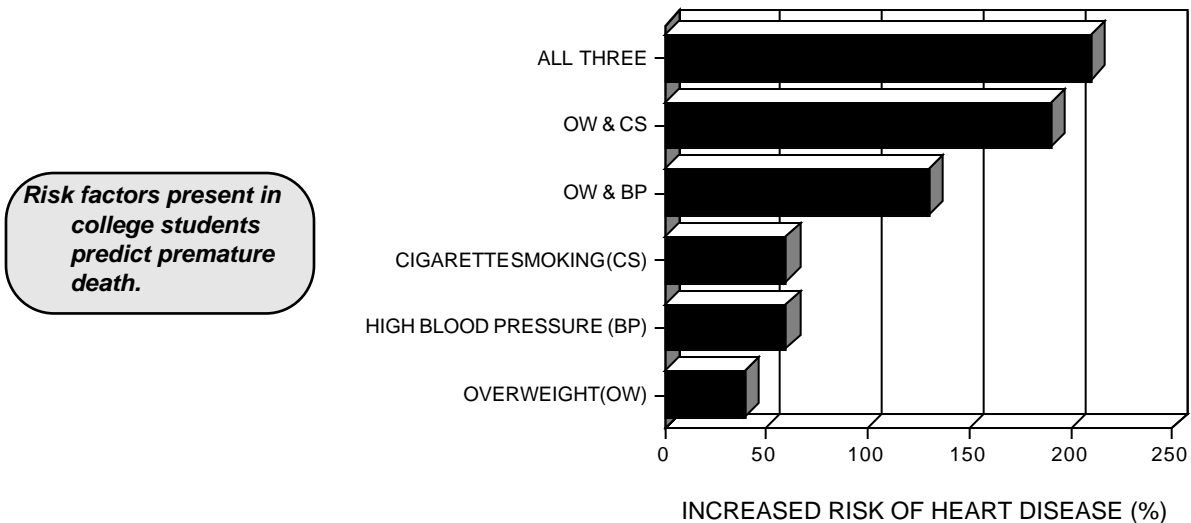
Cardiovascular diseases tend to cluster in families. Because of similar lifestyles and dietary habits, it is not clear how much of this is genetic and how much is environmental. There are certain genetic conditions that clearly contribute to cardiovascular disease. If you have a family history of cardiovascular disease, particularly if it occurred at a younger age, you may be at increased risk.

Hypertension

Hypertension, or high blood pressure, is a potent cardiovascular disease risk factor. Hypertension is present when the systolic pressure is ≥ 140 mmHg or the diastolic pressure is ≥ 90 mmHg. Lowering the blood pressure of hypertensive people reduces the risk of cardiovascular disease. The methods used to lower blood pressure are exercise, weight loss, reduction of salt intake, and medication.

FIGURE 1-2.

Coronary heart disease mortality ratios for students based upon risk factors present when entering college. The risk factors present in the teens were predictive of coronary disease from 20 to 40 years later. Graph developed from published data [9].



Elevated Blood Lipids

Certain lipids (i.e., fats) that normally circulate in the blood increase the risk of cardiovascular disease. Elevated levels of total cholesterol, low density lipoprotein (LDL-C), and triglycerides increase cardiovascular disease risk. In contrast, high levels of high density lipoprotein (HDL-C) seem to be protective.

Cholesterol and LDL-C can be reduced by consuming a diet low in cholesterol and saturated fats. Triglycerides can be lowered through exercise, weight loss, and reduction of sugar and alcohol consumption. HDL-C can be increased through routine exercise, and loss of fat weight. It is important to have your blood lipid levels checked periodically, and if necessary, modify them with diet, exercise, and weight loss. There is a growing medical trend to use medication to control blood lipids as studies have shown a clear benefit.

Diabetes Mellitus

Diabetes mellitus is an abnormality of carbohydrate and fat metabolism. It is a complicated disease in which there is not enough effective insulin to meet the body's requirements. This leads to elevated blood glucose levels. Diabetes mellitus increases your risk of cardiovascular disease and is a major cause of blindness, limb amputation, and kidney failure.

There are two general types of diabetes mellitus, an adult-onset form and an insulin-dependent form that is more common among juveniles. The adult form usually does not require insulin and is closely linked with being overweight. This adult onset form accounts for 90% of all diabetes in the country. If ever there was a lifestyle disease, it is noninsulin-dependent diabetes. All obese people are not diabetic, but as a subgroup, they are at risk for diabetes. It has been found that people who have "apple shaped" bodies are particularly prone to develop noninsulin-dependent diabetes mellitus. The "apple shape" is a predominance of abdominal fat. The waist-hip ratio presented in Chapter 4 is a method of assessing body shape. Just as obesity and being overweight lead to insulin resistance, weight loss can reverse the condition. Often, when people with noninsulin-diabetes mellitus lose weight, they are no longer diabetic.

Cigarette Smoking

Smoking not only causes devastating lung diseases, such as emphysema and lung cancer, it is also a major cardiovascular disease risk factor. The effects of smoking are complex, but smoking may aggravate atherosclerosis. Some 51 million Americans (or about 30 percent of the entire population) still smoke. There is no easy way to stop, but every smoker should try. Life-long abstinence is the goal; short-term quitting does little to improve your health.

Behavior Patterns

Some believe that certain types of behavior such as tenseness, competitiveness, and obsessiveness are cardiovascular risk factors. A more relaxed lifestyle is likely to make you feel better and may help you live longer.

Obesity

Being overweight tends to be associated with other potent risk factors such as sedentary lifestyle, improper diet, abnormal blood lipid profiles, and diabetes mellitus. Additionally, overweight people are at a much higher risk of death and complications from illness and surgery. Chapter 4 discusses this in greater detail.

EXERCISE AND FITNESS ARE RISK FACTORS

In the early 1950s medical researchers started to believe that sedentary lifestyle may be a risk factor of cardiovascular disease. In the 1990s medical researchers have established that inactivity and low aerobic fitness are risk factors of cardiovascular diseases and all-cause mortality. As you will discover in Chapters 2 and 3, aerobic fitness and aerobic exercise are closely linked. When you change your aerobic exercise behavior, your fitness will also change.

Aerobic Fitness

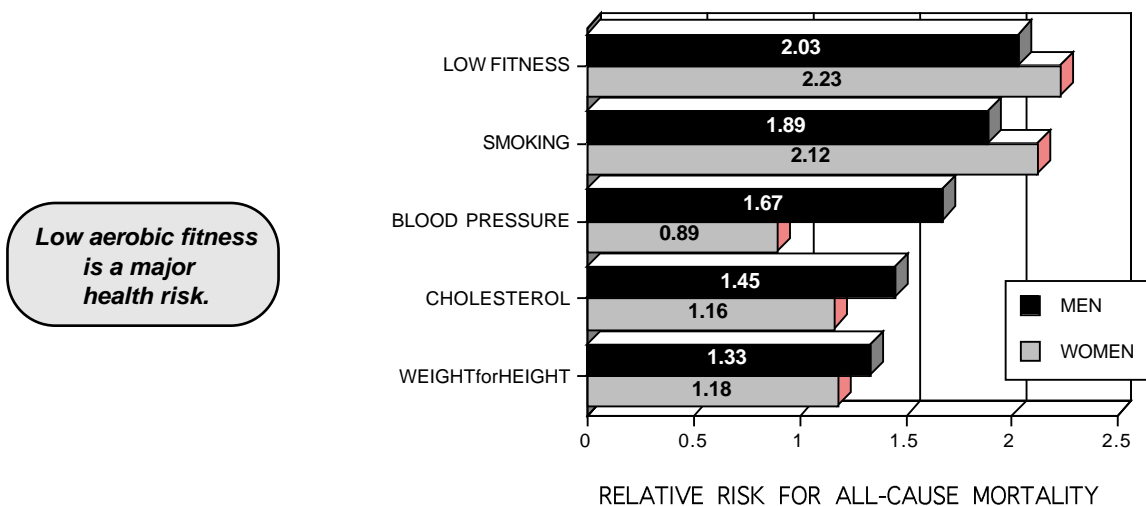
While obesity, blood lipids, high blood pressure, and smoking are clearly accepted as health risk factors, published data [1] show that “low fitness” may be the most potent risk factor for all-cause mortality. Low fitness was defined as the 20% of men and women who were least aerobically fit for their age. A maximal treadmill test determined aerobic fitness. Figure 1-3 compares low fitness of men and women with these well accepted risk factors. These data show that low fitness was the strongest predictor of all-cause mortality. The least fit 20% of men and women were about twice as likely to die during an eight-year follow-up when compared to their more fit counterparts.

Aerobic Exercise

A classic study on the role of aerobic exercise on health involved assessing the physical activity habits of nearly 17,000 male Harvard alumni [5, 7]. A questionnaire was used to assess their level of activity and health status. Physical activity was defined by the number of calories expended during exercise.¹ This research examined the role of aerobic exercise on both morbidity (first heart attack), and mortality. Those alumni who expended less than 500 calories per week were classified as sedentary.

FIGURE 1-3.

A comparison of aerobic fitness with other risk factors as a predictor of all-cause mortality in the next 8 years [1].



1. Methods of estimating the number of calories burned during exercise is shown in Chapter 3.

FIGURE 1-4.

The community-attributable risks of first heart attack and all cause mortality of Harvard alumni. The risk estimates the percentage reduction in heart attacks that could be expected in the total group if the adverse characteristic was not present. Graph published from data published [5, 7].

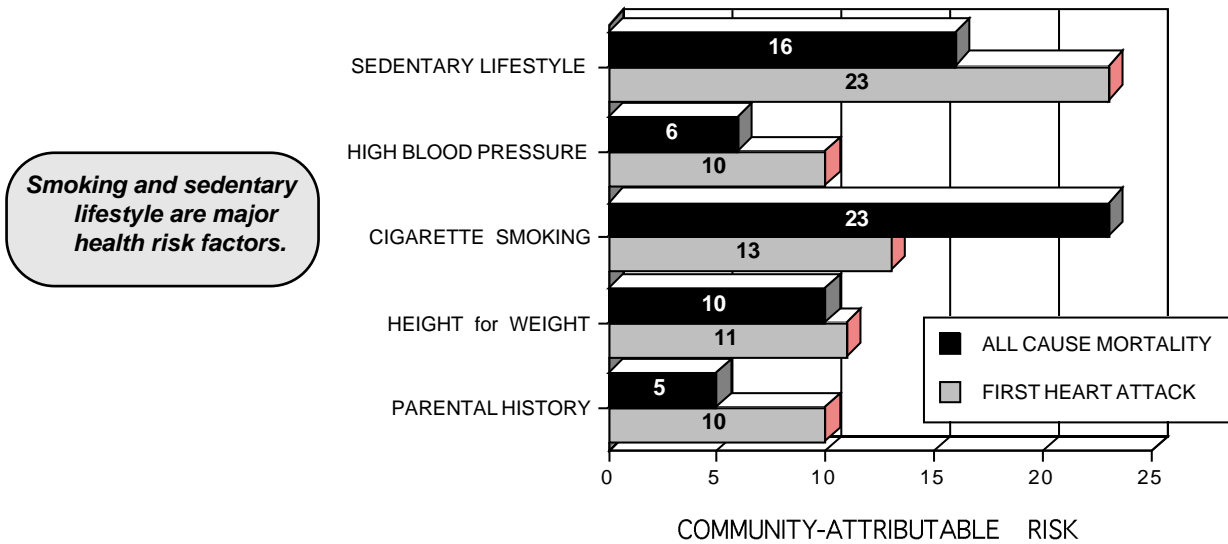


Figure 1-4 shows that sedentary lifestyle was a potent risk factor for heart attack and all-cause mortality. Shown is the community-attributable risk, which is an estimate of the potential reduction in morbidity or mortality if the risk factor were not present. This calculation considers the prevalence of the risk factor in the population. The higher the prevalence, the greater the potential improvement in public health. These results show that sedentary lifestyle and cigarette smoking have the highest community-attributable risk estimates. If all alumni were physically active (i.e., expended at least 2,000 calories per week), the mortality rate could be expected to be reduced by 16%, and there would be 23% fewer heart attacks. If none of the Harvard alumni smoked, the mortality rate could be expected to be reduced by 23% and there would be 13% fewer heart attacks.

These risk estimates were found to be additive. If none of alumni smoked and all were physically active, mortality would be lowered by 39% and 36%² and less of the alumni would suffer a heart attack. These data clearly show the reasons for the public health initiative to encourage Americans to quit smoking and become physically active.

Exponential Effect of a Sedentary Lifestyle

Risk factor research has found that having several risk factors increases risk in a multiplicative fashion or at an exponential rate. The investigators [6] of the Harvard alumni study also examined the influence of combining sedentary living with these other risk factors. Figure 1-5 graphically shows the effect of having several risk factors. The risk of heart attack for sedentary, hypertensive alumni who smoked was over seven times higher than for those who did not have any of these risk factors. The number of heart

2. From Figure 1-4, i.e., (16 + 23) = 39% and (23 + 13) = 36%.

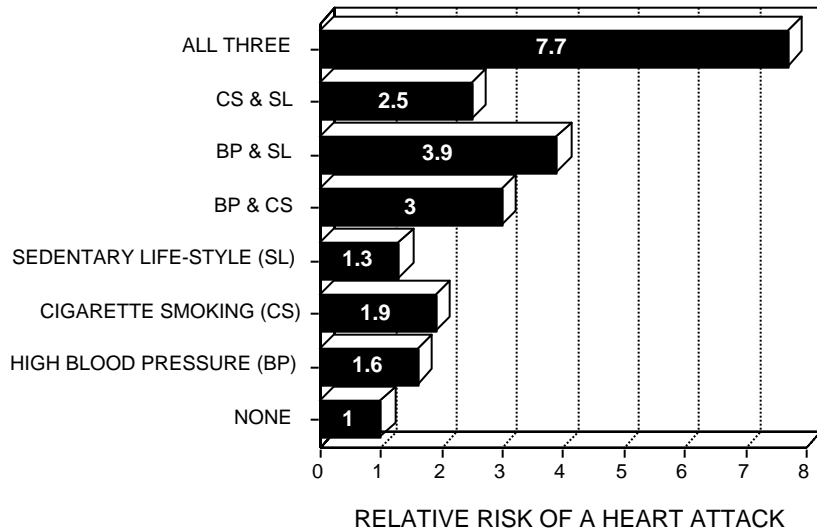
OTHER MAJOR HEALTH CONCERNS

attacks would be reduced by as much as 50% if all alumni were physically active, non-smokers with normal blood pressure. Proper lifestyle can make a big difference.

FIGURE 1-5.

Age-adjusted relative risk of first heart attack among Harvard male alumni with combination of cardiovascular risk factors that were: history of high blood pressure (BP); cigarette smoking habit (CS); and sedentary lifestyle (SD), energy expenditure <2,000 kilocalories per week. Graph developed from published data [6, 7].

Being sedentary, hypertensive, and a smoker greatly increases your risk of a heart attack.



OTHER MAJOR HEALTH CONCERNS

The primary goal of this book is to discuss the role of exercise, and fitness in maintaining good health and longevity. As we have shown, exercise and fitness do affect health and reduce all-cause mortality. Exercise is not, however, a panacea, and it will not protect you from many illnesses. Provided in this final section of this chapter is a brief discussion of other important health concerns. By taking “common sense” steps you can reduce your risk for many of these diseases.

CANCER

Cancer is the second leading cause of death of Americans and the leading cause of death in females between the ages of 35 and 74. Presently, the most common cancer killers for men are lung, colon, and prostate, while for women they are lung, breast, and colon. Many cancers can be prevented or, if detected early, cured. Proper screening and a healthy lifestyle, with emphasis on good nutrition, smoking absence, and minimal alcohol consumption minimize the risk of contracting these tragic illnesses. An estimated one third of cancer deaths could be avoided if people did not use tobacco. Improper diet and nutrition probably account for another third.

Lung Cancer

Lung cancer is one of the great tragedies of our time. Early in this century, primary cancer of the lung was rare. However, it has become the most common cancer of men and the most common cause of death from cancer for both men and women. It is almost completely preventable by not smoking. This year about 152,000 new cases will be diagnosed and there will be an estimated 139,000 lung cancer deaths.

Primary lung cancer is a cancer that begins within the lung, not a cancer that originates elsewhere and spreads to the lung. Cancers that do not begin in the lung are not included in lung cancer statistics. Primary lung cancer is essentially a disease of cigarette smoking. Although radiation and heavy exposure to certain fumes or chemicals over many years can cause lung cancer, these occurrences are relatively rare, particularly among non-smokers. Workers, however, should be protected from harmful substances. Radon exposure should be minimized in the home and workplace.

Unfortunately, up to this point in time preventative lung cancer screening has been uniformly ineffective at saving people's lives. Routine sputum examinations and chest x-rays do not seem to reduce the death rate from lung cancer.

Although heavy smokers should be monitored by their physicians, the only effective prevention is to stop smoking. The risk of lung cancer is relatively low for people who have less than a 10 pack-year history of smoking.³ The incidence rapidly rises after 20 pack-years and is related to the total amount of cigarette exposure. Heavy smokers' relative risk of death due to lung cancer is 20 to 30 times higher than non smokers. Similarly, the risk of lung cancer drops off when smoking is stopped, but it does not reach non-smoking risk levels for up to 10 to 20 years, if ever.

Breast Cancer

Breast cancer is the most common cancer in women, but is no longer the leading cancer killer for them. That dubious distinction belongs to cancer of the lung. The incidence of breast cancer has been increasing slightly since 1950 and presently stands at about 100 cases per 100,000 people per year. An estimated 1.3% of all 40 year-old-women will develop breast cancer in the next ten years. This rate increases to 2.8% for women over age 65.

Major risk factors for breast cancer are a personal or family history of breast cancer, fibrocystic disease of the breast, estrogen usage, early menarche, late age of first pregnancy, and late menopause. Obesity and a history of other cancers, such as colon or ovary, also seem to be risk factors. Prevention consists of restricted use of female hormones (estrogens), a low fat diet, where no more than 30 percent of calories are obtained from fat, and limited or no alcohol consumption.

Proper screening has been shown to find early disease and save lives. Screening for breast cancer consists of a monthly breast self-examination after the age of 20. A physician should examine a woman's breasts every two to three years between the ages of 20 and 40 and yearly thereafter. Women should have a mammogram annually after age 50. A mammogram is a special type of x-ray of the breast that can pick up early breast cancer. The evidence supporting earlier mammograms is not conclusive, but an initial mammogram at age 35, followed by repeat mammograms every one to two years after age 40, is reasonable. Consult your physician for specific recommendations, which are subject to change.

3. A "pack-year" is the equivalent of smoking a package of cigarettes per day for one year.

Cervical Cancer

Cancer of the cervix has dramatically decreased over the past 30 years due to the introduction of the Papanicolaou (Pap) smear. This is a medical procedure in which small scrapings of cells from the cervix (the opening to the uterus or womb) are examined for evidence of early malignancy or abnormal cell changes. Women should have an initial Pap Smear when they become sexually active or by age 18. After three initial negative tests, Pap smears can be performed less frequently at your physician's discretion. Early detection is *the* determining factor in cervical cancer cure. Risk factors for cancer of the cervix include frequent sex with multiple partners (particularly those who are uncircumcised), certain female hormones, smoking and possibly oral contraceptives.

Colon and Rectal Cancer

Colon and rectal cancer (cancer of the large bowel and rectum) are common forms of cancer for both males and females. These cancers occur in 147,000 Americans annually. They account for 15% of all cancers, and 12% of all cancer deaths. Colon and rectal cancer risk factors include bowel diseases, such as ulcerative colitis or Crohn's disease, colonic polyps (small growths in the colon or rectum), a family history of colon cancer or colonic polyps, a previous history of colon cancer, or previous gynecological or breast cancer. High fat and low fiber diets also seem to contribute to colon and rectal cancer risk.

Prevention consists of consuming adequate fiber and not too much fat. Since the majority of these cancers can be felt on a digital examination by your physician, it is recommended that people over age 40 have annual rectal examinations. After age 50, annual fecal occult blood tests should be done. This test checks a small amount of stool for evidence of blood, and indication of hidden bleeding in the gastrointestinal tract. If bleeding is found, further tests are performed. Sigmoidoscopy (direct viewing of the rectum and "sigmoid" part of the colon) should be performed annually for two years after the age of 50. If the first two exams are both negative, repeat sigmoidoscopies should be performed every three to five years thereafter or at the discretion of your physician.

Prostate Cancer

This form of cancer is primarily a disease of older men and is uncommon below age 50. The average age of diagnosis is 73. Improper diet may be a contributing factor. No routine screening program is clearly beneficial for detecting cancer of the prostate, but your physician can often pick up early problems through a digital rectal exam. A simple blood test is now also used to screen for prostate cancer.

Skin Cancer

More than 500,000 cases of skin cancer are reported every year, making this the most common form of cancer. About 90% of these cancers occur in areas not usually covered by clothing. By far the most common cause of skin cancer is overexposure to the sun. While most skin cancers are slow growing and curable, two kinds, squamous cell and malignant Melanoma, are very aggressive and can be lethal. Each year approximately 6,000 people die of Melanoma most of whom are young and otherwise healthy. This tragedy can be markedly reduced by avoiding overexposure to the sun. Fair skinned people are most at risk, but everyone should avoid sunburns and wear sunblock when exposing skin to direct sunlight.

CHRONIC OBSTRUCTIVE LUNG DISEASE

Chronic obstructive lung disease (COPD) includes chronic bronchitis and emphysema. It affects approximately 10 million Americans and is the fifth most common cause of death. This disease limits your mobility and productivity and leads to slow death through progressive suffocation. This illness could be almost completely eliminated if people did not smoke. Almost half of long term smokers develop some degree of this disease. Prevention, of course, consists of not smoking. Exercise is not harmful but will not dramatically improve COPD. Prescription medications may reduce the effects, but abstinence from smoking is essential. Provided next are some tips on how to quit smoking.

- Be determined to quit.
- Learn about the risks of smoking.
- Smoke only when you have to. Eliminate cigarettes you “feel like” smoking but can do without.
- Smoke low tar and nicotine cigarettes, and only smoke the first half of the cigarette.
- Don't let cigarettes stay lit all day in your ashtray. Light them only when you must smoke them.
- Consider the use of medications or patches to assist in the physical dependence aspect of smoking.
- Set reduction goals and work hard toward them.
- When you feel healthy, you are less likely to smoke. Exercise and proper nutrition helps.
- Don't worry about weight gain, this is almost invariable, but temporary. Once you have quick smoking, diet and exercise can be used to combat any weight gain.
- Don't feel guilty. You are not a bad person because you smoke, but smoking is bad for your health.
- If you fail, try again. Just because you lose a “battle” does not mean you will lose the “war.” Keep trying to stop.

DRUGS AND ALCOHOL

Illicit drugs are another tragedy in our society. Drugs alter your behavior, often leading you to do things that you later regret. Drug use wastes a lot of time that could be channeled into more productive activities. Stimulant drugs such as speed or cocaine can lead to cardiac arrhythmias and sudden death; they also often lead to “post use” exhaustion and depression. Heroin and other opiates lead to severe addiction. It is not by chance that taking opiates without a prescription is illegal virtually throughout the entire world. Intravenous drugs use can cause serious illness, including hepatitis, and AIDS. Anabolic steroids, although possibly assisting in gaining muscle mass, have been implicated in several medical problems (and are dangerous).

Alcohol may be the most commonly used drug in our society. An occasional drink can aid in digestion and relaxation, but even one drink of alcohol can affect your judgment. Excessive alcohol consumption can lead to severe psychosocial problems not only for the alcoholic, but for his co-workers, friends and family. Liver and digestive diseases, often alcohol related, are the ninth leading cause of death of Americans.

SEXUALLY TRANSMITTED DISEASES - HIV AND AIDS

Sexually transmitted diseases are a common affliction for young people. Some of the more common diseases are herpes, syphilis, gonorrhea, and hepatitis. The growing AIDS epidemic dramatically heightened the public health concern of sexually transmitted diseases.

Human Immunodeficiency Virus (HIV) is the agent that causes Acquired Immune Deficiency Syndrome (AIDS). HIV is an infection caused by the HIV virus that attacks the immune cells in the body. Over time, the immunity of the infected person decreases and the person develops illnesses that would not happen with normal immunity. Many people are infected with the HIV virus but do not develop symptoms (i.e., AIDS); they are asymptomatic carriers. Although they look and feel well, they harbor this deadly virus and can pass it on.

The first cases of AIDS in the United States were reported in 1981. The Centers for Disease Control reported that, as of October, 1995, about 501,310 cases of AIDS have been reported. Of these, about 81% have been males. In the United States, the rate of HIV infection is 1 in 280. The rate in Houston is estimated to be 1 in 90 [4]. The most affected population is young people. In fact HIV is the second leading cause of death behind accidents for people between the ages of 25 and 44.

HIV is spread by direct contact with body fluids such as blood, semen, vaginal fluids and breast milk. The major ways HIV is spread are:

- **Sexual contact with an infected person.** While HIV was once thought of as a disease of homosexuals, this no longer the case. Transmission of HIV can occur between men, from men to women, or women to men. Since many people are asymptomatic carriers of HIV, the number of sexual partners increases the risk of HIV infection.
- **Needle sharing.** Needle or syringe use is a major transmission mode of HIV among intravenous drug users. However, this not only includes intravenous drug use, but such needle use as tattooing or ear piercing.
- **Exposure through blood products.** In the early 1980s, a small percentage of HIV transmission was through contaminated blood and blood products. This occurred before the HIV virus was isolated so there were no effective screening tests available. However, at this time all blood products in this country are carefully screened for HIV. The blood supply is now safe from this tragic disease. If you need blood products, you should take them without fear of HIV infection.
- **Exposure of babies from infected mothers.** Most infected children acquired their HIV infection from infected mothers.

The two most effective ways to protect yourself from HIV infection are abstinence from sexual contact or a mutually monogamous relationship with a HIV negative mate. The CDC has developed additional guidelines for the prevention of HIV infection. These are:

- Use latex condoms for all types of sex.
- Do not have unprotected sexual contact with a person known to have, or suspected to have HIV.
- Do not have sex with multiple partners or have sex with people who have multiple partners.

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- Avoid sexual practices that may result in tearing body tissues.
- Do not inject illicit drugs or share needles of any kind. This includes needles used for ear piercing or tattoo drawing.
- Do not have sex with people who inject drugs.
- Do not use any form of illicit drugs (marijuana, cocaine, crack) since these substances impair your judgment.

While AIDS is a devastating disease, there now is some encouraging news. Newer drugs, although still not able to cure HIV, are having much better success at keeping it in check. HIV may no longer be a “death sentence,” but a controllable chronic illness where the person is usually free of symptoms.

MUSCULOSKELETAL INJURIES

Musculoskeletal injuries commonly occur in people participating in sports and exercise. Injuries occur even in well-trained, healthy people. Many injuries are caused by falling, but others are related to the overuse of the musculoskeletal system. Sixty percent of all active runners, at some time, are injured badly enough to preclude continued running. Injuries can be prevented or minimized by proper warm up, training, good equipment, and technique. When a bone, muscle or joint is injured it should be treated according to the R.I.C.E. formula: Rest, Ice, Compression, and Elevation. Table 1-1 describes the R.I.C.E. formula.

TABLE 1-1.

The R.I.C.E. steps for treating a musculoskeletal injury.

STEP	TREATMENT	DESCRIPTION
1	Rest	Rest the injured extremity for at least one day.
2	Ice	Use ice to reduce vascularity and inflammation. Ice should be used immediately after the injury. It should be placed on the injured area for 15 to 20 minutes then removed for a brief time to prevent frostbite of the skin. Then reapply in 15 - 20 minute cycles. Ice should be used for the first 24 hours after the acute injury then change to heat.
3	Compression	Compression of the injured area reduces inflammation and swelling. This can be accomplished by firm pressure with or without elastic bandages. The area should not be wrapped too tightly because this may injure nerves or restrict blood supply.
4	Elevation	Where possible, elevation of the affected part, above the level of heart, improves venous return and reduces swelling.

Other steps to consider are:

- Anti-inflammatory medications such as aspirin or ibuprofen are often useful.
- After 24 to 36 hours of cold treatment, heat (preferably moist heat) should be applied to speed healing. The heat should be as hot as tolerated comfortably without burning the skin.
- If the pain is improving, compression and elevation may be discontinued and movement begun. If there are still significant problems, seek medical attention.
- If there is any significant deformity, instability, or numbness, consult a physician.

OTHER MEDICAL CONCERNS

- **Heart Disease** - Generally, exercise is good for people with atherosclerotic heart disease. However, it may be necessary to lower exercise intensity, at least initially. Other cardiovascular diseases may weaken the heart muscle or heart valves. Vigorous exercise for people with these disorders is somewhat controversial at this time. It may not be appropriate and may even be harmful. If you have heart or other medical problems, have your exercise program guidelines reviewed by your physician
- **Hot Environments** - Exercising, particularly in hot environments, can raise your body temperature and lead to dehydration from fluid loss. This can cause dizziness, fainting and in rare instances, even death. The risk is highest with high outdoor temperatures, direct sunshine, high relative humidity, and when fluid intake is inadequate. Appropriate precautions should be taken. Drinking water before and during exercise is imperative.
- **Cold Environments** - In cold temperatures, do not exercise strenuously until your muscles are adequately warmed up. Wear several layers of light clothing, which are not airtight, warm gloves, and a hat or hood. Try not to get overheated, because this may lead to getting chilled when you cool down.
- **Asthma** - Exercise may induce wheezing or asthma in susceptible people. However, this problem can usually be controlled with proper medication. In general, people who have their asthma under good medical control can participate in any form of exercise.
- **Eating and Exercise** - Nausea and vomiting may occur after very vigorous exercise. To reduce the risk, eat lightly prior to exercise and consume only liquids during the two hours prior to strenuous exercise. Substances like caffeine or nicotine, which increase gastrointestinal motility, should be avoided if you react to them. Most forms of chronic gastrointestinal diseases do not preclude exercise.
- **Menstrual Dysfunction** - Highly trained female athletes may overtrain and under eat. This may lead to menstrual dysfunction such as reduced flow or complete lack of periods. The problems generally can be reversed with less extensive exercise and some weight gain, but medical evaluation and supervision may be needed.
- **Arthritis** - People with arthritis usually can exercise, although often at a reduced intensity. Medication may also be helpful during exercise. Consult your physician for guidance.
- **Diabetes Mellitus** - Diabetics have unique problems, because strenuous exercise may cause low blood sugar levels. Diabetics under good control should be able to exercise vigorously without significant problems. However, they may have difficulties when they change their level of activity. They also may require small amounts of sugar or small reductions in insulin during periods of active exercise. All people with insulin-dependent diabetes should be known in the exercise facility.
- **Skin Complications** - Major skin complications that occur during exercise are related to increased moisture and friction. The treatment is to dry moist areas with powders and reduce friction areas with lubricants such as petroleum jelly.
- **Eye Protection** - The eyes are also commonly injured. Proper eye wear should always be worn.

SUMMARY

Cardiovascular disease is the leading cause of death among Americans, accounting for about 40% of annual mortality. After a steady rise from 1900 to 1960, the trend has changed. The incidence of cardiovascular disease is declining, due in part to increasing levels of exercise and improved nutrition. Risk factors identify people at higher risk for developing a disease. The established risk factors of cardiovascular diseases are:

- **Age and Gender.** Higher in older men.
- **Heredity and Family History.** Having a family history increases your risk.
- **Hypertension.** High blood pressure increases your risk.
- **Elevated Blood Lipids.** A blood lipid profile of high total cholesterol, or a high LDL-C, and low HDL cholesterol fractions increases risk of cardiovascular diseases.
- **Diabetes Mellitus.** Diabetics are at a higher risk of cardiovascular disease.
- **Cigarette Smoking.** Smoking not only causes lung cancer, but also stroke and heart disease.
- **Behavior Patterns.** Behavior patterns such as tenseness, competitiveness, and obsessiveness may increase your risk of cardiovascular disease.
- **Obesity.** Being overweight not only increases your risk of hypertension and diabetes, but also cardiovascular diseases.
- **Exercise and Aerobic Fitness.** Sedentary lifestyle and low aerobic fitness has been found to be a major, independent risk factor of cardiovascular disease of the same magnitude as other potent risk factors such as smoking, hypertension, and unfavorable blood lipid profile.

Cancer is the second leading cause of death among Americans and the leading cause of death of women between the ages of 35 and 74 years. Lung cancer is the leading cancer killer for both men and women. Lung cancer is almost completely preventable by not smoking. Breast cancer is the most common cancer in women. By practicing breast self-examination a woman can detect breast cancer at an early stage and thereby improve the outcome. Similarly, by using common sense measures, other cancers can be prevented or found when still treatable.

Your habits and choices affect the quality and length of your life. Robust health comes from good nutrition, exercise, appropriate safety precautions, and periodic screening examinations for common, treatable illnesses. Alcohol should be used only in moderation and tobacco must be avoided. The short but devastating history of HIV and AIDS has sharpened public awareness of the need to practice “safe sex.” With certain precautions, exercise is appropriate for almost everyone. These lifestyle habits are not as difficult to achieve as it might seem. The benefits are clear a longer, healthier, more productive life.

STUDY QUESTIONS

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1. What are the major cardiovascular diseases and what percentage of Americans die of these diseases?
2. What are the major cardiovascular disease risk factors?
3. Is aerobic fitness a cardiovascular disease risk factor?
4. Are exercise habits a cardiovascular disease risk factor?
5. What are the leading forms of cancer in men and women?
6. What is the effect of smoking on morbidity and mortality?
7. What is the difference between HIV and AIDS?
8. What behaviors increase the risk of contracting HIV?

NOTES:

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