

Chapter 1

Exercise: The Best Medicine

If you were told you could have more energy, be healthier, and live longer by doing something that takes a little more than one minute out of every two hours, would you do it?

Do you have the time to exercise 90 to 120 minutes a week? Well, if you do, medical research indicates that you can accomplish a death-defying act. You will feel better, roll back your physiological clock, and gain more benefits than you would from any potion or medication ever invented. Participating in a program of regular physical exercise can accomplish the following:

4 The Healing Power of Exercise

Fewer than 20 percent of adults in the United States get enough exercise.

- Increase your life span
- Reduce your chance of developing heart disease
- Reduce your risk of stroke
- Lower your risk of developing certain cancers
- Prevent and treat high blood pressure
- Prevent and treat diabetes
- Burn fat and build muscle
- Strengthen your bones
- Improve cholesterol and triglyceride levels
- Prevent and treat lower back problems
- Reduce stress, anxiety, and symptoms of depression
- Reduce your risk of developing glaucoma
- Boost your energy level

Exercise: The Early Years

Our bodies are not much different today than they were 2 million years ago, when *Homo erectus* first walked on the planet. That is about the time when we began using stone tools, and the screwdriver and ginsu knives were just dreams. *Homo sapiens* appeared almost 500,000 years ago. These ancestors had a larger brain, began cooking their food, and over time developed jaws with smaller teeth. Today, our organs, basic physiology, and biological systems are identical to those of our ancestors who lived 40,000 years ago.

After years of research, the United States Public Health Service declared “physical fitness and exercise to be one of the . . . priority areas in which improvement is expected to lead to substantial reduction in premature morbidity and mortality.” This is not an original conclusion. For example, John Dryden (1631–1700) wrote the following:

Better to hunt in fields for health unbought;
Than fee the doctor for a nauseous draught.
The wise, for cure, on exercise depend;
God never made his work for man to mend.

Before this, the twelfth-century physician Moses Maimonides stated, “Anyone who sits around idle and takes no exercise will be subject to physical discomfort and failing strength.”

We have rediscovered what has been known all along. Exercise improves health. Understanding why these healthy benefits occur requires a lesson in paleoanthropology, which is the study of what life was like for our ancient ancestors.

Cort the caveman hunted elk and fished the streams. He and his prehistoric tribe members journeyed for days at a time, hiking over open fields and harsh terrain. The women, including Corta, his cave-mate, gathered nuts and berries, covering between three and five miles of ground each day. When all the food was captured and gathered, those who had not been eaten by bears or crushed by woolly mammoths returned to their caves. Cort, Corta, and their tribe feasted and stocked the cave to prepare for winter, when little food could be gathered or hunted.

Our primitive forebears were survivors whose bodies thrived on physical activity. Hunting game and gathering nuts, seeds, and fruits were performed by groups, or clans, of 25 to 50 people. Over thousands of centuries, the human body adapted to this highly energetic lifestyle. Our cardiovascular system, endocrine glands, muscles, and bones still function best when the body is challenged by regular bouts of exertion. Makes sense, doesn't it?

While many of us are glad we don't have to run after wild game with a handmade spear and are happy with our modern conveniences such as supermarkets, current lifestyles do not provide us with the amount of exercise our bodies need. Channel surfing, jumping to

conclusions, putting your shoulder to the grindstone, and leaps of faith just are not enough for optimum health!

Modern Lifestyles

Most modern jobs never challenge most of our 600 muscles. Industrialization has advanced so quickly that our bodies have not had the time to adapt to the changes. We still live with the same ancient anatomy, organs, and biochemical profile that Corta and Cort had. So, it is not surprising that there has been an epidemic of cardiovascular and degenerative diseases. Use of automobiles, information superhighways, and drive-through windows has come at a price.

It is easy to slip into a sedentary lifestyle. Because of our highly mechanized society, we hardly notice how out of shape we really are. It's only when the elevator is not working and you need to climb five flights, there is yardwork to do, or you go one-on-one in a basketball game with a 12-year-old that you might realize your real physical condition. When you play that basketball game, you might score a few quick buckets, but then your legs begin to feel like rubber and breathing becomes labored. Your chest starts to hurt with each breath. You know that the only way to avoid being totally embarrassed by your young adversary is to play smart. Only your age and experience help you to last the entire game. For most of us, however, such reminders of being out of shape are rare. It is easy to avoid climbing stairs, and you can watch your children's basketball and soccer games rather than participate. So it's not surprising that with everything else going on in your life, getting into shape may not be a priority. But it should be.

Every minute of every day, about three Americans will have a heart attack. Cardiovascular diseases are the major cause of death in the United States for both men and women. In fact, more women than men die of heart disease—it just happens to them about 10 years later. Many times, there are no warning symptoms; for nearly half of all those who have heart disease, a heart attack is the first symptom.

Lack of exercise is one of the major risk factors for developing heart disease. Not exercising is similar in risk to having untreated high blood pressure or smoking a pack of cigarettes each day. Your body needs regular physical activity to stimulate the complex metabolic and hormone pathways that work best only when you exercise.

Making a Difference in Your Health

Imagine that you are going to your high school reunion. Think about your classmates who stayed in shape and compare them to the ones who gained the typical one to two pounds of weight each year after graduation. How many pounds of fat have they accumulated around their waist, hips, and thighs? What do you think this has done to their health?

Dr. Ralph Paffenbarger, a professor at Stanford University, has been studying Harvard alumni for several decades. Because Harvard University keeps meticulous track of its graduates, he was able to follow nearly 17,000 alumni for more than 15 years. After a rigorous investigation of their lifestyles and habits (both good and bad), he found that those men who exercised regularly lived longer!

He also found that it is never too late to start exercising to reduce your health risks. Harvard grads did not have to be college athletes to benefit. In fact, many alumni became active later in life. On the other hand, being a college athlete did not protect those students from developing medical problems if they did not remain active after graduating. It seems you can't just store up and "bank" the benefits of exercise. It is what you are doing now and continue to do in the future that is critical.

Your Job Can Make a Difference

Many studies that consider the workplace have led us to the conclusion that if you are active on the job, you increase your chances of avoiding narrowed arteries and can live a longer life. Examples of these studies

are revealing. For instance, bus conductors in England who walk up and down stairs, taking tickets on those double-decker buses, have less heart disease than those who sit and drive. Similarly, letter carriers who walk on their route have less cardiovascular disease than postal clerks who sit at their desks. Dock workers who lift, pull, and push the cargo have fewer heart attacks than the longshoremen who check the cargo, using only a clipboard and pen.

Most of these research studies used questionnaires, rather than exercise tests, to measure physical activity. The problem is that it is often difficult to compare different types of exercise. For instance, how does stacking boxes compare to housework? Is gardening similar to brisk walking? Although surveys are useful, they are not able to specify the “dose” of exercise, such as walking, jogging, cycling, or lifting weights, needed to improve your health.

What You Do in Your Spare Time Can Make a Difference

The Aerobics Institute, located in Dallas, helped answer the question, “How much exercise do I need?” At the Institute, people enroll in programs to begin and maintain regular physical activity. Those who join are examined by treadmill testing, which is a very accurate measure of physical work capacity. Those who join the programs are classified by their level of fitness. Scientists divided participants into five levels, from 1 (the most fit), to 5 (the least fit). Just as in the results of questionnaire studies, those who had greater fitness lived longer.

Researchers then examined the initial fitness level of the participants, how much exercise they did, and their overall health. What they found was that going from fifth place to fourth place had the greatest benefit (the most bang for the buck). Although higher degrees of fitness were related to an even longer life span, the largest improvement occurred with only small amounts of exercise.

What this means is that you don’t need to run marathons or pump iron for hours to benefit from physical activity. You can improve your health and prevent disease by simply going for a 30-minute walk three to four times a week. So, exercising for less than 1 percent of the week will enable you to feel better and gain the advantages of less heart disease and a longer life.

How Does Physical Activity Prevent Disease?

Many researchers now believe that physical activity stimulates specific enzyme systems and hormones, which in turn reduce risk factors for disease. The changes include decreased clotting of our blood (similar to the effect of aspirin) to lower chances of a heart attack, improved blood fat (cholesterol and triglyceride) levels, better control of blood sugar and blood pressure, and creation of stronger bones, to name a few. With all these changes occurring, you reduce your chances of heart disease, diabetes and its potential kidney and eye disease, along with the complication of thinning bones (osteoporosis).

Regular physical activity improves your health in many ways. Specific benefits and recommendations are discussed in the following chapters. As an overview, Table 1.1 lists many of these health benefits. As physicians concerned with health and exercise, we have seen countless people feel better and gain health through regular physical activity. In this book we present their stories and how they did it.

Lowering Blood Pressure

Bill and Bob didn't exercise. They did not know each other when they enrolled in the university's research program to find out whether exercise could help lower their blood pressure. Both men were taking medication for hypertension (high blood pressure) and had desk jobs. Neither had participated in any regular physical activity for over 10 years.

Bill was 48 years old and wanted to start an exercise program because he thought he was too out of shape. Bob, at age 39, was motivated to be in the study because he had just recovered from back surgery for a herniated disk. Both men were overweight. Bill's body fat percentage was 22 percent, while Bob's body fat percentage was 29 percent. (The normal body fat percentage is between 12 percent and 18 percent for a man, and between 18 percent and 25 percent for a woman.)

Bill and Bob first met while riding exercycles during training sessions. They discussed family, friends, and their jobs during their workouts. So they could exercise together, they coordinated their work schedules and rode for four 30-minute sessions per week.

Before and after the 16-week study, Bill and Bob's fitness levels were measured on a stationary bike with oxygen uptake analysis. With these studies, we were able to pinpoint their exercise capacities. Their aerobic fitness levels (the ability to use oxygen during exercise) improved by more than 20 percent. In addition, after four months of regular exercise, Bill's body fat dropped to 17 percent, while Bob reduced his to 23 percent. Both Bill and Bob packed on more muscle mass as well. Bob's blood pressure normalized without medication. Although Bill still required medicine to lower his blood pressure, he needed only half of his previous dose.

Now, 10 years later, Bob and Bill meet five times a week to ride the exercise cycle and "treat" their hypertension with exercise.

Bill and Bob's adventure on the stationary bikes did not get them far, distance-wise. However, both felt younger, and their continued training has no doubt added years to their lives. Bob believes that his exercise-induced trimmer waistline reduced the strain on his back, too. His belief has been affirmed by medical research.

There are about 50 million adults in the United States with high blood pressure, and only half of these people know their blood pressure is elevated. Maintaining your fitness can protect you from developing hypertension. Dr. Steven Blair and colleagues observed the blood pressures and fitness levels of over 4,000 men in one study. During an 8½-year period, they found a 52 percent increase in the number of men who developed hypertension among those who were less fit. Bill and Bob's experience illustrates how regular physical activity can actually treat high blood pressure.

Most medical studies show that you don't have to train hard to lower blood pressure. For example, walking for 30 minutes every other day can reduce the systolic (the top number) blood pressure by about 11 points (millimeters of mercury, or mm Hg) and decrease diastolic (the lower number) blood pressure by 8 mm Hg. This is enough to reduce the risk of a stroke by more than 25 percent.

Losing Weight

Tom is 36 years old, happily married, and has three young children. He works as a regional representative for a large electronics firm. Tom was a high school athlete, but he participated in his last regular exercise program

when he attended college. Now the extent of his regular physical activity is walking 50 or 100 feet from his car to his customer's business. His weight has slowly increased about one-quarter pound each month. Now he finds that his weight is 40 pounds above his weight 15 years ago. Over the past few months, Tom has been drinking about three to four ounces of bourbon each night as a way to unwind after work.

Tom came to the clinic complaining of pain on the right side of his abdomen, just under the right side of his ribs. The discomfort was worse when he stood up or moved around. His physical exam revealed an enlarged, tender liver. Blood tests were normal, except that he had a very high triglyceride level. (Triglycerides are a type of blood fat found in the diet and also produced by the liver.) The normal triglyceride level is up to 150 mg/dL—that is, 150 mg for every 100 mL of blood. Tom's triglycerides were over 1,000 mg/dL. A scan showed his liver to be swollen with fat.

Remember that Tom has the same physiology as Cort and Corta, the cave people. Unfortunately, the body that was meant to hunt and eat the lean meat of wild game now consumes a dinner that all too often consists of six to eight ounces of red meat from the supermarket. Tom's lunches while on the road are frequently double cheeseburgers and fries. These high-fat meals, combined with Tom's nightly use of alcohol, were more than his liver could handle. This resulted in the high triglyceride content in his bloodstream and caused his liver to swell. Tom's pain was due to a liver that was so engorged with fat that it stretched its own lining when he moved or stood. We could have prescribed drugs for Tom's condition, but the medications that lower triglyceride levels have a number of side effects (also see Chapter 6).

After discussing his options, Tom decided to make some changes. He revamped his diet by reducing his fat intake to less than 20 percent of his total calories. His main protein source became vegetables and cold-water fish, especially salmon. The fish is relatively low in fat and contains omega-3 fatty acids. This substance naturally lowers triglyceride levels and may be an important reason why people who consume large amounts of fish have low rates of heart disease. He ate red meat only once each week and limited his intake of alcohol to one or two beverages, and just on the weekend.

Tom began to train on a stationary bike three times each week and went for walks around his neighborhood for 20 to 30 minutes every evening. Although he struggled with making all the dietary and the

TABLE 1.1 Exercise and Cardiovascular Risk

Health Problem	Evidence That Exercise Helps
<p><i>Coronary Heart Disease</i> Heart attacks result in over 1,500,000 deaths each year. Coronary artery disease is the nation's number one killer.</p>	<p>A 20 percent to 25 percent reduction in age-adjusted death rate from heart attack is found when studies of exercise are combined. For women, exercise is equivalent to estrogen for lowering heart disease risk.</p>
<p><i>Stroke</i> Stroke is often called a brain attack. It results in many permanent disabilities and is the third leading cause of death. The cause of stroke is often high blood pressure and clogged arteries that lead to the brain. Strokes affect 1 out of every 250 people.</p>	<p>People with inactive lifestyles are nearly seven times more likely to have a stroke than those who are active. Walking just 1 mile a day will reduce your risk.</p>
<p><i>High Blood Pressure</i> High blood pressure is a major cause of stroke, heart disease, and kidney failure.</p>	<p>Both aerobic exercise and weight training can reduce high blood pressure. Systolic (the top number) and diastolic (the bottom number) pressure can be lowered an average of 10 mm Hg, reducing stroke rate by about 25 percent.</p>
<p><i>Elevated Triglyceride Levels</i> High triglyceride levels are a risk factor for heart disease and pancreatitis.</p>	<p>Nearly all studies show that exercise reduces triglyceride levels. Triglycerides are used as an exercise fuel and burned during physical activity. Lower-intensity exercises such as slow jogging or walking mainly use triglycerides. Enzyme systems that break down triglycerides are increased by regular physical activity.</p>
<p><i>Abnormal Cholesterol Levels</i> High LDL cholesterol levels are a risk for heart and blood vessel disease. High HDL cholesterol levels help prevent heart disease by reducing the cholesterol plaques that line the choked arteries to the heart.</p>	<p>Studies have shown that weight lifting can reduce LDL cholesterol levels. Most research has found that HDL cholesterol levels increase with aerobic training. Enzyme systems that modify cholesterol levels appear to be involved.</p>

TABLE 1.1 **Exercise and Cardiovascular Risk** (*continued*)

Health Problem	Evidence That Exercise Helps
<p><i>Obesity</i></p> <p>Obesity increases the risk of high blood pressure, diabetes, cancer, high triglyceride and LDL cholesterol levels, and low HDL cholesterol levels.</p>	<p>Regular exercise is necessary for success at long-term weight loss and control. Exercise prevents the reduction of muscle mass that occurs with diets alone. It also helps you burn more calories.</p>
<p><i>Diabetes</i></p> <p>Diabetes increases the risk for low HDL cholesterol levels, high triglyceride levels, heart and blood vessel disease, kidney failure, and eye disease.</p>	<p>Exercise works best for those who use oral medicines to control their diabetes (Type 2 diabetes). Some can even control their sugar levels with physical activity alone. Exercise reduces the risk of developing diabetes, even among people with a family history of this disorder or those who are overweight. Insulin doses can be lowered with physical activity. Both weight lifting and aerobics are effective ways to help keep diabetes under control.</p>

physical activity changes at first, his wife supported him in his new lifestyle. She shopped for nonfat food items and, like Corta, gathered fruits and vegetables, but obtained them at the local supermarket. The healthy changes in eating and exercise were good for Tom's immediate family members, which included his two sons and a daughter. Tom's triglyceride level plummeted to 240 mg/dL within three weeks. His abdominal pain vanished, and he lost 16 pounds over the next two months. A side benefit of his lifestyle change was that Tom's good, or HDL cholesterol, increased by 10 mg/dL. Just the change in HDL cholesterol alone reduced Tom's chance for developing heart disease by more than 20 percent. In addition, he improved his fitness and drained the fat from his enlarged liver.

HDL cholesterol acts like a biological vacuum cleaner and literally sucks up cholesterol from blood vessels.

Improving Emotional Health

Karla was waking up early in the morning and feeling unrested when she went to work. As a grade school teacher for the past 10 years, her work was

still enjoyable, and she loved watching the light come on when her students grasped a new concept. But Karla felt that the stress of daily contact with 8-year-olds was, in her words, "getting to me." She reported that her father and mother were currently taking medication for treatment of depression, and wondered whether she should begin similar drug therapy. Karla was tired of feeling blah.

At 34, Karla also was worried about other aspects of her health. Her mother had heart disease and had recently undergone successful open-heart surgery to bypass clogged arteries. Karla wondered whether those sharp pains in her chest meant that she soon would suffer the same fate as her mother.

After some routine questions about her past history (she did not smoke and ate a healthy, low-fat diet), a physical examination (she had normal blood pressure and a normal cardiovascular exam), blood tests (her cholesterol and blood sugar levels were normal), and assurances that she was not suffering from heart disease symptoms, we began a discussion of various therapies for depression.

After learning the effects of various medicines, she decided to begin weekly counseling sessions. Karla said she also wanted to start an exercise program. Because she enjoyed jogging in the past, walking and jogging were recommended. After school, Karla began jogging around the schoolyard. At first, she could only walk and jog four times around the perimeter (about one mile total). After one week, she increased the run to six laps around the playground. Each week she added two laps.

By six weeks into her program, Karla was running about 3½ miles each weekday. She was able to sleep through the night, had more energy, and her mood improved. Although it took about 45 minutes out of her day, she believed the extra energy made up for any lost time. Karla visited the counselor three times and was doing so well, she was told to return only if she felt she needed further help.

Depression can cause a variety of complaints besides feeling sad. You can feel tired and lose interest in activities or people. Some people have trouble sleeping, suffer a loss of sex drive, and begin either over- or undereating. Karla had mild depression. A universal finding in exercise studies is that people experience a greater sense of well-being. Regular physical activity is as effective as counseling or drugs for the treatment of mild depression.

There are many theories as to why exercise works as a treatment for depression, and the reason probably differs among individuals (discussed in Chapter 11). No matter the mechanism, it is clear that exercise works in many cases.

Exercise has been credited with many psychological benefits beyond a sense of feeling good and relieving symptoms of depression. Regular physical activity can have a tranquilizing effect and reduces anxiety (also see Chapter 11). It has been documented that when you exercise for 30 minutes, three times a week, you lower the adrenaline hormones circulating in your bloodstream. These hormones are the main chemicals that cause us to fight or run from stressful situations. For Cort and Corta, the stress may have been an attacking giant sloth, but today it may be paying your taxes or facing an oncoming sports utility vehicle on a side street as the driver talks on a cellular phone.

By reducing the surge of adrenaline during stress, a calming effect can occur. Specialized muscle testing with electromyography has confirmed a greater relaxation effect after exercise. Exercise is an effective adjunctive therapy for anxiety, comparable to meditation and behavior change practices.

Other Health Effects

The effects of exercise extend to nearly every system of our body. An ever-expanding list of benefits is being compiled by researchers. These benefits include cancer prevention, lower eye pressure (which reduces the chances of developing glaucoma), and stronger bones. Exercise also can be used for rehabilitation—from treatment of injuries, to therapy after a heart attack or bypass surgery. Some of the important non-cardiac effects of exercise are shown in Table 1.2.

Are You Ready to Exercise?

Are you convinced about the benefits of regular physical activity? If you are not, please reread this chapter or take off all your clothes and look into a full-length mirror. If you are still not convinced, don't despair. Talk to your spouse, children, friends, or neighbors about joining you for a short walk, or take your dog out for a stroll in the neighborhood. If you don't have a dog, take the neighbor's dog for a walk. Park the car a few extra blocks from your work. Use the stairs rather than

TABLE 1.2 **Benefits of Exercise**

Health Problem	Evidence That Exercise Works
<p><i>Osteoporosis</i></p> <p>Although women are more likely to develop osteoporosis, men have reduced skeletal bone strength as they age, too. Certain medications such as cortisone-like drugs, low calcium intake, and lack of physical activity speed up the process.</p>	<p>Aerobic fitness and muscle strength are directly related to bone strength. Exercise, along with dietary calcium, is recommended to prevent osteoporosis. Lifting weights and weight-bearing exercises are best.</p>
<p><i>Depression and Anxiety</i></p> <p>Depression and anxiety can lead to ignoring other health problems, can result in work stress, and can cause conflict with loved ones and at work. Anxiety often results in preoccupation with even trivial problems.</p>	<p>Improvements are regularly seen with all types of physical activity. Exercise works best for people with mild symptoms. The exertion need not be vigorous. In fact, the exertion level can be low because it is not necessary to actually get in shape to benefit from exercise.</p>
<p><i>Elevated Eye Pressure</i></p> <p>High pressure in the eye is a risk for developing glaucoma, which can lead to vision loss.</p>	<p>Both weight lifting and aerobic exercise have been shown to reduce eye pressure. Riding an exercycle three times per week for 30 minutes per session was found to be as effective as a medication in many cases.</p>
<p><i>Arthritis</i></p> <p>Arthritis can lead to muscle weakness, joint deformity, restriction of physical capacity, and ultimately confinement to a bed or wheelchair in severe cases.</p>	<p>Exercise results in lower hospitalization rates among those with rheumatoid arthritis. Range-of-motion exercises are effective for arthritis of the spine. Greater movement, muscle strength, and physical capacity can be gained.</p>
<p><i>Cancer</i></p> <p>Malignancies can be due to environmental stressors such as tobacco and hereditary factors, while others are age related or associated with our immune defense.</p>	<p>Greater activity levels are associated with lower colon cancer risk in a 14-year study from Sweden. Reduced rates of lung cancer have been found in more active men, after controlling for cigarette use and body weight. The Aerobics Institute found that reduced cancer deaths were associated with activity equal to as little as 30 minutes of walking each day. Exercise also may reduce breast and prostate cancer risk.</p>

TABLE 1.3 Ready to Exercise?

- Has your doctor ever said you had heart trouble?
- Do you have trouble breathing when you exercise?
- Do you frequently have pains in your arms and chest?
- Do you often feel faint or have spells of dizziness?
- Have you ever been told your blood pressure was too high?
- Have you been told you have a bone or joint problem that can be made worse by exercise?
- Are you over age 65 and not accustomed to exercise?
- Have you been told your cholesterol levels are abnormal?
- Have close family members had heart disease before age 60?
- Do you have diabetes?
- Do you smoke or have you smoked the equivalent of one pack of cigarettes per day for 10 or more years?

the elevator. Remember, small changes will improve the quantity and quality of your life.

If you are ready to begin an exercise program, give yourself a pat on the back. To help ensure exercise safety, please turn to Chapter 12, where we discuss how to prepare for your training program. If you have a medical condition requiring regular care, such as diabetes, asthma, or high blood pressure, or if you answer yes to any of these questions, then you should be evaluated by your physician before you start training.

If you answered no to these questions, then you can begin to change your lifestyle. Now continue to read the rest of this book and become an honorary member of Cort and Corta's clan.