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# Keeping Fit Articles

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## Getting Into The Swing of Golf Season

Wayne L. Westcott, Ph.D.

In 1995, we published our first research study on golf conditioning. These study results were actually pretty impressive. After just eight weeks of strength training and stretching exercises (only 30 minutes a day, three days a week) the golfers added four pounds of muscle, lost four pounds of fat, reduced their resting blood pressure by five mmHg, improved their muscle strength by 50 percent, enhanced their joint flexibility by 25 percent, and increased their driving power (club head speed) by five miles per hour. Subsequent studies with injured golfers showed similar outcomes and additional benefits, such as no physical setbacks during the following golf season.

After four years of golf conditioning research we published a popular book on this topic, and have seen a tremendous transformation in the golf world in a remarkably short period of time. Consider that in 1995 only 10 professional golfers were doing strength training. By the year 2000 almost every professional golfer was performing regular strength exercise, typically with a personal trainer or physical therapist. During the same five-year period, the number of golfers in the United States increased from 25 million to about 45 million. We may take some credit for the new attitude towards strength training, but Tiger Woods is clearly responsible for the incredible increase in golf participation.

As you may know, golf is a most challenging activity due to the complexity and intricacy of the game. However, you may not be aware that the golf swing is one of the most difficult and demanding physical skills in the sports world. The ballistic action of a powerful golf drive places unusually high stress on the joint structures of the hips, back, shoulders, elbows and wrists. Although the old saying is "drive for show and putt for dough", be assured that the golf swing is serious business with significant injury potential.

So what can you do to reduce your risk of injury and increase your driving distance? Your best bet is to get in shape before getting onto the golf course. Once you are well conditioned, be sure to obtain some professional consultation on your driving technique, as seemingly small imperfections in your swing mechanics can lead to

troublesome injuries over time.

Golfers, like everyone else, benefit from all four health-related categories of physical fitness. These are cardiovascular endurance, muscular strength, joint flexibility, and body composition. However, for improved golf performance, the priorities should be strength training, stretching exercises and improved body composition. Such a program requires just over 30 minutes a day, two or three days per week for excellent results in both physical fitness and performance power.

## Recommended Golf Conditioning Program

We can offer no better conditioning program than the one we used during our four years of golf studies. This included a basic strength training protocol with 15 exercises for the major muscle groups and six standard stretching exercises. The strength exercises, muscle groups and golf swing applications are as follows:

<b>Strength Exercises</b>	<b>Muscle Groups</b>	<b>Golf Swing Applications</b>
Leg Extension	Front Thighs	Driving Power Production
Leg Curl	Rear Thighs	Driving Power Production
Hip Adduction	Inner Thighs	Driving Power Production
Hip Abduction	Outer Thighs	Driving Power Production
Chest Cross	Chest	Swinging Action
Pullover	Upper Back	Swinging Action
Lateral Raise	Shoulders	Swinging Action
Biceps Curl	Front Arms	Club Control
Triceps Extension	Rear Arms	Club Control
Back Extension	Lower Back	Power Transfer (Legs to Torso)
Abdominal Curl	Front Midsection	Power Transfer (Legs to Torso)
Rotary Torso	Side Midsection	Power Transfer (Legs to Torso)
Neck Flexion	Front Neck	Head Stability
Neck Extension	Rear Neck	Head Stability
Wrist Movements	Forearms	Club-Grip

These 15 exercises address almost all of the muscles involved in the golf swing including those that produce driving power (leg groups), those that transfer power from the legs to the upper body (midsection and lower back groups), those that produce the swinging action (torso groups), those that provide club control (arm groups), those that provide club grip (wrist groups), and those that maintain head stability (neck groups).

Perform each exercise for just one set of 8 to 12 repetitions, which requires about one minute for completion. We utilized a movement speed of about six seconds per repetition to increase the exercise effectiveness and reduce the risk of injury. We also advocate full-range exercise movements to develop full-range strength and to enhance joint flexibility.

To further increase joint movement range we perform six stretching exercises for the muscles of the hips, midsection and shoulders. These are the front thigh stretch, rear thigh stretch, hip stretch, chest and midsection stretch, back and shoulder stretch, and arm and shoulder stretch. We move slowly into the stretched position and hold each stretch for approximately 30 seconds.

In our golf conditioning studies did not include endurance exercise, the participants improved their body composition by losing 10 pounds in eight weeks (four pounds more muscle and four pounds less fat). If they had performed some form of aerobic activity (walking, jogging, cycling, stepping, etc.) or incorporated some dietary modifications, they may have achieved even more fat loss.

cardiovascular conditioning has little relation to driving the golf ball or driving the golf cart, golfers who have higher aerobic fitness seem to resist fatigue better, which may be advantageous on the back nine or for consecutive rounds. If you would like to perform some endurance exercise, I suggest 20 minutes of interval training, three days per week. For example, using a stationary cycle you warm-up with four minutes of easy cycling, then do four minutes of high effort cycling, followed by four minutes of lower effort cycling, back to four minutes of higher effort cycling, and cool-down with four minutes of easy cycling. This interesting and well-tolerated aerobic workout will not prepare you for the Boston Marathon, but it should certainly improve your cardiovascular fitness and golf endurance.

Remember that the relatively small amount of time you put into your golf-conditioning program could save you weeks of time by preventing a variety of injuries common to golfers. Just be sure to exercise reasonably and regularly, and seek professional assistance if you have little experience in physical training.

## Stretching A Point: Always Warm-Up

Wayne L. Westcott, Ph.D.

As you all heard how important it is to warm-up before we begin physical activity, and how equally essential it is to cool-down gradually after completing an exercise session. Have you ever wondered why you should sandwich every workout with a few minutes of warming-up and a few minutes of cooling-down?

One reason for warming-up is to prepare your body for more physically demanding activity that is to follow. A gradual warm-up begins an adaptation process in both your cardiovascular and musculoskeletal systems, which reduces the risk of premature physical overload and traumatic injuries. For example, as you warm-up your heart rate and systolic blood pressure gradually increase to accommodate the demands of higher activity levels. In addition, your blood vessels and previously closed capillary levels are activated to enhance blood flow to the working muscles. As your body temperature increases, muscles, connective tissues and joint structures warm-up for more efficient function.

Therefore, the mental aspects associated with warming up should not be discounted. A standard pre-exercise warm-up routine puts you into the proper mindset for a productive workout. Without an appropriate warm-up routine, you may be reluctant to begin your training sessions at the right intensity for a safe and sustained workout. That is, you may start too slow and never seem to hit your desired stride.

Reasons for including a cool-down segment in your exercise session are even more compelling. Certainly, cooling down is a smooth transition period between your activity state and your resting state, in much the same way as the warm-up. More important, however, is the cool-down's effect on blood circulation and heart recovery. Consider that during your jogging or cycling sessions your heart is circulating large quantities of blood throughout your body, and especially to the large muscles of the legs that are doing most of the work. If you simply stop exercising, the heart keeps pumping blood to the legs, but the muscles are no longer moving in rhythmic patterns that facilitated blood return back to the heart. As a result, blood tends to accumulate in the legs and an insufficient blood return causes the heart to work harder in an attempt to force more blood through the system.

A secondary outcome of blood pooling is a feeling of lightheadedness or even fainting due to inadequate blood-oxygen transport. Fortunately, by continuing to move after you cross the finish line you can maintain normal circulation and avoid potentially harmful consequences. Even slow walking provides the piston-like pumping action of your leg muscles that pushes blood through the one-way valves in your veins back to the heart.

Instead of suddenly stopping your exercise, slow down gradually and keep moving for at least five minutes after your workout period. Of course, a harder workout requires a longer cool-down, that is, it takes more time to transition back to rest after a fast 30-minute run than from a slow 30-minute walk.

Near the end of your cool-down, you may conclude with a few gentle and relaxing stretching exercises. It is generally recommended to perform your stretches when your body is fully warmed up and most flexible. This makes the cool-down an ideal place for your stretching routines. It also assists in leaving your workout feeling invigorated rather than exhausted.

### Established Warm-Up and Cool-Down Routines

There is no specific formula for determining the optimum warm-up and cool-down protocols. Basically, this depends on a number of factors, including your age, physical ability, the type of exercise activity and the level of training intensity.

In other words, your warm-up and cool-down programs should be longer if you are older, less physically fit, or if you are working at a more challenging training level. For example, an older beginning exerciser may divide a 20-minute workout into seven minutes of warm-up activity, seven minutes of actual training, and seven minutes of cool-down activity. In comparison, a 30-minute walking workout may be safely sandwiched between a five-minute warm-up and a five-minute cool-down, whereas a 30-minute fast-paced stairclimbing session may require a seven minute warm-up and a 10 minute cool-down for best results.

A suggestion for an effective warm-up is to begin with some abdominal exercises such as trunk curls, and twisting trunk rotations to target the important midsection (core) muscles. These may be followed by some half-squats or chair squats that adduct and abduct the quadriceps, hamstrings and gluteal muscles of the hips and thighs. Next, perform a few standing exercises such as side bends and turns, shoulder rotations and gentle neck stretches. Then do at least a couple minutes of the workout activity (walking, cycling, stairclimbing, etc.) at a very slow pace, gradually progressing towards your desired training intensity.

After completing your workout, please, move immediately into your cool-down phase. Your first step is to continue the exercise for a few more minutes, while continuously slowing the pace to an almost effortless exertion level. When

art rate has returned within 20 beats of resting (typically 80 to 90 beats per minute), you may perform a few waist stretches followed by a few standing stretches. Finish with some seated stretches, such as the Figure A stretch, and some standing stretches, such as the Letter T stretch.

On warming up and cooling down add a little time to each training session, you will find that it is time well spent and that it enhances both your workout performance and your recovery ability. Warming-up and cooling-down may also be the difference between intermittent physical problems and injury-free exercise experiences.

# Using Lawn and Garden Tools Safely

**Wayne L. Westcott, Ph.D.**

When you begin to prepare your lawn and garden for the spring season, please consider some of the following suggestions to help you safely and successfully with your tools. Unfortunately, using hand tools and machines improperly can cause injury and can keep you from enjoying these purposeful outdoor activities.

**Raking with the rake.** After the stormy winter season, you probably have lots of sticks, twigs and leaves on your lawn. When raking these and dead grass into small piles, be sure to hold the rake with a firm but relaxed grip. Use lightweight rakes if you are prone to skin blisters. Try to pull the rake in a diagonal pattern past your side with relatively short strokes. Avoid reaching too far forwards or pulling too far backwards, as either of these exaggerated movements can stress your lower back. To gauge your raking range, periodically check your torso position. You should not notice a significant bend at the waist as you reach forward, or pull backwards, and your torso should remain essentially erect throughout each raking action. Change sides every few raking strokes to avoid overstressing the same muscle groups with repeated repetitive movements.

**Bagging debris.** Rather than moving all the debris to one large collection area, make many small deposits throughout the yard. Doing this keeps you from pulling too much material too far, which can be stressful to your arms, shoulders and back. Small piles facilitate gathering up the leaves and sticks in manageable movements. Just be sure to bend at the knees rather than at the waist when you bag the debris to avoid overloading your low back area.

**Weeding.** After your lawn is raked, you may find some crabgrass or dandelions that need to be removed. Using a hand trowel, you can easily dig-out these and other weeds without much difficulty. However, don't be tempted to bend over to reach the weeds. Excessive waist bending can adversely affect your lower back. Instead, take time to kneel on one knee which provides support and stability, and minimizes back-rounding as you pop out the offensive plants.

**Mowing.** One of the most important steps in your lawn work is likely to involve pushing a lime spreader or a lawnmower. Unless you have a hilly yard, your body should remain relatively straight as you propel the spreader or mower. Try not to lean forward or backward unless you are mowing on an inclined or declined surface. Pay special attention to turning the equipment. Avoid pivot-type turns without flinging your arms too far from your body. Also, avoid overstriding as this can be problematic for the hip and back areas. The key to enjoying each lawn-mowing session is unhurried movements, moderate strides and frequent turns.

**Grass collection.** If your lawnmower has a grass-collecting unit, be careful as you detach it, carry it and dump the contents. Remember to bend at the knees rather than at the waist, and to carry the collection unit close to your body. Do your best to dump the grass near the ground, and don't even think about holding the collection apparatus over a fence. The leverage factor involved with over-fence dumping can place excessive forces on your arms, shoulders and back, and this procedure is a bad part of your game plan.

**Trimming hedges or bushes.** When you trim hedges or bushes to trim, do so in short time segments with sufficient rest between successive cuttings. If you use manual or electric trimmers, holding the implement in front of your body is more tensive than you may think. To reduce stress on your arms, shoulders and back, make every effort to keep your upper arms close to your body. Try to trim at waist level rather than at shoulder level. This may require moving a step stool or a ladder, but it is a better alternative than back pain or shoulder injury.

**Trimming with a fly ball.** When you trim a fly ball, resist the temptation to use only one arm on the trimming device. Holding the trimmer with both hands reduces the resistance on all of the involved muscles and joint structures, as well as provides more stability for pivot-type turns. After a few minutes of trimming, set the device down and change your activity. For example, spend a few minutes raking and bagging the cuttings to give your trimming muscles a necessary rest. Alternating these activities will not make the job any longer, and may greatly reduce your injury risk.

**Hoing.** Hoing in the garden can also be problematic if you are not physically fit or use your tools improperly. Hoing is somewhat different from raking, but requires more muscle effort as you are moving relatively heavy piles of soil rather than relatively light piles of leaves. Like raking, keep your body as straight as possible and switch sides frequently. Use even shorter strokes when hoing, always keeping your upper arms fairly close to your body. Don't let roots or rocks frustrate you, and don't

o as it is always better to take a second hoeing session than to experience a musculoskeletal injury.

is tough on your body no matter how skillful you are at turning the soil upside down. My best advice is to do two shallow spades rather than one large/deep spade. I also suggest doing your spading work in small segments, restitively or alternating spading with less stressful garden activities. Make it a point to wear very strong, sturdy and heavy shoes whenever you spade the garden.

Use a rototiller, operate it as you would a lawnmower. In other words, keep your body upright without leaning forward to push or backwards to pull. Walk reasonably close to the tiller, and keep your upper arms relatively near you. If possible, adjust the handlebars so that your elbows are comfortably bent as you maneuver the machine.

One problem with rototillers is turning them around at the ends of your garden plot. Try to make your turns at a speed and with a small radius, always using the machine leverage/balance to your advantage. Always use the reverse gear rather than pulling the heavy apparatus backwards. Control is the key to safe and productive rototilling, and this is one area where fast movements are not recommended. Give yourself plenty of time to do the job, and if necessary, divide the garden into several rototilling segments.

Though tools are not typically used for planting seeds, I strongly suggest that you avoid bending over when you seed the garden. Instead, place one knee on the ground and place the other foot flat in front of you. Although this slows the seeding process, it allows you to work for longer periods of time with much less stress on your lower back. Alternate every few minutes, and periodically stand up and stretch.

As a general recommendation, lawn and gardening activities are always more effective, efficient and enjoyable when you are in good physical condition. Start today with a few basic exercises (half squats for your legs, trunk curls for your midsection, and arm curls for your upper body), some simple stretches (figure four stretch, letter T stretch), and regular aerobic activity (such as cycling, walking) to prepare yourself for a great outdoor season.

## **New Reasons to Exercise: Better Posture and Greater Height**

**Wayne L. Westcott, Ph.D.**

Over the past several decades a rather depressing health statistic has remained essentially the same, namely, that four out of five Americans experience lower back pain and associated effects. While we are not aware of the corresponding prevalence of neck or back pain, it is undoubtedly too high and certainly, based on our observations, a prominent physical problem that is becoming increasingly more common in adults of all ages.

Because, therefore, there are many probable causes for discomfort in the lower back, upper back and neck areas, and it is unlikely that a simple or single solution will successfully remediate or prevent all such problems. Nevertheless, two factors are commonly identified as major contributors to reduced integrity of the spinal column which can clearly lead to pain and related problems. These increasingly common factors, both associated with sedentary lifestyles, are muscle weakness and poor posture. Unfortunately, each of these problems adversely affects the other, as muscle weakness can result from poor posture and poor posture can result from muscle weakness.

Years of research from the University of Florida Medical School has demonstrated that regular strength exercise of the lower back spine muscles can significantly reduce or eliminate low back pain in a large percentage of patients. It is therefore reasonable to assume that strengthening the muscles of the upper back and neck may likewise benefit people who suffer from discomfort in these areas of the body. While there is less research quantifying the relationship between posture and pain, it is likely that better posture will produce a corresponding reduction in spine-related discomfort.

Dr. Scott Worobey MSPT, has a research interest in the forward head-rounded shoulder posture that has become a common problem often observed in physical therapy evaluations. According to clinicians, this faulty posture frequently leads to shoulder and back discomfort. For example, rounded shoulders may cause mechanical malfunction of the shoulder, resulting in tendon impingement, bursitis, and rotator cuff injury. It is also possible that this posture causes increased fatigue due to the greater muscle tension and activation necessary for support purposes. Rounded shoulders are also a kyphotic posture which puts additional pressure on the thoracic spine, resulting in reduced bone density, microfractures, and loss of height. Add to these concerns the problems associated with forward head posture. The forward head posture causes the weight of the head (approximately 15-pounds) to pull at the cervical spine, which may lead to muscle spasms, spasm and chronic tension headaches.

## arch Study

igned a study to determine whether a fitness program including aerobic activity, strength training, stretching exercise, and postural awareness would improve forward head-rounded shoulder posture and increase standing height.

our men and women (average age 45 years) completed the 10-week posture intervention program, which was conducted twice a week in six-person exercise classes with two instructors per class. Each class was one-hour in length and included about 20 minutes of aerobic activity (stationary cycling and treadmill walking), 20 minutes of strength training (using gym machines), and 10 stretching exercises. The participants performed one set of 8 to 12 repetitions of the following machine exercises for the major muscle groups. Each strength exercise was followed by a 20-second static stretch of the muscle group just worked. For example, the leg extension exercise was followed by a 20-second quadriceps stretch and the leg curl exercise was followed by a 20-second hamstrings stretch.

<b>Strength Exercise/Machine</b>	<b>Major Muscles</b>	<b>At-Machine Stretch</b>
Leg Extension	Quadriceps	Quadriceps Stretch
Leg Curl	Hamstrings	Hamstrings Stretch
Chest Cross/Chest Press	Pectoralis Major, Triceps	Chest Stretch
Pullover	Latissimus Dorsi, Teres Major	Upper Back Stretch
Lateral Raise	Deltoids	Shoulder Stretch
Biceps Curl	Biceps	Biceps Stretch
Triceps Extension	Triceps	Triceps Stretch
Low Back Extension	Erector Spinae	Lower Back Stretch
Abdominal Curl	Rectus Abdominis	Abdominal Stretch
Neck Flexion/Extension	Neck Flexors/Extensors	Neck Stretch

In addition to the basic program of endurance, strength and flexibility exercise, all of the program participants received relevant information, verbal cues and positive reinforcement on proper posture. Two specific stretches for chest and shoulder muscles were presented by the lead class instructor who holds a masters degree in physical therapy.

## Assessment Procedures

All of the study subjects were assessed before and after the 10-week training period for changes in body composition (lean body weight and fat weight), as well as for forward head position and standing height. The participants experienced a 5-percent improvement in body composition, resulting from a 2 1/2-pound gain in lean (muscle) weight and a 3-pound loss of fat weight. Their forward head position improved by almost 1/2 inch, and their standing height increased by almost 1/4 inch.

## Practical Application

Based on these findings, the 10-week program of basic endurance, strength and flexibility exercise is effective for increasing muscle and reducing fat. When combined with postural awareness training and two specific stretches for chest and shoulder muscles, the basic exercise program is also beneficial for improving functional posture, decreasing forward head distance and increasing standing height. Written questionnaire surveys completed by the participants prior to the final assessment revealed an overwhelmingly positive response to the training program. Their comments included noticeable improvements in personal posture, reduced neck and shoulder area discomfort, and less low back pain. Essentially all of the respondents committed to continued postural awareness and a regular exercise regimen, therefore indicating that they perceived the program components to be both physically important and personally beneficial. Although the long-term outcomes of the posture intervention program are not known, the short-term effects are clearly encouraging.

# A Positive Approach to the Aging Process

Wayne L. Westcott, Ph.D.

Most of us speak negatively about getting older, but we usually agree that aging is better than the other alternative. Although the numbers can be discouraging, it is important to realize that our chronological age and our functional age can be very different. Working in the fitness profession for more than 30 years, and conducting thousands of fitness

uations, I have come to the conclusion that one's functional ability may be only marginally related to one's age. erally speaking, I have tested 40 year olds who function more like 20 year olds, and others who function more 60 year olds. That is, there seems to be a 20-year plus or minus effect associated with your level of physical

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 ple sometimes ask me if this exercise factor holds true for older individuals. My answer is an emphatic yes. For mple, there are 60 year olds who have the physical capacity of 40 year olds, and there are others whose physic:ormance resembles that of 80 year olds.

what about people in their 80's and 90's? Certainly we don't expect such elderly individuals to exercise or remai sically active, do we? Perhaps we don't, but we definitely should. Consider the examples of my father, Warren tcott, and my friend, George Conway, both of whom are in their 90's.

father began Nautilus strength training eight years ago, when he was 82 years of age. At that time he was gerously thin, weighing only 124 pounds at a height of 5'11".

esponded well to the progressive resistance exercise, gradually increasing both his muscle strength and body ght. At age 90, he presently weighs 146 pounds having added about 20 pounds of functional tissue (muscle and e), and about two pounds of fat. His Nautilus exercise weightloads are so high that many people prefer not to w him down the line of machines. For example, he completes leg presses with 190 pounds, chest-triceps presse r 160 pounds, and seated rows with 130 pounds. This overall muscular strength makes his daily tasks and tyle activities much easier to perform, and provides a high level of personal satisfaction. For example, he can y his daily 20 minute walks or stationary cycling sessions, and he can manage a large house with little difficulty. rge Conway started exercising when he was 80 years of age, over 17 years ago. As George states, "Exercise s life to your years and years to your life."

my father, George began his fitness program with Nautilus strength training. However, he also started walking, ctivity in which he rapidly improved, and has excelled at various racewalking distances over the past several rs. George has indeed become a competitive senior athlete, as well as a physical fitness enthusiast. Consider h ld record racewalking performances, and you will see that he is every bit as deserving of his *All-American* rating ounge track athletes.

Age 86	3000 Meter Walk	24:40
Age 86	10000 Meter Walk	83:56
Age 87	10000 Meter Walk	82:44
Age 88	10000 Meter Walk	83:51
Age 88	One Hour Walk	6967 Meters
Age 90	10000 Meter Walk	89:55
Age 90	One Hour Walk	6797 Meters

in addition to his athletic accomplishments, George has been an inspiration to countless older adults in the state of Massachusetts. He is frequently featured as a speaker at senior centers and community events. Fortunately, eorge tells it like it is...if you don't want to lose it then you have to use it!

hile the above statement applies to almost every aspect of the aging process, it aptly describes our usculoskeletal system. Unless we do regular strength exercise, we lose over five pounds of muscle and gnificant amounts of bone mass every decade of adult life. This debilitating and insidious lifestyle response ults in a progressively slower metabolism, and is associated with numerous degenerative problems and eases such as low back pain, obesity, heart disease, adult diabetes, and certain types of cancer.

he good news is that muscle loss can be changed to muscle gain by following Warren and George's exercise mples. Even better, you don't have to wait until your 80's to experience the benefits of regular strength aining.

or example, several studies with subjects over age 50 have shown more than three pounds of new muscle llowing three months of strength exercise. Research has also revealed associated benefits, including increased etabolic rate, more bone mass, lower blood pressure, better blood lipid profiles, greater glucose utilization, mproved digestion/elimination, reduced low back pain, decreased arthritic discomfort and enhanced self- onfidence.

rtunately, a sensible and successful strength training program is not an energy sapping or time-consuming deal. Basically, you need to exercise only 20 to 30 minutes, two or three days a week to develop relatively high vels of musculoskeletal fitness. The basic training protocol is one set of a dozen Nautilus exercises, using a sistance that you can perform properly for 8 to 12 repetitions. It doesn't take a long time or excessive effort,

At the results are nothing short of remarkable. Of course, if you prefer to train at home, you can achieve similar benefits by exercising with dumbbells or other types of resistance apparatus.

# Body Composition

## The Most Important Fitness Component

Wayne L. Westcott, Ph.D.

When you think of physical fitness, perhaps your mind reflects back on the fitness tests you performed in elementary and secondary school. If so, you may recall a running test to assess your aerobic capacity, a pull-up or push-up test to measure your muscle strength, a sit-up or squat jump test to estimate your muscle endurance and a sit and reach test to determine your joint flexibility. Although aerobic capacity, muscle strength, muscle endurance and joint flexibility are important components of overall physical fitness, they pale in comparison to the role of body composition.

Body composition is not something you do, like 10 push-ups or 50 sit-ups. Body composition is something you are, but it has a lot to do with what you do. Basically, your body is composed of two types of tissues known as fat weight and lean weight. Fat weight is the fat stored in fat cells throughout the body. Lean weight includes all other tissues, such as organs, bones, blood, skin, and muscle. Approximately half of our lean weight is muscle. Muscle, along with fat, is most likely to change during our adult years.

As we age, we typically lose about five pounds of muscle and add about 15 pounds of fat every decade of life. While this represents a 10-pound change in bodyweight, it is actually a 20-pound change in body composition. The muscle loss adversely affects our physical function and personal appearance. Perhaps more importantly, it results in a reduced metabolic rate that facilitates fat gain. This is because every pound of muscle loss reduces our resting metabolism by at least 35 calories per day. Assuming we eat approximately the same amount of food, calories that were previously used for muscle maintenance are now placed into fat storage, resulting in creeping obesity.

Excess body fat is a major health risk associated with many medical problems including low back pain, type II diabetes, various forms of cancer, high blood pressure, and heart disease. Most people understand this, and half of all Americans are presently on low calorie diet plans to reduce unwanted fat. Unfortunately, dieting alone has a dismal record of success, with over 90 percent of dieters regaining all of this fat weight within one year. Even worse, about one-quarter of the weight lost through dieting is muscle, further reducing this vital tissue and slowing metabolic rate. No wonder a return to normal and necessary eating behavior results in fat regain.

Because the deterioration in body composition is a two-fold problem (too little muscle and too much fat), restoration of desirable body composition requires a dual solution (muscle replacement and fat reduction). Obviously, regular exercise is essential for replacing muscle tissue. However, only strength training is effective for this purpose. Endurance exercise is ideal for improving cardiovascular fitness, but it neither builds muscle nor prevents the loss of muscle during our adult years.

The first step one in attaining a more desirable body composition is a basic program of strength exercise. Our research reveals excellent results from two or three weekly training sessions of 25 minutes each. This is all the time it takes to complete one set of 12 different exercises that address all of your major muscle groups. Each set is performed at a slow movement speed through a full movement range with a weightload that permits between eight and 12 repetitions. When you can do 12 good repetitions the resistance should be increased by one to five pounds.

Combining this simple strength training protocol with 25 minutes of endurance exercise (treadmill walking, stationary cycling, etc.) is an excellent approach for enhancing body composition. In one of our studies, almost 100 men and women performed this combination exercise program for a period of eight weeks. On average the participants added three pounds of muscle and lost nine pounds of fat, for a six-pound reduction in bodyweight and a 12-pound improvement in body composition. These beneficial changes were accomplished without strict dietary intervention, but everyone received heart-healthy eating guidelines and sample menu plans.

In all probability, the three-pronged approach is best for permanent weight management and optimal body composition. The most important component is strength training (two 25-minute sessions per week are sufficient) to replace muscle, raise resting metabolic rate, and improve physical function. The second component is endurance exercise (three 25-minute sessions per week are recommended) to reduce fat stores and increase cardiovascular fitness. The third component is a commitment to better eating habits and sound nutrition, which

pically requires more food rather than less. This is because the recommended foods (grains, vegetables, fruits, lean meats, and low-fat dairy products) generally have fewer calories per serving than the less-nutritious foods that they replace (popular fast foods, fried foods, fat foods, and snack foods).

The results of our summer research study support the three-piece plan for a variety of personal benefits besides better body composition. In addition to adding muscle and losing fat, the 87 participants in our *Keeping Fit Program* achieved significant increases in their muscle strength, performance power, and static balance, and sustained significant decreases in their waist girth and hip girth. They also realized a one-third inch increase in height due to improved posture resulting from stronger lower back, upper back, and neck muscles.