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Adult Exercise Info

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12 Reasons Every Adult Should Strength Train

Changing Adult Activity Patterns

Wayne L. Westcott, Ph.D.

With all the research data on the health and fitness benefits of regular physical activity, why do most American adults remain sedentary? Primarily because it is difficult to change adult lifestyle patterns. If this were not the case, the recent Surgeon General's Report On Physical Activity and Health would have called for more than 30 minutes of movement, most days of the week as a fitness recommendation.

The 1990s have produced a wealth of information on the importance of strength training for older adults (*Biomarkers, Living Longer Stronger, Strong Women Stay Young, Lifefit, Strength Training Past 50*), but we see very few fitness facilities with a significant percentage of senior exercisers. What is the problem? In our opinion, it is partly lack of education and partly lack of motivation, partly the challenge of change and partly the fear of failure.

Fortunately, these are not insurmountable barriers, as we have discovered over the past few years of adult emphasis programming. During that time we have seen our fitness center participants more than double in number, and the median age move towards 50 years. What follows is the basic approach we have taken for changing adult activity patterns.

Education

We use a variety of media to present exercise information to our surrounding communities, including television, radio and lectures. However, our most effective method of communication has been the newspaper. In our weekly *Keeping Fit* newspaper column we periodically present the benefits and principles of sensible strength and endurance exercise, which prompts hundreds of sedentary adults to attend our quarterly fitness orientation sessions.

Each season of the year, just prior to our new *Keeping Fit* session, we hold an orientation session for adults who want to start a supervised exercise program. The evening event features a slide presentation about our *Keeping Fit* program, followed by a question and answer period. Our instructors then give the attendees a tour of the exercise facilities and an opportunity to join the upcoming *Keeping Fit* program.

Motivation

We have found the best exercise motivators to be careful instruction and close supervision. To provide an attentive training environment we hold our *Keeping Fit* classes in a separate exercise room. We limit each class to six participants with two instructors, for a favorable student-teacher ratio.

Another means for motivating our new members are large attendance sheets posted in the exercise room. Self-recording is an excellent way to encourage exercise compliance, and most of the participants check-off their attendance as soon as they enter the training room.

Part of new member motivation is overcoming the challenge of change. Realizing that almost all of the program participants have been sedentary for many years, our instructors begin with a few basic Nautilus machines and progress gradually as the clients gain training competence and confidence. We have found that a concise explanation and precise demonstration of each exercise is the key to making new clients feel comfortable about strength training. That is, when you make strength exercise simple to understand and perform, most beginners are willing to try it themselves.

Another pressing concern for the inactive adult is the fear of failure. New exercisers do not want to appear awkward, be regarded as weaklings, or fall short of the goals you suggest for them. Consequently, our instructors are careful to begin new clients at the appropriate training level, provide plenty of positive reinforcement, and give specific feedback on personal progress.

Part of the exercise motivation are fitness assessments performed before and after the eight-week training program. However, experience has convinced us not to go overboard in this area. We typically do just two physical assessments, body composition and blood pressure, that are most meaningful to the participants. These assessments are usually completed within 10 minutes which makes the evaluation process easy on the participants. We generally do not formally test muscle strength and cardiovascular endurance, as improvements in these parameters are obvious to everyone week by week throughout the program.

Summary

We average over 400 new *Keeping Fit* participants each year, with approximately 80 percent of these joining the YMCA after completion of the program. As a result, a large percentage of our members are previously sedentary, middle-aged adults who have permanently changed their activity patterns. This has not happened spontaneously, but through a planned program designed specifically for these formerly inactive individuals. The key motivational components have been the small classes, close supervision, and private exercise room, which reduce the participants' fear of failure and facilitate gradual change to a physically active lifestyle. In addition to enhancing the health and fitness of our adult community, the *Keeping Fit* program increases our YMCA membership base and provides a solid foundation for our entire fitness operation.

For more information on implementing a similar *Keeping Fit* program in your facility (including articles on training benefits, exercise guidelines, research results, facility management, teaching techniques, and program flyers), please send your request and business card to: Rita Nordhuus, Nautilus International, 709 Powerhouse Rd., Independence, VA 24348.

12 Reasons Every Adult Should Strength Train

By Wayne L. Westcott, Ph.D.

During the past few years, more and more studies have shown that sensible strength training produces many health and fitness benefits. Key researchers have provided a wealth of data on the positive physiological responses to basic programs of strength exercise. Consider these 12 reasons

to strength train:

1. *Avoid Muscle Loss*

Adults who do not strength train lose between 5 and 7 pounds of muscle every decade (Forbes 1976, Evans and Rosenberg 1992). Although endurance exercise improves our cardiovascular fitness, it does not prevent the loss of muscle tissue. Only strength exercise maintains our muscle mass and strength throughout our mid-life years.

2. *Avoid Metabolic Rate Reduction*

Because muscle is very active tissue, muscle loss is accompanied by a reduction in our resting metabolism. Information from Keyes et al. (1973) and Evans and Rosenberg (1992) indicates that the average adult experiences a 2 to 5 percent reduction in metabolic rate every decade of life. Because regular strength exercise prevents muscle loss, it also prevents the accompanying decrease in resting metabolic rate.

3. *Increase Muscle Mass*

Because most adults do not perform strength exercise, they need to first replace the muscle tissue that has been lost through inactivity. Fortunately, research (Westcott 1995) shows that a standard strength training program can increase muscle mass by about 3 pounds over an eight-week training period. This is the typical training response for men and women who do 25 minutes of strength exercise, three days per week.

4. *Increase Metabolic Rate*

Research reveals that adding 3 pounds of muscle increases our resting metabolic rate by 7 percent, and our daily calorie requirements by 15 percent (Campbell et al. 1994). At rest, a pound of muscle requires 35 calories per day for tissue maintenance, and during exercise muscle energy utilization increases dramatically. Adults who replace muscle through sensible strength exercise use more calories all day long, thereby reducing the likelihood of fat accumulation.

5. *Reduce Body Fat*

Campbell and his co-workers (1994) found that strength exercise produced 4 pounds of fat loss after three months of training, even though the subjects were eating 15 percent more calories per day. That is, a basic strength training program resulted in 3 pounds more muscle, 4 pounds less fat, and 370 more calories per day food intake.

6. *Increase Bone Mineral Density*

The effects of progressive resistance exercise are similar for muscle tissue and bone tissue. The same training stimulus that increases muscle myoproteins also increases bone collagen proteins and mineral content. Menkes (1993) has demonstrated significant increases in the bone mineral density of the upper femur after four months of strength exercise.

7. *Improve Glucose Metabolism*

Hurley (1994) has reported a 23 percent increase in glucose uptake after four months of strength training. Because poor glucose metabolism is associated with adult onset diabetes, improved glucose metabolism is an important benefit of regular strength exercise.

8. *Increase Gastrointestinal Transit Time*

A study by Koffler (1992) showed a 56 percent increase in gastrointestinal transit (transit time is faster) after three months of strength training. This is significant due to the fact that delayed gastrointestinal transit time is related to a higher risk of colon cancer.

9. *Reduce Resting Blood Pressure*

Strength training alone has been shown to reduce resting blood pressure significantly (Harris and Holly 1987). Our study (Westcott 1995) has revealed that combining strength and aerobic exercise is an even more effective means of improving blood pressure readings. After two months of combined exercise, our program participants dropped their systolic blood pressure by 5 mm Hg and their diastolic blood pressure by 3 mm Hg.

10. *Improve Blood Lipid Levels*

Although the effect of strength training on blood lipid levels needs further research, at least two studies (Stone et al. 1982, Hurley et al. 1988) have revealed improved blood lipid profiles after several weeks of strength exercise. It is important to note that improvements in blood lipid levels are similar for both endurance and strength exercise (Hurley 1994).

11. *Reduce Low Back Pain*

Years of research on strength training and back pain conducted at the University of Florida Medical School have shown that strong low-back muscles are less likely to be injured than weaker low-back muscles. A recent study by Risch (1993) found that low-back patients had significantly less back pain after 10 weeks of specific (full-range) strength exercise for the lumbar spine muscles. Because 80 percent of Americans experience low-back problems, it is advisable for all adults to strengthen their low-back muscles properly.

12. *Reduce Arthritic Pain*

According to a recent edition of the Tufts University Diet and Nutrition Letter (1994), sensible strength training eases the pain of osteoarthritis and rheumatoid arthritis. This is good news, because most men and women who suffer from arthritis pain need strength exercise to develop stronger muscles, bones, and connective tissue.

There are 12 physiological reasons to perform regular strength exercise. On a more basic level, it is important to understand that proper strength training may help us to look better, feel better, and function better. Remember that our skeletal muscles serve as the engine, chassis, and shock absorbers of our bodies. Consequently, strength training is an effective means of increasing our physical capacity, improving our athletic performance, reducing our injury risk, and improving our self-confidence.

As Young As You Feel

By Wayne L. Westcott, Ph.D., & Jane Guy, M.Ed.

During the past several years, many studies have highlighted the health value of strength training for aging adults. Research at the University of Maryland has shown that strength training is effective for improving

glucose metabolism, increasing bone mineral density, and speeding up gastrointestinal transit. Studies at Tufts University have demonstrated that strength exercise adds lean tissue, increases resting metabolism, and reduces arthritic discomfort. Extensive work at the University of Florida has shown that strength training increases low back strength and alleviates low back pain.

While all of these health and performance factors are important, perhaps the most compelling concerns for most seniors are the three “Bs”—body weight, blood pressure, and body composition. Most senior men and women are concerned about getting soft, gaining weight, and elevating their blood pressure. They have already discovered that dieting doesn't produce permanent weight loss and that walking isn't always effective for firming muscles. Quite true. Unfortunately, many seniors are afraid to try strength training, because they've heard that it can increase both their body weight and their blood pressure. Untrue.

Several small-scale studies have shown that strength exercise is effective for decreasing body weight, increasing lean weight, and reducing resting blood pressure. In addition, strength training results in a higher resting metabolic rate and greater daily energy utilization.

But what specific changes can seniors expect from a basic program of strength exercise? We recently analyzed data on 1,132 men and women who completed the South Shore YMCA basic fitness program. All of the participants performed 25 minutes of strength exercise and 25 minutes of endurance exercise, two or three days per week for a period of eight weeks.

The strength-training program included the following Nautilus exercises: leg extension, leg curl, leg press, chest cross, chest press, super pullover, lateral raise, biceps curl, triceps extension, low back, abdominal curl, neck flexion, and neck extension. Each exercise was performed for one set of eight to 12 repetitions, at a slow movement speed (2 seconds lifting and 4 seconds lowering) and through a full range of motion. Resistance was increased by approximately five percent when 12 repetitions were completed.

The endurance-training program involved walking on a treadmill and stationary cycling.

Participants exercised about 70 to 75 percent of their maximum heart rate, and progressively increased their training time to 25 minutes of continuous aerobic activity.

The basic fitness program was offered in a separate and carefully supervised exercise room.

Classes were held almost every hour throughout the day, and typically had six participants with two instructors. The class members were assessed for body weight, body composition, fat weight, lean weight, systolic blood pressure, and diastolic blood pressure before and after the two-month training period.

Weight and Body Composition

The 1,132 basic fitness program participants included 238 young adults (21 to 40 years), 553 middle-aged adults (41 to 60 years), and 341 senior adults (61 to 80 years). As shown in Table 1, all three age groups started the program with similar body weights (172.7 to 179.9 lb.) and percent fat readings (25.6 to 27.2 percent). The body weight and body composition changes were comparable for all age groups.

As presented in Table 1, the 21-to-40 year-olds lowered their body weight by 2.6 pounds and their percent fat by 2.3 percent. The 41-to-60-year-olds decreased their body weight by 2.0 pounds and their percent fat by 2.1 percent. The 61-to-80-year-olds reduced their body weight by 1.7 pounds, and their percent fat by 2.0 percent.

Changes in fat weight and lean weight were also similar for the three age groups. The 21-to-40-year-olds lost 4.9 pounds of fat weight and added 2.3 pounds of lean weight.

The 41-to-60-year-olds lost 4.4 pounds of fat weight and added 2.3 pounds of lean weight. The 61-to-80-year-olds lost 4.1 pounds of fat weight and added 2.4 pounds of lean weight, for a 6.5 pound change in their body composition (see Table 1).

These findings indicate that senior men and women improve their body weight and body composition about as much as younger adults in response to a basic program of strength and

endurance exercise. It is interesting to note that the seniors developed lean muscle at the same rate as the other participants. Replacing muscle is essential for seniors because sedentary individuals lose over 5 pounds of lean tissue during every decade of adult life. By adding 2.4 pounds of muscle, the seniors in this study reversed almost five years of the aging process after just two months of strength training.

Blood Pressure Changes

All three groups began the basic fitness program with similar diastolic blood pressure readings (76.1 mm Hg to 80.1 mm Hg). However, the average systolic blood pressure for the 61-to-80-year-olds was considerably higher (143.1 mm Hg) than for the 41-to-60-year-olds (127.9 mm Hg) and the 21-to-40-year-olds (121.2 mm Hg).

As presented in Table 2, all three age groups lowered their resting blood pressure as a result of the eight-week exercise program. The seniors, however, experienced the greatest improvement, with a 3.7 mm Hg decrease in diastolic blood pressure and a 6.2 mm Hg reduction in systolic blood pressure.

The change in systolic blood pressure was particularly important to the senior participants because they began the study above the hypertensive level (140 mm Hg), but ended within the normal range.

Discussion of Findings

The results of this relatively large research study should be encouraging news for senior men and women. Consider the following key findings for the 341 older adults who completed the eight-week basic fitness program.

1. Seniors can safely participate in a well-designed and carefully supervised program of strength exercise. Of course, all participants should have their physician’s approval before beginning an exercise program.
2. Seniors can improve their body composition. The seniors in this exercise program reduced their percent fat by 2.0 percent after just two months of training.
3. Seniors can decrease their fat weight. The senior subjects lost more than 4 pounds of fat weight during the eight-week training period.
4. Seniors can increase their lean weight. The seniors in this study added 2.4 pounds of lean weight after two months of training.
5. Seniors can reduce their resting blood pressure. Following eight weeks of regular exercise, the senior subjects experienced a 3.7 mm Hg drop in their diastolic blood pressure and a 6.2 mm Hg drop in their systolic blood pressure.
6. Seniors can develop physically active lifestyles, even after years of sedentary behavior. Over 90 percent of the senior program participants continued to exercise after the completion of the study.

In summary, seniors have much to gain from regular strength training, particularly as part of a supervised exercise program. The senior men and women in this study reported looking, feeling, and functioning better, which is consistent with their recorded improvements in body weight, body composition, and resting blood pressure. It appears that an hour of exercise two or three times a week is one of the best investments seniors can make for their health and fitness.

Table 1

Changes in body weight and body composition for young, middle-aged and older program participants (N=1132).

*Statistically significant change (p<.01).

Age	Body Wt.	Body	Body Wt.	Body	Body Wt.	Body Wt.	Fat Wt.	Fat Wt.	Fat Wt.	Lean	Lean Wt.	Lean
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	Pre	Wt. Post	Change	Fat Pre (lb.)	Post (lb.)	Change (lb.)	Pre (%) (lb.)	Post (%) (lb.)	Change (%) (lb.)	Wt. Pre (lb.)	Post (lb.)	Wt. Change (lb.)
21-40 years (N=238)	176.5	173.9	-2.6*	27.2	24.9	-2.3*	49.1	44.2	-4.9*	127.4	129.7	+2.3*
41-60 years (N=553)	179.9	177.9	-2.0*	27.0	24.9	-2.1*	48.9	44.5	-4.4*	130.8	133.1	+2.3*
61-80 years (N=341)	172.7	171.0	-1.7*	25.6	23.6	-2.0*	44.7	40.6	-4.1*	128.0	130.4	+2.4*

Table 2

Changes in resting blood pressure for the young, middle-aged, and older program participants (N=785).

* Statistically significant change ($p < .01$).

Age	Systolic BP Pre (mm Hg)	Systolic BP Post (mm Hg)	Systolic BP Change (mm Hg)	Diastolic Pre (mm Hg)	Diastolic BP Post (mm Hg)	Diastolic BP Change
21 - 40 years (N=238)	121.2	116.7	-4.5*	76.1	72.9	-3.2*
41 - 60 years (N=553)	127.9	125.4	-2.5*	79.0	76.6	-2.4*
61 - 80 years (N=341)	143.1	136.9	-6.2*	80.1	76.4	-3.7*

Muscle Your Way To Weight Control

Wayne L. Westcott, Ph.D.

Standing in line at the super market, wedged between carts full of TV dinners, processed cheese and improved varieties of dish soap, waiting shoppers are bombarded with magazine-rack hype. Packaged in a variety of covers, one topic is guaranteed to grab our attention. "Diet Your Way to Happiness," "Lose Thirty Pounds by Summer," "Fabulous Thighs in Nine Minutes a Week," and "Diet of the Stars: Grapefruit and Garlic" -- they vie not only for our attention, but our dollars. Weight may be the great American obsession.

Not surprisingly, the reason most new exercisers give for launching an exercise routine is the desire to lose weight. Of course exercise is not the only way to reduce surplus body weight – an attempt to control food consumption is the more usual approach. Dieting is, after all, a big business. Americans reportedly spend some 30 billion dollars annually on weight loss products and programs.

It's a lot when you consider that losing fat is not hard to do – in principle. If we eat more calories

than we need for our daily energy expenditure then we store the excess calories as body fat. Conversely, if we eat fewer calories than we require for our daily energy expenditure, we use up some of our stored body fat to provide the necessary calories.

The Diet Strategy

The most popular and straightforward way to produce a negative calorie balance is to diet. Eating 500 fewer calories per day results in a pound of fat loss per week. Still, even though dieting works reasonably well as a weight loss strategy, it has serious drawbacks.

Here's one of them. When we reduce our calorie consumption most of the additional energy comes from stored fat, however, some of the additional energy comes from protein stores which results in muscle loss. Very low calorie diets (600-900 calories per day) may produce almost as much muscle loss as fat loss, which generates an additional problem. The reduction in muscle mass causes a corresponding decrease in metabolic rate, making further fat loss even more difficult.

Numerous follow-up studies of dieters reveal that lost weight is typically regained within several months after the diet is over. Intolerant of change, our bodies tend to counter adjust for any shift. For example, after a few nights of little sleep, we may end up sleeping several hours longer than normal. In the same way, after finishing a reduced calorie diet we may tend to overeat in a somewhat compensatory manner.

The Aerobic Strategy

A better approach to weight loss is via aerobic exercise, that is, exercise characterized by continuous large muscle activity such as running, cycling, and swimming. Take cycling, for example. Depending on the level of intensity, 500 calories could be consumed by a rider on a thirty to fifty minute ride.

In addition to burning calories, aerobic exercise stimulates a variety of beneficial cardiovascular adaptations: the heart becomes a stronger pump, the circulatory network becomes more efficient, and the blood becomes a better transporter.

Unlike dieting, which often leaves us feeling deprived, aerobic exercise adds something positive to our lives – physical activity. Unlike dieting, aerobic exercise need not be a short-term phenomenon. When integrated into our regular routine, aerobic exercise actually permits greater calorie consumption to meet the extra energy requirements.

The Strength-Building Strategy

Developing muscle is one of the best ways to control weight because it causes a double reducing effect. First, resistance training is vigorous physical activity: a significant number of calories are burned during exercise. Second, the additional muscle tissue produced by resistance training increases resting metabolism: calories are burned at a higher rate all day long – regardless of activity or inactivity.

For years people have associated resistance training with bodybuilding and weightlifting. Yet only a small percentage of men and women possess the genetic capacity to develop relatively large muscles; most of us do not. On the contrary, those of us who don't do regular resistance training should be concerned about losing too much muscle.

After we reach physical maturity in our early twenties, our bodies begin a long and gradual degenerative process. Our maximum heart rate decreases by about one beat per year throughout our lives. Another effect of the aging process is a reduction in muscle mass, which decreases by about one-half pound a year throughout our lives.

In the absence of regular resistance training, our muscle fibers simply become smaller and weaker at a slow but consistent rate. It's a phenomenon called disuse atrophy – essentially the same thing that occurs to an arm that has been immobilized in a cast. And aerobic exercise, even though it's extremely beneficial for our cardiovascular system, does not prevent disuse atrophy in muscles.

Only regular resistance training can maintain (or increase) muscle mass.

This has important weight loss and dieting implications because muscle mass directly affects metabolic rate. A very active tissue, muscle utilizes energy continually for protein synthesis, maintenance, and rebuilding processes. Even when we sleep our skeletal muscles are responsible for over 25 percent of our total energy expenditure. In fact, exercise physiologists believe that every pound of muscle we add or lose as an adult is worth about 350 calories per week.

Let's look at muscle mass loss as it might effect an ordinary man. At twenty-five, Chris had seventy-five pounds of skeletal muscle and required 2500 calories per day to maintain his weight. Over the next twenty years Chris did not perform regular resistance training and so relinquished ten pounds of muscle tissue as a result of disuse atrophy. Consequently at forty-five, Chris has only sixty-five pounds of skeletal muscle and needs only 2000 calories per day to maintain his weight. This is where Chris runs into trouble. Like most of us, he's not aware of the gradual decrease in muscle mass and metabolic rate, and eats more calories than he requires. The result? Chris experiences the slow steady increase in weight (fat) typical of middle age – a gradual accumulation known as creeping obesity.

Every pound of muscle we add or lose as an adult is worth about fifty calories per day. It doesn't have to be this way. If Chris had performed regular resistance training he could have maintained his previous muscle mass and metabolic function, considerably reducing the likelihood of unwanted weight gain.

Fortunately, the extra weight isn't cast in cement. It's possible to increase muscle mass and metabolic rate at any age through a sensible resistance training program.

Resistance training should be part of every weight loss program. Like aerobic exercise, it burns a considerable number of calories. More importantly, the increased muscle tissue requires a higher daily calorie burn making it easier to maintain your weight.

Dieting your way to happiness is as unlikely as the prospect of developing fabulous thighs in nine minutes a week. But developing stronger, firmer muscles is a realistic and workable exercise objective – one that can enhance your physical appearance, physical capacity, and ultimately your self-esteem.

Developing Muscle – Training Tips

So what do you need to know to start an effective resistance training program? First, rest assured that developing muscle needn't be either tedious or time-consuming. Set aside a regular time to exercise and then follow these basic guidelines to establish a sensible strength training program.

Selection: Address all major muscle groups – the quadriceps, hamstrings, lower back, abdominals, chest, upper back, shoulders, biceps and triceps. Each group can be trained individually using rotary exercises or in combination with other groups.

Speed: Slow movement reduces the risk of injury and enhances the training stimulus. Perform all resistance training in a carefully controlled manner.

Range: Muscles develop strength only in the exercised positions, so perform each exercise through a complete range of movement. Whenever possible, work from a position of full muscle extension to full muscle contraction.

Resistance: Always train at about 75 percent of maximum resistance. For most practical purposes, this corresponds to a resistance that can be performed at least eight times, but not more than twelve.

Sets: One, two, or three sets of exercises are equally effective for promoting strength development. Thus, personal preference (or time constraints) should be the determining factor with regards to the number of sets.

Progression: Resistance training must be progressive for continued muscle development. One highly effective approach to exercise progression is to use a given resistance until twelve repetitions can be completed, at which time you should increase resistance by approximately 5 percent.

Frequency: Muscles respond to the training stimulus during the recovery period following an exercise session. Most people require about forty-eight hours for the muscle rebuilding process to reach its peak. It is therefore not advisable to perform strength training more frequently than every other day.

Time Out

By Wayne L. Westcott, Ph.D.

Since Dr. Kenneth Cooper published his first *Aerobics* book in 1968, there has been a strong emphasis on physical fitness in the United States. We've experienced the running revolution of the 1970s, the aerobic dance movement of the '80s, and the strength-training boom of the '90s. Today, most people are aware that exercise is good for their health and is an effective means of preventive medicine.

It is therefore hard to understand why so few people regularly participate in an exercise program. According to the United States Public Health Service Centers for Disease Control, less than 10 percent of all Americans perform enough physical activity to attain any measurable fitness benefits. Most of those who do exercise consistently are walkers and joggers, leaving less than 5 percent of the general public who do strength training.

Strength-Training Misconceptions

There are numerous reasons why people avoid strength training – almost all of them myths. Some don't do it because they have heard that it may increase their blood pressure. Fortunately, this is not true. Although every adult should have his or her doctor's approval before starting a strength program, research reveals that properly performed strength exercise is similar to aerobic activity in terms of blood pressure response. That is, systolic pressure increases about 35 to 50 percent during exercise and returns quickly to resting levels after the session. More important, studies show that several weeks of strength training result in significant *reductions* in resting blood pressure. In a study I conducted and completed this year, 785 men and women who participated in a two-month program of strength and endurance exercise experienced an average 4 mm Hg decrease in systolic blood pressure and a mm Hg decrease in diastolic blood pressure. Sensible strength training, by itself or in combination with endurance exercise, has beneficial effects on resting blood pressure.

Fear of increasing body weight is another reason many adults avoid strength exercise. They mistakenly believe that weight training is synonymous with weight gain. It is true that strength training adds muscle, but this is actually the best way to lose fat. In fact, strength exercise has a threefold impact on fat reduction. First, it increases calorie use during each training session. Second, it increases calorie use for several hours following exercise due to the afterburn effect. Third, it increases calorie use all day by adding new muscle tissue. This is because every pound of new muscle uses about 35 calories each day just for tissue maintenance.

Of course, there are a variety of health-related reasons to do strength exercise. These include increased bone density, improved glucose metabolism, faster gastrointestinal transit, better blood lipid levels, reduced low back pain, and less arthritic discomfort.

Perhaps the most prevalent misunderstanding about strength training, particularly for those who would like to do it, is the time requirement. Many adults simply do not have time to do the multiple-set workouts they have been told are necessary for strength development. Fortunately,

time-efficient, single-set training can be just as productive as time-consuming multiple-set training when performed properly.

Basic and Brief Strength Exercise

During the past five years we have made careful pre-and post-training assessments of the 1,132 participants in our basic exercise program. These classes meet two or three days a week, one hour per session, with 25 minutes of strength exercise (11 Nautilus machines) and 25 minutes of aerobic activity (treadmill walking or stationary cycling).

The basic exercise program is two months long, which seems to be an ideal introductory period for previously sedentary adults. Over 90 percent of the participants rate their exercise class as highly satisfying, and about 80 percent join the YMCA after completing the program. In other words, the eight-week training period is sufficient to turn many inactive women and men into regular exercisers.

One reason for the positive lifestyle change is the excellent results attained by the program participants. As shown in Table 1, the 383 men lost 6.4 pounds of fat weight and gained 3.7 pounds of lean (muscle) weight for a 10-pound improvement in body composition, and the 749 women lost 3.4 pounds of fat weight and gained 1.7 pounds of lean weight for a 5-pound improvement in body composition. At the same time, the men reduced their average resting blood pressure by 4.5 mm Hg, and the women reduced their average resting blood pressure by 3.1 mm Hg.

Another finding is that the younger (ages 21-40), middle (41-60), and older (61-80) adults all attained similar improvements in body composition and resting blood pressure. Just as important, those who began the program in the poorest shape (with the highest percentage of body fat) experienced the most fat loss and lean (muscle) gain. That is, the adults who had the greatest fitness needs made the greatest improvements.

A practical reason for the success of the basic exercise program is the time-efficient training requirements. The participants did only 25 minutes of strength exercise and 25 minutes of aerobic activity each training session. Even more helpful for many time-pressured adults, only two workouts a week were necessary for excellent results. As shown in Figure 1, the two-day and three-day exercisers made similar improvements in body composition and resting blood pressure after eight weeks of training.

In addition to an effective and efficient training program, most beginning exercisers appreciate small classes and attentive instructors. We conduct all of our classes in a separate exercise area, with six members and two instructors per class. This closely supervised setting facilitates the training process and produces an 85 percent compliance rate among program participants. We have found that most adults can make time for a well-designed exercise program that takes a sensible and systematic approach to strength training. When the proper exercise principles are applied, excellent results can be achieved in just two 25-minute strength workouts per week.

The Strength-Training Program

The excellent results attained by the 1,132 research program participants required only 25 minutes of strength exercise, two or three days per week. The recommended strength-training protocol, based on the American College of Sports Medicine guidelines, is as follows:

Training Frequency

The standard recommendation of three nonconsecutive days per week is sound, and should be followed whenever possible. However, in a large training study I completed this year, the 416 subjects who strength-trained twice a week achieved almost 90 percent as much strength and muscle gain as the 716 subjects who did strength workouts three days a week. For people who have a hard time getting to the gym three times a week, it is good to know that two strength workouts per week produce nearly as much training benefit.

Training Sets

Two separate studies have found that one-set training and three-set training are equally effective for increasing upper-and lower-body strength. If training time is limited, it is good to know that single-set strength exercise is just as productive as multiple-set workouts.

Training Resistance

The exercise resistance should be high enough to produce a high rate of strength development and low enough to pose a low risk of injury. Empirical evidence clearly indicates that using 75 percent of maximum resistance meets both of these training criteria.

Training Repetitions

Research indicates that most people can complete eight to 12 controlled repetitions with 75 percent of their maximum resistance. Generally speaking, if you cannot perform at least eight repetitions the resistance may be too heavy, and if you can complete more than 12 repetitions the resistance may be too light. Working within the eight to 12 repetition range is recommended for safe and effective muscle development.

Training Progression

Every strength-training program needs a protocol for progressing to heavier workloads. While it is important to increase the exercise resistance periodically, it is equally important to do so gradually. A safe and productive progression is known as the 12 by 5 rule. That is, whenever you can complete 12 repetitions of an exercise in good form, you increase the resistance by 5 percent or less. The 12 by 5 procedure adds small but frequent weightload increments to progressively stress the muscular system.

Training Speed

Unfortunately, there is little consensus on the best training speed for strength development. Our research indicates, however, that slow movement may be preferred over fast movement, because a slow speed produces less momentum and more muscle tension. At six seconds each, eight to 12 repetitions require about 50 to 70 seconds of continuous muscle effort, which provides an excellent anaerobic stimulus for muscle building. We have obtained consistently good results training with six-second repetitions, taking two seconds for the harder lifting movement and four seconds for the easier lowering movements.

Training Range

Full-range muscle strength is best developed through full-range exercise movements. In other words, the training effect is greatest within the exercised portion of the joint movement range. Full-range strength reduces injury risk and increases performance potential. Try to perform each repetition through a full range of movement, but never to a position of discomfort.

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