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THEME: STRENGTH AND
CONDITIONING

The Basics of Starting and Progressing A Strength-training Program

by Courtenay Dunn-Lewis, M.A., and William Kraemer, Ph.D., FACSM



The importance of resistance training in healthy populations is frequently overlooked. Resistance training significantly increases the amount of muscle and elevates bone density in young adults. Both men and women can achieve a more sculpted and toned appearance through resistance training. For older adults, resistance training has a great ability to maintain independent living, help offset age-related bone loss, and maintain the strength and ability necessary to complete cardiovascular workouts for aerobic fitness. For all individuals, strength training makes activities of daily living easier and allows for a sense of pride, capability, confidence, and independence.

Three fundamental goals stand out for anyone starting a new strength training program:

1) learning the fundamental exercises correctly; 2) preventing injury during this particularly vulnerable time; and 3) designing a program that will encourage adherence. Beginners can practice resistance training about two to three times per week, allowing a day of rest between workouts. It is important to remember that initial muscle soreness is a reality when beginning resistance exercise. Rest and recovery is crucial. Also, proper warm-up is needed. This includes five to 10 minutes of light cardiovascular exercise followed by gentle, moving stretches.

In the beginning, almost any stimulation of muscle will lead to progress. It is not necessary to focus on the amount of weight, the number of repetitions, or the number of sets at first. These factors will be more pertinent later in your weight-training program; in the beginning, it is far more important to focus on learning and executing proper exercise technique. It is also important to remember that the muscles are not the only tissues being strengthened. Connective tissues — such as tendons and ligaments — are also slowly adapting to the strain of the new workout. While your muscles may feel stronger quickly after starting a training program, your tendons need a few weeks to adapt to the new muscle growth and strength. It is easy to injure yourself in the beginning weeks, especially if your focus is on increasing the weight instead of on learning proper technique.

It is a good idea to give yourself as many sets and repetitions as you need to learn technique — preferably with proper supervision. Also, refrain from getting overly fatigued, either mentally or physically, in this learning phase. No progress is sacrificed in the first few workouts when slightly lighter weights are used. The goal is not to attain perfection on the first day. You should stop an exercise if you become frustrated. A starting point for the first three weeks of workouts might be performing one set at a weight that would allow from 12 to 15 repetitions and progress over the next few weeks to two to three sets of 12 to 15 repetitions. Not all exercises need to be



Letter from the Editor

by Dixie Thompson, Ph.D., FACSM

Welcome to the Winter 2009-10 edition of the ACSM Fit Society® Page! When discussing “exercise,” many of us think of only walking, jogging, or other aerobic activities – but strength training is also important! Strength training builds healthy bones and muscles and completes a well-rounded physical activity program.

Try to incorporate strengthening exercises into your workout routine at least twice per week. Regardless of your age or fitness level, I am hopeful the articles in this issue of the Fit Society Page Newsletter will serve you well as you strive to lead a fit and healthy life.

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performed for the same number of sets in a workout. Heavier weights need longer rest periods (e.g., one or two minutes of rest for lighter weights; two or three minutes for moderate weights and more than three minutes for heavier weights). At the same time, carefully monitor for symptoms of fatigue. Again, rest period length between sets and exercises should be carefully monitored and adjusted to reduce adverse symptoms of fatigue (lightheadedness, dizziness, nausea).

It is important, especially as one gets older, not to go to complete failure in a set as this can cause joint compression and breath holding (which, if done repetitively, results in dizziness and nausea). It is important to know that dizziness and nausea are not signs of a good workout and demonstrate that the workout should be stopped (and for the next workout, the rest between sets should be increased, weight decreased, and/or sets

decreased to eliminate such symptoms). Fatigue within prescribed ranges is natural; pain is not, and represents a fundamental flaw in the exercise technique, an organic problem, or a medical issue that needs to be addressed upon immediate cessation of the workout. Doing “too much too soon” is also another temptation as one starts a resistance training program. This can lead to overreaching — where the body becomes fatigued, one’s motivation to workout is lowered, and the potential for injury is increased. Still, progression to a higher number of sets (with the lighter load during this beginning phase of training) will allow more practice of the exercise technique along with a development for the continued toleration to resistance exercise stress.

Exercise choice depends on the individual, previous injuries, and other factors like flexibility. Focusing on exercise technique and

major muscle group stimulation is the best approach. It is a good idea to start each training day with multiple-joint leg exercises (squats or lunges), because these exercises induce a greater hormone response than upper-body exercises. Also, these movements, when performed correctly, are safe for the majority of the population, can improve coordination, and can prevent injuries from everyday activities. Next, exercises that target the chest (i.e. bench press) and shoulders (shoulder raise) can be paired with exercises that target the back (seated rows and lateral pull-downs). Abdominal and lower-back exercises should focus on building stability and support; therefore, the bridge pose (top of a pushup) or the bird-dog exercise are excellent. A total body exercise program might include: proper leg presses or squats, deadlifts or leg curls, knee extensions (for those with healthy knees), bench press, horizontal rows, crunches (for those with a healthy lower back, ►

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Q&A

by Anthony Luke, M.D., FACSM

Q: I see rubber bands in the corner of the gym. What are they for and are they useful for building strength?

A: Resistance therapy bands are like large rubber bands. Often, the lighter color the band, the less resistance the band has. They are used commonly during physical therapy. They can be very useful as alternatives to lifting weights. Usually, they are used by fixing one end to an immovable object and using various techniques to work the desired muscle groups. By altering the length of the band, one can change the resistance quite easily. They are small and light, making them travel-friendly. Therapy bands are commonly used to train the rotator cuff muscles (in the shoulder) and the forearm muscles. With proper instruction, bands can be a quite valuable tool for strength-training, especially during warm-up exercises or when rehabilitating from an injury.

Q: When I lift weights, I get soreness specifically around my biceps muscles. Is there something wrong with my technique? Are there some exercises I should concentrate on to avoid this?

A: Biceps tendonitis is a very common problem for weightlifters even when they are not lifting heavy weights. Sometimes the problem lies in weightlifting techniques or in anatomical reasons. Other times, one is simply lifting too much or too often. Make sure to lift with good technique and proper posture. Make sure that you are incorporating rest days between workouts. Also, working on eccentric exercises is useful for weightlifters.

For example, when the biceps contracts, the elbow bends. When the elbow is extending, the biceps muscle is contracted but lengthening. The latter is essentially the contraction of the biceps. This is usually the type of motion that injures muscles and tendons. Working on exercises that contract the muscle while it is lengthening is a very important part of training that can protect muscles and tendons from injury.

Q: I would like to start a weight-training program, but I’ve never really lifted weights before. What suggestions do you have for a safe program?

A: Great question and I’m happy to say it’s never too late to start strengthening exercises. A recently updated Position Stand by the American College of Sports Medicine provides progressive strength training recommendations based on the latest medical evidence. Since you are new to weightlifting, you can be considered a novice lifter. The Position Stand recommends that novice or intermediate individuals lift loads corresponding to 60-70 percent of one’s maximal lifting capacity, referred to as

The Basics (continued from page 2)

and always balanced with lower-back exercise), lateral pull-downs, shoulder presses, arm curls, triceps extensions, and calf raises. Essentially, one should use eight to 10 large muscle group exercises that activate muscle tissue throughout the body. For beginners, performing a total-body workout may not take longer than 45 minutes depending upon the rest period length and number of sets.

To progress, novices can experiment with repetition ranges and increasing weights. It is important to vary the types of signals and stimulation to which your muscles are exposed. After about nine workouts (about three weeks), days with slightly heavier weights can be alternated with lighter days. Examples include sets of 12 to 15 repetitions, eight to 10 repetitions, four to six repetitions, and back to 12 to 15 again. The days with fewer repetitions would require more weight — for example, a four-to-six-repetition day should be done with a weight that you would be unable to lift more than six times (or fewer than four).

Again, proper technique is vital when increasing the resistance from one day to the next. If technique is not correct, the exercise should be stopped. In the beginning phases of a training program, a certified personal trainer can be of great help. Spotting is important when using weights; even when working with machine exercises, proper form can be broken and a certified personal trainer spotting every exercise can be very useful. Many free weight exercises (particularly bench press) should never be done without a spotter.

The most important aspect of strength training for beginners is to find a program you can complete consistently. Resistance training is an excellent activity for your health and lifelong independence. With proper fundamentals and emphasis on the basics, most individuals can incorporate this enjoyable exercise practice into their lives.

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THEME: STRENGTH AND CONDITIONING

Youth Strength Training: Facts and Fallacies

by Avery D. Faigenbaum, Ed.D., FACSM



School-age youth need to participate in 60 minutes or more of moderate to vigorous physical activity each day. Exercise should be developmentally appropriate, enjoyable and safe. While children have traditionally been encouraged to participate in aerobic activities such as swimming and bicycling, a compelling body of evidence indicates that strength training can also be a safe and effective method of exercise for children, provided that appropriate guidelines are followed.

Despite the previously held contention that children would not benefit from strength training due to insufficient levels of circulating androgens, research conducted over the past decade clearly demonstrates that regular participation in a youth strength training program can offer observable health and fitness value to boys and girls. The American College of Sports Medicine supports the 2008 *Physical Activity Guidelines for Americans*, which aim to increase the number of children who regularly participate in “muscle- and bone-strengthening” activities.

Nevertheless, some parents have lingering concerns about the safety of youth strength training and others question whether the potential benefits of youth strength training outweigh the risks. The purpose of this article is to address these concerns and dispel common misconceptions associated with youth strength training.

Myth: Strength training is unsafe for children.

Fact: The risks associated with strength training are not greater than other sports and activities in which children regularly participate. However, the key is to provide qualified supervision, age-specific instruction and a safe training environment because, as in many sports, accidents can happen if children do not follow established training guidelines. Children should not use strength training equipment at home without supervision from a qualified professional.

Myth: Strength training will stunt the growth of children.

Fact: There is no current evidence to indicate a decrease in stature in children who regularly strength train in a supervised environment with qualified instruction. In all likelihood, participation in weight-bearing physical activities (including strength training) will have a favorable influence on growth at any stage of development but will not affect a child's genetic height potential.

Myth: Children will experience bone growth plate damage as a result of strength training.

Fact: A growth plate fracture has not been reported in any research study that was competently supervised and appropriately designed. Nonetheless, youth coaches, physical education teachers and fitness instructors must be aware of the inherent risk associated with strength training and should attempt to decrease this risk by following established training guidelines.

Myth: Children cannot increase strength because they do not have enough testosterone.

Fact: Testosterone is not essential for achieving strength gains, as evidenced by women and elderly individuals who experience impressive gains in strength even though they have little testosterone. When compared on a relative or percent basis, training-induced strength gains in children are comparable to those in adolescents and adults.

Myth: Strength training is only for young athletes.

Fact: While regular participation in a strength training program can enhance the performance of young athletes and reduce their risk of sports-related injuries, boys and girls of all abilities can benefit from strength training. For example, strength training can enhance the bone mineral density of girls, decreasing their risk of developing osteoporosis, and can spark an interest in physical activity in overweight children who

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tend to dislike prolonged periods of aerobic exercise. Due to individual differences in fitness experience and training goals, an advanced strength training program for a young athlete would be inappropriate for an inactive child who should be given an opportunity to learn proper exercise technique and experience the mere enjoyment of strength exercise.

In summary, the belief that strength training is unsafe for children is not consistent with the needs of boys and girls and the documented risks associated with this type of training. However, strength training is a specialized method of conditioning that requires qualified supervision, appropriate overload, gradual progression, and adequate recovery between exercise sessions. Furthermore, when designing youth strength training programs it is important to remember that the goal of the program should not be limited to increasing muscle strength. Teaching youth about their bodies, promoting safe training procedures, and providing a stimulating program that gives participants a more positive attitude toward strength training and physical activity in general are equally important.

THEME: STRENGTH AND CONDITIONING

Conditioning Beyond Strength Training

by Tracy Benham, M.S., Exercise Physiologist



“Get a strong and sexy body.” “Six-pack abs in only minutes a day.” “Lose weight while getting a sleek and lean body.”

These types of claims have become a staple of so-called “fitness products” and certain health club marketing schemes. Having a toned and

sleek physique is a common goal for many people — and marketers use its allure to get attention for products that people probably don’t need.

Exercise and fitness professionals are often asked questions such as “Is lifting really the only option to improve your muscle strength and bone density?” While strength training through lifting weights is an option that should be explored by everyone, there are many other available choices to increase strength.

Thousands of studies have touted the benefits of strength training and conditioning. But to health and fitness professionals, “conditioning” means more than just losing weight, toning up, getting in shape for sports, or increasing one’s fitness level. Improvements in muscle strength simultaneously improve endurance, balance, agility, bone density, cholesterol, digestion, blood pressure, flexibility and energy level. Thankfully, there are many fun activities, sports and other options to get stronger and fitter while having a great time.

Staying in shape, getting healthier, and being more active can involve a multitude of activities, both purposeful and playful. Group classes, whether it be aerobic-type classes such as indoor cycling, step aerobics, cardio and toning classes, or group instructional classes such as martial arts, kickboxing, karate or Taekwondo are just a few of the classes offered at different types of facilities. Some of the most popular conditioning programs are Pilates and yoga, taught by trained instructors who educate and monitor participation, form, improvement and progress.

Boot camp classes, which use a combination of body-weight exercises, activities and intervals, are a phenomenal option for overall strength and conditioning. They offer the advantages of being motivational, social and efficient for overall cardiovascular training, as well as strength-training benefits for engaging core muscles and using multiple planes, speed and stability for increased muscle work. Lunges, intervals, sprints, push-ups, squats and pull-ups are among the best exercises you can do for overall body tone and wellness — and boot camps usually offer them all. Some boot camps even incorporate rock climbing, tire rolling, wood splitting, and trail running to increase challenges and accomplishments.

One of the easiest ways to get people motivated to get — and stay — in shape is to incorporate fun sports and activities. Soccer, swimming, cycling are just a few of the enjoyable sports that improve both strength and endurance. Finding a team, training facility, or group can do wonders for

increasing motivation and increasing the accountability needed to see the lifelong benefits of being healthy.

Activities or sports that we consider fun and look forward to, such as hiking, snow and water skiing, horseback riding, kayaking or surfing, also help improve your overall conditioning and strength. Almost any sport you can think of, done safely and properly on a regular basis, will help improve your body, mind and fitness levels.

Here, certified trainers, physiologists and coaches weigh in on what activities they enjoy other than weight training to improve overall conditioning, energy level, toning, strength and well-being.

“Activities like kickboxing and running stadium steps are ideal because they deliver the most bang for your energetic buck. They both provide intense cardiovascular training paired with an equally tough resistance training experience. For a lean, hard body, they’ll get you where you want to go in a rapid fashion!”

— Fitz Koehler, MESS, National Celebrity Diet & Fitness Expert for Examiner.com

“I am huge fan of sprint training, beginning with a 10-meter sprint and a 200-meter jog, then another sprint, followed by another jog, aiming for at least six sprints. As fitness improves, I increase the length of the sprint, for example, working up to a 50-meter sprint, followed by a 350-meter jog. If you really want to test up your upper-body strength and fitness, find a climbing wall in your area and spend time climbing. In addition to big muscle strength, climbing requires a lot of small, stabilizer muscles as well.”

— William Harryman, M.S., personal trainer and Ph.D. student

“Although I think training with free weights and resistance bands is an excellent way to get strong, I’ve put body-weight training and good old calisthenics into my personal training and boot camp programs in recent years with excellent results. Using body weight exercises such as squats, lunges, push-ups and pull-ups, and a few calisthenics moves like jumping jacks, step ups and high-knee runs, I can create a nearly ‘no-equipment-needed’ workout that will develop strength and cardiovascular endurance in my clients.”

— Becky Williamson, M.S., Exercise Physiologist

“Having been in the health and fitness business my whole adult life, I find Pilates to be an amazing ‘discovery.’ I had open-heart

Conditioning (continued from page 4)

surgery at age 12 and rehabilitated into incorrect movement patterns. After 20 years living with those patterns I was super-fit but had a “bad back” and “bad neck,” just to name a few. Pilates has allowed me to become fitter and stronger without injury and has allowed me to become pain-free! I have seen similar results in my clients. I have former college football players who came to me just wanting to be pain free... and Pilates has given them not only that, but the ability to golf and enjoy life!”

— Staci Brodeur, M.S., Pilates Studio owner and instructor

THEME: STRENGTH AND CONDITIONING

Special Feature: The Heart Rate Debate

by Linda Melone, ACSM Certified Personal TrainerSM



Back in the days of leg warmers and high-impact aerobics, instructors posted colorful heart rate charts for participants to monitor their exercise exertion. Bright columns of green, red and yellow “zones” indicated whether you were in the aerobic zone, the fat-burning zone or the (heaven forbid!) anaerobic zone. In more recent times, monitoring heart rate remains a hotly debated issue: How important is it to track your heart rate and how can doing so help you reach your fitness goals?

Have a heart

First, know that maintaining a healthy heart is one of the most important reasons to exercise. And, since the heart is a muscle, regular exercise increases the heart’s capacity to deal with new tasks without strain — much like strengthening skeletal muscles. Your heart rate gives you a play-by-play account of your body’s responses to changes in your physical activity. It also determines whether you’re working hard enough to get the results you desire or if you’re not allowing enough recovery time after your last workout (your resting heart rate will be higher than normal).

In order to find the best “zone” for your goals and activity, you must first know how to calculate your maximum heart rate. The following formula offers a rough baseline:

$$220 - \text{Age} = \text{maximum heart rate (MHR)}$$

Pick a number

For endurance training and general aerobic conditioning, calculate 50 to 65 percent of your maximum heart rate if you’re a beginner; 60 to 75 percent for intermediate level exercisers; and 70 to 85 percent for established aerobic exercisers. For example, if you’re a 45-year-old beginner with no known health issues, your maximum heart rate is approximately 175 beats a minute. Fifty to 65 percent of that maximum is 87 to 113 beats per minute; this is your starting point for cardiovascular activity.

For weight loss, use interval training to burn the most calories. Short bursts of high-intensity exercise (80 to 85 percent of your maximum heart rate) followed by lower-intensity recovery periods (50 to 65 percent of your maximum heart rate) burns more calories than exercising at a consistent level of exertion for the same amount of time. Richard Cotton, M.A., ACSM’s National Director of Certification Programs, cautions, “Speed or anaerobic training done above those ranges (85 percent and over) and is not recommended for beginners.”

Your heart rate can also help you keep tabs on your progress: measure your heart rate 15 to 60 minutes after exercising and compare these numbers over time as you get in better shape. The numbers decrease as your heart becomes stronger.

Heart rate monitors

Far superior to manually taking your pulse, a wireless heart rate monitor tells you your heart rate within seconds. However, not all coaches and trainers like to rely on them. Danny Stein, President of the South Coast Roadrunners, says he rarely uses heart rate monitors but instead coaches his runners to develop a “feel”

for pace and threshold. Stein says, “I use heart rate monitors with beginning runners, mostly, because they tend to overdo it on recovery days. Using a monitor teaches them to know where they should be.”

Keeping track of your heart rate during exercise assures that you get the most bang for your exercise buck.

THE ATHLETE’S KITCHEN:

Sedentary Athletes: Sitting & Weighting

by Nancy Clark, M.S., R.D., FACSM



Imagine this: a lean, fit athlete who trains hard, eats heartily, and does not fret about getting fat. While this image holds true for some athletes, it seems far from reality for others. All too often, I listen to my clients complain, “I should be pencil thin for all the exercise I do.” Or they moan, “I eat like a bird compared to my friends.” How could this be?

The answer is many athletes burn far fewer calories than they realize; they are actually couch potatoes the majority of the day. These seemingly active people can be surprisingly sedentary, apart from their purposeful exercise.

Think about it. The majority of your waking hours can easily be spent sitting, with TV and computers being the primary culprits that induce sedentary behaviors. The average athletic person sits at breakfast, drives to work and sits all day, drives to the gym, exercises for

45 to 90 minutes, drives home, sits at dinner, and then sits in front of a screen before going to bed. Even competitive athletes who do double workouts often live a sedentary lifestyle. They generally do little but rest and recover during the non-exercise parts of their day.

According to Neville Owen, Ph.D., speaker at the American College of Sports Medicine's Annual Meeting in May 2009, the average person sits 9.3 hours a day. Even if you are physically fit, this high amount of inactivity is bad for your health. Exercise reduces health risks in both lean and overweight people, even if the exercise is not associated with weight loss. Owen reports the more a person sits, the higher the risk of early mortality. Hence, we not only do we need to find time to exercise, we also need to find ways to sit less — for example, bike to work, pace when talking on the phone, stand up when writing e-mails. (To elevate the height of your laptop computer, put it on top of a cardboard box that you put on top of your desk.) Why, we could even reduce our carbon footprint by hanging laundry outside to dry on a clothesline. That would not only add on exercise but also save energy!

Because activity has been engineered out of our lives, non-exercisers and avid athletes alike can easily spend too much time doing too little activity. For example, we no longer use our muscles to open the garage door, lower the car window, wash laundry, or even walk down the hall to ask a colleague a question (e-mail is easier). For many of us, the primary movement we get in a day is our purposeful workout/training session. Hence, the goal of this article is to increase your awareness of your 24-hour activity level, and encourage you to take steps (no pun intended) to move a bit more and sit a bit less throughout the waking hours of your day.

Sitting & weighting

People who sit a lot tend to gain undesired body fat. The more they sit, the fatter they get. Fatness heightens the risk of heart disease, diabetes and other associated chronic diseases. These health risks start at a young age. A recent study from the journal *Obesity* with sedentary teens reports just four weekly 30-minute workouts with moderate aerobic activity were enough to stimulate major health improvements. And isn't it scary to think teens are already afflicted with the so-called "diseases of aging?"

Both sedentary and active people of all ages commonly assume their undesired body fat will melt away effortlessly once they start exercising. Not the case. A study in the *American Journal of Physiology* with

sedentary people (ages 56 to 78 years) who added one hour of brisk walking a day indicated they did not lose undesired body fat, despite adding the hour of exercise and eating no additional food. How could that be?

They failed to lose weight because they napped more and slept more! In the course of the 24-hour day, they compensated for the extra activity by conserving energy and being more sedentary at other times of the day. Endurance athletes tend to do the same thing, according to a study from ACSM. Many fail to acknowledge how inactive they are when they stop training. Hence, exercise enhances fat loss if it contributes to a 24-hour calorie deficit. But all too often, athletes burn off 600 calories when training, only to refuel with 800 calories of bon-bons while watching TV... counterproductive!

Fidgeters vs. sitters

Some (generally weight-conscious) athletes love to be sedentary. They look forward to finishing their workout, settling into their recliner, putting their feet up, turning on the TV, and vegging-out for hours on end. Yet, other (lean) athletes rarely sit, and when they do, they can't sit still. They shift and wiggle in their chairs, and are very good fidgeters. Their desire to fidget is genetic, starts at birth, and explains why they prefer to relax by puttering (as opposed to sitting and reading) — and why they eat more than the sedentary athletes who eat like birds.

While fidgeters may enjoy having a "fast metabolism," sedentary athletes often complain they have a "slow metabolism." They eat small portions, yet have undesired body fat. They commonly believe something is wrong with their bodies. The truth is, they barely move their bodies in the course of a day — other than during their five-mile run or one-hour spin class. Nothing is medically wrong with them. (Or, they may fail to acknowledge how much they actually do eat!)

To their detriment, sedentary athletes (who are good at sitting) tend to burn fewer calories than they realize over the course of the day. Similarly, obese people (who are good at sitting) tend to sit 2.5 hours more than their peers; this prevents them from burning about 350 calories a day. A good fidgeter, in comparison, can burn an extra 300 to 500 calories per day. So the question arises: Does obesity foster sedentary behavior? Or does the tendency to be sedentary foster obesity?

The Bottom Line

If weight is an issue, try to be more active throughout the day, not just during your exercise sessions. Figure out how to move your body in ways that have purpose and

meaning: walk the dog, scrub the floor, walk to the post office. Your health and waistline will benefit.

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the one-repetition max. This is the maximal weight amount you can lift once with a specific exercise.

Ideally, each weight-lifting set should include eight to 12 repetitions of each exercise with good technique. A novice can start with one to three sets per exercise. For untrained individuals, it is recommended that slow and moderate velocities be used. Exercises for the major muscle groups in the whole body can be done two to three times a week. Both free-weight and weight-machine exercises are great for beginners and strength gains.