



ACSM Information On...

# Resistance Training for Health and Fitness

Resistance training is a form of physical activity that is designed to improve muscular fitness by exercising a muscle or a muscle group against external resistance. There are many positive health outcomes of resistance training.

**A COMPLETE PHYSICAL ACTIVITY PROGRAM**  
A well-rounded physical activity program includes aerobic exercise and strength training exercise, but not necessarily in the same session. This blend helps maintain or improve cardiorespiratory and muscular fitness and overall health and function. Regular physical activity will provide more health benefits than sporadic, high intensity workouts, so choose exercises you are likely to enjoy and that you can incorporate into your schedule.

ACSM's physical activity recommendations for healthy adults, updated in 2011, recommend at least 30 minutes of moderate-intensity physical activity (working hard enough to break a sweat, but still able to carry on a conversation) five days per week, or 20 minutes of more vigorous activity three days per week. Combinations of moderate- and vigorous-intensity activity can be performed to meet this recommendation.

Examples of typical aerobic exercises are:

- Walking
- Running
- Stair climbing
- Cycling
- Rowing
- Cross-country skiing
- Swimming.

In addition, strength training should be performed a minimum of two days each week, with 8-12 repetitions of 8-10 different exercises that target all major muscle groups. This type of training can be accomplished using body weight, resistance bands, free weights, medicine balls or weight machines.

## RESISTANCE TRAINING BENEFITS EVERYONE!

As we age we tend to lose lean muscle mass, which is a condition known as sarcopenia. Resistance training helps maintain and combat the loss of muscle mass by increasing muscular fitness. This form of training can also prevent osteoporosis by augmenting bone mineral density. What's more? Regular resistance training can decrease the risk of heart disease by lowering body fat, decreasing blood pressure, improving cholesterol, and lowering the stress placed on the heart while lifting a particular load. Improving muscular fitness is very important for enhancing quality of life.

## VARIOUS TYPES OF RESISTANCES

Resistance training can be accomplished with traditional free weights and dumbbells, weight machines, body weight, elastic tubing, medicine balls, or even common household products like milk jugs filled with sand or soup cans. The choice to incorporate a certain type of resistance depends on level of physical fitness, how familiar a person is with specific exercise movements, and individual goals. For example, low fit individuals can focus primarily on machine-based exercises as they have been regarded as safer to use compared to more complex free weight

exercises. The incorporation of free weight movements can be performed as a person increases his or her muscular fitness. For example, advanced individuals can perform multiple sets and heavier resistances using multiple-joint exercises, such as squats and deadlifts. Whichever form of resistance is chosen, multiple-joint, large muscle group exercises should be performed before single-joint, smaller group exercises.

## RESISTANCE TRAINING GUIDELINES AND EXERCISES

The American College of Sports Medicine (ACSM) recommends that a strength training program should be performed a minimum of two non-consecutive days each week, with one set of 8 to 12 repetitions for healthy adults or 10 to 15 repetitions for older and frail individuals. Eight to 10 exercises should be performed that target the major muscle groups.

Examples of typical resistance exercises that can be performed using free-weights, machines, or body weight for the major muscle groups are:

	Free-Weight	Machine-Based	Body Weight
Chest	Supine Bench Press	Seated Chest Press	Push-ups
Back	Bent-over Barbell Rows	Lat Pulldown	Pull-ups
Shoulders	Dumbbell Lateral Raise	Shoulder Press	Arm Circles
Biceps	Barbell/Dumbbell Curls	Cable Curls	Reverse Grip Pull-ups
Triceps	Dumbbell Kickbacks	Pressdowns	Dips
Abdomen	Weighted Crunches	Seated "Abs" Machine	Crunches, Prone Planks
Quadriceps	Back Squats	Leg Extension	Body Weight Lunges
Hamstrings	Stiff-leg Deadlifts	Leg Curls	Hip-ups

ACSM stresses the importance of progressing resistance training programs to meet specific resistance training goals. Progression in resistance training is defined as “the act of moving forward or advancing toward a specific goal over time until the target goal has been achieved.” This can occur with specific trainable characteristics of muscular fitness, such as strength, power, hypertrophy, and local muscular endurance. These four factors will improve with almost any properly designed resistance training program, but will be fully enhanced by properly modifying the load, volume, rest period between sets, and the frequency of each workout. The load is the amount of weight lifted in a given set, which is based on a percentage of the 1-repetition maximum (1RM). The volume is the total number of exercises, repetitions, and sets that are performed in a given exercise session. Rest period is the time period between each set and exercise. Frequency refers to the number of exercise sessions per week. How to manipulate each of these for the optimal enhancement of strength, power, hypertrophy, or muscular endurance is described below.

### MUSCULAR STRENGTH

Muscular strength is the ability of a muscle or muscle group to exert a maximal external force.

- Load: 60-70% 1RM for novice to intermediate; 80-100% for advanced
- Volume: 1-3 sets of 8-12 repetitions for novice to intermediate; 2-6 sets of 1-8 repetitions for advanced
- Rest period: 2-3 min for higher intense exercises that use heavier loads; 1-2 minutes between the lower intense exercises with light loads

### MUSCULAR POWER

Power is defined as the optimal amount of work performed in a given time period. Muscular power is the highest power output attainable during a particular movement, and is required in activities of daily living, sport, and work. For optimal improvements in muscular power, a light load of 0 to 60% of 1RM should be used for 3-6 repetitions over one to three sets per exercise.

- Load: 30-60% 1RM for upper body exercises; 0-60% 1RM for lower body exercises
- Volume: 1-3 sets of 3-6 repetitions per exercise
- Rest period: 2-3 min for higher intense exercises that use heavier loads; 1-2 minutes between the lower intense exercises with light loads

### MUSCULAR HYPERTROPHY

Muscular hypertrophy is the enhancement of muscle size.

- Load: 70-85% 1RM for novice to intermediate; 70-100% for advanced
- Volume: 1-3 sets of 8-12 repetitions for novice to intermediate; 3-6 sets of 1-12 repetitions for advanced
- Rest period: 2-3 min for higher intense exercises that use heavier loads; 1-2 minutes between the lower intense exercises with light loads

### MUSCULAR ENDURANCE

Local muscular endurance is the ability of a muscle or a muscle group to repeatedly exert a submaximal resistance.

- Load: lower than 70% of 1RM
- Volume: 2-4 sets of 10-25 repetitions
- Rest period: 30 seconds to 1-minute between each set

### FREQUENCY

For all the above, it is recommended that novice individuals train the entire body 2-3 days per week. Intermediate individuals should train 3 days if using a total-body workouts or 4 days if using an upper/lower body split routine, training each major muscle group twice per week. Advanced lifters can train 4-6 days per week, training each major muscle group once to twice per week. At this level, muscle group split routines of one to three muscle groups trained per workout are common since this would allow a higher volume per muscle group. Elite weightlifters and body-builders may benefit from using very high frequencies such as, two workouts per day for 4-5 days per week.

### OVERTRAINING

To reduce the risk of overtraining, a dramatic increase in volume should be avoided. It is recommended that a 2-10% increase in the load be applied when the individual can comfortably perform the current workload for one to two repetitions over the desired number on two consecutive training sessions.

### STAYING ACTIVE PAYS OFF!

Those who are physically active tend to live longer, healthier lives. Research shows that moderate physical activity – such as 30 minutes a day of brisk walking – significantly contributes to longevity. Even a person with risk factors like high blood pressure, diabetes or even a smoking habit can gain real benefits from incorporating regular physical activity into their daily life.

As many dieters have found, exercise can help you stay on a diet and lose weight. What's more – regular exercise can help lower blood pressure, control blood sugar, improve cholesterol levels and build stronger, denser bones.

### THE FIRST STEP

Before you begin an exercise program, take a fitness test, or substantially increase your level of activity, make sure to answer the following questions. This physical activity readiness questionnaire (PAR-Q) will help determine if you're ready to begin an exercise routine or program.

- Has your doctor ever said that you have a heart condition or that you should participate in physical activity only as recommended by a doctor?
- Do you feel pain in your chest during physical activity?
- In the past month, have you had chest pain when you were not doing physical activity?
- Do you lose your balance from dizziness? Do you ever lose consciousness?
- Do you have a bone or joint problem that could be made worse by a change in your physical activity?
- Is your doctor currently prescribing drugs for your blood pressure or a heart condition?
- Do you know of any reason you should not participate in physical activity?

If you answered yes to one or more questions, if you are over 40 years of age and have recently been inactive, or if you are concerned about your health, consult a physician before taking a fitness test or substantially increasing your physical activity. If you answered no to each question, then it's likely that you can safely begin exercising.

### PRIOR TO EXERCISE

Prior to beginning any exercise program, including the activities depicted in this brochure, individuals should seek medical evaluation and clearance to engage in activity. Not all exercise programs are suitable for everyone, and some programs may result in injury. Activities should be carried out at a pace that is comfortable for the user. Users should discontinue participation in any exercise activity that causes pain or discomfort. In such event, medical consultation should be immediately obtained.



**AMERICAN COLLEGE  
of SPORTS MEDICINE®**  
LEADING THE WAY