

## Strength and Endurance

### What are Strength and Endurance?

Strength training—also known as resistance training—refers to exercise that causes muscles to contract against resistance. This helps to build muscle strength, mass, and tone. Strength training also helps increase *muscular endurance*—the capacity of a muscle or muscle group to engage in physical activities for longer periods of time before fatigue sets in.

Endurance is essential for any activity, whether it be a sport or cleaning your home. If your muscles can work longer, you will have a greater ability to sustain the activities of everyday life, including your fitness program.

### Developing a Strength Training Program

Three things need to be considered as you put together a weight-training program that will help build strength and endurance:

- **Repetitions and Sets:** *Repetitions* are the number of times you lift a weight, or one complete cycle of an exercise. You should perform 8-15 reps of 8-10 different exercises that, together, target all the major muscle groups. With a *set*, you will perform an exercise for a given number of repetitions, rest for a period of time, then repeat the exercise. The number of repetitions per set and sets for each exercise depend on your specific goals. Two to three sets of each exercise are usually recommended. Be sure to include one to two minute rest periods between sets of each exercise, or long enough to catch your breath.
- **Resistance:** Many things can be used as resistance in strength training exercises, such as your own body weight against gravity, free weights, weight machines, resistance bands, and medicine balls. Weight is essential to a strength-training program. It provides the resistance needed for muscles to work and grow. Begin with low resistance and slowly increase weights. If you find that you have to use momentum or compromise correct form to lift a weight or pull against resistance, then the weight/resistance is too great. It is best to maintain or lower the amount of weight you are lifting



until you can safely execute the movement with a higher weight. Increase weights *only* when you are able to perform 12 repetitions of an exercise correctly without cheating. Do not dramatically increase weights; instead, increase weight gradually. For example, if you are lifting 3-5 pounds for a particular exercise and 12 repetitions do not require much effort; increase the weight to the next highest weight available (5-8 pounds), but at first lower the number of repetitions you do and only increase as it is comfortable.

- **Frequency of Workouts:** Although the goal of training is to challenge muscles to increase strength and endurance, it's also important to give them adequate time between sessions to recover and for repair of the stressed muscles to occur. Aim to challenge the targeted areas 2-3 times per week, alternating the types of activities you use to challenge a particular area. Give yourself 1-2 days between sessions in order to achieve optimal and sustained benefits from your workouts and not to become frustrated.

As you exercise, be mindful of your *form*. A trainer or PT can help you achieve correct form while performing each exercise. Failure to use good form while exercising can either result in injury or not challenge your target areas sufficiently. When you are standing to do upper body exercises, keep your feet comfortably apart, with your knees soft but not bent. Hold your spine in neutral position with your hips in alignment with your shoulders. Be sure to perform each exercise at a smooth, controlled pace. Focus on your breath, making sure to get a full breath cycle with a complete lift and release of each repetition. For example, inhale as you lift and lower as you exhale. If this is difficult or takes your mind away from focusing on your form, just remember to breathe continuously and rhythmically at all times.

A well-rounded fitness routine incorporates cardiovascular exercise with strength training. While establishing a routine that is best for you, plan each day or week to include both types of activities. When done together, you will experience the optimal benefits associated with each type of exercise.

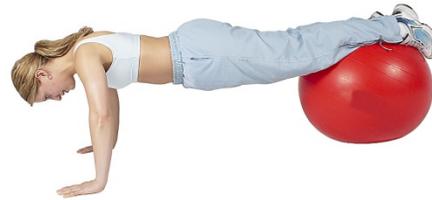
## Two Ways to Increase Strength and Endurance

- **Moving against resistance**  
As discussed above, strength training involves lifting a weight or pulling against a load, either a weight or your own body. It typically involves moving a joint through a range of motion, such as an elbow in a bicep curl or knee in a squat. This type of exercise strengthens the group of muscles

used throughout the entire movement, which builds the basic strength needed to perform everyday activities.

- **Holding a position against force**

With this type of exercise, referred to as *isometrics*, the joint and muscle do not change during contraction (for example, pushing halfway on a push-up then holding that position for a certain amount of time). This type of strength training mainly isolates a specific muscle that is used to hold the position, strengthening it where the resistance occurs. This can be useful in achieving a well-rounded workout by directly exercising muscles that do not get challenged often.



## Why is Strength and Endurance Training Important?

Adding just a few days of training to your workout routine can lead to big changes in your body. Over time you will feel stronger, become more agile as your flexibility is increased, and be able to perform activities for a longer period of time. Strong muscles naturally improve your posture by providing extra support for holding the spine upright. This dramatically reduces the risk of injury to joints and bones. A stronger muscular system leads to increased bone density and reduces the risk of osteoporosis. This is very important to those with MS, who often have an increased risk for osteoporosis as the result of medications such as steroids.

In addition, you will look and feel better as a result of having a consistent exercise program. Strength training increases your rate metabolism and makes it easier to maintain your weight at an ideal level. As your muscles become toned, their outward appearance will improve. Exercise training will not only increase muscular strength and endurance, it will lead to increased energy levels, which is especially important to people with MS who experience fatigue. All of this directly affects mood, by reducing stress and minimizing feelings of depression.

## What Should People with MS Consider When Exercising?

### **It is not necessary to work your muscles to the point of fatigue.**

Gradually increase the time and intensity of your workouts, and avoid increasing resistance too early in your program, which could cause muscle soreness. If you experience fatigue or balance problems, emphasize larger muscle groups instead of trying to do a complete workout at first. Be wise in the types of activities you choose. Besides selecting things you enjoy, consider exercises that challenge your body in ways that provide functional benefits and improve skills that translate to activities of daily life.

### **Be practical.**

Plan your strength program so you do not become fatigued and will be able to do the things you enjoy.

### **Be aware of balance and coordination problems.**

Problems with balance and coordination can lead to dangerous falls. Therefore, choose exercises that provide maximum support such as swimming, recumbent cycling, and check with a physical health professional to design a physical activity program that incorporates balance and coordination training.



### **Be conscious of spasticity/tremors.**

Choose supportive exercise modalities such as an upright or recumbent bicycle instead of the treadmill, and use equipment such as toe clips and heel straps to increase foot stability. Focus on areas of muscle imbalance. Never begin your exercise program aggressively, and always cool down afterwards. As a warmup, perform gently rhythmic/active flexibility exercises,, and cool down with static flexibility movements that focus on increasing mobility and lengthening tight areas.

## **Be aware of muscle imbalances.**

Muscle imbalances in the body can result from inactivity due to a sedentary lifestyle or as the result of the type of loss of function that can occur in people with MS. Weakness or functional change can cause some muscles to work harder than others and result in overuse. This can create an imbalance with how the muscles work, which in turn can lead to additional problems. If you've ever twisted an ankle, you probably noticed how the opposite leg carried much more of your weight to compensate for the injury. This overcompensation can create problems in the hip or back if sustained for an extended period of time. When muscle imbalances occur, choose activities that will help to restore the proper relationship between muscle groups.