Strength Training for the Heart?

Cedric X. Bryant, PhD, and James A. Peterson, PhD
StairMaster Sports/Medical Products, Inc.
Kirkland, Washington

FOR DECADES, CARDIAC REHABILITATION programs have focused almost exclusively on improving cardiorespiratory fitness, despite the fact that all activities of daily living also require a certain level of muscular fitness. Physicians and exercise scientists have traditionally not included strength training as part of the cardiac patient’s exercise prescription, due in large part to a belief that heavy resistance exercise places a strain on, rather than providing a training stimulus for, the cardiovascular system.

Recent research, however, suggests that sound strength training can have a positive effect on cardiac rehab patients. As a result, many individuals who prescribe and administer cardiac rehab programs firmly believe strength training should be an integral part of a comprehensive exercise regimen for cardiac patients, particularly for the following types of individuals:

- Individuals whose occupations require extensive arm work (e.g., laborers, construction workers, auto mechanics). Improving strength and endurance levels of specific muscle groups used in their occupational activities allows them to more safely perform their work related duties while diminishing the likelihood that other bodily systems might be overtaxed.
- Individuals with a desire to participate in leisure or recreational activities that involve extensive use of the upper extremities (e.g., racquet sports, gardening).
- Individuals with a desire to engage in strength training, either to offset the atrophy that results from physical inactivity or to enhance their physical appearance, both of which have a positive impact on the cardiac patient’s self-esteem and psychological well-being.

What’s the Proper Prescription?
Strength training programs designed to develop muscular fitness should adhere to the same basic training principles as cardiorespiratory fitness. The application of these principles to strength training activities is different, however, than for aerobic activities.

Intensity. The intensity of strength training activity is measured by the resistance against which a muscle must move. Heavy resistances (greater than, or equal to 60% of the maximum amount of weight that can be lifted one time) should be avoided by cardiac patients.

Duration. The duration of a strength training activity is measured by the number of times an object is lifted. This measure is usually referred to quantitatively as the number of repetitions performed. As with aerobic activity, there is an inverse relationship between intensity (weight) and duration (repetitions).

The traditional DeLorme theory of strength training theorizes that the higher the weight and the lower the repetitions, the more the training will increase muscular strength. By the same token, the lower the weight and the higher

the repetitions, the more the training will increase muscular endurance.

The most commonly followed guideline for cardiac patients is to perform 10 to 15 repetitions. Two or three sets (i.e., groups of repetitions performed consecutively until a given number or a point of momentary muscular exhaustion is reached) of each routine are normally recommended.

**Frequency.** If more intense strength training (using heavier weights) is being performed, then the training should be done only every second or third day. At lower levels of relative resistance, the issue of adequate time to recover is not as critical. Therefore the amount of rest between workouts can be safely reduced.

**Starting level.** A critical element in developing a safe, sensible, strength training program for cardiac patients involves determining what initial level of resistance should be used for each exercise. Initial weights should not be more than 40 to 50% of the patient's one-repetition maximal level (1-RM).

Although 1-RM testing has been shown to be a relatively safe technique for most cardiac patients, a more useful and prudent way is the Titration method. This method involves having patients start with 10 reps with a lighter, more comfortable weight and progress to 15 reps each training session. At their next workout they should increase the amount of resistance for a specific exercise to the next highest weight for 10 reps.

During the session they again progress to being able to perform 15 reps for each set of exercises. This process continues until the patient identifies the level of resistance that is appropriate to his or her training objectives.

**Slow progression.** The individual can progress to the next level of resistance for a particular exercise when he or she can perform 15 reps of weight for two or three sets without significant strain. The initial number of repetitions that should be performed at the new level of resistance is usually 10. If the individual cannot perform at least 10, the increase was probably too high and a lower amount of resistance should be selected.

**Ensuring Safety and Effectiveness**

Safety is the most crucial issue attendant to strength training for cardiac patients. The American Association of Cardiovascular and Pulmonary Rehabilitation has developed specific guidelines for the safe and effective application of strength training for cardiac patients:

- Limit strength training to cardiac patients who are asymptomatic or are only mildly symptomatic.
- Strength training should only be initiated after a minimum of 12 weeks of aerobic training.
- To prevent soreness and injury, choose a weight that will allow the individual to comfortably perform 10 to 12 reps of an exercise. Generally this level of resistance will approximate 60% of the maximum weight load that can be lifted in one repetition. Training at this intensity will produce significant improvements in functional muscle strength without overtaxing the cardiovascular system.
- Patients who experience an exaggerated rise in their blood pressure (BP) and/or rate pressure product (systolic BP x heart rate) while strength training should perform single-limb rather than double-limb movements.
- Generally, two or three sets of each exercise are recommended.
- Don't strain! Ratings of perceived exertion (6-20 RPE scale) should not exceed "fairly light" (11) or "somewhat hard" (13) during lifting.
- Avoid breath holding. Breathe normally at all times.
- Increase the amount of resistance lifted by 2-1/2 to 10 lbs when 10 to 20 reps can be comfortably accomplished; for high-risk adults and cardiac patients, the weight should be increased only after they can easily manage 12 to 15 reps of exercise.
- Raise the weight to a count of 2, and lower the weight gradually to a count of 4; emphasize full-range exercise movements.
- Include exercises for all of the major muscle groups.
- Organize the resistance training program so that muscles are generally exercised in a largest-to-smallest order, two to three times a week.
- Avoid excessive hand gripping when possible, since this may evoke an excessive blood pressure response to lifting.
- Stop exercising in the event of any contraindicative warning signs or symptoms, especially dizziness, abnormal heart rhythm, unusual shortness of breath, and/or chest pain.
- Do not rest for an extended period of time (i.e., more than 1 min) between either the exercises or the sets of exercises.
- Patients should monitor and record their heart rate response, RPE, and symptoms following each exercise or set.
of exercises, just as they would during aerobic training.

**Strong Heart, Strong Muscles**

During the past decade, strength training has also been demonstrated to have a beneficial effect on cardiovascular health. For example, strength training has been shown to raise high-density lipoprotein (HDL—the good cholesterol) concentrations in the blood and lower arterial blood pressure in certain groups of borderline hypertensives.

In addition, resistance training may reduce the risk for a sudden heart attack due to uncustomed physical exertion that stresses both the skeletal muscles and the heart (e.g., carrying groceries up stairs or shoveling heavy snow).

Properly performed strength training will not only help cardiac patients meet the challenges of daily life and lower their risk for certain diseases, it will also help lower their risk of incurring musculoskeletal injuries by increasing the density and strength of their bones, ligaments, and tendons. In short, strength training is good medicine. ▲

**References**


---

This article originally appeared in the February 1994 issue of *FITNESS Management* and is reprinted here with permission. Copyright 1994 *FITNESS Management* magazine, Los Angeles, Calif., U.S.A.