



The Truth on Fitness:
STRENGTH = CARDIO

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In considering fitness programs, two broad categories typically define one's exercise options; strength training, or cardiovascular conditioning. Most of us understand, intuitively, the differences between these modes of exercise, and organize our workouts so that they are treated separately. In fact, most gym environments divide the equipment serving these two modalities. From a different perspective, however, strength training and cardiovascular conditioning are really one in the same, with equipment options that blur the lines between the two applications.

Cardiovascular fitness is generally defined as the ability to sustain strenuous activity, involving large muscle groups, over an extended period of time (Nieman, 1999). In essence, the role of the heart is to supply oxygen to the working muscles. As the demand for oxygen increases, the cardiovascular system responds by increasing the volume of blood ejected during each beat (stroke volume), and/or by increasing its rate of contraction (beats per minute). This concept, in and of itself, is not difficult to understand. What limits us is the fact that we associate these physiological responses with a few select devices, such as treadmills, ellipticals, and bikes, and rarely with strength training equipment, or strength related exercises. Conversely, we rarely view cardio equipment as strength building tools, and, for the most part, they're not.

The truth is, strength training exercise can have significant cardiovascular benefits, and may in fact meet Nieman's definition for sustained strenuous activity. Franklin and colleagues (1996), for instance, identify several common activities which might ordinarily be classified as strength building, but which also evoke elevated heart rates. Examples of these are digging dirt, hand lawn mowing, carrying objects, shoveling, and stair climbing. Anyone who has performed these functions will agree that their muscles got a serious workout, while at the same time, their heart rate jumped considerably.

The limitation of a strength exercise as a cardiovascular training stimulus is not so much in the exercise itself, but more in the manner in which it's applied. Strength training, for all intents and purposes, involves a relatively high-intensity action conducted over a fairly brief period — that which is required to accommodate, say, six to ten repetitions. Even "endurance" exercises, in which fifteen to twenty repetitions are performed, last at most thirty seconds, and heart rates typically don't climb significantly. The activities that we commonly refer to as cardiovascular, on the other hand, last several minutes, and in fact, may endure for an hour or more.

It may be difficult to convince people to perform a strength exercise, such as a chest press, for thirty minutes. Fortunately, there is growing evidence that short duration, high intensity interval training will deliver both

cardiovascular (Helgerud et al, 2007) and muscular (Gibala and McGee, 2008), benefits. This then, is where there is opportunity to merge cardio and strength exercises. Instead of terminating strength training exercises after a fixed number of repetitions, one might consider performing those exercises for a period of time, between one to two minutes. A traditional strength exercise performed in this manner will almost certainly evoke a physiological response indicative of those suggested by Franklin et al. In this way, the activity becomes a high-intensity interval exercise with both muscular and cardiovascular results.

In defense of those who prefer to adhere to a more traditional strength routine, evidence suggests that improving muscle strength will reduce demands on the cardiovascular system. The heart rate response to a resistance exercise, as it turns out, is directly proportional to the percentage of the working muscle's maximal capacity, and not the absolute load itself (Lind and McNicol, 1967; Mitchell et al, 1980). This property, referred to as a pressor response, means that a muscle working at 50% of its capacity will evoke a lower heart rate than when working at 80% of its maximal effort. In other words, if muscles are strengthened so that a load represents a lower percentage of its maximal capacity, then the demand on the cardiovascular system will be reduced at that training intensity. Thus, an increase in strength results in a cardiovascular benefit by reducing the overall stress on the system.

So far, we've discussed how strength exercises can be modified in order to deliver a cardiovascular result, but it is unclear how cardiovascular machines can be employed to build strength. Other than, perhaps, bicycle ergometers, which can induce strength increases in leg muscles, few cardio devices, such as treadmills or elliptical trainers, have the added benefit of strength enhancement. Clearly, there is a legitimate reason for health club operators to separate the cardio and strength equipment.

One notable exception, however, has been shown to improve both cardiovascular endurance and leg strength. The CYBEX Arc trainer is a cardiovascular training device whose motion and biomechanics emulate a rhythmic step-up exercise. When resistance is carefully selected, the results can be a significant increase in leg strength or power. A study conducted at the Centers for Athletic Development (Moody, 2008), evaluated the effects of moderately high intensity training on the Arc, on maximal hopping distance, an indicator of lower body power. Subjects trained three times per week for four weeks, excluding all other lower body strengthening exercises. On average, hopping distance improved 20% for all subjects, indicating a significant improvement in leg power over the training period. Thus, a cardiovascular machine, when adjusted properly, can be used to deliver both cardiovascular and strength benefits.

Designing effective strength and cardio programs can become somewhat challenging, considering the time constraints associated with both fitness elements. With a little modification and creativity, however, the distinction between cardio and strength exercises can be eliminated, and one can experience an outstanding

workout in an abbreviated time period. Moreover, by combining strength and cardio training into a single concept, one will be assured of a balanced and complete program with more extensive benefits.

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