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# The Five Checkpoints of a Properly-Performed Strength Exercise

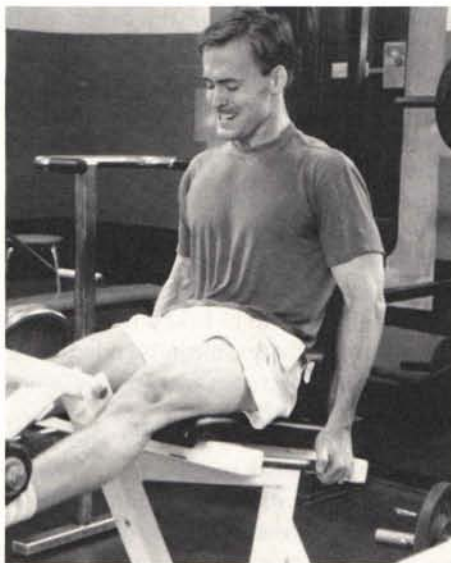
By  
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Regardless of the type of strength training program that is utilized, a quality program begins with a quality repetition. Indeed, the repetition is the most basic and integral aspect of a strength program. A repetition consists of raising the weight to the middle of the movement where the muscle is fully contracted, pausing briefly in that position and then returning the weight to the starting position where the muscle is fully stretched. The following five checkpoints will help you in performing and prescribing quality repetitions.

## **CHECKPOINT #1: Raise the weight in a deliberate, controlled manner.**

A quality repetition starts with the raising of the weight or resistance. The weight should be lifted concentrically in a deliberate, controlled manner without any jerking movements. (Raising the weight is sometimes referred to as the *positive* phase of a movement and involves a *concentric* muscular contraction; lowering the weight is typically referred to as the *negative* phase of a movement and involves an *eccentric* muscular contraction.)

Lifting a weight in a rapid, explosive fashion is ill-advised for two reasons. First of all, explosive lifting introduces momentum into the movement which makes the exercise less productive and less efficient. To illustrate the effects of momentum on muscular tension, imagine that you pushed a 100 pound cart a distance of 50 yards at a steady, deliberate pace. In this instance, you maintained constant tension on your muscles for the entire 50 yards. This time, however, you accelerated your pace to the point where you were running as fast as possible. If you were to stop pushing the cart after 35 yards, the cart would continue to move by itself because you gave it momentum. So, your muscles had resistance for the first 35 yards ... but not for the final 15 yards. The same effect occurs in the weight room. When weights are lifted explosively, there is tension on the muscles for the initial part of the movement ... but not for the last part. In effect, the requirement for muscular force is lessened and the potential strength gains are reduced accordingly.



**A repetition is the most basic and integral aspect of a strength program.**

Secondly, explosive lifting is also potentially dangerous. Dr. Fred Allman, a past president of the American College of Sports Medicine states, "Many injuries may be the result of weakened connective tissue caused by explosive training in the weight room." (Reston, 1982, p. 42) Here's why: Using momentum to lift a weight increases the internal forces encountered by a given joint; the faster a weight is lifted, the greater these forces are amplified — especially at the point of explosion. When the forces exceed the structural limits of a joint, an injury occurs in the muscles, bones or connective tissue. Lifting a weight in about 1-2 seconds will guarantee that you're exercising in a safe, efficient manner.

## **CHECKPOINT #2: Pause briefly in the position of full muscle contraction.**

Most people are very weak in the mid-range of exercise movements because they rarely, if ever, emphasize that position. Pausing momentarily in this position allows you to focus attention on your muscles when they are fully contracted. Further, a brief pause permits a smooth transition between the concentric and eccentric phases of the repetition.

## **CHECKPOINT #3: Lower the weight under control.**

It should take about 3-4 seconds to

lower the weight eccentrically back to the starting/stretched position. Because you can lower more weight than you can raise, it stands to reason that the lowering portion of the movement should be accentuated for a longer time. In fact, some research suggests that a fresh muscle can lower approximately 40 percent more than it can raise. So, if you can lift 100 pounds, you can lower about 140 pounds. The lowering of the weight should also be emphasized because it makes the exercise more efficient: the same muscles that are used to raise the weight concentrically are also used to lower it eccentrically. The only difference is that when you raise a weight, your muscles are shortening against tension, and when you lower a weight, your muscles are lengthening against tension. So, by emphasizing the lowering of a weight, each repetition becomes more efficient and each set becomes more productive. Because a muscle under tension lengthens as you lower it, lowering the weight in a controlled manner also ensures that the exercised muscle is being stretched properly and safely.

In effect, a quality repetition should be roughly 4-6 seconds in length. Most strength coaches who are opposed to explosive, ballistic movements in the weight room consider a 4-6 second rep as a general guideline for lifting "under control" or "without momentum."

## **CHECKPOINT #4: Exercise throughout the greatest range of motion that safety allows.**

A quality rep is done throughout the greatest possible range of motion that safety allows — from a position of full stretch to a position of full muscular contraction and back to a position of full stretch. Exercising throughout a full range of motion will allow you to maintain (or perhaps increase) your flexibility, which reduces your potential for injury. Furthermore, it ensures that you are exercising your entire muscle — not just a portion of it — thereby making the movement more efficient. Indeed, studies have shown that full-range exercise is necessary for a full-range effect. This does not imply that you should avoid limited

range movements altogether. During rehabilitation, for example, you can exercise throughout a pain-free range and still manage to stimulate some gains in strength. However, full range movements are more productive and should be performed whenever possible.

**CHECKPOINT #5: Reach concentric muscular failure within a prescribed number of repetitions.**

Research suggests that our level of intensity is the most important factor in determining your results from strength training — the *harder* that you train, the *better* your response. In the weight room, a high level of intensity is characterized by performing each exercise to the point of *concentric* muscular failure: when you've exhausted your muscles to the extent that you literally cannot raise the weight for any more repetitions. Failure to reach a desirable level of intensity — or muscular fatigue — will result in submaximal strength gains. Evidence for this "threshold" is suggested in the literature by the "Overload Principle." (Enoka, 1988; Fox & Mathews, 1981; Hochschuler, Cotler, & Guyer, 1993; Jones, 1988; Wilmore, 1982). Essentially, this principle states that in order to increase muscular size and strength, a muscle must be stressed — or "overloaded" — with a workload that is beyond its present capacity. Your intensity of effort must be great enough to exceed this threshold level so that a sufficient amount of muscular fatigue is produced. Given proper nourishment and an adequate amount of recovery between workouts, a muscle will adapt to these demands by increasing in size and strength. The extent to which this occurs then becomes a function of your inherited characteristics (i.e. muscle length, predominant muscle fiber type, etc.).

In general, you should reach concentric muscular failure within 15-20 reps for exercises involving your hips, 10-15 reps for your legs and midsection and 6-12 reps for your upper torso. However, some movements have rather short ranges of motion and require a minor adjustment in the minimum number of reps to ensure that your muscles are under tension for an adequate amount of time. Generally, these are single-joint movements that have a range of motion of about 90 degrees or less. Therefore, shoulder shrugs, internal and external rotation (for the "rotator cuff") along with exercises for your forearms should be done for 8-12 reps to guarantee a desirable amount of contraction time.

If concentric muscular failure occurs

before you reach the lower level of the repetition range, the weight is too heavy and should be reduced for your next workout. If the upper level of the repetition range is exceeded before you experience muscular exhaustion, the weight is too light and should be increased for your next workout by five percent or less.

If you're just beginning an exercise program, or if you change the exercises in your routine, it may take several workouts before you find a challenging weight. That's okay — simply continue to make progressions in the resistance as needed.

It should be noted that attempting a one-repetition maximum or performing low-repetition movements (i.e., less than about 3 or 4 reps) significantly increases your risk of injury. Likewise, once an activity exceeds the recommended number of reps, it becomes a test of endurance rather than strength.

Remember, how you lift a weight is more important than how much weight you lift. Your strength training will be safer and more efficient by performing each rep with proper technique.

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## ANNOUNCING "PROJECT SCHOOL ALERT"

One child in a hundred experiences seizures. If he or she had a seizure right now, would you know how to handle it?

The Epilepsy Foundation of Western Pennsylvania is pleased to announce the second year of an exciting new epilepsy information/technical assistance program entitled "Project School Alert." This program, funded by the Pennsylvania Department of Education, Bureau of Special Education, has as it's major goal an increased awareness about epilepsy, proper first aid techniques and the stigma that still exists in our society about people with epilepsy.

"Project School Alert", which is free of charge, is conducted through inservice training for school personnel, classroom presentations for students and one-on-one consultations regarding specific student concerns. A variety of formats, each custom designed, are available including: video presentations, group or panel discussions, informational handouts and a storybook performance for elementary student audiences.

During the first year of this project, over 300 programs reaching thirteen thousand students were presented. Response has been overwhelmingly positive, with many invitations for the coming school year extended.

As the 1993-1994 school year begins, please reserve a time for your school to participate. Presentations can be scheduled by calling either The Epilepsy Foundation of Western Pennsylvania (412) 261-5880 or The Epilepsy Foundation of Southeastern Pennsylvania (215) 667-7478.

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