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10

MYTHS

ABOUT

STRENGTH

TRAINING

Don't let your members believe everything they hear; there are a lot of misconceptions about strength-training circulating around the weight room.

By Matt Brzycki

Despite the efforts of the scientific and academic communities, myths in strength training continue to abound. The following myths are among the most prevalent.



Myth No. 1: When people stop lifting weights, their muscles turn into fat

Muscle cannot be changed into fat — or vice versa — any more than gold can be changed into lead. Muscle tissue consists of special contractile proteins that allow movement to occur. It is about 70 percent water, 22 percent protein and 7 percent fat. (The remaining 1 percent or so includes inorganic salts such as calcium, potassium and sodium.) Conversely, fatty (or adipose) tissue is composed of spherical cells that are specifically designed to store fat. It is about 22 percent water, 6 percent protein and 72 percent fat. Since muscle and fat are two different and distinct types of biological tissue, a muscle cannot turn into fat when a person stops lifting weights. Similarly, lifting weights — or performing any other type of physical training — will not change fat into muscle. The fact is, muscles hypertrophy (or become larger) from physical activity, and atrophy (or become smaller) from physical inactivity.



Myth No. 2: Multiple sets are more effective than single sets for increasing muscular size

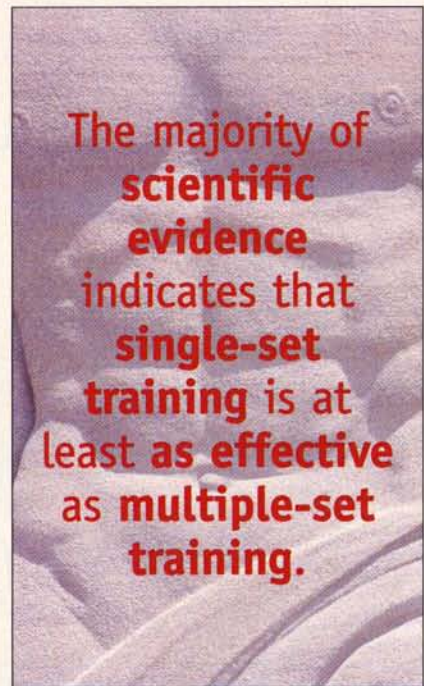
and strength

The overwhelming majority of sci-

entific evidence indicates that single-set training is at least as effective as multiple-set training. An exhaustive literature review in 1998 by Drs. Ralph Carpinelli and Robert Otto of Adelphi University, New York, N.Y., and later reviews by Carpinelli, examined all studies that compared different numbers of sets (dating back to 1956). Collectively, their research found five studies that showed multiple-set training was superior to single-set training, and 57 that did not. Two of the five studies that concluded multiple-set training was superior to single-set training involved only one exercise. One of these studies actually used

six exercises but, curiously, the researchers only reported data from the barbell squat.

So, the basis for performing single-set training — or a relatively low number of sets — has powerful and compelling support in scientific literature. Incidentally, numerous authorities have advocated single-set training since the early 1970s. Dan Riley — a veteran strength coach with more than 20 years of experience in the National Football League, and another eight at the collegiate level — notes, “Your goal must be to perform as few sets as possible while stimulating maximum gains. If performed properly,



The majority of scientific evidence indicates that single-set training is at least as effective as multiple-set training.

only one set is needed to generate maximum gains.”



Myth No. 3: Eccentric exercise produces muscular damage, and should be avoided at all costs

Muscular damage and soreness can occur if a muscle is loaded in a concentric, static or eccentric manner. And, in fact, some studies have shown that eccentric contractions do not induce a greater level of muscular soreness than concentric contractions. Research has suggested that the intensity of the activity — not the type of muscle contraction — may be the dependent factor in producing muscular soreness.

Interestingly, research has shown that an adaptive response occurs from performing eccentric contractions. In one study, subjects who only performed concentric contractions during their training “complained of severe muscle soreness” after completing post-training tests in which eccentric contractions were performed. Meanwhile, subjects who performed a combination of concentric and eccentric contractions during their training did not report any muscular soreness after completing the same post-training tests.

Keep in mind, too, that the duration of the eccentric phase of a repetition involves a relatively brief period of loading. If a weight is lowered in about three to four seconds per repetition, for example, then the eccentric loading that occurs during a set of 15 repetitions only lasts about 45 to 60 seconds.

The eccentric phase of a repetition —

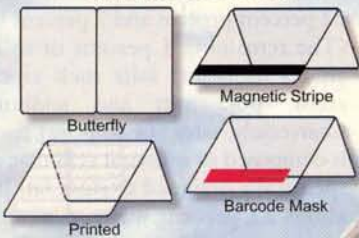
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and eccentric activity, for that matter — is safe and productive as long as it is not performed to an extreme. As muscles become more familiar with eccentric loading, any amount of muscular soreness and tissue damage will be reduced.



**Myth No. 4:
Women who lift
weights will
develop large
muscles**

Since the early 1960s, research has shown that most women can achieve significant improvements in their muscular strength without significant gains in their muscular size. One researcher, for example, found that a group of 47 women increased their strength in the leg press by nearly 30 percent after 10 weeks of training, yet the largest increase in muscular size was less than one-quarter inch.

There are several physiological reasons that prevent or minimize the possibility that women will significantly increase the size of their muscles. For instance, most women have relatively low levels of serum testosterone, which restricts the degree that they can increase their muscular size.

There are a relatively small number of women who have inherited the ingredients necessary to experience significant increases in their muscular size from lifting weights. However, the overwhelming majority of women can gain considerable muscular strength from lifting weights and will have little or no change in their muscular size. In short, it is physiologically improbable for the average woman to develop the large muscles that some deem unsightly or unfeminine.



**Myth No. 5:
More repetitions
will build
muscular
endurance,
and fewer
repetitions will
build muscular strength**

Muscular endurance and muscular strength are directly related. If lifters increase their muscular endurance, they will also increase their muscular strength. Here is an example: Suppose lifters can perform a one-repetition maximum (1-RM) in the bench press at 200 pounds, and they can lift for 10 repetitions at 75 percent (150 pounds). And after several months of training with higher repetitions — say, within a range of about eight to 12 — they progress to the point where they can lift 180 pounds for 10 repetitions. Given that they increased the amount of weight they can lift for 10

repetitions in the bench press by 20 percent — from 150 to 180 pounds — do you think their 1-RM strength will now be greater than, less than or equal to the previous 1-RM effort of 200 pounds? The odds are it will be greater than their previous 1-RM. So even though they trained with higher repetitions, they increased their muscular strength.

By the way, it works the other way, as well. If muscular strength is increased, muscular endurance will also increase. Here is why: As exercisers get stronger, they need fewer muscle fibers to sustain a sub-maximal effort (muscular endurance). This also means they have a

greater reserve of muscle fibers available to extend their sub-maximal effort.



**Myth No. 6:
Higher
repetitions
will "tone"
muscles,
and lower
repetitions
will "bulk" muscles**

There is no scientific evidence that higher repetitions increase muscular definition, or "tone," and lower repetitions increase muscular size, or "bulk." In one 10-week study, there were no significant

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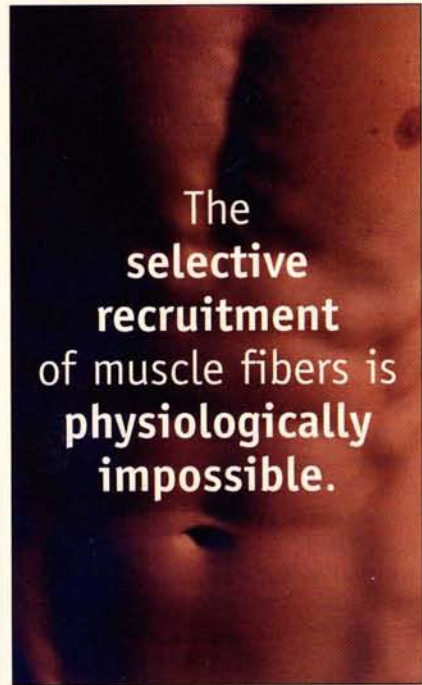
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differences in muscular size (and strength) between a group that trained with sets of four repetitions, and a group that trained with sets of 10 repetitions.

If two people perform the same program — that is, the same exercises, as well as the same number of sets and repetitions — for a period of time, it is highly unlikely they will end up looking like physical clones of each other. Look around the weight room and observe different pairs of training partners. You will see that people who train together usually have different physiques — despite performing the same exercises and using the same number of sets and repetitions.

People respond differently to strength training because each person — except for monozygotic (identical) twins — is a unique genetic entity with a different genetic potential for achieving muscular size. Some people are predisposed toward developing heavily muscled physiques, while others are predisposed toward developing highly defined physiques. Therefore, the belief that performing high repetitions with light weights will increase muscular definition, and performing low repetitions with heavy weights will increase muscular size is entirely anecdotal, with no factual basis whatsoever.



The
**selective
recruitment**
of muscle fibers is
**physiologically
impossible.**

Whether sets consist of low repetitions, high repetitions or intermediate repetitions, individuals are still going to develop according to their genetic (or inherited) blueprint — provided the sets are performed with similar levels of intensity.



**Myth No. 7:
High-velocity
repetitions will
preferentially
recruit fast-twitch
fibers**

The selective recruitment of muscle fibers is physiologically impossible. Muscle fibers are recruited — or “innervated” — by the nervous system in an orderly fashion according to the intensity or force requirements, not by the speed of movement. Demands of low muscular intensity are met by slow-twitch fibers. Intermediate fibers are recruited once the slow-twitch fibers are no longer able to continue the task. The fast-twitch fibers are finally recruited only when the other fatigue-resistant fibers have severely depleted their energy stores and cannot meet the force requirements. All fibers are working when the fast-twitch fibers are being used. The orderly recruitment pattern remains the same regardless of whether the repetition speed is fast or slow.

This pattern is consistent with the “size principle” of recruitment that was proposed by Dr. Elwood Henneman in the 1950s. He described the experimental basis of his principle in 18 related articles that were published in the *Journal of Neurophysiology* over the course of 25 years. According to this principle —



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which is widely accepted by neurophysiologists and regarded by them as one of the most important advances in the field of motor control — motoneurons are recruited based upon increasing size: The motor unit with the smallest motoneuron is recruited first, and the motor unit with the largest motoneuron is recruited last. (A motor unit consists of a motoneuron and all the muscle fibers that it innervates.) In general, the smallest motoneurons innervate slow-twitch fibers, and the largest motoneurons innervate fast-twitch fibers. Therefore, slow-twitch fibers are recruited first, and fast-twitch fibers are recruited last.

And the orderly pattern of recruitment has an important training implication: To engage as many fast-twitch fibers as possible, it is critical that a person trains to the point of muscular fatigue.



Myth No. 8:
Periodization
is the most
effective way
to schedule
workouts

Also referred to as “cycling,” periodization is a theoretical schedule of pre-planned workouts popularized by competitive weightlifters as their preferred method of training to peak for a 1-RM during contests. Essentially, the idea is to change or “cycle” program variables, such as the number of sets and repetitions, the workloads (which are based upon percentages of a 1-RM) and the recovery intervals between the sets/exercises. These variables are manipulated during rigidly defined “phases” of training, which usually are designated as hypertrophy, basic strength, strength/power, peaking, maintenance and active rest. It is thought that by manipulating the variables, individuals can selectively target specific physiological functions.

There is no legitimate scientific evidence to support the claim that performing different numbers of sets and repetitions with different percentages of a 1-RM while taking different intervals of recovery between sets will specifically influence hypertrophy, strength, strength/power or anything else. Strength training is actually quite simple: overload the muscles by increasing the resistance and/or repetitions from one workout to the next.

Essentially, “periodization” is a sexy word for “variety.” But incorporating variety into a program — which is certainly important — can be done as needed in a manner that is far less regimented and much more informal.



Myth No. 9:
Using a wide
grip in the lat
pulldown will
produce a
wide back

An individual’s potential for muscular development is based primarily on genetics. Inherited characteristics cannot be manipulated by changing the grip used during an exercise. If anything, a wider grip actually makes the lat pulldown less effective. Try this: Have clients take an empty bar and hold it near the upper part of their chest (near the collarbones) with their hands

spaced far apart. While standing in front of a mirror, have them press the bar overhead. Note the distance the bar traveled vertically. Now, ask them to move their hands a bit closer together and try it again. They will find that the narrower grip allowed the bar to travel a greater distance. Being able to move the bar a greater distance means there is a greater range of motion around the shoulder and elbow joints. Greater range of motion translates into a greater involvement of the targeted muscles. As a rule of thumb, the grip in the lat pulldown should be slightly wider than shoulder-width apart.

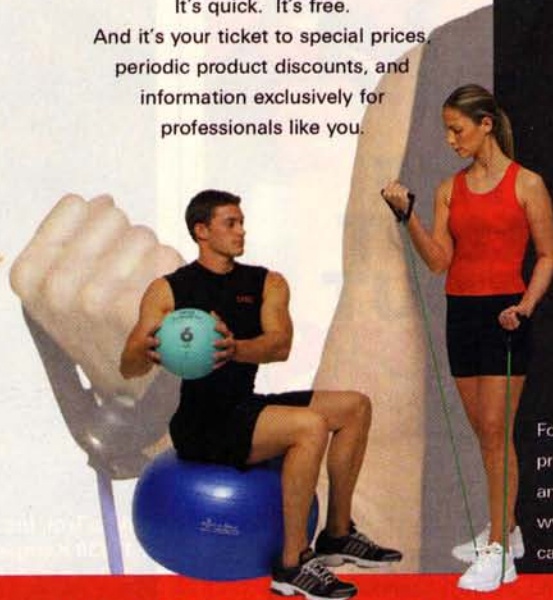
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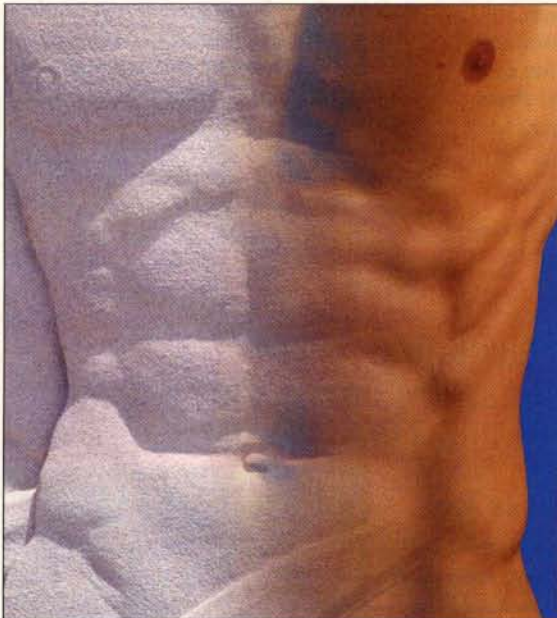
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**Myth No. 10:
Free weights are
better than
machines for
increasing
muscular size
and strength**

The use of any equipment in which a load is progressively applied on the muscles will stimulate improvements in mus-



cular size and strength. Consider the bench press. Whether it is performed with a machine or a barbell, the exercise addresses the same major muscles: chest, anterior deltoid and triceps. Although balancing a barbell requires a greater involvement of synergistic muscles, it does not appear as if this results in a significantly greater response. Indeed, studies have shown no significant differences in the development of strength when comparing groups that used free weights and groups that used machines. The bottom line is, muscles do not have eyes, brains or cognitive ability. Therefore, they cannot possibly know whether the source of resistance is a barbell, dumbbells, selectorized machine, plated machine or another human being. The sole factors that determine the response from strength training are genetics and effort — not the equipment used. **FMY**

Matt Brzycki is the coordinator of recreational fitness and wellness at Princeton University. He has more than 20 years of experience at the college level, and has authored, co-authored or edited eight books.

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