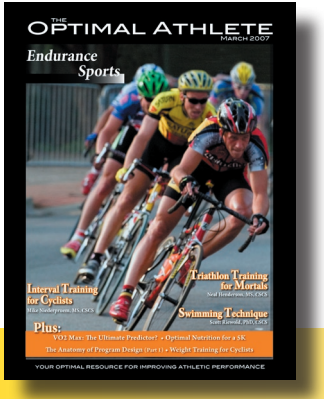

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The Anatomy of Program Design Part 1

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On Monday January 8th, 2007 every health and fitness center in America should have flown there banner at half mass in honor of National Bench Press Day. Members new and old were chomping at the bit to start there New Years resolution with 3 sets of 10 reps of barbell bench press. To be honest, 3 Sets of 10 is not a bad place to start when designing your own programs or programs for clients, but why? Hold on, I am getting there. Now, I know what you are thinking, here we go again! First he is going to give me some outdated verbage depicting the organization and planning of training (Periodization). Then he is going to go on to define fundamental principles of specificity, overload, and progression and leave me with an increased vocabulary, but with very few ideas about how to design a program. So cynical! I will leave the vocabulary lessons to superior minds that have already gone to great lengths to define and organize training theory, such as the late Mel Siff, Vladimir Zatiorsky, and Tudor Bompa. Additionally, in an effort to simplify our methods for achievement I will not preach to you about proper warm up or exercise selection at this point, but what I would like to talk about is the "meat and potatoes" of program design: Sets and Reps!

What is wrong with 3 Sets of 10 Reps? Absolutely, nothing! But there is a time and a place for everything. Do you ever ask yourself why am I doing three sets of each exercise?

SETS

Single Set Training or Multiple Set Training?

Why can't I just do 1 set to failure? Well one set to failure could be a good place to start, but can it take you where you are trying to go? In untrained (UT) subjects, several studies have reported similar strength increases between single and multiple-set programs (1). So this makes it a great place to start, if you are untrained and can train to failure (although as an untrained individual is often hard to recruit enough musculature to actually train to failure with one set!). However, in resistance-trained individuals multiple-set programs have been shown to be superior for strength, power, hypertrophy, and high intensity endurance improvements (1). And if you are an athlete preparing to excel at the next level in your respective sport these are at least some of the physical qualities you will need to possess or improve upon to make that jump.

Training Volume

A simplistic view of training volume is sets x reps, meaning when performing 3x10 on the bench press your total volume for that day is 30 reps. Now, this is a very simplistic way to define a very complex subject, but this definition will suffice for the time being. In 2003 researchers performed an extensive review of literature that found 4 sets of resistance training to elicit maximal strength gains in both untrained and resistance trained individuals (1). But please do not misunderstand the information because there is no magic number of sets that will produce your expected outcome. As an organism adapts to its training stimu-

lus the training volume can be increased to provide further stimulus for adaptation. This simply means that as you adapt to your current training protocol, to continue to adapt you must continue to provide more stimulus and one way of doing this is to add volume (i.e. more sets).

REPS

Okay now that we have a grasp of how many sets to do, why not 10 reps? At some point in time 10 reps will be the appropriate answer to your training questions, but when? Well that all depends on what your immediate goals are and where you are in your training progression. Whether your goal is to be an elite cyclist or a menace to quarterbacks all over the nation there is some form of strength that will enhance your performance, regardless of your level of participation.

The response elicited by strength training will of course always depend on your training age (the number of years you have been consistently training), but here are some general physiological adaptations to training:

Neural adaptations

It has been well documented that initial strength gains are often due to neural adaptations versus muscular hypertrophy (2). Initially your body will learn to voluntarily recruit or activate both a larger number of muscle fibers with in each muscle and a greater number of muscles in order to accomplish the task at hand. As you adapt to your training stimulus you will need to increase or intensify your stimulus in order to promote continued adaptation. As you intensify your stimulus you will not only increase your ability to recruit more muscle, but change the pattern in which you recruit those muscles to perform the lift more efficiently.

Muscular Adaptations

Hold your horses, I know this is the moment you have all been waiting for, this is the part where I tell you what reps will get you bigger. Well you are right, but first we have to realize the risk/reward of getting bigger. Do you want to be bigger or do you want to be better? This is an important question you must ask yourself before beginning a strength training program.

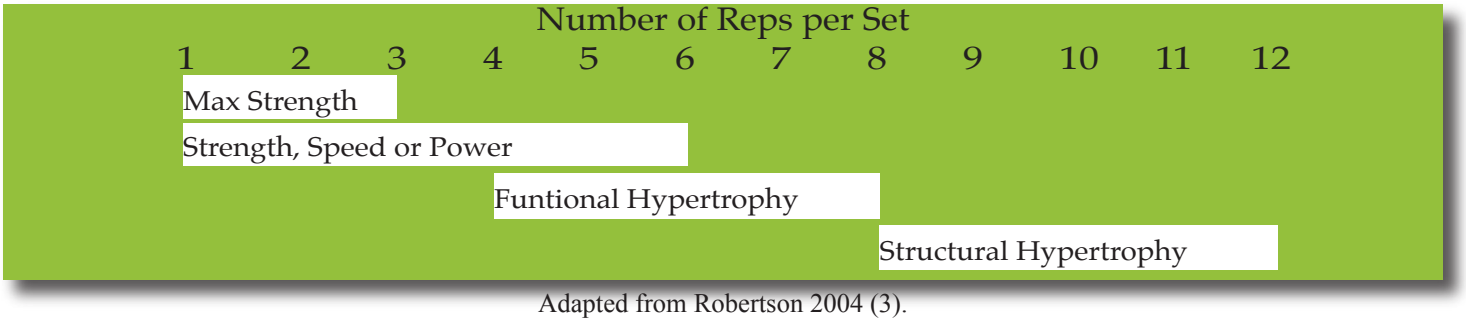
Bodybuilders are nice to look at, but how many of them can hit a 100 mph hour fast ball or dunk a basketball? I know there are a few out there that can, after all most bodybuilders were competitive athletes at one time or another (and of course they are still competitive within the sport of bodybuilding), but when your goal is performance enhancement you need to make sure you don't get side tracked with just having bigger "guns". With higher reps that bodybuilders use you are unable to lift as much weight, but you are able to lift the weight in a slow and controlled manner. This is great if appearance is your final goal, but if performance is your ultimate goal this can potentially hinder your progress. With this type of high rep training you can hypertrophy the wrong type of fibers, your slow twitch fibers and their supporting structures that provide the nutrients to aid in the performance of those fibers. These rep schemes can generally range from 8 to 15 reps or your structural hypertrophy range. As we decrease our amount of reps per set, to maintain a proper stimulus, we will have to increase our intensity.

With an increased intensity we start to hypertrophy our fast twitch fibers and the components within them that contribute to actual muscular contractions. These fast twitch fibers are much more successful at providing short and powerful muscular contractions. This can be considered functional hypertrophy with rep ranges from 4 to 8. As we progress down the rep continuum

the time our muscles spend under tension begin to decrease to point where we are no longer providing as much of a stimulus for growth. At these levels our strength will often be increased by both growth and some of the neural adaptations that have been previously mentioned. Now that is not to say if you are lifting under 4 reps that you will not see any muscular growth because again that will depend on your training status, but the emphasis will be on increased strength through increased recruitment of fast twitch fibers, increase coordination within a muscle and increased coordination between muscles (i.e. synergists and stabilizers).

What about speed and power? With speed and power training again we have to look at how long the muscles are under tension. Resistance training with in this realm is often executed explosively and with maximal intensity so that even with 6 reps the time your muscles are under tension will be minimal. Why only 6 reps for power training? Well, there are several reasons, but the primary reason is energy availability. Your body can only produce energy so fast and your immediate energy stores can be wiped out in as few as 6 seconds with all out maximal efforts.

Table 1 can be used for a conceptual representation of what qualities will be promoted when working in certain rep ranges.



Adapted from Robertson 2004 (3).

Remember, strength is a progressive continuum and should be trained that way. You can efficiently improve strength by building on each quality before moving to the next one. First, train for hypertrophy and allow your muscles to grow and your passive structures (i.e. tendons and ligaments) to become accustomed to handling an external load. As you progress into more maximum strength training your body will have developed the coordination, size, and strength to withstand the rigors of such high intensity training. Just remember don't get ahead of yourself; Arnold wasn't built in a day! Now go ahead finish your 3rd set, but remember there is a place for everything. The next question you should be asking is how much weight should I be using?

*Look for Part 2 of this article in our May issue.

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