

# X-Ray Vision - Take A Good Hard Look!

Researched and Composed by Jacob Wilson, BSc. (Hons), MSc. CSCS

## Goals of This Article

In the spirit of this series, the sole purpose of this article is for you, as an athlete to understand exactly how well your overall conditioning actually is. I will break down almost every factor involved in building a championship physique. Your job will be to realize what your strengths and weaknesses are. And folks, I have news for you...Everyone has weaknesses, if we did not then improvement would be an impossibility. The goal of any athlete is to realize what those shortcomings are, and to make them strengths. That is by far the quickest way to improve.

I remember Shawn Ray during Olympia prep, mentioning the fact that he was not just a bodybuilder, but an athlete. And as such, he followed every sport available, with extreme precision. Not for the sheer enjoyment of the events, but to actually learn from these other athletes.

Interestingly enough, many of us do the same, but do not actually learn from these other greats. If you study Magic Johnson, you would know that every off season, he worked extremely hard on his weaknesses. In doing so these quickly became strengths. Eddie George the past several months has literally dissected his game, his mechanics, his very essence if you will. This year everyone was predicting his demise. I on the other hand, knew of his off season conditioning program, and ended out drafting him on my fantasy football team. He scored two touchdowns this past Sunday, one of which was the game winner, and a two point conversion!

Abc is comprehensive, meaning we build on past articles, which is just as it should be. And the most important subject covered by Mr. Knowlden last month was the following on homeostasis

*Your body is naturally resistant to change. It prefers to be in a constant state with no change to its environment. It simply does not want big, freaky muscles. You have to force this complex machine to accept them. The principle is that simple. Without the right weapons you will never even come close to pushing your body to reach its potential.*

---- Adam " Old School " Knowlden

We cannot leave a statement like that behind us. Rather, we should hold tight to it, and make it applicable to all areas of our hypertrophy based program. You see, athletes tend to cover up their weaknesses, and build up a stagnant state, rather than address them. Which means that the homeostasis principle is a mental one, as well as a physical. In that spirit, we must address both the mind, and the body within the following series. You must be willing to honestly critique your abilities, and additionally make the necessary changes to correct them.

Just as Eddie George doubled his game this past season, you can literally double your ability to add muscle to your frame. Which by the way, is the name of the game!

## 1. Explosive Ability

Have you ever noticed how slow bodybuilders move? I think if you lined up most bodybuilders, with your average Joe, and had them walk in a straight line for 100 yards, you would find that the average Joe had gone the distance, while we were back on the 20 yard line.

This is due to many factors. The main one being, that we are very self conscious about wasting energy. A popular bodybuilding saying is " why run when you can walk, and why walk when you can crawl. " What can I say, the principle works!

The factor that should not be involved though, is an inability to move quickly if called upon to do so. Even though we move slowly 99 percent of the time, we should have an extreme capacity to explode with excessive force at any given moment! Take Kevin Levrone for example. He is perhaps the greatest athlete to ever grace the stage and can actually run a 4.1 40!

The question now is why is this an important factor in training? The answer is based on the fact that we have three( actually more, but essentially ) muscle fiber subtypes. These include fast twitch IIA and IIB cells, and also slow twitch I fibers.

The best way to explain this to you, would be to quote my muscle fiber article:

*Even a small muscle group has well over a 100, 000 muscle fibers! Take the brachialis for example (see 8 weeks to bigger forearms for a picture ). As small as it is, it contains easily over 150, 000 muscle fibers! A Motor Neuron is what stimulates our muscles to contract. In essence a motor Neuron is simply a message boy. Which is to say it carries impulses (messages) from our brain and spinal cord to our muscles. Another example would be a mailing shoot, in which one person places a letter and it is carried to another section of a building almost immediately. One motor neuron controls a number of muscle fibers. This can be as few as 2 or as many as 2, 000! Again, one muscle group can have hundreds of thousands of muscle cells! A single motor neuron and the fibers it stimulates is called a motor unit. If the brachialis contains 150, 000 muscle fibers and the average motor unit contained 150 of these cells, then there would be a total of 1, 000 motor units in this muscle group. Here is the cool part, each motor unit mainly contains muscle cells of its kind! In addition, the motor unit fires with a frequency that is conducive to the fibers it stimulates. Simply put, a slow twitch motor neuron will cause the muscles in it to contract slowly. This again is conducive to endurance, while a fast twitch unit will fire quickly! The quicker it fires the more power it produces. The way your body recruits these motor units is actually quite easy to understand. If the activity is light it will mainly stimulate slower twitch muscle fibers, when it becomes too intense it will call on its fast twitch IIA fibers, and last of all (for the highest intensity movements) it will recruit the fast twitch IIB fibers. This is why slow twitch muscles are called low threshold, and fast twitch IIB's are called high threshold. Low threshold because they are the first muscle fibers to be recruited and high threshold because they are only*

*recruited under the most intense circumstances! You should understand that your body almost always activates its muscle fibers in this fashion!*

--- Quote Muscle Fibers Part II

I discussed also in that article, that there are many ways to stimulate these fibers. But the basic essence, is that the more intense tasks will stimulate fast twitch fibers, and the lighter, longer ones will stimulate growth in the slower twitch fibers.

Fast twitch fibers are the larger of the three, and more precisely, IIB cells are the most prominent in diameter. You can stimulate them through a maintained set( again see anatomy article ), heavier weight, or explosive movements! Which is why this is such an important ability.

In essence, by developing the ability to train explosively, you will be able to more readily tap into, or activate the threshold of your larger IIB fibers, which are extremely difficult to build up.

Your ability to explode within a given criterion task is best tested on compound exercises, such as the bench press, pull-ups, bent over row, squat, parallel dip, standing barbell curl and military press. A well conditioned bodybuilder will have the ability to accelerate the weight like a bullet out of gun. Their muscles will literally feel overly excited at the bottom of a movement. If you are poor in this respect, your body will have an almost delayed effect, as if it takes a while to turn on the machine.

## **Stretch Reflex**

Before we continue, I would like to discuss a phenomenon known as " stretch reflex. " Our bodies have many safety mechanisms, and this is the case here.

In essence to prevent overextension and serious injury to the muscles and tendons, muscles are equipped with special nerve cells called spindles that apply the brakes when maximum elasticity is reached. When I say applying the breaks that is exactly what I mean. Lets say that you were walking and stumbled. You know the type of stumbles that happen in a crowd that make you feel like a freaking moron. After stumbling, you immediately brace yourself with your forward leg, spindle fibers in your leg send a message to your central nervous system, and this sets off the protective mechanism which we have already referred to. That mechanism causes a very powerful contraction in the muscles, which prevent you from falling.

The great news, is that by focusing on this, you can actually improve the skill of utilizing the stretch reflex.

Studies have shown, that the quicker you load, or stretch the muscle, the more effective the protective mechanism. In essence you will end out recruiting a tremendous amount more muscle fibers, and take advantage of elastic energy. To further explain elastic energy, When a muscle is stretched, the faster an athlete explodes out of that stretch the more force they will be able to produce. It is similar to a rubber band, the quicker I release it the farther it will go. You are literally lowering time in the hole.

In addition to this, our bodies have another protective mechanism known as anticipatory tension. What else did you notice, the last time you stumbled? Your whole body tensed up right. That's the basic premise here. Your body tensed itself in case it fell. Fortunately the stretch reflex and anticipatory tension can be trained together.

There are several ways to accomplish this, and I will outline the most prominent.

Plyometrics - As I discussed in my enhanced neural drive article, plyo would be any hopping, skipping, or jumping movements. As stated, you want to use exercises, that are compound to work on explosive movements, therefore choose corresponding plyometric exercises.

Depth Jumps- You can use depth jumps. This is where you stand on a box, step off of it, and explode straight up in the air. You can also try this on one leg! Another method is simply jumping up and down as fast as possible. Or hopping forward on one or two feet.

Clap Pushups - Clap pushups are my favorite form of plyo.

Enhanced Neural Drive ( I suggest you read the article ) - Again, the key here is to begin with a one repetition maximum, rest 3-5 minutes and then perform plyo.

Set One: One Rep Maximum on Bench Press

Set Two: 6-10 explosive clap pushups

Repeat twice, for a total of 3 cycles. (taken from neural drive article)

Explosive Perform Exercises - This of course is the most direct way of enhancement. If I were performing a bench press, I would have a quick lowering time, and an explosive concentric press afterwards. Which, is extremely similar to a plyometric movement. Old School discussed using this on pullups. If you have ever tried exploding through an entire set of these, you know what a rush it can be! Again, you need to limit the time you have in the hole!

Another technique is known as "compensatory acceleration." You train the central nervous system (CNS) to improve the rate of force development when using high loads. There have been some excellent studies on this subject, and one of the more popular was conducted by Jones et al. in 1996. The journal was entitled: The Effects of Compensatory Acceleration on Upper Body Strength and Power. J. Strength and Cond. Res. 10(4):287

Note: You can use enhanced neural drive prior to explosive sets.

Note on Specificity: What is important to understand is that reversible action movements, which are a more accurate term for plyometrics, refers to a specific skill. The theory is simply to develop the skill, to break through plateaus in your bodybuilding. However, this skill should be viewed as a separate motor ability then lifting for strength.

## Optimized Motor Unit Recruitment

Essentially the name of the game within this category is to maximally recruit as many motor units as possible, namely fast twitch IIB, which are the hardest to target. The body will not maximally recruit as many motor units as possible, until it is forced to maximally perform. It is that simple! This will occur at the focal point of a set. Which is why Mike Mentzer, The Austrian Oak and so many others advocate pushing yourself to the limit on the last rep. That could occur on the 10th rep, or if you are working heavy enough it can take place on the first rep.

**Note:** Remember, targeting fast twitch fibers is a very complex equation. Explosive movements are one way, which needs to be in your arsenal. However, maintaining a set as in 8-12 reps is also an effective way. Be sure and read muscle fibers part two in the anatomy section for further detail.

This is where the mighty strip set can again be deployed! You would begin by choosing a weight you can only lift one time. Once you get the rep, you will not attempt a second one, but rather set the weight on the rack, and strip 2-10 percent of the weight off which would again at this point equal your one rep maximum( due to fatigue ). You would eek out another rep and then repeat the process. Continue until you have gotten 6-8 reps.

What just happened you ask!? For each rep, you maximally recruited as many motor units as possible!

Maximally Recruited Motor Units = **Explosion!**

In summary, you need a good ability to accelerate a weight. However, you should also realize that this is just one vital tool. You will not always train like this. In fact, for a high percentage of your sets, you will train much slower and more precisely( again see muscle fiber article ). And as such, you will never be as explosive as a power lifter. Rather, you will seek a happy medium on all lifting styles. We will now address those.

I would personally work on explosive training one to three times a year, or in cycles.

Rhythmic Lifting - 4 weeks

Explosive Training - 4 weeks

etc.

Just like any other cycle.

## 2. Concentric, Static, and Eccentric Strength

Concentric strength is your ability to lift a particular weight positively. The up phase of the lift, so to speak. The eccentric portion of a rep is the phase in which you lower the weight, and the static portion would be the phase in which you have shortened, or fully contracted the muscle, I.E. the lockout on a dumbbell bench press.

You need to consciously be aware that each of these plays a major role in your training program. There are several ways to discover if you have adequately strengthened each portion of the lift.

A. Concentric Ability - The positive phase of a lift is normally the most focused of the three phases. Most likely this is "relatively" your strongest point. And it is for this reason, that many bodybuilders plateau concentrically first and foremost. The way I would like you to see if your positive phase is in good shape, is if you have been stagnant lately on it. Say you have been stuck with a certain lift for quite a while. You need to understand, that although it is certainly not the only way, progressive resistance, generally in the higher rep range( 6-12 ) is certainly one of the best tools in building your physique. Which means stagnant phases in this category will not yield optimal growth. If this is the case, I would suggest a round about attack on your concentric talent. What I am saying is to literally single it out every workout, for at least one phase, by utilizing concentric super overload. Use it to get out of that sticking point, and then carry on. Or you might use enhanced neural drive, or both methods for that matter. But my point is to pull out all the stops. Naturally this is not the case with each body part, so you will have to analyze each of your lifts. For example you may be progressing on your bench press, and squat, but not at all on your standing barbell curl. With that in mind, focus on taking that rut out. The priority principle is also an excellent tool.

B. Static Ability - As stated, concentric is usually a strong point in a bodybuilders arsenal, as such, it must be carefully scrutinized, and perhaps only narrowed down to one body part. Static strength on the other hand in a criterion task is usually an overall weak point. And it should be stronger than your concentric ability. For example if you can get 315 on the bench for 2 reps, that would total about 10 seconds max. Statically, you should be able to hold the weight straight over your chest for at least 30 seconds.

That is one way to test static strength, another is to test it after a set is complete. You finish a set on the bench press, and then attempt to hold it statically for as long as possible. If you can only do this for a few seconds, you are weak in this area.

What needs to again be emphasized is that progressive resistance is a vital aspect in your hypertrophy program. But does that only mean in your ability to get a certain number of repetitions with a weight? No and no wise! Due to the fact, that you are most likely weak in this area, you will be able to rapidly increase your strength and with it, your muscle mass. Essentially by forcing your muscle face a new stimulus, it will be overloaded to a point in which super compensation is no longer a choice!

Note again on Specificity: As bodybuilders, it is vital to continually force the body to new stimuli. As adaptation is a change in the organism in response to an environmental change. However, these changes are specific. Therefore static strength is specific to the criterion task, and generally has low transfer to say concentric strength, or eccentric strength.

### **How to increase static strength**

A. The most general way would be to incorporate what many call X-rep training. Which means, the whole set is performed statically. Choose a weight on whatever exercise you can perform, lift it so that you are fully contracted and then hold it

there for 30-70 seconds( optimal tension zone for mass gains ). If an area is weak statically, you will find that your poundage's will go up in a hurry. Almost as if it were your first year in the gym again!

You can also build up static strength half way through the movement. Which means that you would squat down about 1/4 of the way, and just hold the weight until failure. Static strength gains will be specific to the degree you train it. I.E. a 90 degree squat will be specific to a 90 degree squat, and not to a 1/4 squat.

B. The second way to improve this weakness is to attack it after a normal set is complete. Say you are performing incline bench presses. After your last rep, hold the weight overhead until you can no longer do so. You will notice a drastic improvement in no time.

Finally, you may already have a strong base in this area. If this is the case, dissect each body part, and see which one is lacking statically. It may be only a few body parts. However, remember that this is a sport of symmetry, treat it as such, and reap the benefits of optimal growth!

C. Eccentric Strength - Raise your hand if you have heard that the eccentric portion of a rep is where most of the stimulus for muscle growth occurs. Ok, most of you did great! Now raise your hands if you know why.

Not as many this time. That is mostly because the latter is rarely addressed.

I have actually discussed it in more detail in the anatomy section of the site. But I would like to re-address it from a rarely discussed standpoint.

You see, when you lower a weight( eccentric phase ) the body only recruits half of the muscle fibers that it did on the positive portion. The point is obvious, you end out placing double the stimulus on the way down on the muscle fibers being worked at that stage, then you did on the way up! That's a powerful statement right there. And it also highlights the vitality of the negative! Anytime you can get twice as much out of a movement, you must suck the life out of the situation.

Going back to your level of eccentric efficiency, there are many ways to test this. As you know, you can, or should have a much higher level of strength at the negative level, then the positive. In fact, up to 150 times the strength. That is quite a jump in strength ( read Adam Knowlden's Shock Your Body Out of The Convert Zone article to find out why this is the case )!

Most bodybuilders however are not reaching those types of limits. The first step to knowing if this is a weakness is if you are failing eccentrically at about the same time you are failing concentrically. Take the squat for example. When you reach the end of a set, are you barely able to get an eccentric rep when you are near concentric failure? Are you barely able to control the weight on the way down?

If that is the case, then I can tell you right off the bat, you seriously need to work on this aspect of your training. Basically your eccentric ability should always be extremely stronger than your concentric ability. Especially in bodybuilding.

Before moving on, let me emphasize two more factors, or benefits to building this area up. First off, notice how I mentioned the word " control " a minute ago. Negative training heavily relies on your ability to control a weight. And secondly, this type of training can target, and in many cases actually reverse the order of recruitment in motor units. Notice in the above quote I stated the following:

*This is why slow twitch muscles are called low threshold, and fast twitch IIB's are called high threshold. Low threshold because they are the first muscle fibers to be recruited and high threshold because they are only recruited under the most intense circumstances! You should understand that your body almost always activates its muscle fibers in this fashion!*

Read that part that I highlighted. I said " almost " always. In the case of heavy negatives, studies have shown that the process can reverse, and you will end up recruiting fast twitch fibers first in the set. That to me is amazing! Studies like these show the extreme complexities housed within our sport. We are literally pioneers exploring a new frontier. That is how much more there is to discover in physiology! Scientists have not even begun to tap into the complexities of a cell.

And our knowledge doubles every 5 years in this respect. The point is simply that no one, can simplify anything this complex. It takes a person willing to push himself not only in the gym, but also in the film room( so to speak ) as you are doing right now by assessing yourself

I would refer you to Old Schools articles on negatives, and also the articles in the anatomy section to get a more in depth look on how to enhance your ability. Briefly however you can use forced negatives, assisted negatives, heavy negative training, an emphasis on the negative, and Old School negatives.

One point I would like to address, which hasn't been in past articles is heavy, pure negative training. This is referring to using an actual heavier weight than you would use with concentric training. Which would mean, if you can lift 225 on the bench press 6 times, you might eccentric train for 6 reps using 265.

The nail I want to hammer home is that, if you are weak in this area, you need to build up slow. Do not go packing on 150 percent of your normal training weight. But rather start by only adding 10-15 percent and training that way. Also heavy negatives should be kept to no more than 6 reps, because it is working beyond your previous limits. Which, if not addressed properly can lead to serious injury.

As always, you may only be weak eccentrically on one or two body parts, or it may be an overall phenomenon. Either way, it needs to be addressed immediately if optimal gains are your interest.

### **3. Anaerobic Efficiency - Systematic, Storage, Productive Capabilities etc.**

**Note:** If you have any specific questions, or would like to get into further anatomical, and physiological detail, consult our anatomy section, as it will most certainly assist you in these matters!

Anaerobic - Without Oxygen

As intense as it sounds, almost every set in the weight room relies heavily on anaerobic processes. We literally train under the gun! To further compound the situation, we stay in this zone until we can no longer function at the given task at hand.

Putting two and two together, it is easy to understand that your anaerobic capabilities must be absolutely superior, in every way shape and form! In order to accomplish this feat you will need to single out the energy pathways used to supply your muscles with ATP( our cells source of energy ) while the muscles are not being delivered oxygen. There are five main factors I will address in improving your anaerobic capacity. Each of these factors should be addressed in your own program, enabling you to see which aspect of your anaerobic conditioning needs the most amount of work.

A. The first factor, and supplier of energy for that matter would be the ATP-CP system ( creatine phosphate ). Your body has only a minute supply of ATP readily available. The muscle cell stores a substance called creatine phosphate. This is used to literally recycle ATP. Combined, the elite athlete can derive several seconds of all out energy production.

B. The second factor we need to address is the GLA system ( [Glycogen-Lactic Acid](#) ). When you run out of creatine phosphate, your body relies on stored glycogen, which is a complex carbohydrate. Think of glycogen as a miniature starch. The *main* difference between the two, is that starch has many more chains of glucose, then does glycogen. Which would explain why a cell would prefer the former. Your cell breaks down the glycogen by hydrolysis( uses water to break down the carb, similar to placing a substance in a container of water and watching it dissolve, it hydrates it ) which allows available glucose, to be synthesized into ATP. This process takes a bit longer than the CP system, but can still afford powerful contractions, for 30-70 seconds of all out work. The problem of course is that this processing of glucose into ATP leaves a bi product called lactic acid. You know the importance of maintaining a correct PH balance. The more acidic( acid meaning molecule can release hydrogen ions ) the interior of your muscles get, the more interference the chemical processes needed for contraction become. This also interferes with ATP production. The afore mentioned combined with depleted energy stores eventually causes failure if intensity is maintained.

C. The third factor, vital to anaerobic conditioning is your transitional capabilities. Which is to say, how efficiently, or quickly for that matter can you change gears! On that note. Do you recall the last time you drove with a newbie on a clutch? I swear, it is comparable to driving on insanely ruff terrain!

The machine, that is your body operates similarly, in that it must make a transition from one energy system to the next to maintain contractile efficiency. If your level of conditioning is lacking, then you will not be able to make the transition smooth enough, and failure will set in before you had a chance to stimulate optimal growth. Turn that scenario around, and you will have the energy producing capabilities to stimulate your muscles to a level you never dreamed possible!

D. Storage Capabilities - If I have a fanny pack full of food, and a family to feed, how many people do you believe will walk away with full stomachs? Another way to compare this, would be to remember your last hiking trip. If you had a long trail to

travel, and only brought one small bottle of water, you would probably fail of dehydration one third of the way up, no matter what type of condition you were in! Your muscle cells are no different. The more energy packed into the cells, the greater your capacity to optimize a set will be. Fortunately we can actually increase our cytosol's( this is the extra cellular material in the cell ) ability to store creatine, and glycogen( and other nutrients such as amino's etc. ). By increasing our energy reserves, we increase the longevity of a working set. A person hindered by energy reserves, is a person asking to run into an unnecessary plateau. I again, liken this to going on a hike without the nutrients to make it up the trail.

E. Cellular Furnace - If you have ever had the privilege of looking at a cell under the intense magnification of an electron microscope, you realize how spectacular the experience can be. There is an entire factory inside of a substance that cannot even be detected by the human eye. It boggles the mind. If you have not done so, I would highly suggest going to a local science center, and doing so. It will most definitely give you a greater perspective on the complexity and shear genius that is your body.

When carefully examining a cell, you will see several structures within it. Firstly the cell membrane( basically the protective layer of the cell, the skin so to speak, ), and once you actually enter the Cytoplasm, which is essentially the cell environment, several organs( actually organelles or miniature organs ) appear. Each of these organs has a particular purpose. Just like specific organs in your overall anatomy have functions. There is protein synthesizing machinery( rER, free ribosomes etc. ), there are packaging centers( golgi body ), digestion capsules ( lysosomes ) and much much more.

The important thing to understand is that you can almost always classify a cell type, or its function, by seeing what the organelle most prominent within the cytoplasm is( cell environment, like the inside of your body ). For example, if I have several squat racks in a room, then the room must be designated for hardcore bodybuilders, or power lifters for that matter! But if all you see in a room is a bunch of sissy, pansy machines, then you can bet that you are viewing a gym that was built for sissies and pansies( I believe JP would agree with me on this one ).

The main organelle we are concerned with here, is the mitochondria. From my past writings you understand the importance of this vital cell component. As stated, our fuel source for muscular contraction comes from ATP! 95 percent of the ATP used for muscular contractions is produced in the mitochondria( again, see anatomy of a muscle and muscle fibers part 3 for a complete understanding on mitochondria)!

Which would mean that an efficient muscle cell, would be jam packed with this machinery! An inefficient muscle cell, would not have a high density in this respect. And by not having it, then the owner of that fiber is literally screwing himself over in countless aspects. Namely for this subject however, he will not be able to produce enough ATP to sustain, or maintain intensity throughout a given set. If you cannot maintain a set, you cannot push yourself to optimal limits, which lead to optimal growth! In addition to this, as the demand for ATP increases, you will have a higher ability to process it, and there will be much less lactate build up! Which as you know will enhance your ability to maintain the time under tension in a given set, big time! You have no choice to address this issue!

Breakdown - How To Assess Each of These Areas, and How to Build Them Up.

ATP-CP System - Summed up this provides incredibly efficient energy for 20-30 seconds. Your fast twitch IIB fibers would be worked best in this time range. Namely 30 all out explosive seconds. The best way to attack this area would be to use explosive, all out training for 30 seconds at a time. If you can explode with a weight in that time frame, this system is probably extremely efficient. However, if you notice, that you can only maintain explosive movements for about 1 or 5 reps( with a weight you can get about 6-10 reps with), then you are most likely lacking in this area. Take even the most gifted sprinters and even their muscular contractile efficiency almost immediately began to slow in a race, but they are so efficient in their anaerobic systems, that you cannot detect the this at all.

Going back to explosive training. It's one thing to be able to explode with one rep. That is essentially what powerlifting is centered on. It is another thing to be able to explode for 6-12 reps straight with a maintained intensity. That is bodybuilding! And that is where energy systems come into play.

GLA System - Bodybuilders will have to train in the 30-70 second range, there is not doubt about that( 6-15 reps). And by doing so they will rely heavily on their GLA energy pathway. In fact, I would say that most growth, occurs in this range( definitely in the fast twitch IIA fibers) , and studies would back this up. Which is why hypertrophy athletes are high rep lifters. Again, if the limit is 70 seconds, then you will want to push this limit( pushing the outter envelope of a system is what will drive its threshold back, which is why I recommend 60-70 seconds for improvement ). I recommend the 60 seconds and grow man grow method. Essentially, for a workout, you will make sure that you never go below 60 seconds on a set. That means that if you have to use partial reps to sustain a set, then that is what it will take! Say I choose a weight on barbell curls that I can curl for 12 reps. If I fail on the last rep, and while timing myself notice that there are 15 seconds left, then I will use partial reps to continue the set until this has been completed. You will know if this system is weak, if your body shuts down almost immediately when lactic acid builds up. Or if you notice lactic acid build up too quickly. The body should be efficient at getting rid of it. But if this is not the case, then you will feel a burn almost immediately when entering the GLA system and will not be able to sustain contraction.

Transitional Capabilities - One of the best ways to test your transitional capabilities is on the 20 rep, rest pause squat. If you find that you cannot make it past rep 10, most likely, you are extremely weak in this area! Again, this is your ability to change from the ATP-CP system over to the GLA system, smoothly in the middle of a set. A well conditioned bodybuilder can do this almost seamlessly. If you feel, that you are reaching a sticking point in the middle of a set due to this, then the best way to correct it is by forcing a transition at peaked levels.

One example of this would be to use a weight that will allow you 30 seconds of all out effort, in which you reach failure. At this stage you have exhausted the first energy system. Strip the weight immediately and continue for 40 more seconds ( about 8 more reps, or 12 depending on tempo ) and you will have made a limit transition. When I say limit, I am referring to the fact, that you not only forced the body to change systems, but to tax both to their highest levels. Any shocking method that takes you past failure can assist this.

Storage Capabilities - Again, if you feel you are not getting a bang for your buck out of a set, because energy is low( which is really an easy aspect to assess ), then you need to build up your storage capacity. The method is simple! Utilize methods that tax the cells energy stores. Supersets, posing in between sets, high repetition training, the hundred rep rest pause method, the 15-20-25 method, partial repetitions etc. Force the body to have no choice but to enhance its ability to collect energy!

Mitochondria Density - Studies show the following for building up mitochondrial density:

*Fast Twitch IIB " Glycolytic Fibers " - 10 minutes of fast running (at close to 100% VO2max ) ( simply means running as quickly as possible for 10 minutes ) produced the absolute greatest results in these muscle fibers as far as mitochondrial density is concerned.*

*Fast Twitch IIA " Oxidative Fibers " - 10 minute all out cardio did the same thing for IIA fibers! Slow Twitch I " Oxidative Fibers " - Slow twitch were another story however. 10 minute runs did increase slow twitch. But optimal results were found in the 27 minute range at at 85% VO2max. In other words a very brisk half hour session of cardio. Increases were actually more in the 60 minute range with easy going intensity, but comparatively speaking 27 minutes was essentially just as effective! And gave you more bang for your buck! -- From Muscle Fibers Part Three Article, make sure and read this piece for more in depth info on enhancing this aspect of your conditioning. It is too vital to ignore!*

#### 4. Ability to Maintain Intensity Throughout A Workout - Aerobic Conditioning / Capillarization / Recovery

A constant pounding...that sums up this sport in a few simple words. Like a prize fighter, the bodybuilder must endure blow after blow, and then come back for more. Even if we have the above credentials down, and can maintain a high level of intensity from rep one to rep twelve, we still must face several other like sets. And if our intensity falters, our training effect( growth, strength gains, etc ) will also lower with it.

To further compound this dilemma, we must recover within days for the following bout. Our stamina must be incessant, proficient, and beyond the scope of what one would call reasonable. This is due to our expectations, which far exceed reason, and enter into the realm of pure freak, freaky, and freakier!

What we need to therefore do, is address the factors involves in maintaining one's intensity throughout a workout, and from workout to workout.

##### Recovery Ability Between Successive Sets

Depletion is the main aspect we will address here. Firstly what type of exercise is involved in a typical hypertrophy set? That would be anaerobic correct...Which means that you worked without oxygen. And therefore must repay that oxygen dept! The quicker you can repay this dept, the sooner you will be able to get back under the rack. Secondly you depleted your ATP stores( and creatine phosphate etc. ). And

finally you built up several waste products which prohibit efficient contraction and intensity during further sets.

Now, if you will notice, or to further expound on these points, in between sets( even shorter ones ), we are essentially sucking wind. This is for several reasons. Firstly, as I stated we need to repay our oxygen dept in order to function properly again, and secondly in order to replenish ATP stores( and everything in between ) we need to use additional oxygen to fuel the process.

Can we step aside for a moment? When you have completed a set, you have depleted your energy stores. Obviously replenishing these is contingent on your diet. If you have a diet low in carbs, you will naturally have less glycogen stores within the muscle cells. Additionally, the meal prior to training has a significant effect. The body will take its energy( in the form of glucose that is ) in three different ways:

remaining glycogen supplies in the muscles

absorption of glucose from food in the intestine, which gets to working muscle through the bloodstream

and finally breakdown of the liver's glycogen into glucose, which gets to working muscle through the bloodstream

As you can see, from especially choice two, that a complex carbohydrate meal, prior to training, can enhance your workout big time, as the muscles will absorb the glucose from the food in your intestines.

### **Recovery Ability Between Workouts**

Recovery in between workouts is contingent on a few basic factors. This would be hormone production, how efficiently your muscles are being replenished with micro and macronutrients, and finally how efficient the muscle is at supporting its current muscle mass. I mention the latter, because if you have a low ability to maintain the current level of muscle, then you will most definitely have a low ability to support the process of hypertrophy, and probably will not be able to support it at all. Additionally, if you are dieting, muscle loss will undoubtedly play a much larger role!

Note: We are addressing the physical conditioning aspect of bodybuilding here. However, it goes without saying, that diet, and sleep are vital to the recovery process. This area also needs to be assessed by you.

#### Enhancing The Factors Involved in Recovery Between Sets and Workouts

Putting two and two together, it is apparent that we need to increase our ability to consume oxygen and deliver oxygen, deliver micro and macro nutrients, clear waste from the muscle cells, and finally have the ability to process and use all of these substances arriving at the muscle. After all, its one thing to receive something, it is another to be able to utilize that something.

Stroke Volume of The Left Ventricle, V02 Max, Capillarization, Ability To Process

I often hear, that bodybuilding is a purely anaerobic sport. Let me ask you a question. What are you doing right now? You are performing an aerobic activity correct. My guess is that you are either on your computer, on the couch or someplace else. ( man, I hope some of you are not sitting on the toilet reading this. You work your behind off to write an article, and people end up reading it in the freaking bathroom. ) When you go to sleep at night, what type of activity are you involved in? The same damn thing. You are breathing in oxygen, therefore it is aerobic. And the same holds true, in between sets, which accounts for almost half, if not more of a particular workout. The minority of our work is done training, and the rest is pure recovery.

You can now see the need to be superior aerobically. Lets begin with the first factor bolded above. This is **the stroke volume of your left ventricle**. Now, in order to understand stroke volume, you need to understand what blood does. It carries all the nutrients, water and gases( like oxygen ) to our muscles. The quicker that blood gets to the muscles, the better, let me tell you!

The left ventricle is what ejects or pumps blood throughout the body! Hence, stroke volume is the literal amount of blood ejected from the ventricle each beat! The importance of this is without question. The higher your stroke volume, the more efficiently you can replenish your working cells.

You can tell your stroke volume by taking your pulse, and counting the beats per minute. If your heart rate is at 80 beats per minute, then that is how many times your heart had to pump blood in a minute to meet your cellular needs. However, if you lowered that( we will discuss how in a sec ) to 55 beats a minute, then you would have drastically enhanced the stroke volume of the left ventricle. Making the body have to undergo much less stress.

Translate this to your workout. After a set, your heart rate would be racing. However, a well conditioned heart would be able to deliver the same amount of blood, in a much more efficient way than an out of shape heart. You would recover extremely quicker, with a left ventricle that had a greater means and capacity to deliver blood to the cells in need of it!

Therefore Increased Stroke Volume will:

1. Enhance Your Ability To Recover Between Sets
2. Enhance your ability between workouts to deliver nutrient rich blood to the muscles that need repair. They will have the needed building blocks, and you will increase the efficiency of hormone production. Furthermore, recover is a difficult enough task. If you could cut the load, or really stress on your heart in half wouldn't you do it? After all, less stress and less energy expenditure leads to more energy devoted to hypertrophy of the desired body parts!

The second aspect discussed was the VO2 Max. This is simply defined as the maximum volume of oxygen consumed by the body each minute of exercise. The two factors involved in this would be the delivery system( stroke volume ), and the processing system. We have already discussed the former, therefore we can move onto the latter.

This, again is your muscles mitochondrial density. The higher amount of mitochondria you have, the greater the capacity for processing oxygen will be. We have already discussed the importance of recovery between workouts due to stroke volume. Let me re-bring to your attention, the vital importance of m. density in this process as well.

*ATP is the human body's perfect energy currency! In fact essentially all cells run off of it! The process of repairing a muscle is also fueled through this mechanism! If you do not have sufficient Mitochondrial density, you will reach a point in which muscular growth becomes an impossibility! This is why I stated that you will never even come close to reaching your genetic potential if you did not seriously train for density in this area! Literally, your muscles will get to a point in which hypertrophy cannot be supported any longer and even maintained! You see muscle is constantly being repaired and maintained. Even when I stand up tiny tears occur in these cells. The more muscle you have the more energy it takes to just maintain it. Eventually( and when I say this, it happens sooner than most realize! ) maintaining the mass becomes a massive job, let alone building it up. The answer: Well you already know it! Build up your mitochondrial density!!! Not only will you continue to grow, but you will grow faster, because you are supplying your body with energy quicker and more efficiency to accomplish the difficult task of building a muscle up! Again, you have two choices --- Quote from muscle fibers part III*

The last factor was capillary density. These blood vessels connect a muscle to our cardiovascular system. They literally carry the nutrients and oxygen to your working muscles. Additionally they get rid of metabolic wastes formed through exercise. Lets add this up,

More nutrients in + more wastes out = a greater capacity to stimulate, and support growth!

### **Assessing Your Cardiovascular Conditioning**

Many a bodybuilder are extremely easy to assess. If you have a problem making it up a single flight of stairs or a small hill( aside from the next day after a leg workout ) then you are seriously, seriously out of shape in this area, and are without a doubt sabotaging your efforts. Essentially, you should have no problem with bipedal forms of travel. No walking, or normal movements should tax your cardiovascular system. Walking up a flight of stairs should be nothing to you.

That is the first step. Now, however, if you have reached that step then you need to assess further. Are you having trouble recovering between sets, or workouts? Has your whole body plateaued in muscle growth for quite some time? Can you maintain your intensity throughout the duration of a workout, or does it seriously falter. If you answered yes to any of those questions, then I would work on all of the aspects above seriously.

### **Just Do It!**

The question now is how to improve each of these aspects. I will outline it for you.

Stroke Volume, VO2 Max - The goal, essentially, is to enhance your hearts ability to pump nutrient rich blood to the muscles. The first way to approach the heart, is through a similar view to that of your weight training sessions. You see, the heart is made of " cardiac " muscle. The difference between cardiac and skeletal muscle, is that you can voluntarily contract the latter, while this cannot occur in the former. The similarities however, is that both can be hypertrophied!

Even though we cannot voluntarily contract our heart, we can voluntarily increase the workload on our entire bodies, thus, increasing the workload on the heart. This is of vital importance. A trained athlete will have a bigger heart, than an untrained. That is the main adaptation. You will not pump blood more powerfully pound for pound, but rather have a larger heart which equals a greater pump! It will also increase its filling capacity ( ability to fill up with blood before each beat ) due to its new enlarged state.

The best way to build this muscle is through high intensity cardiovascular work. One of the best quotes I have heard, was by Trackman Dave in our forums. He stated the following:

*" Progressive resistance, it applies to cardiovascular training as well. "*

Therefore, you will not only want to work on this aspect of your training, but you will want to use progressively harder workouts. Most gym equipment, have progressive levels, which makes it easy to gauge. As you progress, you should also notice a lower resting heart rate. I would definitely take your pulse now, and gauge its improvements over the next 6-12 months. They can actually be quite drastic if you train hard enough.

## **Suggestions**

If you are completely out of shape in this area, then even starting off with one 25 minute cardio session a week can enhance your conditioning. After about a month of this, you might add one hardcore 10 minute session.

If you have a good cardio base, but would like to enhance it, you can jump right into the two aerobic sessions a week.

One interesting fact about most pro bodybuilders is that they do a mass amount of cardio pre-contest. Here is a quote from Ronnie Coleman on his prep for the 99 Mr. Olympia. Which was by far his best condition ever!

*This year, I changed things up quite a bit. For example, instead of doing 30 minutes of cardio in the morning and at night 8 weeks out from the contest, I ended up doing one hour of cardio twice a day, 12 weeks out. It helped me get much harder than the previous year. --- Ronnie Coleman - Battle For Olympia 98*

Paul Dillet, Mike Mattarazzo, Cormier and many other athletes will give similar testimonials. The point I am trying to make, is that like other sports, you can rev your cardiovascular conditioning, during a certain portion of a year, which may coincide directly with your cut. You might end out doing 3-4 hardcore cardio sessions every week. Then, during bulking season, just maintain your condition with much

less frequent training sessions. Take any sport and you will find similar scenarios. In the off season a baseball, basketball, or football player will work on several aspects of physical conditioning, and attempt to hold on to it during the season, but with a much different training style, directed more toward game day performance.

Ultimately, as Trackman Dave stated, you will want to progressively increase the intensity of your workouts. By exposing the heart to a higher workload, it will adapt and become a much more efficient pump! Which is easily the most vital component in our bodies! And again, checking your resting heart rate, is probably the best way to gauge the effectiveness of your program, aside from how you actually feel in the weight room.

### **Capillarization**

Capillaries are of prime concern here, because they are plentiful in muscle tissue. In fact, every muscle fiber is associated with at least one capillary and usually more. If you want specific capillarization( increasing the number of capillaries per muscle group ), then you need to train specifically. By far, and I mean extremely far, the best way to stimulate this wanted adaptation is through the utilization of supersets, tri-sets, and giant sets! They create a high demand for blood, and waste management, and you will see tremendous adaptations, quickly by incorporating them( see old schools shock your body to the next level for further instructions ). Posing between sets also works, as does higher repetition sets.

### **Efficiency of Gas Exchange in the Lungs**

This goes hand and hand with the above statements. I believe the best method for in weight room performance would be supersetting opposite body parts. This will also increase your hearts conditioning. Most people are far from being in the condition they need to be in. Which is why, during a workout like 13 weeks to burning fat, they feel as if they will faint, due to the opposite body, compound supersets. What they need to realize, is that they are literally and quite directly enhancing every area mentioned above, in one fell swoop! It works that well!

## **5. Motionary Status - Flexibility, Scar Tissue, Fascia Hindrance etc.**

It is sections like these that separate the good from the bad, and the great from the good athletes. I truly believe that range of motion is one of the most sacred keys to our sport. What I will do is discuss each factor involved and how to correct this, if it is a weak point in your conditioning.

A. Muscles work in opposite directions. In other words, at the knee joint you are capable of flexion( to decrease the angle between two body parts ) and extension ( to straighten out the angle ). If one muscle group is tight, and not flexible, it will literally fight against its mirroring partner. Which would mean if your knee flexors( hamstrings ) were restricted in their range of motion, then your quads would not be able to perform at full efficiency. Furthermore, within a single exercise, especially compound ones, any number of muscle groups can hinder the effectiveness of the whole movement.

Take the squat for example. You may have flexible hammies and quads, but very stiff anterior calf muscles. If this is the case, then by simply increasing your anterior calf muscles range of motion, you will drastically improve your entire squats range of motion, and your ability to lift weight / stimulate muscle growth.

The first rule of thumb for increasing flexibility is to always stretch every body part worked, during each workout. If you worked the quads, then stretch them. End the lazy attitude, of not feeling that it is worth it, and get down and stretch em!

## **B. Fascia Stretching**

I have discussed this in detail many times before. Briefly, every muscle is bound together by connective tissue. If the connective tissue is bound to tight or is restricting the muscle group, then growth will be slowed. The key here is to utilize deep fascia stretching. Further more, fascia stretching with several angles can enhance separation.

Old School and I were just discussing cadavers the other day. And if you notice, when looking at one. The connective tissue between muscle groups, is very manipulate-able. In other words, deep stretching would have a profound effect on this tissue, as would non stretching. Which is to say, muscle groups would almost get glued together so to speak. Therefore intense manipulation can change this. I discuss this in detail in the article entitled: Can You Use The Muscle Memory Phenomenon, Without Ever Having The Muscle!? I suggest you read it. As it will tremendously benefit you.

And on this note, training can actually shorten connective tissue! This is a terrible concept to have to face! And in fact, due to this, bones will actually get pulled closer together. Not a pretty picture.

We will get into more detail in stretching in further articles. But again, you need to be extremely flexible! As an overview:

1. If any exercise is effected by flexibility you need to correct it!
2. If a body part is giving you problems, it is most likely scar tissue. Work it out!
3. If you feel muscle growth is slowed, and you feel tightness in the area of the muscle, your surrounding fascia is probably restricting further growth. I suggest addressing it with fascia stretching.

## **Conclusion**

We have now reached the end of the road( for part one of this series that is ), and find ourselves facing a two way street. You can turn right, and decide not to put the work in that it will inevitably take to dissect every essence of your conditioning, or you can head left, and find yourself on the road to optimal success in this sport. The choice is yours, but I warn you, you take a chance either way( I know, I need to get off this Neo theme ).

Note: Part Two Will Cover A tremendous amount more. It will delve into the unthinkable, and assist you in developing a like body! Stay toned!

Your In Sport

Jacob Wilson [jwilson@abcbodybuilding.com](mailto:jwilson@abcbodybuilding.com)

President Abcbodybuilding / Beyond Failure Magazine