

Muscle Fibers - An In Depth Analysis Part 2



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Introduction

Have you ever contemplated how the body can explode with hundreds of pounds force in one instance, and in another place only ounces of controlled pressure? It just so happens that this kind of thinking can be very anabolic. Yes, very anabolic indeed! You see weight training is a manipulation of our body's everyday functions or movements if you will. If we can thoroughly understand how those functions are carried out then we can simulate them directly under resistance. And not half hazardly as most trainees seem to enjoy doing, but rather with the precision of a skilled surgeon! This is without a doubt the goal today. You will not only learn what each muscle fiber's functional duty is, but how to translate those duties into maximized potential in the weight room! Come with me if you want to grow!!

Muscle Fibers Makeup and Purpose

What you learned in regards to energy systems is unbelievably vital to your comprehension of muscle fiber types. Understand that we have three basic muscle fibers and each one is designed to work with one or more of the above systems(19). What I will do is break down each of these in the following paragraphs.

Note: Again, our goal in this article is to thoroughly understand muscle fibers, in order to attack them with the utmost proficiency in the weight room!

1. Power Muscle Fiber -

The anaerobic systems(pc and glycogen lactic acid) listed are designed to support powerful contractions in the absence of oxygen. These explosive contractions may be used to climb a tree, sprint, explode into a jump, or lift an extremely heavy object. Surely you can see the potential these systems can have. That being said, how would you create a muscle fiber to function in such circumstances? You would want it to generate optimal force right!? If you recall from my article entitled, *The Anatomy of a Muscle Fiber*, the contractile machinery in the muscles are the actin and myosin filaments(23). Therefore the more of this protein you have, the higher

potential the muscle has to generate maximum force! That is the first ingredient needed, what would be the second? The muscle's capacity to work without oxygen should be very efficient. This means that the cell should be very high in glycogen stores. Finally since the fiber is not designed for long and slow contractions it would not need high oxidative properties.

What does this mean? Well if you designed a muscle like that, it would not contain high myoglobin stores (why should it store oxygen). Further, there would not be much room for capillaries and mitochondria. Again, this is meant for high energy, power activities, not long endurance. This means that the muscle fibers would be extremely easy to fatigue. There actually is a cell in our bodies that fits this description to the T! It is called a Fast Twitch IIB fiber. They have a few other names as well. The first being "Fast Glycolytic Fibers" because they contract fast and have large capacity for glycogen storage. The second being high threshold fibers, which will be explained shortly. The third is white fibers, due to the fact that they lack myoglobin stores. Myoglobin is red, so the next time you eat white meat, you will know that you are consuming IIB fibers!

Further Analysis

The first thing that needs to be analyzed is the contractile proteins. For bodybuilding purposes, contractile proteins are the largest aspect of a muscle fiber. For the purposes mentioned above, IIB fibers contain more contractile protein than any other cell. This makes them larger than any other muscle fiber. Their importance is therefore obvious in regards to our sport. Notice how I also mentioned that these muscle cells have low myoglobin content, a smaller number of capillaries and finally a low amount of mitochondria. These all add up to less endurance, and something else that is very, very significant to the way you train! As you know mitochondria is where 95 percent of the ATP our muscles use is produced. You also know that between sets the body needs oxygen to replenish these stores. With fewer mitochondria, it will take longer for your IIB fibers to recover in between sets, further you will not have as much oxygen in the cell due to the lack of capillaries and myoglobin. Capillaries, are not actually a part of the muscle cell. What they do is link it to the cardiovascular system. Each fiber in our bodies is associated with a certain number of these and they are responsible for many actions including bringing oxygen to the cell environment! The conclusion here is simple. You must rest longer after targeting IIB's, than any other muscle fiber in your body! More on this latter.

2. Endurance Cells -

The next muscle fiber that needs to be addressed, is one that works well for slower, more coordinated actions such as standing, walking, slow jogging or even maintaining our posture. Naturally such activities would work directly with the Aerobic Respiration system. A muscle fiber in this environment would first and foremost need high endurance properties. It would need a tremendous amount of mitochondria, in order to make ATP for an extended period of time. Your heart is actually a perfect example of an endurance muscle. It is composed of a 20-25 percent mitochondrial density! And no wonder, it never stops working! Secondly it needs a higher enzyme content

(enzymes for all intensive purposes break down substances to either produce chemical energy or to break it down to be used more efficiently) to break down fats so they can enter the mitochondria to be processed into ATP. They also need high

myoglobin content and a tremendous amount of capillary density. This is to provide oxygen so that macronutrients can be fully broken down and not leave behind high amounts of lactic acid. In other words the cell should be virtually unfatigueable. Finally because it does not need to generate as much force, the fiber will not contain as many contractible proteins.

Identification and Analysis

The cell that fits the bill here is called a Slow Twitch Type I muscle fiber. It is also known as a red fiber due to its myoglobin content. Dark meat is made up of slow twitch fibers, and you can see where the reddish color comes from (myoglobin of course). The final two names are low threshold fibers (discussed latter) and Slow Oxidative because they contract with a slower frequency(not explosive) and because they use Oxygen in the ATP formation process. Slow twitch cells have less contractile proteins and as a result are not as large as the white glycolytic fibers. Unfortunately this leads many a bodybuilder to come to a completely false conclusion. I don't know how many times I have heard athletes say. " Well slow Twitch muscle fibers do not really even apply to this sport. " I'm here to tell you that this could not be further from the truth! If you ignore the potential growth of quite possible half of the cells (muscle) in your entire body, then you are literally shutting the door on a gold mine of pure mass! So many people complain about their lack of ability to gain mass, when the real problem is their lack of knowledge in working out for mass. This is a much more complicated sport then people like to give it credit for. Perhaps the most mentally demanding in the world. The point is that their are muscle groups that are over 80 percent slow twitch, and to ignore that high a comparative ratio of fibers would be ludicrous!

3. Happy Medium Fibers -

The question now remains, is their a muscle cell that has the best of both of the above worlds? One that stings like a Bee and floats like a butterfly. The answer is a definite yes! The muscle cells I am now referring to are called Fast Twitch IIA's. They are also called Fast Oxidative fibers because they contract quickly(are able to develop a lot of force) and have high oxidative properties. These are our bodies " Intermediate muscle cells (5). " They are large, but not quite as large(so they have quite a bit of contractile protein, but not as much as fast glycogen cells) as are 2 b's and their fatigue resistance is intermediate. These are extremely important because they allow us to maintain contractions with heavier poundages for longer periods of time.

Overview	Muscle Fibers		
Type	Slow Twitch (I)	Fast Twitch (IIA)	Fast Twitch (IIB)
Power of Contraction	Low	High	High
Fatigue Resistance	High	Medium	Low
Oxidative Capacity	High	High	Low
Anaerobic Enzyme Content	Low	Medium	High
Mitochondria	Several	Several	Few

Capillaries	Several	Several	Few
Myoglobin Content	High	High	Low
Color of Fiber	Red	Red	White
Glycogen Content	Low	Medium	High
Myoglobin Content	High	High	Low
Fiber Diameter	Small	Medium	Large

How Your Body Recruits Muscle Fibers

Note: This is a subject (nervous system) I would like to devote several complex articles to in our new anatomy section. Therefore I will say only what is applicable to this particular 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). As small as it is, it contains easily over 150, 000 muscle fibers! A Motor Neuron is what stimulates our muscles to contract. 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 way your body recruits these motor units is fundamentally as follows. 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!

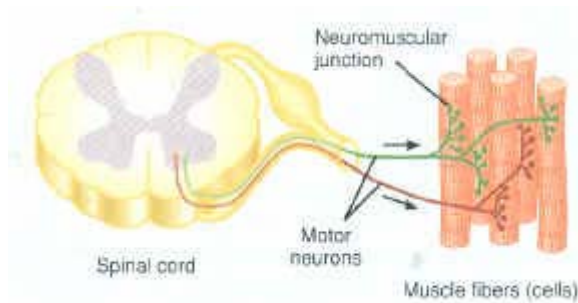


Figure 1 Graphically Depicts a Motor Unit

note: This is actually a quite in depth subject, but overall, this is how the body works. There are many ways to manipulate order however. I will leave that for the nervous system section of the site.

I would like to give you a good definition of threshold. In Webster's it is simply stated as " the point at which a physiological or psychological effect begins to be produced. " A great example is something we are all too familiar with. Our pain thresholds. For some this is low and others extremely high. You have reached this threshold when the pain of a certain activity causes you to quit. I personally inherited my pain threshold from my old man. I've seen several great athletes, but none ever had as close to the pain threshold that he had. Literally nothing was great enough to stop him, as far as this aspect was concerned. Where as my mother(God Bless her) had a low threshold of pain. If she got a minor cut it immediately broke her pain threshold. I'm sure most of you are familiar with what I am talking about. Its the same way with athletes that I train, I can push some people farther than others, simply because their pain thresholds allow me to do so, and others don't. The lower the pain threshold, the less hardcore a person is, and the higher, the greater his capability to be hardcore. A person with a low pain threshold may quit his or her workout after one set of squats, a person with a high threshold may be able to endure an Austrian Blitz before his or hers is reached.

It is the same way with our muscle fibers. Any activity will cross the threshold of slow twitch muscle fibers, while more intense ones will activate fast twitch IIB fibers. Therefore the force or tension required of a muscle group determines the recruitment of its motor units(again this is a group of muscle fibers controlled by a neuron). Fibers will be activated with the speed of contraction you exert, the amount of weight you force the muscle to face, or the sustaining of the load you force the body to endure. When I say speed, remember your fast twitch fibers are meant to contract quickly. Therefore, your body will naturally recruit more fast fibers when called upon to perform explosive activities. This is why sprinters have such huge legs! The speed at which they force their muscles to contract stimulates their higher threshold fibers.

Lets say that your one rep max was 250 pounds on a bench press. If you were to lift 125 pounds(half of your max) you would recruit your slower motor units. This simply is not a great enough stimulus to recruit denser fibers. If however you were to lift 225 for 6 reps, you would incorporate faster twitch fibers. That's basic right? Our goal is of course muscle growth and this will be discussed in a minute, I am just clarifying recruitment. A third way for your body to recruit different fibers is when it is called upon to maintain a certain level of force. Think of it this way, if I am moving a sofa into a friends new home([see the things we have to put up with as bodybuilders](#)

[article](#)), I want to be able to hold that sofa all the way from the moving truck and upstairs(remember the laws of moving). If its a flight of 10 super steep steps and the sofa is heavy, my body will have to recruit its fast twitch fibers. My moving technique is to use my hands as a grip and let my legs do all the work. On the first step my legs will begin recruiting my fast twitch IA fibers. By the 2 or 3rd step those nervous system does not recruit more motor units. This being the case the first set of fibers rest and more IIA's are recruited. Along with these, a number of fast twitch IIB's are called into play(again to maintain my fluent motion upstairs). As my journey continues more IIA's and IIB's are recruited until by the last step they have all come into play if failure is reached. Therefore this is a perfect example of recruitment designed to maintain a desired amount of force. The same occurrence was also taking place with my grip on the sofa. More and more motor units had to be called into play in order to maintain my grip on the sofa. Consequently this is actually the most used method of recruitment applied to bodybuilding circles for reasons explained shortly.

I must also mention that in a set similar to my walk up the stairs, the muscle fibers would not twitch at maximum frequency until the end when nearing failure. To begin the set, my fibers were actually not twitching(the rate at which you twitch determines force produced) at a maximum frequency. At the beginning of a set, the cells do not need to twitch at maximum frequency to overcome the weight, at the end however when fatigue has set in they must produce as much force as possible in order to continue overcoming the weight being faced.

Applying These Concepts To Produce Growth!

A vital concept that every athlete must grasp, is that the body does not adapt to look good on the beach, but rather to survive! This simply means that lifting a weight will not necessarily make your muscles grow. There are several other ways that it can compensate. Just think about it, extra muscle tissue means more work for the body, if it can increase your strength without hypertrophying contractile machinery then it is a happy camper. That is more tissue it must maintain and more calories that it has to consume to do so. The body likes to seek a water level, find a place of comfort and stay there. This means that it's adaptations will always be practical. We think differently on the other hand. More muscle tissue translates to advances in this sport, and a greater fat burning metabolism! With this in mind I will cover how the body adapts to essentially all movements it is faced with in the weight room and beyond. You can then apply this information directly to your workout.

Adaptations Made From Low Repetitions

Low repetition work provides an extremely unique adaptation. The particular range I am talking about is between 1-5 repetitions. This has been verified through studies to be " generally " the best range to see pure strength gains in a person's one rep maximum lift(7, 8, 9, 10). Explosive, demanding work such as this causes your body to react immediately to overcome the resistance. You are not giving your body much choice in the matter. Either it recruits as many motor units as possible or you get crushed by the weight! This is why specific nervous system adaptations must take place in order to survive the next bout of training.

note: Again, we will get into deeper detail on these neural mechanisms in the nervous system coverage presented latter in our anatomy section.

1. Our bodies have protective mechanisms, which cause us to fail before the muscles have actually exerted their full potential against the resistance. This is naturally to prevent injury. However, repetitions in this low range will cause adaptations that will increase your ability to use your muscles full potential. You can see how this will make you stronger.
2. Secondly in order to overcome the weight, you must recruit as many motor units as is humanly possible. Therefore your nervous system will become more efficient at this process. In essence you will **learn** to lift the heavier weight with greater efficiency by coordinating all(or as close as is possible) of your muscle fibers in one fail swoop. This is one reason that powerlifters are so brutally strong. They can literally cause all of their motor units to fire at once! The more motor units working together, the more you will be able to lift in a single one repetition effort(22)!
3. Thirdly, studies have shown that athletes can cause muscle fibers to act more like there counter parts. In other words, you can make a slow twitch muscle fiber act more like a fast twitch fiber. Which means that it will be able to twitch faster. (this also works opposite, for example, most bodybuilders fast twitch IIB fibers behave like fast twitch IIA fibers. This is a good thing and will be discussed in a bit.). If a muscle can twitch faster it can produce more force. (12, 13, 14,)
4. You can also improve your ability to take advantage of your elastic energy(18). In order to overcome enormous weights, an athlete will want to use this. When a muscle is stretched, the quicker 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. Therefore strength athletes will take full advantage of this, by lowering time in the " hole. " Heavy lifting forces one to explode in order to take advantage of this or the weights will not be overcome, this enhances this aspect of training. This also goes along with taking advantage of momentum.

As you can see, strength gain in the 1-5 repetition range can take place without muscular hypertrophy. Does this mean that growth cannot occur at these junctions? Certainly not, it simply means that growth can take place, but it is certainly not the optimal method of adaptation in this zone. The reason for this is twofold. Firstly lower rep sets do not recruit and exhaust as many muscle fibers as higher repetition sets. Secondly, the contractile proteins in a cell are responsible for most muscular growth. These must be exposed to enough stress or they will not be damaged enough to overcompensate by increasing in size. Therefore it is not enough to recruit a muscle fiber, you must also damage the actin and myosin filaments if it is to grow.

In regards to bodybuilding, when used correctly 3-5 repetition sets can stimulate hypertrophy in your fast twitch IIB fibers. If you are experiencing a plateau in growth, I would suggest starting your routine out with a few sets in this range. It will not work very long as far as mass gains are concerned, but in this sport we should take advantages of every opportunity to grow. This style of training is also of extreme benefit(beside its obvious benefit to strength athletes) to someone who must maintain his weight and gain strength. For example, wrestlers, boxers, martial artists, track stars etc. It can also be applied to other activities that cause an athlete to recruit as many motor units as possible in a short amount of time.

Adaptations Made From Higher Repetition Sets

It is now understood that every muscle fiber has a threshold and that the fiber must be adequately stimulated(a nice term for damaged) in order for it to grow. This simply means that your sets must be heavy enough and long enough for optimal mass gains to be realized. These are the repetition ranges that are responsible for hypertrophy induced adaptations in bodybuilders. For comparison I will include lower repetitions as well:

Overview	Growth In Muscle Fibers Below			
Repetition Range	Type I	Type IIA	Type IIB	Strength Gains
1-2 repetitions	Very Low	Low	Low	Excellent
3-5 repetitions	Very Low	Low	Decent to Good	Excellent
6-8 repetitions	Very Low	Good	Excellent	Good
9-12 repetitions	Low	Excellent	Very Good	Good Within Rep R.
13-15 repetitions	Decent	Very Good	Decent to Good	Endurance
16-25 repetitions	Very Good	Diminishing	Low	Endurance
25-50 repetitions	Excellent	Low	Very Low	Endurance
(6, 7, 8, 9, 10, 11, 12, 21)				

Numbers Translated

The first aspect I need to stress is that each set of repetitions I placed above were based upon how hardcore you were while performing them. You need to select a weight that causes you to certainly come at or near the edge of failure in the selected rep range. Furthermore there are many variables that will cause this to occur aside from the amount of weight you are lifting. Here is a list of factors:

1. How Strict You Are - Let say you are trying to hit your fast twitch IIB fibers in a range of 6-8 repetitions for the biceps. If you take the barbell and start swinging it up and down like a fat slob downs beers you will inevitably take much of the stress off of your guns and place it onto your deltoids and back. By doing this you will certainly have to lift a much heavier weight if you hope to hypertrophy the target muscle group. However, if you lower the weight, and eliminate your accessory muscles as much as possible you will still fail in the 6-8 repetition range, and have stimulated probably more growth then *the fat, drunk slob method*. The reason for this is that your biceps actually faced more weight then they would have, because you asked them to " shoulder " the load.

2. Speed of The Repetition - This is perhaps the most difficult variable in the equation. Remember as a bodybuilder the goal is to feel the muscle contract, not to execute a repetition. This simply means that the majority of the time, momentum should not take the weight up, but rather your muscles. All to many times I see bodybuilders perform a set of 12 on the bench press in 2 seconds flat! The problem

is that they are neglecting the negative aspect of the repetition. Countless studies have shown that more damage is done eccentrically(lowering the weight) then concentrically. And so they will allow gravity to bring the weight down, rather than their muscles and use momentum by not pausing on the bottom(actually rather than pause they bounce) to lift the weight back up. In essence the athlete has cheated him/herself out of growth twofold by eliminating the negative and lessening the concentric (lifting) effect of the exercise. Therefore do not rush the negative.

On the other hand changing the speed on the concentric portion of the rep can actually change what type of muscle cell you target(20). If you lift a semi heavy weight at a decent controlled speed you will target the IIA fibers, but if you explode on the concentric you will target a greater percentage of white IIB fibers. The great thing is that by accentuating the negative you will have eliminated quite a bit of the momentum and therefore your muscles will take much more of the load, even while explosively lifting on the positive portion of the lift. Adam "Old School " has discussed this method quite a bit in the forums, and he is incredibly on the money!

This is an excellent way to stimulate growth, but the body adapts to lifting speeds quickly. I would say every 2-4 weeks. Therefore another way to increase the load on your muscle fibers is to completely eliminate momentum. Studies have shown that it takes several seconds for momentum to be eliminated after lowering a weight. If you pause at the bottom for 1-2 seconds you will have eliminated much of the mechanical advantage and force your muscles to do more of the work. Milos Scarvey due to injuries decided to use this method of training and got phenomenal results for the 1998 Olympia. Also technically if you lift the weight slower than normal then even more of the mechanical advantage will be eliminated. The real point here is to play with repetition speeds! Overview:

- a. Accentuate the Negative, studies confirm this to be the most important aspect of hypertrophy training.
- b. By increasing the speed of a rep, your body will recruit more IIB motor units. However, after a few weeks the hypertrophy effect of this will diminish.
- c. When This Happens, eliminate momentum almost entirely by pausing on the bottom of the rep, thereby forcing your muscles to work harder due to the increased workload. Decreased Momentum = Increased Stress On Your Muscle Fibers.

3. Negative Sets - As I stated, negative repetitions maximally stimulate growth in muscle fibers. It just so happens that a muscle can handle up to 150 percent more weight on the negative then on the positive portion of the reps. This is a conservative number, because one athletes negative strength will be better than another. For example, a power lifter may not focus on the negative because it takes away from momentum and in turn takes away from the maximum amount of weight they can lift. Therefore, " **relatively** " speaking their negative strength may not be as strong as a bodybuilder's would be. Considering the fact that you can use more weight on a negative, and that fast twitch muscle fibers have a higher threshold, it would make sense to incorporate this method of training. An example of how to begin this, would be to start out 10-15 percent heavier then a certain repetition range's maximum. Say you can lift 250 6 times. You would raise the weight to 280 and only focus on the negative portion of the rep for the same total of repetitions. Of course you will have a training partner taking as much weight as possible off during the concentric portion of the rep. Negative sets are a proven method for targeting dense IIB and IIA fibers!

4. Development of Endurance Properties: As I discussed higher repetition sets recruit more muscle fibers than their lower rep counter parts, but I would like to briefly explain why. Take a one rep max and compare it to a set of 10 reps. For the set of one, your body adapts by recruiting as many motor units as possible, in a synchronized fashion. In addition it does not develop endurance characteristics such as mitochondria(below I will explain how to increase mitochondrial density). A higher repetition set recruits muscle fibers in the same fashion as my stair example. Which is to say, the body adapts to **progressively** recruiting cells, rather than as many as possible as quickly as possible. As you recall, it takes all the way till the end of a set for all muscle fibers to fire together at a maximum frequency. Therefore the fast twitch fibers adapt by acquiring more endurance qualities.

This is excellent, because it allows fast twitch cells to last longer, which increases the amount of time that they are exposed to the stress of resistance, and enhances hypertrophy. You will also find out shortly that these endurance properties are the difference between a bodybuilder continuing to grow way past his so called genetic limits, or for him to plateau so badly that he considers retirement (or decides to just settle for second or even third best of what he was really capable of!)! On another note, training for endurance, and having your body adapt to recruitment of muscle fibers in this fashion can be detrimental to the powerlifter if overused. This is one of the reasons why I have stated that bodybuilding and powerlifting are completely different sports.

5. Time Consideration - If you look at hockey players you will notice that they have absolutely massive legs! This is across the board, almost all athletes in this particular sport have accumulated a tremendous amount of hypertrophy in this specified region. It just so happens that their sport is similar to weight lifting, as far as fast twitch muscle fibers are concerned. They go on the ice and sprint until they have essentially reached failure and then recover on the bench. The typical shift for these athletes lasts between 30-60 seconds of maximum effort. I noticed this myself years and years ago(I'm biased, being as hockey was an important part of my life)! Several weight training coaches have also noticed this for years(8, 9, 10, 17,) and it is just now becoming popular main stream. The theory is that maximum hypertrophy in fast twitch IIA and B fibers occurs between 30-60 seconds. This is the primary reason why the repetitions above fit this bill, because they usually all fall within this range. Think of 30-45 seconds as 6-8 reps and 46-60 as 9-12 repetitions. This method of training can be applied to almost any activity that causes an athlete to exert a maximum amount of effort within the time frame. One technique this is perfectly applied to is static contraction training or static strip sets. As I have stated in my articles, when using this shocking method, you want to time yourself within this range.

Notice that the illustration discussed above was an activity outside of weight training! Do not be fooled, this can very much be applied to us as bodybuilders. Recently a client of mine's legs had plateaued. I instituted short all out sprinting sessions, lasting 30-60 seconds against high levels of resistance(a higher level on the bike) and he ripped through his plateau like tinfoil! His quads grew so much that he had to pull out the vitamin E due to the stretch marks he had developed. I don't believe that this will be the traditional style of training for our sport, but it can and will stimulate growth in your fast twitch IIA and B fibers! If you look at sprinters their hamstrings are incredible. Try sprinting for a month to induce hamstring

growth and see if they don't explode! Again, apply this principle to whatever activity fits the bill.

7. Slow Twitch Muscle Fibers - The story on working type I cells begins happily, but has a sad ending. The reason why it begins so easily is due to their low thresholds. Which is to say, any low weight exercise immediately recruits slow twitch motor units! If you can recruit them, you can stimulate growth in them! So far so good. The sad ending however is the extreme pain you will have to endure to actually force them to hypertrophy! Believe me, benching 135 pounds might seem like easy money, but lifting it for 100 reps is about as hardcore as a human being can get! The throbbing pain is almost too much to bare! Never the less, that is what it takes. Fail or come close to failure in the repetition range that I discussed above and your slow twitch muscle fibers will give you more mass then you would have believed!

6. Shocking Methods Applied - Shocking Methods have very specific applications to mass. I try to get into detail on what these accomplish through my articles on them. A few are:

1. The larger and stronger your muscle fibers become, the harder it is to stimulate growth in them. Shocking methods extend sets to points that straight sets simply cannot.
2. They allow you to target all three muscle fiber types to their full potential in one fail swoop. Think of it this way, a 8 repetition set may not give you a complete stimulus in your fast twitch fibers. By stripping the weight, you almost ensure complete stimulation across the board. You may also manipulate sets in ways that would be impossible any other way! For example, lets say you wanted to go extremely heavy and super high rep at the same time. Or if you wanted to combine the positive aspects of low rep sets with those of high rep sets. You could easily lift a weight that causes you to fail in the 5 repetition range, then strip to another weight you can only lift 5 reps on, and so on and so forth! Furthermore, compound sets release hormones on a wider response, where as isolation exercises release specific hormones for the particular muscle group worked. By combining a heavy compound with an isolation you will get the best of both worlds. I can go on and on, but it is for this reason that I write entire articles on shocking methods. (you will also see that they are exceptional at creating density in mitochondria).

Rap It All Up -

The body adapts to repetition sequences quicker than any other stimulus it will face. This is why you will want to keep your workouts fresh, and use all of the above techniques discussed to optimally stimulate growth in all three of your muscle fiber types. Finally I would like to stress that " strength " is relative to optimal stress placed on the muscle group. In other words, don't work your ego at the expense of your muscles!

This Article Is Continued In Part Three Of The Series! [Click Here To Read It](#)

Sincerely

Jacob Wilson

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