Hello again everybody, I’m Dr. Larry Van Such, and welcome back. If you haven’t already listened to the first seminar on isometric training, I highly recommend that you go back and do so now, since a lot of what we are going to talk about today builds from this discussion and we are going to assume that you already know certain things or at least have an idea of what we are talking about.

So again, if you haven’t done so already, please go back and listen, it will only take about 20 minutes and it will be well worth your time.

For those of you who have already listened to the first seminar, today we are going to continue our discussion and talk more about slow twitch fibers and what makes a slow twitch training program and fast twitch fibers and what makes a fast twitch training program. We have a lot to cover so let’s begin.

The first thing I want to talk to you about are the basic principles of muscular contraction. If you remember from our last seminar we started to talk a little bit about skeletal muscles and how each of them contain both fast twitch muscle fibers and slow twitch muscle fibers.

Fast twitch muscle fibers are responsible for the speed of muscular contraction and slow twitch fibers are responsible for the strength and endurance of a muscle. There is actually a third fiber type found in skeletal muscles called intermediate twitch fibers, which are fibers that possess qualities of both slow and fast twitch fibers. We probably won’t refer to these any more but I want you to know that they exist.

Now, in most muscles, these fiber types are intermingled, that is, they are mixed together. However, there is usually a predominance of one or the other. For example, in the postural muscles along the spine, the slow twitch fibers dominate. This is because slow twitch fibers can undergo extensive repetitive contractions without fatigue. This is important because in order to maintain good posture while standing and even sitting, your slow twitch fibers need to be constantly firing, that is, contracting back and forth, over and over again, helping to maintain an upright position. This happens constantly and without you even being aware of it.

In non-postural muscles, such as those located in your arms and legs, the fast twitch fibers dominate. This allows for powerfully quick forces to be generated over a short period of time. This too is very important because you need your arms and legs to be quick and fast since a lot of times they are needed to react to certain stimulus to protect yourself. Such as is the case if you touch a hot stove or need to move quickly to get out of harms way.

All of these fiber types are arranged into groups known as motor units. There are many motor units within the overall muscle. When a muscle begins to contract, only some of the motor units become active. As the demand on the muscle increases, more and more motor units are recruited.
to help support this demand. As the demand on the muscle decreases, the number of motor units also decreases. This is a general description of muscular contraction.

Now it is widely accepted that the most popular way to exercise your skeletal muscles is through weightlifting. For example, the quadriceps are typically trained on a leg extension machine; the hamstrings are typically trained on a leg curl machine; the adductors/abductors are trained on adductor/abductor machines; and the pectoralis muscles are trained on a flat bench, incline, and/or decline bench, with dumbbells or machines.

Plyometric training is another popular way to exercise your skeletal muscles that involves the stretching of a particular muscle and then quickly trying to contract it. Examples of plyometric training include jumping up and down off of boxes, running steps, and jumping rope. Even running with ankle weights and swinging a baseball bat with a weighted doughnut at the end are plyometric exercises.

There is nothing wrong with these types of exercises if trying to increase your muscles strength and endurance are concerned. They are excellent exercises and I highly recommend them if that is your goal.

The problem, however, lies when you do these and similar routines and are expecting your muscles to start contracting faster, as in running faster, or throwing a baseball or softball faster, or swinging a golf club or tennis racket faster, and even if you are trying to jump higher or kick a football or soccer ball farther. If speed is your goal, then these exercises will be of limited value, and I’m going to explain to you why.

Let's first go back and look again at the basic definition of what a slow twitch fiber is. The following was taken from Grays Anatomy Textbook: Slow twitch fibers are fibers that are responsible for the strength and endurance of a muscle only, and not the speed in which a muscle contracts. And a slow twitch response is defined as one where your muscles can undergo extensive repetitive contractions before fatigue, that is, before getting tired.

Now, you may have already known about the first part of this definition; that is, slow twitch fiber are responsible for the strength and endurance of a muscle, but what about the second part that states that a slow twitch response is defined as one where your muscles can undergo extensive repetitive contractions before fatigue?

What is the relevance of this statement? More particularly, what is the relevance of the phrase extensive repetitive contractions?

Well let me ask you a question; What do weightlifting and plyometric training have in common?

How about extensive repetitive contractions. Or, how about just, “repetitions”? Would you agree that weight training and plyometrics are well known for putting your muscles through a lot of repetitions? The answer is yes.

So what does this mean? Well for starters it means that since weight training and plyometric training involve putting your muscles through numerous repetitions, and since the ability to perform a lot of repetitions is the main function of a slow twitch fiber, then any training routine that forces your muscles through repetitions, like weight training and plyometrics, will by definition, train your muscles for better strength and endurance. Or in other words, any training...
routine involving repetitions, is by definition, primarily a slow twitch fiber training program and not a fast twitch one. Now this definition of a slow twitch fiber is not my definition, but rather, one that is taken from medical textbooks found throughout the world.

And if you ever hope to become really successful at increasing your muscle contraction speed, then its extremely important that you understand this. Why? Because if all you ever do is weightlifting and plyometric training, or any similar routine involving a lot of repetitions, such as working out with medicine balls, or , then not only will you be training your slow twitch fibers for better strength and endurance, but you will also be conditioning your fast twitch fibers to behave the same way. Why? Because as we said earlier, skeletal muscles have both slow and fast mixed together, and you cannot separate them from each other and train them individually. They are always trained together and at the same time. And by weight training and plyometric training, which are primarily slow twitch exercises, like it or not, your fast twitch fibers get dragged into the exercise and then they start acting or behaving more and more like slow twitch fibers. This is great for your strength, but bad for speed. And this is why a lot of times, it is not uncommon to actually get slower after doing these types of exercises.

Now I know some of you listening right now might be thinking, “I don’t know if this is entirely true because I did get faster after doing plyometric exercises or weight training”. You may have done exercises such as running down the football field with a sled of weights or a parachute attached around your waist. Or you may have run the steps at the stadium, or maybe you did a lot of jumping up and down off of white boxes. These are all plyometric exercises and yes, I’ll admit it is possible to get a little faster by doing these types of things. Whenever you get stronger and increase your endurance at something, you can’t help but get a little faster. But how much faster did you really get? And, how long did it take before you saw any improvement? Dropping your 40 yard dash time by 1/10 of a second after training for 4 months to a year is not that big of a deal unless you are at the absolute peak of your athletic ability.

And I think its worth mentioning here that a lot times, what is perceived as getting faster with plyometric training and weight training is really nothing more than an increase in muscular coordination with that particular activity. And the thing to understand here is that increasing your coordination is common to all types of training, not just plyometrics, and it will always give you the appearance of getting faster, but it is only the first step to increasing muscle speed. And so any increases in speed with weight training or plyometric training will always be secondary to increases in strength and endurance with these exercises for any length of time.

And so let me summarize for you what I have said so far. Slow twitch fibers are responsible for the strength and endurance of a muscle and a slow twitch response is one where your muscles can undergo extensive repetitive contractions without fatigue. Therefore, any training routine that involves a lot of repetitions is a slow twitch exercise program and good mainly for strength and endurance, not speed. Also, since slow twitch fibers are mixed together with fast twitch fibers, they are always trained together and so not only does weight training and plyometric training condition your slow twitch fibers for strength and endurance, they also condition your fast twitch fibers to behave the same way. This is ultimately counterproductive to speed training.

In a moment, I am going clarify what I have said to far even further and explain to you exactly what happens to your muscles when you do repetitive exercises, but first I want to read for you a few testimonials:
Testimonial break, when return I’ll explain why this is the case.

Okay, we just finished talking about training routines that puts your muscles through repetitive contractions (i.e., repetitions), like the ones done during weightlifting and/or plyometric training, and how these are primarily slow twitch exercise programs. Now I am going to explain to you why:

Slow twitch fibers are capable of undergoing extensive repetitive contractions without fatigue. Extensive repetitive contractions, or repetitions, force the lengths of your muscles to be constantly changing. Muscles contract then elongate, and this process is repeated over and over again anywhere between eight to twelve times. This is what’s known as a “set.” Doing sets of exercises provides your muscles with an infinite number of potential stopping points between the beginning of a repetition and the end.

This has the effect of overloading your muscle memory pertaining to just one specific stopping point. A specific stopping point that is well-defined in a muscle’s memory, as you will see, is necessary to produce faster contracting muscles. Without them, your muscles will always be slow to respond.

To help illustrate this point, lets take for example, performing biceps curls: You begin with your arm down by your side holding onto a weight, perhaps 20 lbs. Next, you flex your forearm upwards until you can no longer move it. This process is usually repeated over and over again until the muscle tires. The net effect is the biceps is trained to be strong at the starting point, ending point and all points in between.

However, if you want your biceps muscle to contract to a specific point very quickly, two-thirds of the way for example, it cannot do so … at least not very fast. It’s hasn’t been trained to perform this way. It’s been conditioned to contract to and through an infinite number of points (a slow twitch response) throughout the repetition, not just one at two-thirds of the way.

This pre-determined distance you may want to contract to is not well defined within that muscle. Or in other words, it hasn’t been specifically programmed into the muscle. Instead, it’s mixed in with an infinite number of other potential stopping points. The memory of this muscle is overloaded. With regards to speed, this muscle is now slow to respond. It’s confused having no specific target distance to contract to.

Have you ever tried to throw a baseball, swing a golf club or kick a football after lifting weights or doing plyometric exercises? These activities cannot be done very effectively. They all require that your muscles have specific target distances to be able to snap and contract to very quickly.

However, the fast twitch response which relies on just a few specific stopping points in within your muscles gets wiped-out or stripped away with this type of training. This is what’s known as “dumbing-down” your muscles and is why you’ll always feel tired, heavy and sluggish (i.e., slow) following weight training and/or plyometric training. Slow twitch response training programs like these are good primarily for strength and endurance. Any increase in muscular speed you get will always be considerably less than the true potential of that muscle.
I want to read for you a few more testimonials and when we come back we will talk about fast twitch fibers and what makes a fast twitch training program.

Why is it important for muscles to have a specific target distance to contract to? Because when they do, and when you start training them to respond that way, their rate of contraction increases significantly.

Fast twitch fibers are responsible for the speed of muscular contraction, and a fast twitch response is the ability of a muscle to rapidly contract to a specific distance over a short period of time.

Repetitive contractions, as in weight training and plyometric training, are of little value to the speed with which a muscle contracts. (Do not confuse any increased coordination you may develop in performing certain plyometric exercises with that of an increased rate in muscle contraction. Increased coordination is common to all types of training that’s done on a daily basis and is only the first step towards developing fast twitch contractions.)

How and why will a muscle begin to contract faster when it has a specific target distance to contract to? Well, for a start, muscles have memory. They have the ability to learn a particular activity/movement and repeat it automatically with practice. The less they have to remember (one specific target distance), the quicker they can contract to it. Our brains work the same way. The less we have to remember, the quicker we can recall things.

For example: If you went into a room filled with a 100 different items, and someone asked you to find one particular item, a screwdriver for instance, immediately your brain will create the proper neuro-pathways (i.e., memory) associated with finding that screwdriver. And, if you were asked to go back and find that same item again, you would become quicker at finding it. Before long, you wouldn’t even have to think about it -- you would immediately know where to go (a fast twitch response). However, if each time you were asked to go into that room and look for a different item, your brain would never develop a consistent pattern of thought (memory), and you would constantly have to think about where something is. This non-specific pattern of thought would always take longer (a slow twitch response).

A muscle trained to contract to just one pre-determined distance or stopping point can do so a lot faster than a muscle that’s been trained to contract to and through an infinite number of distances or stopping points. This does not limit the muscle’s ability to function. It increases it.

Just about every athletic skill that requires speed is dependent upon this principle. Throwing a baseball, swinging a baseball bat, tennis racket or golf club, running fast, jumping high, kicking a ball far, etc., are all driven by your muscles’ ability to contract with amazing speed to a specific contact point or to a predetermined distance.

Martial artists know this. They know that if they can get their muscles to go from a state of complete relaxation to a state of immediate contraction at the instant or distance of making contact with a board, it will snap in half. Train your muscles the right way and watch your speed increase.

Interestingly enough, anything that uses memory responds very similarly. Computers are a good example. If your hard drive is overloaded or full of programs, picture files, video files, audio files, etc., what happens when you try and browse for just one file? It takes a while doesn’t it?
Usually an hourglass will appear, as this is a sign that it’s going to take some time before it finds the file. But, if you clean or de-fragment your hard drive and delete unwanted files, doesn’t the speed of your computer increase? Yes, it does. When you free up its memory, and give it just one thing to look for, it performs much quicker. Your muscles can be trained to work the same way.

And the best way by far is using the resistance band with an isometric training strategy. Why, because resistance bands possess a dynamic elastic type of energy with acceleration properties that are far superior to the acceleration of gravity found in weights. We talked about this in the last seminar, remember? This makes them the ideal speed training device to transfer speed into your muscles. And when used with an isometric training strategy, you will start programming your muscles to use this elastic energy to contract to just one predetermined distance or target point. This has a tremendous effect on muscle speed. And the nice thing about this type of training is that it doesn’t take months to see results. People have been reporting back with amazing progress after using this strategy for just a few days.

The reason for this deals with what is known as neuromuscular re-education. Neuromuscular re-education is your body’s way of forming specific nerve networks and motor pathways necessary to perform certain activities. Your body does this automatically with every new skill you learn. And when you start using the resistance band with an isometric training strategy, your body will begin to form the proper nerve networks and motor pathways necessary for greater muscular contraction speed.

This will conclude our discussion regarding speed training. Hopefully by now, you have a better appreciation for what weight training and plyometric training can do for you and what isometric training with the resistance band can do for you.

Thanks again for listening. For AthleticQuickness.com, I’m Dr. Larry Van Such.