

# *Personal Training by Robert J. Bovee*

Researched & Written by Robert J. Bovee Certified Master PPT, RTS, ETS, FTS, LMS, WMS, HWFS, SNS, SSCS, MES, E/FT, PSCS, PRCS

## **Connective Tissue Training**

You're only as strong as your weakest link. It is an old cliché; but to someone who trains hard, it still holds true.

Think about it: What is your weakest link? Is it calves? Obliques? Traps?

Before you think of weak links in terms of muscle, consider this: If you exhaust a muscle, you can wait a few days or so and then train it to the max again. Even if you tear a muscle, you can train around it while you wait a few weeks for it to heal. But, if you've got a weak or injured tendon or ligament, then you've really got problems. Connective tissue builds and heals slowly. A partial tear can take four or more months to heal; sometimes it never does. A complete tear will undoubtedly need surgery. Then you are looking at more than nine months of healing, plus atrophy in surrounding muscles because they can't be worked while adjacent connective tissue is recuperating from going under the knife.

In many obvious ways – and some which are not so obvious – your connective tissue is your weakest link. After all, muscle strength is limited by the ability of the tendon to handle the force generated by the muscle and the muscle system is affected by the strength of the ligaments to stabilize the joints involved in the lift.

That's why building the muscles without conditioning the connective tissue leaves you open to injury, weakness and pain, which can turn chronic, limiting your range of motion. Common sense dictates a simple solution: Make the tendons and ligaments stronger. The question is how?

Like any aspect of bodybuilding, the answer requires knowledge of the basics. Without knowing how the body works, it is impossible to reach high and achieve your training goals. So, let's start with the most basic question: What are tendons and ligaments and how do they get stronger?

Every muscle has a tendon on each end that attaches the muscles to the bone. Tendons are made of thick, rubbery white tissue. Any kind of skeletal movement, from walking to lifting weights, happens because the muscle contracts and pulls on the tendon, which in turn pulls on the bone and moves it.

Ligaments are also attachment tissues; they connect one bone to another. They hold the joints together. Ligaments are thinner and less elastic than tendons. They also are white.

The whiteness of these tissues reveals the major reason for their slowness to grow and/or heal. Unlike the red, juicy muscle tissue, tendons and ligaments have very little blood supply. Even bones have more blood than connective tissue, which is why a broken bone can heal in four to six weeks, versus nine months for tendons and ligaments.

This is because the bloodstream supplies the oxygen and nutrients needed for growth, repair and function. It flushes out waste products and toxins and carries them away. Obviously, getting the maximum possible blood supply into these tissues is a good idea.

Two kinds of vascularization are important in building the connective tissue. You're familiar with one of them already: the pump. When a muscle is contracted over and over again, it uses a lot of energy. In turn, it requires large and immediate amounts of oxygen and nutrients. Using energy also produces waste products that need to be quickly removed in order for the muscle to continue working.

The body responds by sending a greater supply of blood surging through the blood vessels of the muscle to feed it and flush it. You feel this as heat and swelling. But there's also another response and

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adaptation process. The vessels of that muscle will get bigger as you continue pumping it; new capillaries will start to branch out so that even more blood can be sent to the muscle. This greater blood supply allows the muscle to grow in response to training. The increased muscle mass creates the need for more blood supply, and the two adaptive processes complement each other right up to the limit of your genetic potential – or discipline, whichever comes first.

## **Building Up the White Tissue**

Although ligaments and tendons don't have the capacity to build a large network of blood vessels, you can still manipulate the adaptation process to push them to their greatest possible development. Don't think, "If it doesn't show, it doesn't matter." It has a profound effect on what shows.

Vascularized connective tissue is far less likely to tear or rupture under extreme stress. Studies show that the loss of elasticity, which is the major sign of aging in white tissue, can be delayed and/or minimized by proper conditioning. In addition, if a maximally vascularized tendon or ligament is injured, it will heal a lot better, and full function will return much faster than less conditioned white tissue.

Most athletes need more information on the care and building of white tissue.

The first part of any tendon/ligament conditioning program should begin with a proper warm-up. It's essential that stretching comes after. People sometimes get confused about the difference between warming up and stretching. They think that if they stretch, they're warming up. That's not correct. You need to increase the core temperature of your body. Whether that's through a brisk walk or a session on the stationary bike, you have to get your core temperature up before stretching. It makes tissues more pliable.

## **Light Sweat**

You're warmed up sufficiently if you notice a light sweat, because that shows that your temperature has come up and the body is trying to cool itself.

While the work you do for your muscles will provide some conditioning for the tendons and ligaments, it will be less efficient than a workout designed specifically for these tissues. The program that will let you achieve your desired result will involve flexion and a high number of reps with minimal resistance. Paulos explains: "As you exercise and stress the joint, the ligament will respond to being stretched. And the more it's stretched, the more it will respond by laying down cells and collagen making it stronger."

"When you strengthen a ligament, you actually add to its blood supply. In order for the ligament to get larger, it has to have more blood. The blood is interspersed between the collagen fibers."

When you repetitively contract a muscle, it automatically vascularizes the tendons within its limits. So Paulos suggests that two types of workout be integrated into your program:

"Your workout routines designed to give flexibility and/or definition to muscle groups should be interspersed with overloading types of routines that actually load the muscle beyond its capacity. Low weights with lots of reps (20-30) will stretch the muscle and stimulate blood flow. But unless you overload the muscle, it won't build bulk and it probably won't build blood vessels. You have to

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overload tissue to get it to respond by laying down more tissue, whether it is blood vessels, ligaments or bulk,” says Paulos.

However, even strong tissues can be injured if their owner doesn’t know the mechanisms of trauma. The most traumatic damage, of course, is a tear.

“The most common kinds of tears are usually ballistic tears,” says Bean. “They happen when a person changes direction in a hurry or makes a sudden motion in a hurry or makes a sudden motion like in Olympic lifts or stop-and-go sports like basketball.

Strength is then a crucial factor, according to Bean. “You want the tissue strong enough so that if it tears, it tears from the bone rather than in two.

You can’t get a suture to hold it very well,” adds Bean. “A surgeon can repair anything better if it has a chunk of bone attached to it.”

## **Creeping Microtrauma**

A less obvious and more serious type of injury is microtrauma. This is a series of microscopic injuries to tissue, usually from repeated overuse and insufficient recuperation. Because tissues aren’t given time to heal, or just don’t heal because incidents of microtrauma mount, an unnoticeable weakening of the tissue occurs, although strength stays the same. It’s insidious, creeping up on you with very few symptoms. Then comes day when you’re doing, say an ordinary set of bench presses and your pec blows out. This is another case where knowledge lets you prevent the problem.

Says Paulos: “Microtrauma in a ligament or tendon often means the tissue is being stretched excessively. Take a ligament, for instance. If it stretches more than 10-15% of its normal length, it will tear. But, if it stretches 8%, it will just incur a microtear – microtrauma – and if it is repeatedly stretched 8%, it weakens to the point where less force will rupture it.

“You can prevent microtrauma by taking rest periods in between sets and in between workouts. If you give the body adequate rest, the vasculature will heal the microtrauma.”

Some of the signs of incurred microtrauma include soreness in one muscle area when other muscles used in the workout have already recuperated; and unusual feeling of instability, such as a buckling or “popping” feeling in the joint; a feeling of a muscle twitching or trembling after doing a heavy set; and pain after a workout that repeatedly occurs only at a certain point in the range of motion. If you notice these subtle signs, pay attention and give your body some downtime to recuperate.

Microtrauma can also be caused by improper form while lifting. Proper form has developed as a way of balancing the body biomechanically under a heavy load, which is why it’s so important.

## **Don’t Put Off Rehab!**

Bodybuilders injure tendons far more often than ligaments. If you injure a tendon seriously enough to interfere with your training, but not seriously enough to require medical care, proper rehab is crucial. And don’t think this doesn’t include you. You must take the necessary time to rehab a soft tissue injury, no matter how slight. If you “work through the pain,” you risk turning temporary inflammation into chronic inflammation, known as tendinitis.

What to do?

“The approach to a tendon-related injury is to rest it until the acute inflammation phase is over with” says Bean.

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When you resume training, take it easy, Bean advises: “If you have pain during your workout but it goes away, you’re probably okay. If it still bothers you two hours later, then you overdid it and you have to modify your routine accordingly.”

Ending a workout with a proper cool-down is as important as beginning it with a proper warm-up – in other words, essential.

Bean throws cold water on one popular post-workout practice – the hot tub. “You want to ice the joints, or at least get them in cold water, rather than hot,” he says. “If people don’t believe that, let them try a hot tub and see how they feel four to five hours later. Then let them jump in a cold pool after their next workout, cold meaning 60-70 degrees and then see how they feel a few hours later. It’s not comfortable when you’re in the cold, but it brings the muscles back quicker and helps heal microtrauma. After all, a hard workout tears down muscle tissue, which is a kind of injury. And everyone knows you apply ice, not heat, to a new injury. It doesn’t change just because the selective injury of a workout is extremely minor.”

There’s another surprise: Avoid anti-inflammatories, says Paulos. Ibuprofen is essential equipment in every athlete’s gym bag, but using it routinely after workouts may be defeating your purpose.

“The way anti-inflammatories work, they actually retard the healing process by reducing the inflammation,” says Paulos. “Inflammation isn’t all bad. It’s actually what healing is all about. The body has natural substances that fight inflammation called kinans. Once they get flowing, over time the inflammation will be quieted down due to rest and the body’s chemicals. White blood cells migrate to the area of trauma and lay down various structures. If you keep taking anti-inflammatories, that will block the metabolic and chemical response. Some physicians refuse to give these medications during the healing phase after surgery because they feel it retards healing.”

Once you’ve taken time off to rest an injury, proceed with stretching, negatives and a few low-weight/high-rep workouts. Yes, you might lose a few weeks out of your cycle. But it is vastly preferable to losing nine months and having to work your way back because you’ve injured your tendons or ligaments to the point where surgery is the only solution.

For more information, please contact Robert J. Bovee at **(585) 330-0614**.