My First Half-Century in the Iron Game

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In the last month's article I mentioned differences in muscular fiber type, genetic differences that cannot be altered but that have a great deal to do with our performance: very brief but explosive activities like sprinting or competitive weightlifting are best served by "fast-twitch" fibers, while endurance activities like running a marathon are enhanced by "slow-twitch" fibers.

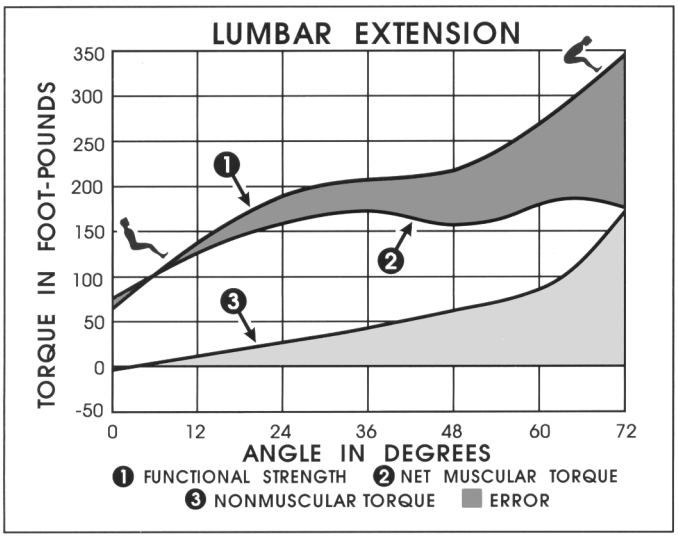
Directly contrary to a lot of outright bullshit on this subject that has been published by several self-proclaimed "experts" who are in fact, simply fools and are usually liars as well, you can NOT change your fiber type by altering your training procedures; you are stuck for life with whatever mixture of fiber types that you were awarded with in the genetic sweepstakes.

HOWEVER, muscular atrophy, the loss of muscular size and strength, is very selective on a basis of fiber type: fast-twitch fibers atrophy faster and to a greater extent than slow-twitch fibers do, so when you stop training your resulting losses in size and strength are primarily a loss of size and strength in your fast-twitch fibers. A result that can lead to a very misleading conclusion if it is overlooked, because it may APPEAR that your fiber type is changing as you become stronger from exercise, or when you become weaker from inactivity leading to atrophy. And this is true in regard to both disuse atrophy and overuse atrophy, if you do not exercise enough or exercise too much.

When we first tested the strongest of the two subjects mentioned in last month's article, Joe Cirulli, his lower-back strength was quite low in comparison to his true potential, was below "average" for an untrained man of his age and size, and was low in spite of a long history of hard exercise. Tested for full-range strength both before and after an exercise carried to failure, thirteen repetitions with 150 foot-pounds of resistance, the resulting fatigue from the exercise reduced his fresh strength by only 31 percent; a result that would indicate a "usual" or "average" mixture of fiber types in the muscles being tested. Thus it appeared that he had neither a high percentage of fast-twitch or slow-twitch fibers.

Given the "usual" mixture of fiber types, if a subject is exercised to a point of momentary muscular failure after ten repetitions they will lose approximately twenty percent of their fresh strength, will lose about two percent of fresh strength for each repetition performed. So, given that Joe performed thirteen repetitions during that first test, we would expect a loss of about 26 percent of his fresh strength, and thus the actual loss of 31 percent was not far above average.

But, once exposed to totally isolated, specific exercise for his lower-back muscles, Joe's lower-back strength almost exploded, increased so rapidly and to such a degree that we could hardly believe what we were seeing.



In a period of five months and eight days, Joe's strength in the fully extended position of his lower back increased by 450 percent; and this result was produced by a schedule of only one exercise every 14 days, once every two weeks.

The chart to the left shows Joe's lower-back strength tested 5 months and 8 days he began to exercise on the lumbar extension machine. The highest curve shows functional strength, the middle curve shows true strength, net muscular torque, and the lowest curve shows the torque produced by stored energy. The dark shaded area shows the error introduced if stored energy is not considered; while the light shaded area shows torque resulting from stored energy. A failure to consider stored energy in this case would lead to an overstatement

of true strength in the flexed position of nearly 100 percent, with a slight understatement of true strength in the extended position. Joe's strength in the flexed position was overstated as a consequence of nonmuscular torque produced by stored energy. Moving forward into the full-flexed position of the spine compresses soft tissue in front of the spine while stretching soft tissue behind the spine, and this compression and stretching of soft tissue stores energy which will then produce torque that tends to return the spine to a neutral position. Thus a test that ignores stored energy torque tends to overstate the strength levels that are measured.

If Joe had been dead, and if we put his corpse into the testing machine in the flexed position of the spine, then stored energy would have produced more than 100 foot-pounds of torque. A much larger man that we later tested produced 352 foot-pounds of torque from stored energy alone, and would have produced the same result if he had been dead; and since 352 foot-pounds of torque is higher than the level of total torque produced by an average untrained man, it would have appeared that he was stronger than average even after he was dead.

But of greater interest for the subject of this article, differences in muscular fiber types, I want to point out the fact that Joe's fiber type appeared to change as he became stronger; while his first test indicated an average, random mixture of fiber types, his later tests at much higher levels of strength made it obvious that in fact he has a very high percentage of fast-twitch fibers in these muscles.

But we did NOT change his fiber type, we merely reactivated fast-twitch fibers that were there all the time but that were not functional as a result of atrophy. Later, as he became much stronger, his fiber type appeared to change. When first tested, an exercise to failure with thirteen repetitions reduced his fresh strength by only 31 percent; but tested and exercised the same way and with the same number of repetitions but at a much higher level of strength, then he would lose about 80 percent of his fresh strength from the exercise. The chart used as an illustration in the last chapter showed a loss of about 50 percent of fresh strength from a light exercise with only six repetitions.

So people like Joe, people with a higher than usual percentage of fast-twitch fibers in their muscles, show certain characteristics that average people do not show: they are far stronger than usual, considering sex, age and size, but they have very little muscular endurance, show a very high level of fatigue even from brief exercise.

While people on the other end of the scale, people with a higher than average percentage of slow-twitch fibers, show opposite characteristics: they are below average strength but have enormous endurance, can continue an exercise seemingly endlessly and afterwards will show little or no signs of fatigue. May even be stronger after a hard exercise than they were before the exercise. Which result I will not even attempt to explain, because, quite frankly, I do not know the cause and effect relationship that produces such effects. It happens, but I do not know why it happens or even how it happens.

Most people, about eighty percent of all people do not fall into either of the two categories covered above; instead, most people have a random mixture of fiber types, and will show both average strength and average muscular endurance.

We have learned a great deal from such tests during the last ten years, but some of our observations still cannot be explained; cannot be denied but are still not understood. Some of what we have learned, however, can be applied in practice. We know, for example, that fast-twitch muscles cannot tolerate either frequent or high-repetition exercises; trained in the usual fashion three times a week and with multiple sets of the exercises, such subjects will rapidly lose both muscular size and strength. Research conducted with thousands of subjects has clearly established that fast-twitch subjects will increase their strength very rapidly on a schedule of only one exercise a week, or even one exercise every fourteen days. The same subject, trained three times a week, will rapidly lose strength. And that result has also been established by research.

We can now determine your muscular fiber type in the muscles of the spine, the neck and the knee, but we still cannot test all of your muscles. And since the fiber type of your quadriceps tells us nothing about any of your other muscles, since fiber types are not consistent throughout your body, this means that an application of this knowledge is limited to only part of your body. You might have fast-twitch fibers in your biceps muscles and slow-twitch fibers in your triceps muscles, but we cannot yet test these muscles in a meaningful manner.

More than forty years ago I learned the hard way that training with low repetitions, from three to six, would do nothing for me, while training with high repetitions, from 15 to 20 or more, caused me to lose size and strength; I could produce good results only when I used a schedule of from seven to ten repetitions. When I could barely squeeze out a tenth repetition, then I increased the weight about five percent during the next workout. But I always worked to "failure," continued each set of every exercise for as many repetitions as I could perform in good form; if, as sometimes happened, I could do more than ten repetitions then I did not stop after ten but continued on to failure.

More than twenty years ago, when I was training with Casey Viator, I was stronger in my biceps muscles than he was, even though his arms were much larger than mine; but he was far stronger than I was in his triceps muscles. Thus I suspect that I have more fast-twitch fibers in my biceps than he does, but that opposite situation exists in our triceps muscles.

Figure two, the photo above, shows what Casey and I looked like (early 1970s); I weighed only 172 pounds then and he weighed about 212; my upper arm "cold" measured 15 and 5/8 inches, while his was about 19. But I could chin myself with more weight than he could.

So, just how can we apply this information? FIRST, carefully determine just how much weight you can use for only one repetition in good form. SECOND, then a few days later take 80 percent of that weight and perform as many repetitions as you can in good form. You may, if you have a lot of fast-twitch fibers, be able to do only two or three reps with 80 percent, or you may find that you can do 15 or more. Most people, however, will fail after ten or eleven repetitions.

But, regardless of just how many reps you get, that should tell you how to train those muscles; if your reps are low, then train with low reps, and if high then train with higher reps.

Unfortunately, many good exercises involve the use of several muscles in the same movement and it may be that different muscles do not have the same mixture of fiber types. Which means that a schedule of reps that might be perfect for your pectorals in a bench press would not be equally good for your triceps or deltoid muscles in the same exercise.

Which information may not solve all of your problems, but at least it may start you thinking in a logical direction. But, in the end, you can solve your own problems only by careful trial and error; if it works well, then do it, but if it fails then try something else.