

My First Half-Century in the Iron Game

Testing Strength: Part Four

Nearly sixty years ago, when I first became involved with exercise, very little, if anything, and absolutely nothing that came to my attention, had ever been published on the subject of the differences in muscular fiber types; so far as I knew then, no such differences existed, and if anybody else had a different opinion then I was not aware of it.

Published speculation, and it was nothing except outright speculation, regarding differences in muscular fibers, first came to my attention about thirty years ago; shortly thereafter, the people operating both the Cybex company and the Universal Athletic Sales company started publishing all sorts of claims about fiber-type differences, and these published claims went a long way in the direction of starting yet another in a long line of outright myths about exercise, myths, superstitions, misinformation, and other outright bullshit about just what to do and what to avoid in exercise, myths that are based upon absolutely nothing apart from speculation and stupid theories but, myths that are now widely accepted as fact.

Initially, when a lot of people asked me about my opinions regarding differences in muscular fiber types, and lots of people did ask me, I simply refused to express any opinion; instead, I told them the truth, told them that I knew less than nothing about muscular fiber types and thus had no opinions on the subject. Previously, I had encountered and observed the effects of differences in fiber types, but had failed to understand the significance of these observations. Saw things but did not understand them. So, in spite of the fact that many other people were publishing all sorts of statements about differences in fiber types, I remained silent on the subject for nearly twenty years.

About twenty-five years ago, I got a call from a man in California who told me about a man he had met who could benchpress more than 600 pounds at a body weight of about 230, and the caller added that he believed the man he told me about might, with proper training, eventually be able to benchpress more than 700 pounds. Being interested, but having very little confidence in either the honesty or the judgment of the man who called me, I then called another man in California, a very wealthy man who had a lot of experience and interest in exercise; I asked this second man to investigate the situation on my behalf, and he promised to do so. Then, later, having done so, he called me back and said that he was very impressed by the benchpresser, so impressed that he wanted to pay all of the expenses involved in sending the man to Florida so that I could train him. And, in due course, the benchpresser arrived in Florida; whereupon, due to my ignorance, I immediately made a terrible mistake.

At an accurately weighed bodyweight of 229 pounds, the man from California benchpressed 605 pounds in perfect form, so the reports of his ability had not been overstated. But you do not, or should not, train with maximum-possible poundages of resistance when trying to increase strength; so I gave him 480 pounds and asked him to perform as many repetitions as possible, and was then very surprised when he failed after only three repetitions, was surprised since I expected him to get ten or eleven repetitions with that relatively light weight. So, initially, I accused him of not trying; but I was wrong, he was trying. In the end I formed such a poor opinion of him that I sent him back to California, thereby having failed to recognize a tremendous opportunity: years later, I clearly understand that this man was a genetic freak, had a very high percentage of so-called fast-twitch fibers, fibers which were directly responsible for his high level of strength but low level of muscular endurance. Had I known then what I know now, this man probably would have benchpressed 700 pounds, which would then have been a new world record. And what did happen to him? I don't know all the details, but do know that he was fresh out of prison when he first came to my attention, and that he was soon back in prison after he returned to California, but beyond that I know nothing else about him.

Several years later, we designed and built an early prototype of a testing machine that could measure the output of force produced during an exercise; this machine provided a form of exercise that permitted the user to perform maximum-possible efforts during each of any number of repetitions. When Casey Viator was tested on a benchpress version of this machine, in an attempt to determine just how much fatigue resulted from ten maximum-possible repetitions, we found, much to our surprise, that he could not perform ten maximum-possible repetitions; during his eighth repetition,

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his output of force was only eight percent of what it was during the first repetition, after which he could not produce a measurable level of force, his then remaining positive strength being zero. Eight repetitions wiped him out.

Having observed this result, and having been surprised by it, we still failed to understand it. Then, a month or so later, I conducted another test of Casey for the benefit of a couple of scientists from Ohio, having told them in advance just what results to expect. This second test, however, was not performed using a benchpress machine, was, instead, conducted with a leg press machine. But, instead of failing after only eight repetitions, as he did with the benchpress exercise, Casey performed more than thirty repetitions with no slightest sign of resulting fatigue; the force produced during the last repetition was just as high as it was during the first repetition. That result being the opposite of what I was expecting, to say that I was stunned by the result would be putting it very mildly indeed.

Now, many years later, tens of thousands of tests later with thousands of different subjects, I understand exactly what happened, and why it happened: in his muscles involved in the benchpress, Casey obviously had a very high percentage of fast-twitch fibers, but in his muscles used in the legpress he had a high percentage of slow-twitch fibers.

The testing and exercise machines used in these early experiments were not based upon an isokinetic form of resistance, were, instead, what we called "Infimetric" machines where the positive resistance for one limb was supplied by the negative functioning of the other limb; in effect, one limb worked against resistance supplied by the other limb. Secondly, it should be understood that both of the exercises tested were compound movements involving several muscles, thus we could not determine just how much of the measured force was produced by any one muscle. Consequently, for the purpose of determining differences in muscular fiber types, these tests were very crude, because fiber types vary from one muscle to another; nevertheless, the results in these tests were so dramatic that the cause and effect relationships were obvious.

In the meantime, of course, Cybex, Universal, and others of our competitors were telling anybody who would listen to them that our exercises had no benefit for fast-twitch fibers and thus should be avoided like the plague, while their exercises, naturally, were ideal for the development of fast-twitch fibers and thus should be the only exercises used for the purposes of increasing muscular size and strength.

Cybex, then having no negative resistance in their exercises, was also telling people that any form of negative exercise was counterproductive and dangerous. For my part, at that time, twenty-five years ago, I had no opinions regarding either differences in muscular fiber types or the benefits, if any, of negative exercise, so I remained silent in regard to both subjects. I strongly suspected, rightly as things turned out, that the Cybex people knew something less than nothing about either fiber types or negative exercise, but I was also aware that my knowledge regarding those matters was also totally lacking.

A few people were then playing around with a very invasive method of trying to determine fiber types: a very small "plug" of muscle tissue was surgically removed from the muscle being tested and was then examined utilizing magnification provided by a microscope. Using identical twins as test subjects, we performed such research in cooperation with doctors from a major university in Ohio, but the test results were so ambiguous that we quickly lost interest in this approach.

Now, many years later, it is my opinion that trying to determine the functioning of a muscle by examining pieces of it under a microscope makes about as much sense, none, as trying to determine a man's intelligence by examining his brain after he is dead. If all or most of a muscle has turned into bone, and this sometimes happens, or if the brain suffered massive physical damage, then a loss of functional ability would be expectable; but, beyond such extreme examples, any such test results will tell you little or nothing about functional ability.

Thus, in the end, the solution to the problem of trying to determine differences in muscular fiber types was solved by "working backwards," rather than trying to determine fiber types by microscopic examination in order to know the functional ability of the muscle, why not measure functional ability in order to determine fiber type? Doing it this way is far more accurate, faster by far, much cheaper, safer, pain free and not subject to differences in people's opinions.

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An almost endless list of self-proclaimed “experts” now involved in the field of exercise have come up with all sorts of theories about how to change muscular fiber types, something that is almost certainly impossible to do, since fiber types are genetically predetermined. A large part of the controversy on this subject is a result of the fact that muscular atrophy is selective in respect to differences in fiber type, and such selective atrophy can make it appear that a change in fiber type has occurred when in fact no such change has occurred. If, based upon meaningful tests of fiber type that are available, it is obvious that a particular muscle has a much higher than usual percentage of fast-twitch fibers, and if that subject is then overtrained, exposed to far more exercise than they can tolerate, a later test of fiber type based upon measurements of functional ability will give the impression that the muscle’s fast-twitch fibers have been changed into slow-twitch fibers; but no such change has occurred, the fast-twitch fibers are still there but can no longer function, have been overworked to the extent that they have lost all, or most, of their functional ability.

Likewise, if you start training with an atrophied muscle, and then greatly increase the muscle’s strength as a response to proper exercise, it will appear that the muscle’s fiber types have changed; while, in fact, what you have actually done is reactivate previously atrophied and nonfunctional fast-twitch fibers.

Unfortunately, it is impossible to conduct such fiber-type tests with all muscles, because doing so requires total isolation of the muscle being tested, and this cannot be accomplished with most muscles. Using MedX machines, and these are the only tools capable of performing meaningful tests, we can now test the muscles that extend the lumbar spine, that rotate the torso, that both extend and rotate the neck, that both extend and bend the leg around the axis of the knee. But, very fortunately, the muscles that we can test are the most critical muscles in the body, the muscles most likely to be injured.

Given the results of fiber-type tests of these critical muscles, it then becomes possible to determine just what program of exercises should be utilized in any particular case; and it also becomes possible, for the first time, to determine the exact results of an exercise program.