My First Half-Century in the Iron Game

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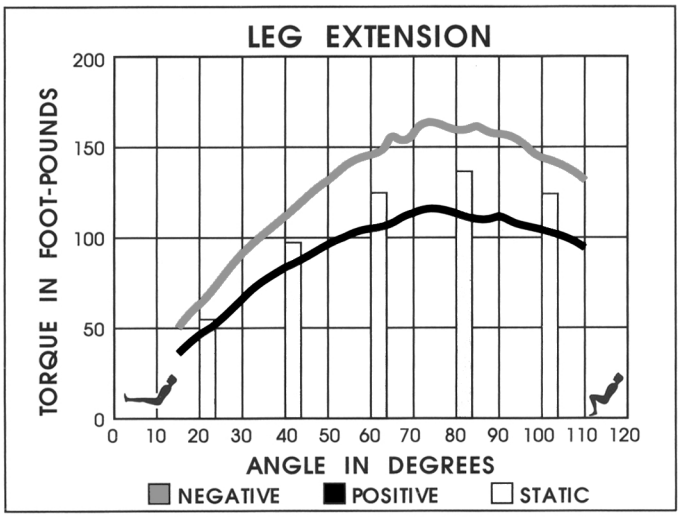
In the last chapter I mentioned that you have three distinct levels of strength at any given moment: your positive (concentric) level of strength is lowest, your negative (eccentric) level of strength is highest, and your static (isometric) level of strength is midway between the two levels of dynamic strength.

With a fresh muscle, if you can lift a maximum of only 100 pounds at a fairly slow speed of upwards movement (your so-called IRM or one repetition maximum) then you can lower a weight of 140 pounds at the same slow speed. Thus your negative (lowering) strength is about 40 percent higher than your positive (lifting) strength.

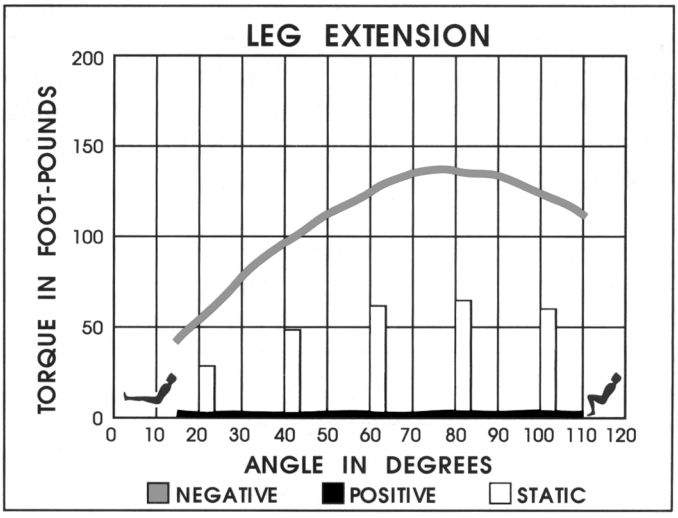
And since, as I mentioned in that earlier chapter, it takes the same amount of force to lower a weight that it does to lift the same weight, it follows that your output of force is 40 percent higher when performing negative work than it is during positive work. Assuming, in both cases, that you are working as hard as possible, performing a truly maximal effort.

fig. 1



But if, instead, you tested your static (isometric) strength, you would find that it was 120, midway between positive and negative strength levels. The following illustration, number 1, illustrates these three different levels of strength: the lowest curve on this chart shows fresh strength of the quadriceps muscles (leg-extension), while the much higher curve shows the coexisting level of fresh negative strength of the same muscles, and the bar-graphs show the fresh level of static strength.

fig. 2



This illustration is a copy if an actual test that we performed in January of 1986, nearly ten years ago, and during that period of time we performed similar tests with several thousand other subjects, both male and female. The testing machine used for these tests was “one of a kind,” the only one like it that was ever built. This testing machine was one of more than 3,000 prototype machines that we designed, built and tested over a period of more than fourteen years of continuous research and development. All of which prototype machines were rejected, none of which were ever placed on the market because we were not satisfied with any of them.

So this machine was not literally “perfect,” but it was, at least, by far the best tool of its kind that had ever been built up to that time; and we did learn a lot of very important things from this machine and other prototypes. One of the most

important things that we learned was that any sort of dynamic testing procedure was utterly worthless because of a long list of unavoidable problems associated with dynamic testing: things like torque from gravity, torque from stored energy, torque from muscular friction, and impact forces, all of which factors bias the test results to an enormous degree.

The problems illustrated above are a result of muscular friction, which reduced the tested level of strength during the positive test but increased the indicated level of strength during the negative test. So the positive test results are too low while the negative results are too high; in both cases are grossly misleading, do not indicate the true level of strength. But remember: both of the two misleading test results were produced by a dynamic testing procedure. In contrast, the static test results are not biased by friction, so the true level of strength is shown only by the static test results.

And, again, remember that these tests were performed with fresh muscles, and that the level of muscular friction is lowest when a muscle is fresh. Then, as a muscle becomes fatigued from work or exercise, the level of muscular friction increases enormously. The following illustration is a clear example of this increase in muscular friction produced by fatigue.

(Illustration 2)

Immediately after the test results shown by illustration number one were produced, the subject was exercised to a point of total failure, to a point where he could no longer move his leg in a positive manner even when there was no resistance against such movement. At that point his remaining positive strength was ZERO.

Then, immediately after that very hard exercise, the subject was tested again, tested for all three levels of remaining strength, levels of exhausted strength that are illustrated by the second chart, and static strength was 60. These figures being based upon the assumption that fresh strength was positive 100, negative 140, and static 120.

When fresh, muscular friction reduced his positive strength from a true level of muscular force of 120 to a tested level of only 100, a reduction of about 17 percent. But when exhausted the true level of strength had dropped to only 60, half of its fresh level, while the friction had been increased to three times its fresh level. The result being that the muscular friction was then equal to the true level of strength, so that a true level of 60 minus friction of 60 indicated a remaining level of positive strength of ZERO.

But also remember that the friction which reduces positive strength increases negative strength, so his remaining negative strength was then 120, a test result produced by adding friction of 60 to a true level of strength of 60.

Thus if we evaluated the effects of the exercise based upon tests of positive strength it would appear that he had lost all of his fresh strength, and if we based our assumptions on negative tests it would appear that he had lost only about 14 percent of his fresh strength. When, in fact, as is clearly demonstrated by the static-test results, he had actually lost 50 percent of his fresh strength.

The following three illustrations clearly show these results: number 3 shows positive fatigue (a total loss of fresh positive strength); number 4 shows negative fatigue (a loss of 14 percent of fresh negative strength); number 5 shows the true level of fatigue (a loss of 50 percent of fresh strength).

It should be clearly understood by all readers that exercise carried to the point shown by these test results is counterproductive, causes so much fatigue that it may take you a month or more to fully recover from it, and will cause losses in strength rather than gains. We performed such tests only for research purposes and they should never be used for any other reason. The man who was used in this test was almost crippled by pain for several weeks after this test.

If your fresh positive strength is 100, that is if you can perform only one repetition with 100, and if you then perform ten repetitions to momentary failure with resistance of 80, then your remaining strength when you fail will be reduced from its fresh level by only a bit more than 20 percent. But in this procedure the subject's fresh positive strength was reduced by 100 percent, a level of fatigue that was five times as high as that normally produced by working to failure after ten repetitions.

The exercise that produced these dramatic results involved the performance of 25 full-range repetitions with both positive and negative resistance; the first 11 repetitions were sub maximal, did not involve maximum-possible effort, but the last 14 repetitions were all maximum efforts, balls to the wall, throttle to the floor, do or die. And during those last 14 repetitions his positive strength dropped from one repetition to the next; while, simultaneously, his negative strength was rising from repetition to immediately following repetition.

While steadily losing positive strength he was simultaneously gaining negative strength. With fresh muscles his negative to positive strength ratio was 1.4 to 1, that is his negative strength was 40 percent higher than his positive strength; but with exhausted muscles his negative to positive ratio was 57.1 to 1, that is his negative strength was then more than 5,000 percent higher than his positive strength.

I will return to this subject in next chapter in an effort to explain some practical applications of this information.