SuperSlow® Strength Training:

An Absolute Requirement for The Prevention of Osteoporosis

by Ken Hutchins

At a Nautilus Seminar in 1985, an off-the-cuff discussion occurred between Ellington Darden, Arthur Jones, and me. As mental gymnastics and theoretical exploration, we collectively contended that muscle hypertrophy was irrelevant to bone remodeling. I reflected on this topic for several days thereafter and subsequently reversed my agreement with our original statements.

The Original Argument

Effectively, the original discussion is as follows: Let's pretend we are dealing with a brain-dead subject. Of course, this *vegetable* cannot volitionally contract his muscles. He cannot *exercise*.

It should be possible to elicit bone growth, however, by viseing and placing forces to bend the shafts of the bones. There remains one problem: how do we know the correct force range? We have no feedback from the subject to indicate pain. We do not know that minimum magnitude to stimulate bone growth or that maximum magnitude to avoid bone destruction.

Arthur Jones remarked that we could use the left side of the body as a standard. Carefully subject it to forces until breaks occur and accurately record the manner and force levels under which they occurred. Then expose the right side to forces just beneath those *dangerous* values. This elicits the desired growth stimulation without destruction.

In such a setting, the bones don't *care* that the muscles are not involved. Exercise, therefore, is not required to elicit bone strengthening, though this *vegetable procedure* is not very practical for you and me.

Argument Extension

If we carry this viseing procedure further, we encounter obstacles with our brain-dead subject: How do we address bones other than those of the appendicular skeleton — the arms and legs?

Can we put our knee on the sacrum and pull either ilium with our hands to bend the pelvis side to side? How do we test the left side to serve as a danger standard and then safely expose the right side of the pelvis? Both sides are, more or less, part of the same bone. Can we build a device to do this with any repeatability and safety?

The pelvis *might* lend itself to such procedures: certainly with increased complexity. But what about the remainder of the axial skeleton? Do we devise some kind of percussion technique? Do we press in along each rib with our fingers? Watch out! They may easily break. What about the clavicles and scapulas?

How do we approach the individual vertebral bodies? Certainly, we cannot test one side, then the other. Disregarding the dangers, how do we get at a vertebral body to impose a mechanical strain? Do we insert Steinmann pins at right angles to torque its longitudinal length?

Passive Jogging

There may be methods that easily achieve immediate ends if not long-range goals. One approach: drop the brain-dead subject from progressively higher distances. Build a tubular chute through which you drop the body — held in a vertical, upright position — feet first. Of course, you must brace the knees, pin some of the other joints, as well as put the head and neck in a collar.

The purpose of the chute is to hold the torso vertical as the impact *pile drives* force up through the feet as the body hits the ground. You do not want to drop it just any kind of way. And without the chute, attempts to drop it lack the necessary control. The torso simply slumps like a bag of potatoes. This is a violent treatment.

Also bear in mind that such progressive dropping avails the subject only compression forces. We are more interested in bending and torsional forces for stimulating bone hypertrophy. At least this is what bone histologists report.

Argument Reversal

This leads us back to where we began. The only meaningful way to get at the axial skeleton is through the muscles. With our brain-dead subject, they cannot contract volitionally. So let's try electrical stimulation. Still, the intensity of the contraction is difficult to control. Electrical stimulation requires some standardization to stay between the fracture and bone hypertrophy thresholds. This is a tedious affair even with normal subjects. Electrical stimulation rarely produces a contraction intensity adequate to stimulate muscle hypertrophy. And adequate electrical stimulation

produces violent and harmful contractions. Its only practical — still questionable — application is relegated to early-stage rehabilitation involving low-intensity contraction for extremely feeble musculatures.

The only meaningful way to get at the axial skeleton is through the muscles. The only meaningful way to work with and through the muscles is the act of exercise. And by "exercise," we mean *strength training*, exclusively. Other activity does not qualify the definition. (Please read *The First Definition of Exercise* by Ken Hutchins. It is available from *Media Support.*)

Other activities — such as walking, running, and dance — commonly and wrongly construed as meaningful exercise — are certainly ruled out. Their *questionable* role in osteoporosis prevention is restricted to the application of undesirable compression forces to the appendicular skeleton. As I subsequently admit, such effect is not isolatory, only that its meaning to the axial skeleton tapers off somewhat and unpredictably as the compression forces are absorbed into the limbs. You have, EITHER, an undesirable situation OR virtually no meaningful stimulus to many of the targeted structural areas.

Specific vs. Systemic Bone Hypertrophy

It is not yet (1985) documented that exercise will prevent or ameliorate osteoporosis. Of course, there is a plethora of specious studies performed with questionable measuring devices. These studies corroborate the notion that is logical: exercise is an important factor in osteoporosis prevention. Objective proof, however, remains at some distance in the future. The densitometers used in these studies are themselves, effectively, being studied to determine their measuring reliability.

Many commercial interests have already spoken out of turn. Representatives from large pharmaceutical companies as well as advertisements by the Dairy Council are stating as fact that "calcium supplementation prevents osteoporosis." And the advertising muscle put behind such plausible theories forced as fact is tremendous. From a moral standpoint that I fear may backfire as *raping the elderly*, commercial interests have jumped the gun. Many popular magazines sing the praises of exercise and recreational activities. It is as if *we can make it so if all of us say and believe it's so.* True — this may all come to pass as fact, but it is premature to really know.

We do not know — by way of objective research — that human bone will favorably adapt to a stimulus provided through strength training (1985). Bone strengthening *should* favorably result. Bone hypertrophy is a logical sequel to muscular hypertrophy. It just has not been *proved* in humans. Note the following:

> If a skeletal musculature can be strengthened, then the muscle must grow larger. In growing larger and stronger, the connective tissue sheath that envelopes the muscle within and without must increase correspondingly in size and strength. And if this sheath then coalesces to form the tendon at either end of the muscle, therefore the tendon must grow correspondingly larger and stronger. And then the tendon attachment to the bone must also be of greater structural integrity. Since the tendon attachment is anchored in the bone, then the bone must grow stronger. Therefore, the entire drive train must be adaptive. This includes the bones. And if we someday discover that muscular strengthening is possible without a corresponding response by the bones, we shall have to *accuse* the human body of being illogical and maladaptive.

Another uncertainty is assumed: *If* bone hypertrophy follows from muscle hypertrophy, is the response specific only to the area stimulated or it is generalized?

This will be an even-more difficult question to answer. It requires defining what is *specific* and what is *generalized* or *systemic*.

It is commonly believed that SuperSlow® Exercise is extremely specific and isolatory with regard to the area of the body addressed. It is more so than any other activity, but it is far less isolatory than what most imagine. The most isolatory exercise possible is a knee extension properly performed on a Nautilus® or MedX® Leg Extension machine retrofitted with SuperSlow cams and bearings. Nevertheless, I have witnessed abdominal spasms in subjects who I judge to be the best skilled at isolation. So if researchers are trying to decide if bone remodeling is a specific or systemic stimulus/response, this certainly clouds the issue.

Only through the experiment with our brain-dead subject do we have an isolatory bone stimulus. *This is made possible by the preclusion of exercise* for this individual.

One More Plug For *SuperSlow*® Strengthening Exercise

There remains one more reason why our brain-dead subject is doomed to have destroyed bones. Pretend that we do exactly what we originally proposed to the arms and legs. We break all of the bones on the left side of the body to obtain acceptable break thresholds. Then we apply a calculated percentage less magnitude of strain to the bones on the right side of the body. Then the bones stimulated adapt to the imposed strain.

After the bones adapt, what next? How do we induce the bones to continue adapting to progressively denser levels? Do we assume that the bones will continue responding to the original strain levels? If so, for how long? Or does the stimulus threshold increase proportionally to the break (strength) threshold? Are we going to assume that the effect is systemic and that the originally destroyed left side and inaccessible areas also respond to the stimulus? If so, are we going to assess new safety standards by breaking the bones on the left side again?

Maybe there is another way. Through research with many brain-dead subjects, can we learn the appropriate percentage increase in strain to impose on a weekly progression rate?

There remains only one practical answer: strength training. It is progressive. It can and should always stay

at force levels well within the integrity range of the bones no matter how strong or weak they become.

With SuperSlow high-intensity, low-force exercise, we have the techniques to stay within safe force levels for anyone who has volitional contraction capability of their muscles. These techniques are not widely known at this time, but they are available for many and varied applications. Osteoporosis prevention is merely one. We now term these techniques *controlled mechanical stimulation™;* and they represent the purest form of meaningful stimulation for prophylactic and rehabilitative exercise through applied mechanics.

[Note: This article was written to poke fun at those proponents of jogging and aerobic dance as osteoporosis prevention. Also, this article was written in 1985 and before the advent of newer densitometers which are reputed to be valid. Of course, I was also led to believe that the earlier tools were valid, therefore, I remain optimistically suspicious. *Apparently*, several pilot studies have emerged wherein a 1% per week bone-density increase was documented using the MedX® Lumbar exercise machine.]