



⇒ Product Review ⇐

March 2014 #264

“SARCOPENIA AND THE ELUSIVE FOUNTAIN OF YOUTH”

Introduction

The above quote, which is the title of an editorial written by Stephen B Hanauer that appeared in one of the world’s most respected medical journals (Hanauer S. *Nat Clin Pract Gastroenterol Hepatol*, Vol. 6, No. 1, 2009) represents, for me, the culmination of a quest for knowledge that began almost 20 years ago. At that time my desire to truly understand why sick people are sick and how nutrition relates to this process was not being satisfied by current research papers which tended to focus on the needs of healthy populations. In addition, advocates of the more esoteric, anecdotal approaches to clinical nutrition as it relates to ailing populations, even though they were demonstrating a certain level of success using these approaches, could provide little, if any, **documentable** reasons why these approaches were successful. Please note again the emphasis on “documentable.” Twenty years ago I certainly found no shortage of theories and explanations as to why particular approaches to clinical nutrition diagnosis and treatment attained success. However, generally speaking, upon further inquiries by me for proof that these theories and explanations were actually accurate, I all too often received little more than vague assurances and criticisms that I “lacked faith.”

Hoping to find answers elsewhere, I started making periodic visits to the various medical libraries that were in close proximity to the many customers’ offices I was visiting in those days. During one of those visits I happened upon a special edition of an obscure medical

journal devoted to the concerns of health care practitioners who work in intensive and critical care units. I was fascinated because all of the papers in this special edition addressed clinical nutrition, with many of them specifically addressing nutritional supplementation. As I read the papers three thoughts immediately entered my mind:

1. Contrary to the prevailing thinking in the “medical establishment” that clinical nutrition and supplementation has no legitimate place in health care, the authors in this special edition were taking a very positive, encouraging stance.
2. The nutritional treatments that were advocated to be most efficacious were not complex mixtures of exotic forms of macro- and micronutrients. Rather, they discussed the value of supplementation of very basic forms of macro- and micronutrient supplementation.
3. The clinical scenarios discussed were very similar to those we were discussing in our clinical nutrition realm, i.e. leaky gut and need for magnesium.

However, what fascinated me the most were the discussions of *why* supplementation of macro- and micronutrients were necessary for patients in critical care scenarios such as traumas, burns, and surgery. Contrary to the very basic explanations offered in the alternative medicine clinical nutrition community (of which I was a member) that revolved around optimal dietary intake and absorption - these discussions, while acknowledging that optimal intake and absorption is an issue, suggested that the major reason that supplementation was necessary is that the unique physiology of severely ailing patients adversely altered nutrient metabolism to such an extent that macro- and

micronutrient supplementation was absolutely indicated as an adjunct to other treatment procedures to maximize patient outcomes.

This was an epiphany for me. Now I had some well-documented, logical reasons why sick people are sick. (In this situation why, for example, burn patients feel so lousy in parts of the body that are not directly affected by the burn). Furthermore, I had quality, specific information on how clinical nutrition and nutritional supplements related to this process not only in terms of cause but in terms of improved outcomes.

Finally, I also had an answer to an important question that had been plaguing me for years:

If dietary micronutrient deficiency and poor absorption is such a major cause of all chronic illness, as was and is currently being advocated by many in the alternative medicine, clinical nutrition community, why doesn't everyone get better across the board with a multivitamin/mineral supplement and some digestive aids?

What was the answer? Profound catabolic, pro-inflammatory changes that massively alter nutrient metabolism are occurring in ailing populations to such an extent that any positive impact of basic micronutrient supplementation is completely negated. Therefore, according to many of the authors in this special edition, the reason supplementation does not result in clinical improvement is not that supplementation is “worthless” as has been stated continuously by critics for several decades now, but that it is valuable but only effective when combined with other therapeutic modalities that assist in the correction of the catabolic, proinflammatory processes that severely and negatively alter nutrient metabolism.

Was there a catabolic process and a nutrient that seemed to be elevated in importance above the others in this special edition?

While the special edition of this journal addressed many different catabolic processes that occur in ailing populations and many different nutrient interventions, one process and one nutrient seemed to rise in emphasis above the others. What was the key catabolic process? Loss of organ-based protein mass, principally from muscle. What was the one key nutrient that received more emphasis concerning supplementation? **Protein.**

Interestingly, there was another catabolic process and class of nutrients that seemed to me to come in a close second – acid/alkaline imbalances and the need for electrolyte supplementation with emphasis on magnesium.

The take-away message for me

Twenty years ago the prevailing thinking in my world of alternative medicine clinical nutrition was that micronutrient deficiency and malabsorption were the key issues in terms of using clinical nutrition to improve patient outcomes. The authors of this special edition were suggesting otherwise. They were suggesting that the key issue in ailing populations was a catabolic, proinflammatory physiology that made optimization of protein and electrolytes the top concern.

Could this information that was meant for very sick, critical care patients be extrapolated to the chronically ill patients we typically encounter in the alternative medicine clinical nutrition community?

As you might guess, twenty years ago my suggestion that papers on critical care nutrition could have relevance to the outpatient scenario where diabetes, cardiovascular disease, bone loss, and arthritis are some of the most important concerns was met with a healthy dose of skepticism by my alternative medicine, clinical nutrition peers. For, I was discussing and strongly advocating classical dietetics and the work and writings of top, cutting edge dieticians, which was, to say the least, not being held in high regard by these peers in those days. Fortunately, since that time a large body of papers from top medical and nutrition journals,

many of which I have featured in my newsletters, have made it clear that the processes and needs that exist in the patients described in that critical care nutrition special edition twenty years ago are virtually identical, albeit in an attenuated form, to those that exist in the chronically ill patients we encounter every day.

In turn, it has become increasingly clear to me that, if resolution of patient chief complaints in a cost and time effective manner is paramount in our minds, we must not eliminate our focus on micronutrients, as suggested today by many researchers and the media, but deemphasize it a bit. We can no longer look at micronutrients as stand-alone panaceas that, if given in high enough doses, can cure or prevent virtually every chronic illness. Rather, I feel we must now look at micronutrient supplementation in two ways. First, we must regard it as a modality that repletes deficiencies not only induced by poor dietary intake and malabsorption but illness induced metabolic imbalances such as inflammation, low-grade chronic metabolic acidosis, and insulin resistance. Second, we must regard micronutrient supplementation as part of a team of alternative and allopathic therapeutic modalities that could potentially be used to time and cost effectively optimize patient health and quality of life.

Of course, with the above being stated, if micronutrient supplementation is no longer “top of the heap” so to speak, what should be at the top of the therapeutic nutrition heap, so to speak, in our quest to address chief complaints and improve quality of life in the vast majority of today’s aging, baby-boomer, chronically ill patients? As suggested in the title of this newsletter which is also the title of an editorial in a leading medical journal, therapeutic modalities that optimize muscle mass and function. As noted in several past newsletters, this would include supplemental modalities such as protein powder, electrolytes such as potassium and magnesium, and those that optimize insulin metabolism. However, there is one other supplemental modality that, if you are

like me, does not readily come to mind when considering optimization of muscle mass and function. What is this supplement? Fish oil.

Fish oil and optimization of muscle mass and function

On one hand you may think that fish oil supplementation makes sense from an intuitive standpoint because of the role of chronic inflammation in loss of muscle mass and function and the role of fish oil in reducing chronic inflammation. As you will see from the literature I am about to review, while the fish oil – inflammation connection is part of the story, fish oil supplementation can also act to help optimize muscle mass and function in a manner that is quite independent of its role in optimizing inflammatory mediators.

The first paper I would like to review is “Fish oil supplementation enhances the effects of strength training in elderly women” by Rodacki et al (Rodacki CLN et al. *Am J Clin Nutr*, Vol. 95, pp. 428-36, 2012). The first quote I would like to feature from this paper discusses past research on fish oil supplementation and muscle physiology:

“Fish oil (FO) supplementation, which is rich in n-3 PUFAs, has been shown to increase nerve conduction velocity in the elderly, sarcolemma ion channel modulation, and improved heart contractile activity. Thus, because FO supplementation improves both cardiac muscle contractility and nerve conduction velocity, it is reasonable to hypothesize that it may potentiate strength-training effects on skeletal muscles.”

The actual parameters of the study are as follows:

“Forty-five women (aged 64 ± 1.4 y) were randomly assigned to 3 groups. One group performed strength training only (ST group) for 90 d, whereas others performed the same strength-training program and received FO supplementation (2 g/d) for 90 d (ST90 group) or for 150 d (ST150 group; supplemented 60 d before training). Muscle strength and functional capacity were assessed before and after the training period.”

The daily dose of EPA was ~0.4 g and the daily dose of DHA was 0.3 g.

What were the results? First it is important to note that use of fish oil before training did not yield any improvements. However, when fish was combined with strength training the following was noted:

“The present study aimed to determine the effects on the neuromuscular system (ie, muscle strength and functional capacity) of FO supplementation when used in addition to a strength-training program in elderly women and to determine whether FO supplementation for a longer period causes further effects. The main finding was that FO supplementation along with strength training improved the response of the neuromuscular system. However, supplementation with FO for an additional period pretraining did not cause any additional effects.”

Was there any change in body weight during the study? The authors comment:

“Body weight remained unchanged among groups during the period of the study. This indicated that the amount of FO provided (2 g/d) did not cause any changes in body mass.”

Therefore, as you can see, fish oil did not have an impact on optimizing muscle mass. (Fortunately, we have other modalities at our disposal such as whey protein and leucine powders that can accomplish this when used with optimal diet and strength training). However, it had a major impact in improving muscle function, which is just as important as optimization of muscle mass when addressing patient chief complaints and quality of life issues.

Why did fish oil yield this positive impact on muscle function? Rodacki et al state:

“One possible physiologic mechanism is that the FO may improve muscle function, changing the fluidity of the membrane and acetylcholine sensitivity.”

The next quote makes an interesting statement about the quantity of fish oil used in the study:

“In the present study, 90 d of FO supplementation potentiated the effects of an equal length of strength training, although the dose provided was below that recommended by the American Heart Association and the UK government.”

In concluding their study, Rodacki et al summarize the important effects of fish oil on optimizing muscle strength and functionality in the elderly:

“In conclusion, the use of FO supplementation in addition to strength training potentiates the neuromuscular system, enhancing the muscle strength and the functional capacity in elderly women. Thus, FO may be an attractive supplement for the elderly to maximize their neuromuscular responses to strength training, which is important to life quality.”

The next paper I would like to feature that focuses on fish oil as an important supplement in maximizing anabolic responses generally and muscle physiology specifically is “Omega-3 fatty acids and protein metabolism: enhancement of anabolic interventions for sarcopenia” by Di Girolamo et al (Di Girolamo FG et al. *Curr Opin Clin Nutr Metab Care*, Vol. 17, No. 2, pp. 145-150, March 2014). One of the most interesting quotes from this paper is the following, that points out the importance of combining fish oil supplementation with protein/amino acids to attain an optimal anabolic response:

“The first and second study showed that neither omega-3 fatty acids nor corn oil were able to elicit an adequate anabolic effect either in the young/middle-aged or in the elderly individuals. Only when the omega-3 fatty acid supplementation was associated to the anabolic stimulus from amino acid administration, could an anabolic response be observed, with higher muscle anabolic signaling activity and increased insulin/amino acid-mediated protein synthesis. The corn oil, on the other hand, was not effective.”

How does fish oil create this increase in anabolic response? Di Girolamo et al provide even more detail than Rodacki et al in the paper just discussed. First, they make it clear

that the anabolic effect of fish oil, in contrast to what we might intuitively expect, has little to do with reducing inflammation:

“It is assumed that many of the beneficial effects of omega-3 fatty acids are associated with their anti-inflammatory properties, however, as shown by the experimental studies, the anabolic effects of omega-3 fatty acids were independent of any significant influence on inflammation.”

If a reduction in inflammation is not the mechanism, what might it be? The authors suggest that it might have to do with an entity called mTOR signaling pathway:

“Smith *et al.* in their studies show that the action is at least partially mediated via increased activation of the mTOR-p70s6k (mammalian target of rapamycin/ribosomal protein kinase S6) signaling pathway that is known to influence skeletal muscle mass, particularly under conditions of mechanical stimulation.”

How else might fish oil improve muscle function and anabolic activity? Di Girolamo et al discuss the work of the authors of the study discussed above:

“Rodacki *et al.* showed an increased plasma concentration of EPA and DHA in the fish oil-supplemented groups. The authors hypothesize that a higher concentration of omega-3 fatty acid in nerve and muscle cell membranes may affect membrane fluidity, therefore, influencing endocytosis, exocytosis, membrane fusion, neurotransmitter uptake and release, including acetylcholine and the activities of membrane-associated enzymes. Such increased membrane fluidity, mediated by increased omega-3 fatty acid content would accelerate the impulse conduction rate at the synapsis, thus enhancing the speed of muscle contraction. An additional potential mechanism associated with a higher DHA content in cell membranes would involve an intrinsic stimulation of the protein kinase C pathway, leading to enhanced translational activity and muscle protein synthesis.”

The next quote points out that fish oil not only enhances improvement of muscle function but also reduces breakdown of muscle:

“...omega-3 fatty acids seem to decrease muscle tissue breakdown by reducing the activity of the ubiquitin-proteasome proteolytic pathway, which is elevated in cachectic cancer patients.”

The final quote I would like to feature from the Di Girolamo et al paper discusses optimal fish oil dosing in relationship to optimization of muscle physiology:

“The available data show that among the quantity tested, the lower dosage of supplementation (1g/day may be adequate.”

In this time where cost effectiveness is such a major concern for both patients and clinicians, it is certainly gratifying to note that both papers I have just reviewed point out that daily doses of fish oil considered to be low by many can have a major positive impact of muscle physiology.

A COST-EFFECTIVE SUPPLEMENTAL PROTOCOL THAT CAN BE USED TO OPTIMIZE MUSCLE MASS AND FUNCTION

With the above in mind, I would now like to suggest a supplemental protocol using **Moss Nutrition Select** products that could be employed with any patient needing optimization of muscle mass and function, especially the elderly. Of course, not every patient will always need every supplement on this list. Therefore, before supplementing, it is always best to engage in a diagnostic protocol designed to determine allostatic load, muscle status, and anabolic/catabolic balance such as the **Entry Level Clinical Nutrition™** diagnostic protocol. If you would like more information on this diagnostic protocol, please see previous newsletters or call to speak with me or any of our clinical specialists. However, if, for whatever reason, going through a diagnostic protocol with any particular patient is not possible, the following supplemental protocol is a good starting point to increase anabolic function, muscle mass and function, which, in turn, has a very good chance of

improving patient quality of life no matter what the clinical presentation. Before continuing, please keep in mind one important caveat:

While much research has shown that the protocol below can be effective, its effect will be greatly minimized in the absence of regular weight-bearing exercise and a reasonably healthy diet!!

Anabolic Supplemental Protocol

Select Whey (Chocolate, vanilla, or unflavored): 1-2 servings per day. If the patient cannot tolerate dairy products, consider use of **Select Meal DF** instead.

L-Leucine Powder – 1 scoop per day in one serving of **Select Whey**

EPA/DHA HP Select® – 1 capsule per day.

K Alkaline + Mg – 2 caps per day before bed.

Glycemic Select™ – 2 caps 3 times per day with meals.

For more information about these products, please visit our website or call our office.

Select Whey Vanilla- Moss Nutrition

Contents: 960 g

Select Whey Chocolate- Moss Nutrition

Contents: 1050 g

Select Whey Unflavored- Moss Nutrition

Contents: 900 g

Select Meal DF Vanilla- Moss Nutrition

Contents: 616 g

Select Meal DF Chocolate- Moss Nutrition

Contents: 616 g

L-Leucine Powder- Moss Nutrition

Contents: 65 g

EPA/DHA HP Select® - Moss Nutrition

Contents: 120 SG

K Alkaline + Mg- Moss Nutrition

Contents: 90 VC

Glycemic Select™- Moss Nutrition

Contents: 180 VC



The Anabolic Protocol

UPDATE: Now, you can get the benefits of all these products in 1 Product: SarcoSelect™!

Please read the May and June newsletters to learn more about **SarcoSelect™** and all it can do to assist in the optimization of muscle mass, muscle function, chief complaints, and overall quality of life in your patients. We are very excited about this new product!

SarcoSelect™ - Moss Nutrition Select

Contents: 585 g
(1.29 lbs)

(14 servings)

