

More Bad Science: 0 + 0 = 1?

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"Force, if unassisted by judgment, collapses through its own mass."

Horace, circa 45 B.C.

The field of anaerobic exercise science is without a doubt lacking quality, unbiased educational materials. While there is an abundance of sensational "fluff" books designed to sell despite little or no meaningful content, viz. mainstream books, there is a dearth of more serious works on the subject. Those of us truly interested in the facts of anaerobic exercise science must rely on either textbooks, which usually devote little space to anaerobic exercise let alone resistance training, or original studies. One must always keep in mind that in certain instances, when one craves to get the most detailed information possible, it is best to get it straight from the horse's mouth, or, in other words, the original study. Neither of said sources are always perfect or free from bias, but one must start somewhere in one's quest for knowledge. After all, the only real alternative to studying the work of others is to conduct your own research.

Because time is precious, most of us do not have the leisure to pour over original studies on every single topic related to the physiological, histological, biochemical, nutritional, or applied facets of resistance training. In the interest of time, we may opt to cautiously read research summaries that appear as chapters in reference books. Such books with multiple authors or "experts" for each chapter are supposed to be more accurate and inclusive than texts written by a single or a couple of authors. These multi-author books are also useful in that they place information in the context of other supposedly scientific studies on a given subject. But remember, just because something is written does not mean it's true.

Recently, when reading the well-respected and widely read professional reference *Nutrition in Exercise and Sport*, Third Edition edited by Ira Wolinski, I stumbled across a disturbing passage in this extensive but expensive (\$149 American) work. Chapter 5, entitled "Amino Acid and Protein Metabolism During Recovery," presents several studies examining the effects of various forms of exercise on 3-methylhistidine (3-MH) excretion. 3-MH is a biochemical marker of contractile protein breakdown that is excreted unchanged in the urine.

The passage began innocently enough. On page 145, the authors reviewed studies which showed that infrequent (every four days) or isolated bouts of resistance exercise do not increase degradation of muscle contractile proteins. They then presented studies that showed that chronic daily bouts (up to 6 consecutive workouts) of resistance training tend to increase 3-MH excretion.

At this juncture, I had said to myself, "A-ha. These studies clearly show that six consecutive days of resistance exercise lead to overtraining as evidenced by a substantial increase in muscle protein breakdown." I was astounded, however, at the conclusion of the authors which was printed exactly as follows:

"Data from studies examining 3-MH changes in response to isolated bouts and chronic weightlifting exercise help to illustrate the importance of a regular training program for gaining muscle mass. Since muscle growth is associated with higher rates of protein turnover (degradation and synthesis), it makes sense that an isolated bout of resistance exercise does not elevate 3-MH excretion and hence, muscle protein turnover. Practical experience tells us that adding muscle by lifting weights sporadically is not possible. Only when a regular training program is followed do gains in muscle mass occur. Obviously, if muscle protein degradation is elevated during a resistance training program, skeletal muscle protein synthesis rates must also increase in order to support skeletal muscle repair, growth, and function. Indeed, recent evidence shows that weightlifting exercise increases skeletal muscle protein synthesis during the 24 hr period following exercise."

I'll wait right here while you read that again. A dissection of the argument will clearly show how irrational and contradictory it is. The paramount comment is *"...it makes sense that an isolated bout of resistance exercise does not elevate 3-MH excretion and hence, muscle protein turnover. Practical experience tells us that adding muscle by lifting weights sporadically is not possible."*

Essentially, the authors concluded that a single workout doesn't result in growth stimulation because it didn't significantly increase contractile protein catabolism! Now, if a single workout doesn't result in any hypertrophic stimulation, then how can multiple single workouts result in hypertrophy? In other words, if one workout is equal to zero stimulation, then how can zero plus zero equal anything greater than zero?

A second problem with this conclusion is that it implies it is superior to overtrain daily to the brink of significantly destroying contractile protein as opposed to training with appropriate rest days to prevent muscle catabolism. This conclusion is akin to saying that in order for one to increase bone mineral density, one must first overtrain to the point of developing stress fractures. Alternatively, it is as ludicrous as saying that if you want to develop a suntan, then you must first overexpose yourself to ultraviolet rays until you bake your skin to the point of developing blisters. The idea of resistance training should be to minimize –not to promote– muscle tissue breakdown while stimulating growth.

A third error is the contradictory nature of the last sentence: *"Indeed, recent evidence shows that weightlifting exercise increases skeletal muscle protein synthesis during the 24 hr period following exercise."* Didn't the authors just indicate that a single workout did not increase 3-MH, which, they contend, must happen for growth to occur? Next they've concluded with apparent certainty that a single workout HAS been shown to increase protein synthesis! You can't have it both ways; either one workout does or does not stimulate muscle growth. Considering the bulk of the final paragraph quoted verbatim above and the apparent stance of the authors, the last study demonstrating an increase in muscle protein synthesis with a single resistance training session should have been preceded by "in contrast," "paradoxically," or "surprisingly," but most certainly not "indeed" as it was.

I concede that I am not infallible, and perhaps my preceding interpretations are not exactly what was meant by the authors. However, the authors cannot be completely exonerated of all wrong doing. When one has the honor of authoring educational materials, there is a tremendous responsibility of presenting information with the greatest of clarity. Anything less, such as the above excerpt, only serves to contribute to the confusion that has already paralyzed so many enthusiasts in the sport and recreation of body building. In a field deserving of precision but plagued with ambiguity, as the old adage reminds us, *"Either you're part of the problem or part of the solution."*

Although I've completed half a dozen biochemistry courses, I am certainly not a biochemist nor a muscle physiologist. So, if you are intimately familiar with 3-methylhistidine data and feel I've misinterpreted the data, please let me know. But then again, I'm not sure that anyone yet knows how to accurately assess 3-MH data as there is disagreement within the scientific community. In addition, I read all of the original papers regarding the effects of resistance training on 3-MH that the authors cited. I discovered a number of things including the following: 1) some of the cited studies themselves refute the fact that significantly increasing 3-MH results in muscle growth, 2) the training methods employed were generally ill-conceived and would result in overtraining for the vast majority, and 3) despite the fact that 3-MH is a result of contractile protein breakdown, none of the authors mentioned the possibility that 3-MH is a sign of overtraining. For example, a study by Hickson and Hinkelman was conducted in the following fashion. Subjects exercised 6 days per week for four weeks. They performed 3 sets of 6 weightlifting exercises for a total of 18 sets per day. Chest and arms were alternated with legs and back every-other-day to *"allow targeted muscle groups to rest 48 hrs between sessions."*

As far as the workout protocol is concerned, it is a methodological nightmare. First, 48 hrs is hardly sufficient time to recuperate from multiple sets per body part. Second, 24 hours is not enough rest to recover from the systemic demands of resistance exercise. Third, arms were trained one day and back was trained the following day. Thus, the biceps brachii were trained either directly or indirectly everyday except the rest day, which brings me to another point...Fourth, apparently the seventh day was taken off for Sabbath and for no other reason. Fifth, and MOST IMPORTANTLY, the subjects, after 28 days, 24 workouts, 432 sets, and consuming three times the RDA of protein, showed NO significant increase in lean body mass! This progress can best be categorized as pitiful especially when many high-intensity practitioners make significant progress with a fraction of the total sets. And somehow this study was used to support the notion that elevated 3-MH is indicative of a productive routine?

Despite this mass of confusion that is intended to educate, I can confidently proclaim, as well as any first-grader, that 0+0 1! If a single workout can't stimulate muscular growth, then how can a series of single workouts stimulate muscular growth? Under this assumption, they can't. But fear not, for anyone with a hint of EEG activity should know better.