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H.I.T. and N.E.A.T.

During the eleven years that I have operated Ultimate Exercise, Inc. I have encountered two frustrating facts. The first fact is that, despite our admonitions that extra exercise is not necessary, almost all of our clients develop an insatiable urge to do extra activity. The second fact is that my observations that adding a pound of muscle produces a significant increase in basal metabolic rate cannot be backed up by the scientific literature. Only recently have I begun to suspect that these two long-standing frustrations may be linked.

Before I discuss my thinking on this topic, and the scientific literature that triggered my thinking, a little background is in order. Ultimate Exercise was opened as a Licensed SuperSlow™ facility under the auspices of the SuperSlow Exercise Guild. One of the major tenets of SuperSlow philosophy was (and is) that not just any activity constitutes exercise, and that other activity (particularly “aerobic” or steady-state activity) was harmful at worst, and at best only served to consume precious recovery resources. This notion was a cornerstone of the philosophy and operation of a SuperSlow facility. We (SuperSlow facility owners) not only believed it, we taught it to our clients with extreme fervor. In the early days of Ultimate Exercise, I felt that we spent more time explaining the theoretical rationale of this notion than we did actually training the clients. If clients resisted our arguments, we would become even more assertive. I remember Drew Baye during the heyday of his SuperSlow enthusiasm telling of seeing one of his clients jogging on the roadside while he was driving through his neighborhood. Drew’s response to this sight was typical of what one critic called “the Branch Davidians of the fitness industry”...he pulled the car in front of his client and commanded that she stop jogging and walk (not jog) home. Despite these kind of ridiculous encounters, SuperSlow clients continued to relentlessly pursue extra activity.

In the earlier days of Ultimate Exercise I thought this urge to seek out extra activity was due to the prevailing attitude of the general public about the minimal amount of exercise needed to experience benefit. What was perplexing was that most of our clients came to us as completely sedentary individuals, yet very commonly, after 10 or 12 weeks they would be adding extra activity. We had clients, despite our efforts to convince them of the negative effects of extra activity, take up mountain-biking, kayaking, hiking, running 10K’s and triathalons. Even more frustrating, the clients tended to credit the extra activity with their results and improved sense of well-being.

Initially this phenomenon was very difficult to understand. Clients that bought into our concept would suddenly become drawn to the very activities that we taught them were very inefficient for exercise purposes. However, as I myself became stronger than I had ever been, and with a greater sense of well-being than I had experienced since my childhood, I developed the urge to try my hand at BMX racing—a sport that I had done quite well at during my teens and early 20s. Quite to my surprise, my power on the bike greatly exceeded what I possessed 20 years prior. I was hooked; all I needed was to bring my skills up in order to be better than I’d ever been. I was quickly racing every weekend and practicing skills during any spare time. It was then that I realized that my clients had not been brainwashed by Kenneth Cooper, and that they were not trying to rebel against me. I realized that the situation was something we had created. In essence, we were giving people a Ferrari and then telling them they could only drive in a school zone.

I have always noted a reversal in cause and effect with regard to people’s assumptions about exercise. The general public by and large believes that particular activities produce particular body types (ie-“the long and lean muscles of a swimmer or dancer”). Instead, I believe that possession of a particular body-type generates a natural selection process, whereby a person finds the activity they are best suited for. Performance of certain types of sports or activities is much more an expression of the joy of possessing a superior somatic phenotype for that activity than the activity producing a superior somatic phenotype. What I found was that I had inserted myself into the middle of this loop... Ultimate Exercise was producing physical improvements in our clients that made them now experience the “joy of a superior somatic phenotype” that drove them to seek out sports and extra activity.

This phenomenon is now so commonplace and easy to recognize that we tell our clients that we expect this to happen in their own lives. We still tell them that extra activity is not necessary or desirable as a supplement to the exercise we provide. However, we tell them that as they get stronger, they will develop a

greater sense of efficacy and will spontaneously become more active. We tell them this is an unavoidable consequence of becoming stronger and we do not try to discourage them from partaking in other activities. We only ask that they pursue activity because they enjoy the activity and that they keep us informed of their activity levels so we can adjust their training volume and frequency appropriately.

The second frustration in my 11 years is not being able to explain why I believe that the addition of a pound of muscle requires an extra 100 calories of energy per day to support its functioning. I am not certain where I heard this notion. It may have been from Ken Hutchins or perhaps Dr. Ellington Darden. Wherever I heard it, I immediately accepted it because it seemed self-evident with my observations. Whenever one of our UE clients had made significant strength gains and by our estimations had gained about 5 pounds of muscle, we would start to see body fat come off at a rate of about a pound a week. This would typically manifest about 8-12 weeks into a program. Since a pound of fat contains 3,500 calories and this was lost over 7 days this represented an increase in metabolic rate of 500 calories. Divide this 500 calories by 5 pounds of muscle and one could surmise that this pound of muscle “cost” 100 calories per day.

The problem with this intuitive estimation is that no published scientific literature backs it up. Critics were quick to point this out citing studies that showed a pound of muscle burned as little as 15 and as much as 35 calories per 24-hour period. The studies that cite the lowest number managed to look at just the metabolic activity of the muscle itself without counting the metabolic cost of all the tissues that support this new muscle (increase in skeletal mass, blood vessel growth, cardiac output, need for heat dissipation etc). The studies that did account for these variables were closer to the 35-calorie-per-24-hour count. The question that always plagued me was: Where did my other 65 calories go?

In the past few years scientists have identified a concept that has become a hotbed for research activity. The concept is called NEAT or *Non Exercise Activity Thermogenesis*. NEAT is the energy expended through all other activities of daily living that are not a part of formal exercise activity. It has been noted that lean individuals have higher levels of NEAT than obese individuals. But it is not so simple as to suggest that higher levels of NEAT in obese individuals would make them lean. It is very hard to separate cause and effect or even to know if this is an association. The most recent research (of the articles cited at the end of this article) note that NEAT is a complex neurohormonal phenomenon modulated by an interactive web of neuroproteins and hormones. **The complexity of this biological network suggests that it is not just exercise burning extra calories that is at hand here. Rather, there appears to be an alteration of gene expression that activates a whole host of behaviors and activities that favor leanness over fatness.**

With this concept in hand I began to pay attention to our clients' activity levels on a more microscopic level. I am able to do so because many Ultimate Exercise clients (and former clients) work with me at the hospital. One client that I was able to observe during a period of time when their physical condition was optimal was very active. Whenever this person was on the phone, reading or engaged in conversation, their leg would bounce up and down continuously. During meetings the “thumper phenomenon” would be in full effect and there would be continuous “doodling” on a notepad. Prior to UE, I did not note this kind of behavior or activity. Another client began taking the stairs back to the ER after delivering patients upstairs due to impatience with the elevators. This same impatience prompted a much brisker speed of walking when carrying out tasks. These are all highly unscientific and biased observations granted, but interesting when viewed in light of the controlled observations in the studies on NEAT. The studies thus far have not identified the source of NEAT, but I suspect that it will be found to correlate with lean muscle mass. Keep a more detailed eye on your clients, friends, or even yourself and see if you notice a similar pattern.

The most promising aspect of this new research is the understanding that fat loss is much more than calories in versus calories out. Nutrient partitioning is being directed by alterations in gene expression (epigenetic changes) in response to types of physical activity, dietary, emotional and other lifestyle elements. **A stimulus that demands production of new muscle and the metabolic activity to support this new tissue does much more than just demand more calories. High intensity exercise creates a new “neuro-endocrine dog-trail” that feeds back to spontaneously produce even further changes in behaviors and preferences that serve to advance the health of the organism. It is a positive feedback loop that we are only beginning to understand. I think everyone involved in this field has always understood that HIT does great things. For the first time that I can remember, the scientific literature is suggesting it is even much better than we imagined.** In a new book from McGraw-Hill publishers, *Body by Science*, I (and my co-author John Little) will explore how new scientific literature supports brief, infrequent, high intensity exercise. The book

will be available in early 2009. Advanced ordering is available at Amazon.com now.

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Neuroregulation of nonexercise activity thermogenesis and obesity resistance. Kotz, CM, Teske, JA, Billington CJ. Am J Physiol Regul Integr Comp Physiol. 2008 Mar; 294(3):R699-710. Full text available at ajpregu.physiology.org.

Role of nonexercise activity thermogenesis (NEAT) in obesity. Kotz, CM and Levine, JA. Minn. Med. 2005 Sep; 88(9):54-7.

Variability in energy expenditure and its components. Donahoo, WT et al. Curr Opin Clin Nutr and Metab. Care. 2004 Nov; 7(6): 599-605.

These articles can be looked up at www.nlm.nih.gov at the Pubmed site. Each article will have a list of related articles listed to the right of the abstract that will open a treasure trove of articles on this topic.