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(And for my engagement with the author he critiques in this post, see here)

Fitness Podcasts — Brad Schoenfeld.

The 5 Biggest Workout Mistakes—Adam Bornstein.

How Much Fat Should I Eat?—Adam Bornstein.

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Training the Obese Beginner: Part 1 – Lyle McDonald.

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Why eating less and exercising more doesn’t always work for long-term weight loss – Eirik Garnas.


No Easy Path To Dropping Pounds After Pregnancy – Arya Sharma.

10 principles of the Function First Approach to Corrective Exercise – Anthony Carey.

Plantar Fasciitis – A Function First View – Anthony Carey.

A Model for Successful Corrective Exercise Programming – Anthony Carey.

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It’s been forever since I put out one of these, so please forgive me for taking a break from my series on Gray Cook.

The Goal Snowball – Alwyn Cosgrove.

Strategies – Alwyn Cosgrove.

My Turning Point – Alwyn Cosgrove.


10 Tips to Deal with Holiday Weight Gain – Lyle McDonald.

More Protein, More Muscle... – Brad Pilon.

We are 90% microbe and 10% human: Can we lose weight by boosting good bacteria with probiotics and prebiotics? – Bret Contreras.


How Does Foam Rolling Work? And Why “SMR” Should be Called “SMT” – Bret Contreras.


Glute Training Science at MPI – Chad Waterbury.
Fission Fusion Training – Amir Siddiqui.

The Role of Metabolic Stress in Muscle Growth – Brad Schoenfeld.

My 6 Most Important Training Discoveries – Charles Staley.


Clock In And Do Work – Alwyn Cosgrove.

An objective look at L-carnitine supplementation for fat-loss and enhanced performance – Layne Norton.

103 Ways to Make 2013 Your Best Year Yet – Alwyn Cosgrove.

What’s good about the Biggest Loser? – Alwyn Cosgrove.

Different types of interval training – Alwyn Cosgrove.

Living the AC life – Alwyn Cosgrove.

My Handout for the Perform Better Workshop in Los Angeles this weekend – Dan John.


The Basic Axiom: The Fission Fusion Training Model – Amir Siddqui.

Stoking the metabolic fire: does higher meal frequency increase metabolism and enhance fat loss? – Amir Siddiqui.


Blame and magical thinking: The consequences of the autism “biomed” movement – David Gorski.

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Aesthetics To Strength – Amir Siddiqui.

My Philosophy of Intermittent Fasting – Brad Pilon.

Are you too busy to get better? – Alwyn Cosgrove.


35 Short and Awesome Personal Trainer Tips to Give to Your Client.


Intensity Techniques to Make You Hurt – Tim Henriques.

Best Ways to Make Dieting Easier – Joy Victoria.


How to Train More Frequently – Chad Waterbury.

An Opportunity Missed by Fitness Professionals – Rick Kaselj.

Episode 3 of Muscle College Radio is Now LIVE! (Dr. Wilson and I annihilate cardio myths) – Layne Norton.
We have pretty extensively covered a wide variety of supplements now, including HMB, glutamine, beta-alanine, caffeine, L-carnitine, fish oil and creatine; now I wish to turn to a supplement I had just heard of on No Bullshit Bodybuilding’s FB page, and subsequently found in my nutrition literature — citrate, beginning with a brief analysis of why a buffer supplement might be worthwhile:

Anaerobic glycolysis provides the primary fuel source for exercise of near-maximal intensity lasting longer than approximately 20-30 seconds. The total capacity of this system is limited by the progressive increase in acidity of the intracellular environment, caused by the accumulation of lactate and hydrogen ions. When intracellular buffering capacity is exceeded, lactate and hydrogen ions diffuse into the extracellular space, perhaps aided by a positive pH gradient. Since the 1930s it has been recognized that dietary strategies that decrease blood pH (e.g intake of acid salts) impair high-intensity exercise, whole alkalotic therapies improve such performance (Dennig et al. 1931; Dill et al. 1932). In theory, an increase in extracellular buffering capacity should delay the onset of muscular fatigue during prolonged anaerobic metabolism by increasing the muscle’s ability to dispose of excess hydrogen ions. (Burke and Deacon, Clinical Sports Nutrition, p. 442, 2010)

Sorry for the long quote, but it serves to demonstrate both how important this supplement is, and how long research supporting it has existed.

Burke and Deakin state that sodium bicarbonate and sodium citrate have historically been the two most popular buffering agents used in sport, with people trying ‘soda loading’, or ‘bicarbonate loading’ for the past 70 years in the forms of the household product ‘bicarb soda’ or as pharmaceutical urinary alkalinizers such as Ural. (p. 442) The authors also note there are no major health risks associated with bicarbonate loading, although some individuals do experience some gastrointestinal distress in the form of cramping or diarrhea, which may be mitigated by a consumption of a liter or more of water with or around bicarbonate intake.

**Tips for usage**

0.3-0.5 g/kg of body mass, which for me at a bodyweight of 95kgs means I would ingest 27-47g per day, usually 1-2 hours prior to exercise (about 4-7 teaspoons, or 1-3 tablespoons). For extreme cases ‘chronic’ loading has been investigated with subjects ingesting up to 500mg/kg/d over a 5-6 day period (spread over the day by 4 doses), this achieved what the authors call a “plasma base excess” (p. 443) which was sustained over the days of chronic ingestion. Chronic intake enhanced performance of a prolonged sprint test which was taken 1-2 days after supplementation had finished — which may be a beneficial outcome for sports which has a series of “competition events” (p. 443).

In conclusion for those of you looking to put on muscle mass, this is the most well-supported supplement in the literature for that, with creatine running second and Beta-alanine third (at least of the supplements we have examined). When training for maximum muscle gain (as previously stated, which is everyone), I see there as being two options for you (1) triple stack these three supplements into a workout matrix lasting a longer time (say 12 weeks), or (2) as single supplements that you either overlap or take concurrently over a shorter period of time (say 6 weeks). Your physiological response in terms of gastrointestinal irritability may determine which of these strategies you try.

**References**


**Related articles**

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- Supplement Research: Glutamine. (killsessionmusings.wordpress.com)
- Supplement Research: HMB. (killsessionmusings.wordpress.com)
- What Are the Benefits of Saliva? (topdentists.com)
- Bicarbonate-Dependent Secretion and Proteolytic Processing of Recombinant Myocilin (plosone.org)
- All I want for Christmas is…. Bicarbonate of soda (timesofflanta.com)
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- OXYGEN How Oxygen Supplementation Can Help Build Muscle Faster… (andreelmoore.wordpress.com)
- The Building Blocks of Baking – Part 7 Raising Agents (bakewithclaire.wordpress.com)

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Now that we're back into it, I'll move onto another supplement important to the muscle-building crowd, HMB – it is important to note, that when I say “muscle-building crowd”, the fat loss people should not feel like they need to switch off. Building, and keeping muscle is of extreme importance for anyone in the gym! Muscle mass is a huge metabolic component to fat loss, in using it, keeping it, and building it, so these reviews of supposed “muscle-building” supps are important for everyone.

HMB's actual name is B-hydroxy-B-methylbutyrate which Burke and Deakin, 2010 state is a metabolite of the amino acid leucine – supposed benefits to HMB supplementation include gains in strength and lean body mass, enhanced recovery, and anti catabolism.

The hypothesis underpinning these claims is that the anti-catabolic effects that are sometimes associated with leucine feeding during times of stress are mediated by HMB. (Burke and Deacon, Clinical Sports Nutrition, p. 459, 2010)

HMB has been studied quite well in both animals and in humans, particularly in conjunction with resistance training with an emphasis on body composition changes and strength. Burke and Deakin summarize the findings of the studies performed thus far in table 16.8 on p. 463-5:

This table shows there is mixed support for the hypothesis that HMB can enhance the response to resistance training as a result of reducing exercise induced protein breakdown or damage. (Burke and Deacon, Clinical Sports Nutrition, p. 462, 2010)

Burke and Deakin break these findings down for us, it might be helpful to look at their findings briefly; they state that some studies (Nissen et al. 1996; Panton et al. 200; Jowko et al. 2001; Thomson 2004) reported a benefit to HMB supplementation while others (Kreider et al. 199; Slater et al. 2001; O’Connor & Crow 2003; Ransone et al. 2003; Hoffman et al. 2004) failed to detect any benefit. A meta-analysis was performed in 2004 by Nissar & Sharp 2003 and found a positive increase in lean mass and strength gain above resistance training alone, but the effects were “trivial to small; effect sizes for gain in muscle mass = 0.15 and strength = 0.19” (p. 462). The authors note that this meta analysis has received criticism – that the sample set for the studies was limited to only three different labs and experimental bias has been shown, due to interdependence. (p. 462)

From here Burke and Deakin theorize the findings in the current research – although they state
that is difficult. They suggest that HMB supplementation may be useful in the early phases of a new training program, or in previously untrained subjects new to a resistance training program – they state however that if this is the case it is negated anyway once adaptation to training occurs. This would explain why adaptations have been noted in short-term studies, but not at the end of longer ones, and why novice trainers respond more so than experienced ones. They also state, finally, and perhaps most importantly, specific research on this theorizing would need to be done, as well as more research is needed before HMB can be recommended as an effective supplement.

Williams, 2007 supports Burke and Deakin, showing another review done in the year 2000 by Slater and Jenkins which found only two peer-reviewed papers and eight abstracts on HMB, these papers found that:

... although there is some support for the claims, at least in the young, untrained individuals, the response of resistance-trained individuals is less clear and that there is a need for more tightly controlled, longer duration studies to evaluate the ergogenic effect of HMB supplementation. Peer-reviewed studies published subsequent to their review are equivocal regarding the ergogenic effect of HMB supplementation on exercise performance in untrained individuals, but in general indicate that it does not benefit train individuals. (Williams, p. 223, Nutrition for Health, Fitness and Sport, 2009)

Williams looks at other a few other studies not covered by Burke and Deakin, but ultimately come to a very similar conclusion:

Thus the available data indicate that HMB supplementation does not appear to affect muscle strength, body composition, or anaerobic exercise performance in resistance-trained subjects. (Williams, p. 224, Nutrition for Health, Fitness and Sport, 2009)

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