Neveux \ Photo Design by Aldrich Bonifacio \ Model: Berry Kabov

Firefight for Firepower

John A. Wise, Ph.D., Reveals Why Beta-Alanine Is a True Muscle Intensi-Fire

by Jerry Brainum • Photography by Michael Neveux

What limits muscular gains? Certainly, not training hard enough will prevent you from progressing at an acceptable rate. Not paying enough attention to diet will also inhibit rapid size and strength gains. On a more elemental level, however, muscle fatigue puts a major damper on muscle growth. The actual causes of muscle fatigue during training can vary, from a lack of sufficient carbs and calories to dehydration. The most familiar sign of impending fatigue during any particular set, however, is an intense burning sensation in the trained muscles.

The burn is caused by a buildup of lactic acid, although it's the acid part, rather than the lactate portion, that is the true problem. If you could douse the fire that causes muscle flameout during a set, you'd be able to train harder and thus speed gains in size and strength.

Creatine is considered one of the most effective food supplements. While it works mainly by increasing muscle energy stores, it also provides some muscle buffering. In short, it helps to soak up acid produced during hard training, acid that inhibits energy production in working muscle.

The primary muscle-buffering substance is called L-carnosine. It's a dipeptide, consisting of two amino acids—beta-alanine and histidine—bonded together. Several studies clearly show that the limiting factor for carnosine synthesis in muscle is beta-alanine.

Beta-alanine is a comparatively obscure nutrient and is one of the few known "beta" amino acids. Other amino acids are "alpha" amino acids and are found in the natural "L" configuration or the "D" configuration, which isn't usable by the human body. Beta-alanine exists in several foods, mainly protein, and also forms part of the structure of the B-complex vitamin pantothenic acid. Beta-alanine is metabolized into acetic acid, better known as vinegar in its dilute form.

To find out the facts about using beta-alanine, I interviewed John A. Wise, Ph.D., a co-author of most of the recent studies examining the athletic use of beta-alanine supplements. He is currently the chief science officer of Natural Alternatives International in San Marcos, California.

JB: What is beta-alanine, and how does it work in the body?

JW: It's an amino acid that isn't involved in structural proteins. It combines with another amino acid, histidine, to form a dipeptide that serves as a buffer in muscle. In human muscle the dipeptide combination of beta-alanine and histidine is called L-carnosine.

JB: Can the body synthesize beta-alanine?

JW: Yes, but the synthesis is under some kind of limited control. Using a supplemental form of beta-alanine can significantly increase the synthesis.

JB: When were the effects of carnosine first discovered by scientists?

JW: Scientists have speculated about the effects of carnosine for some time, based on the known effects of other dipeptides existing

in muscle. Something in muscle was providing a buffering, or anti-acidity, effect. The debate was just how much the intramuscular dipeptides contributed to intramuscular buffering.

JB: Speaking of buffering effects, doesn't common baking soda—sodium bicarbonate—provide a buffering effect?

JW: Sodium bicarb works only indirectly because it provides buffering in the blood but not in muscle. Because of that, numerous studies have failed to show any consistent effect.

JB: Not to mention the side effects that can occur, such as explosive diarrhea. Why would a bodybuilder want to use a beta-alanine supplement?

JW: The main advantage for a bodybuilder would be a training effect similar in magnitude to that of creatine, although the effects differ. Using creatine allows you to train harder and recover faster. That's also the category that beta-alanine falls into. By increasing muscle levels of carnosine, beta-alanine use allows you to train harder and longer before fatigue sets in.

JB: So would it be fair to say that while beta-alanine isn't a direct anabolic promoter, as hormones are, by promoting increased training intensity with less fatigue, it can promote gains in muscle size and strength?

JW: Yes, exactly.

JB: Since carnosine is the key to how beta-alanine works, why not just use carnosine supplements?

JW: Carnosine does work as a supplement, but it's very expensive. Using it in doses that are efficacious as an ergogenic aid would cost hundreds of dollars a month. Ingested L-carnosine is degraded into beta-alanine and histidine as soon as it enters the blood through the activity of the enzyme carnosinase. Beta-alanine is far less expensive, and it's the limiting factor in promoting carnosine synthesis in muscle.

If you could douse the fire that causes muscle flame-out during a set, you should be able to train harder and thus speed gains in size and strength.

JB: Some studies seem to show that supplemental carnosine is taken up more rapidly in slow-twitch, or endurance, muscle fibers than it is in fast-twitch fibers. Would using a supplement that promotes carnosine synthesis in muscle, such as beta-alanine, be more suitable for use in endurance events?

JW: Current research shows that beta-alanine affects both types of muscle fibers. The effect in anaerobic, or fast-twitch, fibers would be greater because that's the type of activity that gives you an increased acid buildup in the muscles. The levels of carnosine are also higher in fast-twitch fibers than in slow-twitch fibers, regardless of training. Using supplemental beta-alanine results in an average 60 percent increase of muscle carnosine. *(continued on page 180)*

(continued from page 176)

JB: Since carnosine consists of beta-alanine and histidine bonded together, wouldn't taking extra histidine also lead to increased muscle carnosine?

JW: No, because histidine is used in protein synthesis reactions throughout the body, and increasing it merely leads to increased amino acid competition. On the other hand, beta-alanine is not involved in protein synthesis reactions and thus would directly be used for carnosine synthesis in muscle.

JB: Some new supplements contain both beta-alanine and histidine. Does that serve any purpose other than looking good on the label?

JW: Adding histidine to a supplement that already contains beta-alanine is superfluous. It's similar to adding L-arginine, a precursor of creatine, to a supplement that contains creatine.

JB: Some companies also include simple carbohydrates and caffeine along with the beta-alanine in the belief that carbs and caffeine are synergistic with it and make it work better. Any truth to that?

JW: Simple carbs, such as glucose, can increase the uptake of beta-alanine into muscle. The effect relates to increased insulin secretion induced by the simple sugars. Insulin promotes the entry of all amino acids—including beta-alanine—into muscle. Caffeine has its own ergogenic effect, but that is independent of the effect of beta-alanine.

JB: Some studies show that taking antioxidant nutrients, such as vitamin E, boosts beta-alanine uptake. Is that true?

JW: We don't have any evidence of that.

JB: What about combining creatine with beta-alanine? Would that be beneficial?

JW: A couple of studies—but not all studies—do show that beta-alanine is synergistic with creatine. It depends on how you measure the performance effects. The main effect of creatine is to increase energy levels in muscle through increasing the phosphocreatine content. The phosphate portion also provides a minor buffering effect. The main effect of beta-alanine is to increase the buffering capacity of muscle. Since the supplements work differently in muscle, they can provide a synergistic effect. But, again, it isn't always evident.

JB: What's the optimal dose of beta-alanine for bodybuilding purposes?

JW: We've looked at various dosages, such as 3.2 grams and 6.4 grams per day, and there is little difference in effect between the two. The carnosine increase in muscle that results from taking beta-alanine is time dependent. You don't get a loading effect in the muscle the way you do with creatine. Using supplemental creatine promotes a rapid increase in muscle creatine content. That doesn't happen with beta-alanine, which produces a more gradual increase in muscle carnosine content.

Mixing beta-alanine in a protein shake would not be a good idea.

Model: Jonathan Lawson

Model: Todd Smith

Using a beta-alanine supplement leads to a rapid increase in blood beta-alanine, but that also drops quickly, too. Based on that, we feel that taking several small doses is more effective—two to four times a day. The most efficacious dose is about one to 1 1/2 grams taken two to four times a day. Taking more than the suggested doses doesn't seem to increase the beneficial effects of beta-alanine.

JB: Is there an optimal time to take the supplements?

JW: Our studies don't point to any particular optimal time. The important thing is supplementing over time so that you get increased carnosine in the muscle.

JB: Are there any side effects linked to using beta-alanine?

JW: Compared to creatine, there is no increase in hydration, or water retention, when using beta-alanine supplements. The only side effect we've found is a slight flushing effect that's similar to, but on a smaller scale than, what the B-complex vitamin niacin causes. That happens mainly when larger doses are used. For those who find the effect uncomfortable, taking smaller doses more often eliminates it. Taking beta-alanine with simple sugars also blocks the flush effect.

JB: Does it work better for men than it does for women?

JW: We've done several studies featuring both male and female subjects, and no gender difference is apparent in the results. We are now conducting a new study that specifically examines the effects of beta-alanine in women, so we should know more about that soon.

JB: Some studies show that creatine works better in younger people. Does that also apply to beta-alanine?

JW: Some data show that carnosine levels in the body drop as you get older. Increasing carnosine levels through supplemental beta-alanine use may be even more effective for those over age 40, in whom carnosine levels are often lower.

JB: What about teenagers and younger people? Is beta-alanine safe and effective for that age group?

JW: The beta-alanine safety profile is similar to that of creatine (hundreds of studies found no adverse effects with normal use). Another thing to consider is that more creatine and beta-alanine can be gotten through diet. Thus, we're not talking about pharmacological levels but rather physiological levels that are contained in various foods, such as chicken, turkey and shrimp.

JB: Since some studies show that bodybuilders usually have elevated muscle carnosine levels, why would they need to use a beta-alanine supplement?

JW: Our studies have clearly shown that even in trained athletes who have elevated muscle carnosine levels, you can still increase carnosine further by using beta-alanine supplements. This would translate into a significant performance gain, even for world-class or champion athletes.

JB: Are there any stimulant effects, such as those linked to other supplements like ephedrine and caffeine, with beta-alanine?

JW: No.

JB: Does beta-alanine interact with other supplements? Should it be taken alone?

JW: In the studies conducted thus far, beta-alanine has been ingested only with simple sugars, nothing else. Mixing beta-alanine in a protein shake would probably not be a good idea. That relates to competition for absorption into the body among various amino acids that use the same transport system to get into cells and muscle cells.

JB: How long does it typically take to notice any benefits from this supplement?

JW: The shortest studies we've done were two weeks, but I'd say you would likely notice beneficial effects after two to four weeks of beta-alanine supplementation.

JB: What specifically would a bodybuilder notice—increased strength, muscle endurance and so on?

JW: More reps, quicker recovery between reps—and a definite training effect, along with improved recovery.

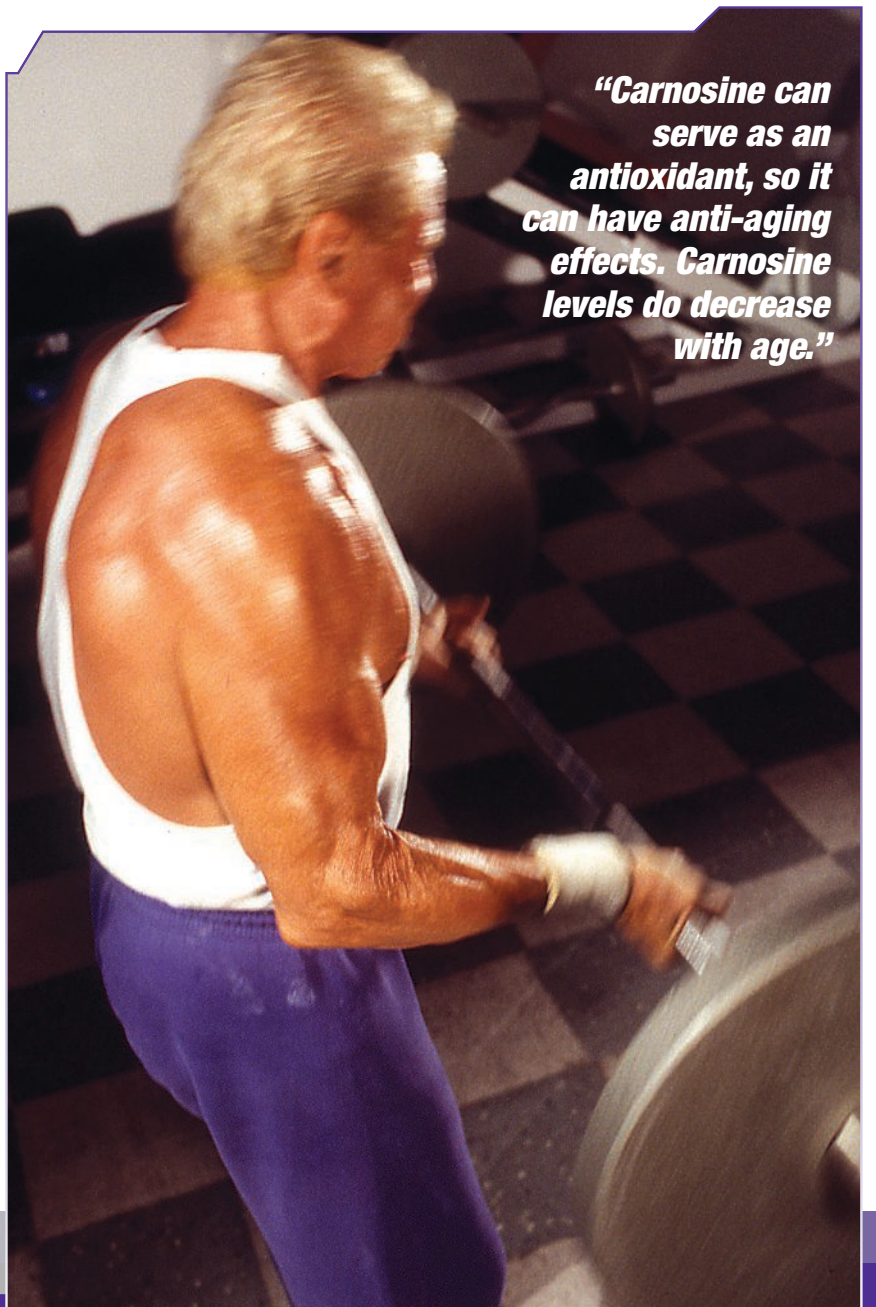
JB: Are there any known drug interactions with beta-alanine?

JW: No, there aren't.

JB: How would you say beta-alanine compares with popular food supplements, such as creatine?

JW: I believe beta-alanine use is going to be equivalent to creatine. I think it's going to be a safe, legal and effective supplement that can have an effect on performance-based training. How much benefit anyone gets from beta-alanine is strongly related to how hard the person trains. The benefits will be more apparent in harder-training people.

JB: So there's enough



existing research to claim that beta-alanine is an effective supplement?

JW: Without question, there is. In fact, when you compare the level of research on beta-alanine and that on creatine, the evidence for beta-alanine's efficacy is superior to creatine's when *it* was introduced into the commercial market.

JB: Since beta-alanine is a natural product, can any company sell it?

JW: My company has a patent on its use for athletic purposes. We have three national and multiple international patents pertaining to beta-alanine use. Companies that want to add beta-alanine to a supplement would need to obtain a license from us first.

JB: Although the research on beta-alanine looks very impressive, so did initial research for other supplements, many of which worked better on paper than they did in the real world. Is beta-alanine just another passing supplement fad?

JW: I think without doubt that beta-alanine will prove to be an effective supplement for athletes. Supplements such as HMB, which did have some solid research behind it, are also expensive, and the doses that are effective are just too expensive for most people. Many companies don't suggest a high enough dose for HMB, which explains the lack of results in most cases.

JB: Are there any health benefits associated with increasing carnosine levels in the body through beta-alanine supplements?

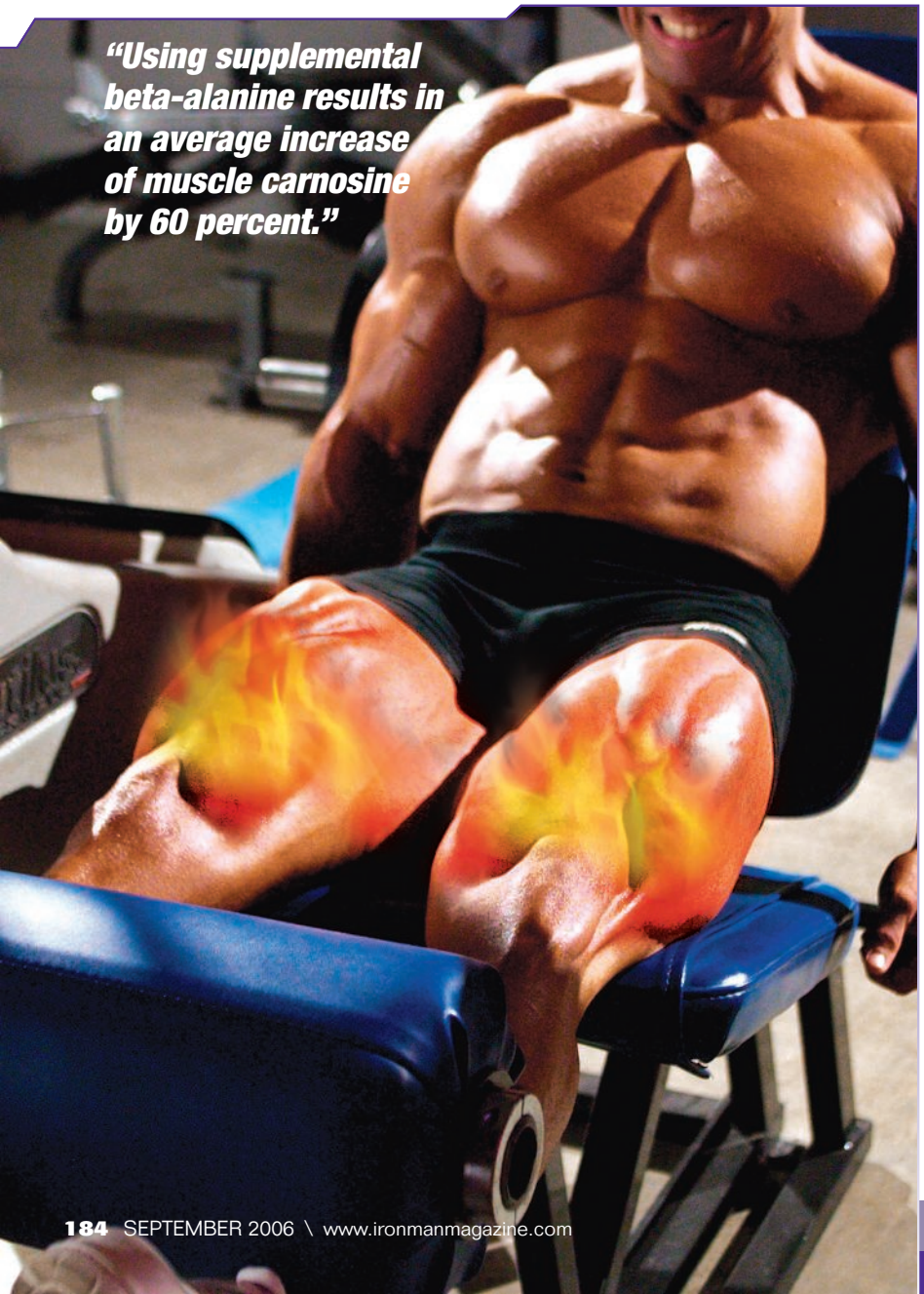
JW: Carnosine can serve as an antioxidant, so it can have anti-aging effects. Carnosine levels do decrease with age, and I think that would adversely affect normal activity levels.

JB: Some scientists suggest that carnosine is a natural inhibitor of the aging process because it inhibits the production of AGE, or advanced glycation end products that are known to produce aging effects in many tissues and organs. In fact, some isolated-cell studies have shown complete cellular regeneration when aging cells are exposed to carnosine. Since the effects of increased carnosine levels in the body have been known for some time, why hasn't a beta-alanine supplement been introduced until now?

JW: The most recent studies that document the effectiveness of beta-alanine are just now being published. We've presented data about beta-alanine at professional meetings for several years, and it is now being published widely in professional journals. That recent publicity about the research is what has prompted the new interest in beta-alanine.

JB: Would using a beta-alanine supplement also offer any benefits to an endurance athlete?

JW: Recent studies show that increasing carnosine levels in muscle increases the neuromuscular threshold, or the point when muscles change from aerobic to anaerobic metabolism. Increasing carnosine levels



significantly raises the threshold, meaning an endurance athlete can increase power output and maintain this enhanced power without experiencing fatigue from excess acid in the muscle.

JB: Does beta-alanine have any particular taste?
JW: No, it has no discernible taste.

JB: What's your feedback thus far from athletes who've used the supplement?
JW: A number of elite athletes have used beta-alanine during training for major international competitions and have experienced record-breaking performances.

JB: Research shows that about 80 percent of people

"We feel that taking several small doses of beta-alanine seems to be more effective. The most efficacious dose is about one to 1 1/2 grams taken two to four times a day."

respond to creatine use, with another 20 percent being nonresponsive. Do some people fail to respond to beta-alanine?

JW: There's a possibility, but we don't have enough information to definitely answer the question. We have done studies showing that about one out of 30 people doesn't show increased muscle carnosine levels after using beta-alanine for short periods, such as two weeks. Why that happens isn't known, but it may relate to an inability to effectively absorb beta-alanine into the muscle tissue.

JB: Are there any known medical contraindications to using the supplement?

JW: At this time we don't know of any medical condition that would prevent anyone from using it.

JB: Beta-alanine shares the same amino acid transport mechanism as taurine, another amino acid. Does that mean that people should separate taurine use from beta-alanine intake?

JW: It could be a potential problem because of the competition issue, but we haven't seen any depletion of muscle taurine levels in any of our studies. A few studies used supplements that contained creatine, taurine and beta-alanine, and they showed no negative effects on either beta-alanine or taurine uptake.

JB: Many dietitians would suggest that you should not waste money on beta-alanine supplements, since it exists naturally in several foods and exercise itself increases muscle carnosine levels. How would you respond to such a criticism?

JW: Our studies show that beta-alanine will still increase muscle carnosine levels in athletes, even if they consume foods rich in beta-alanine or carnosine and even if they train hard.

JB: Should it be cycled?

JW: We have no data suggesting that you would need to discontinue beta-alanine use. Unlike what happens with creatine, there is no known decrease in beta-alanine absorption with continued use, thus making it unnecessary to cycle the supplement.

JB: How does beta-alanine compare in price to other supplements, such as creatine?

JW: Beta-alanine is in the same category that creatine was when it was first introduced into the market. One reason why creatine prices have declined is because of increased demand and more efficient production. Beta-alanine is not an overly expensive supplement in relation to other food supplements sold today.

"A number of elite athletes have used beta-alanine during training for major international competitions and have experienced record-breaking performances."

Editor's note: The patented formula of beta-alanine is available in the new supplement Red Dragon, $29.95 for 120 capsules. To order, call (800) 447-0008, or visit www.Home-Gym.com. **IM**