

## Background

Beta-alanine (also commonly known as B-alanine) is a naturally occurring nonessential amino acid used to increase intramuscular muscle carnosine (not to be confused with carnitine), which plays a role in the ability of muscle tissue to contract. During exercise, hydrogen-ion buildup leads to muscle fatigue, and carnosine has been shown to act as a hydrogen-ion buffer,<sup>1</sup> especially in Type II (“slow twitch”) muscle fibers. High carnosine concentrations occur naturally in individuals with a high proportion of Type I (“fast twitch”) fibers or in those whose diet is high in protein. Muscle carnosine content is lower in women, declines with age, and is probably lower in vegetarians, whose diets lack the best sources of beta-alanine.<sup>2</sup>

## Dose Range and Upper Limit:

### *Food and Nutrition Board DRI:*

*RDA/AI:* Not relevant for this substance.

*Upper Limit:* Not relevant for this substance.

*Doses Used In Randomized Clinical Trials:* Several small clinical studies in healthy subjects undergoing physical exercise have used a loading/initial dose regimen (3.2 g/day for one week) followed by a maintenance dose of 6.4 g/day for three weeks.<sup>3</sup> Additional RCT doses include 400 mg six times daily for four days, followed by 600 mg six times daily for four days, and then 800 mg six times daily for 20 days; and in another RCT, a dose of 800 mg eight times daily was used during a 10-week resistance-training program in previously untrained individuals.<sup>3,4</sup> High-intensity training and short-term supplementation (periods of eight weeks) with a 3-7 g/day dose followed by a six to eight week washout phase has not been associated with adverse effects in most people.<sup>2</sup> Limited studies have evaluated the effects of beta-alanine supplementation for longer than 10 weeks.<sup>2</sup>

*Toxicology Data:* No data found. When used short term, it is possibly safe.<sup>2</sup>

## Evaluation of Potential Benefits

Existing data suggest that beta-alanine supplementation accompanied by high-intensity interval and strength training improves strength, power, speed, and possibly endurance. As a result, there can be improvements in overall performance and lean body mass.<sup>1,2,4,5</sup> Supplementation may also delay neuromuscular fatigue and exhaustion, therefore improving recovery time between exercises/operations/training.<sup>3,5</sup>

## Potential Detrimental Effects on...

*Military Performance:* Beta-alanine can cause dose-dependent flushing of the skin and paresthesia (“pins and needles” sensations) within 20 minutes of consumption, which could affect dexterity, coordination, balance, spatial orientation, strength, and endurance. Severe reactions have occurred with 40 mg/kg (body weight) dose; tolerable with 20 mg/kg; and mild with 10 mg/kg. At the lowest dose (<10mg/kg), limited side effects occurred in 25% of subjects.<sup>6</sup> In some studies, beta-alanine was given as frequently as eight times per day so that each dose can be kept below 10 mg/kg.<sup>7</sup> Time-release capsules can also prevent or reduce the effects of flushing and paresthesia.

*Military Survivability:* No data found.

## Other Health Risks

There is a theoretical possibility that beta-alanine supplementation can reduce the levels of taurine in the body<sup>6,7</sup>, and taurine is necessary to help regulate the composition of bodily fluids. In addition, it may act as an antioxidant and free-radical scavenger.

## Interactions with Medications or Other Bioactive Substances

No data found.

## Withdrawal Effects

No data found.

## Concern and Benefit Estimate (See Dietary Supplement Risk Matrix)

*Benefit potential:* Moderate

*Risk (safety concern):* Low

*Classification score:* **4**

There can be an argument for a 3, based on a lack of long-term data on supplementation and variability of products on the market (most research being done with the same product, CarnoSyn).

## References

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2. AIS Sports Nutrition, Australian Institute of Sport. B-alanine. Fact Sheets: Group B Supplements 2009; [http://www.ausport.gov.au/ais/nutrition/supplements/supplement\\_fact\\_sheets/group\\_a\\_supplements2/b-alanine](http://www.ausport.gov.au/ais/nutrition/supplements/supplement_fact_sheets/group_a_supplements2/b-alanine). Accessed October 03, 2011.
3. Stout JR, Cramer JT, Zoeller RF, Torok D, et al. Effects of beta-alanine supplementation on the onset of neuromuscular fatigue and ventilatory threshold in women. *Amino Acids*. 2007;32(3):381-6.
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5. Smith AE, Walter AA, Crael JI, Kendall KI, et al. Effects of beta-alanine supplementation and high-intensity interval training on endurance performance and body composition in men; a double-blind trial. *Journal of the International Society of Sports Nutrition*. 2009;6(5):9.
6. Harris RC, Tallon MJ, Dunnett M, Boobis L, et al. The absorption of orally supplied beta-alanine and its effect on muscle carnosine synthesis in human vastus lateralis. *Amino Acids*. 2006;30(3):279-89.
7. Hill CA, Harris RC, Kim HJ, Harris BD, et al. Influence of beta-alanine supplementation on skeletal muscle carnosine concentrations and high intensity cycling capacity. *Amino Acids*. 2007;32(2):225-33.