

# PERFORMANCE NUTRITION

## DECIPHERING THE LATEST SCIENTIFIC RESEARCH TO HELP YOU GET THE MOST FROM YOUR TRAINING, DIET AND SUPPLEMENTATION

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### BETA-ALANINE SHOWN TO IMPROVE FIGHTING PERFORMANCE

A recent study in the *International Journal of Sport Nutrition and Exercise Metabolism* found that beta-alanine supplements improved both punch force and punch frequency in simulated boxing bouts. The findings will be of real interest to anyone involved in combat sports, especially boxing and mixed martial arts, where how fast and hard you punch goes a long way to determine the outcome of a fight. Beta-alanine supplementation has been extensively studied in a variety of exercise protocols, but not all the studies have found performance benefits. However, the general consen-

sus is that beta-alanine has at least a moderate ergogenic effect; especially in exercise tests lasting 60–240 seconds. The potential ergogenic properties of beta-alanine are thought to arise from an upregulation of carnosine, which is a major pH-buffering agent in muscles.

#### MAIN FINDINGS

Four weeks of beta-alanine supplementation were shown to improve average punch force and punch frequency in a simulated boxing session. Furthermore, blood lactate concentrations were significantly higher in those consuming beta-alanine compared to those taking a placebo. This indicates that glycolytic

energy production was increased and shuttled into the bloodstream in the beta-alanine trial.

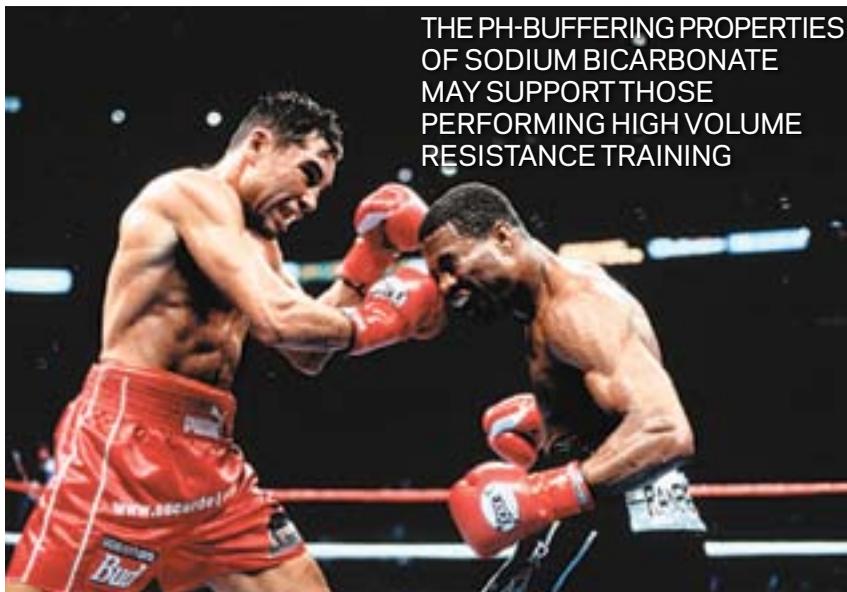
#### SIGNIFICANT METHODOLOGY

Sixteen amateur boxers, with an average of six years' boxing experience, took part in the study. This comprised a simulated boxing contest followed by four weeks of either beta-alanine (eight boxers) or placebo (eight boxers) supplementation, followed by a final simulated boxing contest. Each contest consisted of three, three-minute rounds, separated by one minute. In each round, boxers threw standard punch combinations for two minutes 50 seconds and then threw as many punches as they could in the final 10 seconds. Punch force was measured using a force transducer. Those on the beta-alanine regime consumed a total of 6 g/day of beta-alanine, which was provided in four equally dosed capsules. These were consumed immediately after eating a meal containing protein, in order to reduce the risk of any potential side effects.

#### TAKE-HOME MESSAGE

Athletes and sportsmen and women should look for nutrition strategies in the build-up to events that enable them to improve their performance. One such strategy is to chronically supplement with beta-alanine, which was shown in this study to increase punching performance, almost certainly through an enhanced internal buffering capacity of the exercising muscles. Moreover, the buffering capacity of the muscles might be further improved by supplementing with a combination of beta-alanine (intracellular buffer) and sodium bicarbonate (extracellular buffer). The current recommended dose is approximately 3–4 g per day, but an initial loading dose of 6 g for four weeks can be taken. Beta-alanine does not appear to have any severe side effects but it can cause a mild tingling sensation to the skin (paresthesia) in some individuals. Turkey and prawns are good food sources containing beta-alanine so they can also be used to meet daily doses. It is important to note that the

THE pH-BUFFERING PROPERTIES OF SODIUM BICARBONATE MAY SUPPORT THOSE PERFORMING HIGH VOLUME RESISTANCE TRAINING



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## THE POTENTIAL ERGOGENIC PROPERTIES OF BETA-ALANINE ARE THOUGHT TO ARISE FROM AN UPREGULATION OF CARNOSINE, WHICH IS A MAJOR PH-BUFFERING AGENT IN MUSCLES

present study is the first to investigate the effects of beta-alanine in a “real-world” boxing scenario. Additional research focusing on the real-world benefits of beta-alanine and other pH buffers, such as sodium bicarbonate, is now required.

### REFERENCE

■ Donovan T, Ballam T, Morton JP, Close GL (2012) **Beta-alanine improves punch force and frequency in amateur boxers during a simulated contest.** *International Journal of Sport Nutrition and Exercise Metabolism.*

## SODIUM BICARBONATE: AN AID TO COMPLETING MORE REPS

Previous studies investigating the effects of sodium bicarbonate on resistance exercise have had mixed results. However, a new study has found that it may have potential benefits for those performing high-volume resistance training, which is popular with bodybuilders and other people looking to gain muscle. More specifically, the study found that consuming a sodium bicarbonate supplement one hour before a lower-body weights session increased the total amount of reps that a group of resistance-trained males could perform. The authors of the study, published in the *European Journal of Applied Physiology*, propose that previous research studies focusing on resistance exercise might not have observed an ergogenic effect because they utilised study protocols that were much lower in exercise volume.

Sodium bicarbonate acts as a pH-buffer, reducing the acidity of the muscles, and potentially alleviating fatigue.

### MAIN FINDINGS

The administration of sodium bicarbonate resulted in the completion of significantly more total reps compared to the placebo: 153 and 147.9, respectively. Furthermore, blood lactate concentrations were greater and the blood was more alkaline (higher pH) after sodium bicarbonate had been consumed.

### SIGNIFICANT METHODOLOGY

Twelve resistance-trained males, who had been lifting weights for at least two years, took part in the study. They completed two or more familiarisation visits to ensure they knew what to do before they completed two experimental testing sessions. The sessions comprised the following lower body exercises: back squats, incline leg presses and leg extensions. Four sets of each exercise were performed, with 10-12 repetition-maximum loads and short rest intervals. One hour before each experimental testing session the men consumed either 0.3 g per kg of body weight of sodium bicarbonate or the same amount of calcium carbonate (a placebo) in the form of individual capsules. Arterialised blood samples were taken via fingertip puncture four times during the experimental testing sessions and analysed for pH, base excess and lactate.

### TAKE-HOME MESSAGE

Evidence is accumulating to suggest that sodium bicarbonate supplementation is beneficial in high-intensity sports. Furthermore, the pH-buffering properties of this supplement may support those performing high volume resistance-training sessions. In addition to improving performance, sodium bicarbonate might also help to reduce exercise-induced damage to muscles. Sodium bicarbonate does, however, have some side effects. Some people experience gut problems, ranging from mild symptoms such as increased gas or burping to more serious symptoms, such as vomiting and diarrhoea. Consuming sodium bicarbonate with a carbohydrate-based meal before training may help to reduce side effects. Other ways of attempting to reduce side effects include staggering the dose across a one-hour period and using different administrations, such as capsules or paste, or mixing with sports drinks. Anyone considering using sodium bicarbonate should undertake trials during training first, possibly targeting key sessions. If you train for aesthetics, or for sports that strive to optimise power-to-weight ratios, you should be aware that high sodium loads can cause fluid retention. The current recommended dose is 0.3 g per kg of bodyweight, which should be taken approximately one hour before training. **M&F**

### REFERENCE

■ Carr BM, Webster MJ, Boyd JC, Hudson GM, Scheett TP (2012) **Sodium bicarbonate supplementation improves hypertrophy-type resistance exercise performance.** *European Journal of Applied Physiology*

Performance Nutrition is a London-based consultancy, providing comprehensive support to elite and recreational athletes. Director, James Collins, is a leading Sport and Exercise Nutritionist, who worked with Elite Sports in Great Britain in the run-up to the 2012 Olympics. He is also Head Nutritionist for Arsenal FC. For further information visit [www.theperformancenutritionist.com](http://www.theperformancenutritionist.com)

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