

BETA-ALANINE

Sports scientists have recently developed a growing interest in beta-alanine and its ability to delay fatigue and promote greater levels of work. Much like creatine, beta-alanine works within the muscle cell as part of a buffer cycle, which helps prevent fatigue. It does this by serving as rate-limiting substance in carnosine production, which has antioxidant properties and works as a buffer to offset acid production in the muscle. One initial study provided

dose of 3.2–6.4 g/d beta-alanine should be consumed 60 minutes before exercise on an empty stomach.

BRANCHED-CHAIN AMINO ACIDS (BCCAS)

BCCAs, isoleucine, leucine and valine, have been heavily researched for their potential to mediate muscle damage and soreness. In addition to muscle damage, leucine is also being researched for its role in preventing muscle loss, which many argue is also part of the recovery process-especially from resistance training. Tr

Increasing the circulating levels of aminoacids, specifically leucine and the BCCAs, may be effective at minimizing the symptoms associated with muscle damage.

A ratio of 45 per cent leucine, 25 per cent isoleucine and 30 per cent valine is effective in reducing muscle damage and soreness.

BETA-HYDROXY BETA-METHYLBUTYRATE (HMB)

One of the reasons that athletes take beta-hydroxy-beta-methylbutyrate (HMB) is the hope of increasing muscle size. HMB is the by-product of the metabolism of leucine, an essential amino acid. A 3-g dose, which is considered safe in adults, is theorized to increase muscle size because of the effect of HMB on reducing the breakdown of muscle cell protein following resistance exercise. In trained athletes, HMB supplementation typically does not result in a change in body composition. Thus, in trained athletes who want to change body composition, HMB supplements appear to have low potential risks but also little potential benefits. HMB supplements are not recommended for children or adolescents.

ω -3 FATTY ACIDS

Increased ω -3 concentrations in the blood are associated with decreased levels of pro-inflammatory markers interleukin-6, interleukin-6 and interleukin-1, tumour necrosis factor alpha [TNF-alpha], C-reactive protein [CRP]) and higher levels of anti-inflammatory markers interleukin 1. However, few studies have examined ω -3 intake and modulation of exercise-induced inflammation. Clinical and epidemiological research has demonstrated the ability of ω -3 fatty acid intake to decrease inflammatory markers, increase blood flow upto 36 per cent during exercise.

WHEY PROTEIN

Whey is one of the two major protein groups of bovine milk, accounting for 20 per cent of the milk while casein accounts for the remainder. All of the constituents of whey protein provide high levels of the essential and branched chain aminoacids. The bioactivities of these proteins possess many beneficial properties as well. Additionally, whey is also rich in vitamins and minerals. Whey protein is most recognized for its application in sports nutrition.

... processing techniques

Whey protein has high biological value, better than egg protein. Whey protein contains ample supply of the aminoacid cysteine. Whey protein also contains a high concentration of branched chain aminoacids (BCAA) namely, L-isoleucine, L-leucine and L-valine, that are important for their role in the maintenance of tissue and the prevention of catabolic actions during exercise.

These branched aminoacids must be present in the muscle cell to promote protein synthesis. These BCCA helps increase the bio-availability of high complex carbohydrate intake and are absorbed by muscle cells for anabolic muscle building activity.

The current theory is that during prolonged exercise, the BCCAs are released from skeletal muscle, the carbon part is used as fuel and nitrogen part is used to make the aminoacid alanine which then goes to the liver where it is turned into glucose for energy. So for athletes who want to protect their existing mass, the idea is to take a BCCA source before and after the exercise. While maintaining exercise performance and delaying exertion, BCCAs are very important for muscle growth.

CASEIN

Casein exists in milk in the form of a micelle, which is a large colloid particle. An attractive property of the casein micelle is its ability to form a gel or clot in the stomach. The ability to form this clot makes it very efficient in nutrient supply. The clot is able to provide a sustained slow release of aminoacids into the blood stream, sometimes lasting for several hours. This provides better nitrogen retention and utilization in the body. In athletes supplementing their diets with additional protein, casein has been shown to provide the greatest benefit for increases in protein synthesis for a prolonged duration.

BOVINE COLOSTRUM

Although bovine colostrum is not typically thought of as a food supplement, the use by strength/power athletes of this protein supplement as an ergogenic aid has become common. Bovine colostrum is a protein rich, immunity boosting substance found in the mother cow's milk in the first few days after giving birth. Limited research suggests that bovine colostrum might boost immune function in athletes who do intense exercise. F

SOYA PROTEIN

Soya is the most widely used vegetable source. The soyabean can be separated into three distinct categories: flour, concentrates and isolates. They contain 50 per cent, 70 per cent and 90 per cent of protein respectively. Soya protein and its naturally occurring isoflavones have been valued for its antioxidant capacity. Consumption of soya protein may be responsible for the enhancement of plasma total antioxidant status (TAS) and the reduction in oxidative stress measurement such as creatine kinase and myloperoxidase in subjects undergoing a routine exercise program. Soya protein may serve to protect the exercising individual against oxidative stress and resulting muscle injury and inflammation.

GLUCORONOLACTONE

Glucoronolactone is metabolized from glucose and is reported to increase feelings of wellbeing, reduce sleepiness and enhance reaction time. It is found in some energy drinks (along with caffeine and taurine), in concentrations ranging from 200 to 2400 mg per litre. The safety of high doses has not been established.

NITRIC OXIDE

Nitric oxide is a vasodilator that opens up the blood vessels and supposedly increases blood flow to the muscles. This is good for patients with cardiovascular disease but has yet to be proven as advantageous for athletes.

SODIUM BICARBONATE

Sodium bicarbonate is known to buffer the lactic acid that accumulates in the blood. Although consuming large doses of sodium bicarbonate can improve performance in high intensity exercise that lasts for 60 to 180 seconds, it is also known to cause nausea and diarrhoea. At lower dose it is not ergogenic.

SPIRULINA

Spirulina maxima is a filamentous unicellular cyanobacterium belonging to the *oscillatoraceae* family. Studies on spirulina supplementation have shown that there is a significant increase in exercise performance. Spirulina also increased fat oxidation and reduced glutathione concentration and attenuated the increase of exercise induced lipid peroxidation. Also spirulina prevented skeletal muscle damage in untrained subjects and postponed exhaustion time among athletes. Spirulina diminishes postprandial lipemia after a high-fat meal in young athletes.