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In many sporting and exercise contexts there is a requirement to increase the buffer capacity of the muscle due to the intensity of the exercise resulting in lactic acid production. Muscle buffers provide a means whereby the muscle attempts to keep its internal pH at a neutral value of 7.0 (pH of 1-6 are acid and above 7.0 are alkaline) and so enable the enzymes which help control energy producing reactions to work most efficiently. It is known from many studies that due to high intensity exercise the pH of a muscle cell can be reduced to values around pH6.4 – and at this pH the enzymes maybe somewhat inhibited. Inhibition of enzyme activity results in lower energy production and ultimately a reduced capability to produce power, strength, and speed.

Carnosine is a major intra-muscular buffer, and some early studies have demonstrated that sprint trainedathletes have increased levels of carnosine due to their training. More recently, studies have shown that by ingesting beta-alanine over a period of a few weeks (normally 4-6 weeks), the muscle carnosine content increases significantly. In one such study the muscle carnosine content increased by 58% after 4 weeks and then to 80% over 10 weeks (Hill et al., 2007). It is very clear that taking beta-alanine over a period of weeks promotes muscle carnosine (and therefore muscle buffer) capacity.

The required dose of beta-alanine to enhance carnosine in muscle is around 4-6 grams a day, although a lower dose (e.g. 2-3 grams a day) over a longer period of time produces a similar finding. In fact it has been suggested, from a meta-analysis of studies exploring the efficacy of beta-alanine, that an overall dose of 179g (that could be 6 grams over 30 days or 4 grams over 42 days or 3 grams over 58 days - NOT in one day!) improves sprint and power performance by around 3% (Hobson et al., 2012). Thus it appears that chronic loading with beta-alanine is desirable to attain improvements in performance. Having said that, it must be remembered that training with a gradual increase in muscle carnosine (as would happen if beta-alanine is taken daily over a period of time) will lead to better quality training and thereby further improve performance outcomes.

A question that often arises (as it should) concerns the likely side effects of taking beta-alanine. The only reported side effects are that of paraesthesia i.e. a feeling of tingling in the hands or fingers or even nape of neck. This is temporary and usually addressed by taking lower doses spread over a day rather than a 5-6 gram dose at a single time or a lower dose taken over a longer period of time (hence the current NutritionX labelling).

So, if an athlete is engaged in any activities where lactic acid production is likely to occur and possibly hamper performance, then loading up with beta-alanine to enhance muscle buffer capacity and aid the performance should be seriously considered. Single bouts of high intensity exercise lasting less than 30 seconds are not likely to benefit whereas bouts between 30-240 seconds or repeated bouts over a prolonged time such is many team sports may do so. In fact, any athletes/players who have large numbers of fast twitch muscle fibres and generally are 'lactate producers' may also benefit from beta-alanine supplementation.

References

Hill, CA et al (2007). Influence of β-alanine supplementation on muscle carnosine concentrations and high intensity cycling capacity. Amino Acids 32: 225-233.
Hobson, RM et al (2012). Effects of β-alanine supplementation on performance: a rmeta-analysis. Amino Acids 43: 25-37.