

## Cutting Edge Compounds

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### Carnosine

This is the first of hopefully many intermittent articles where I will discuss some of the very latest advances in sports nutrition, substances so new that they are not available in most gyms, health food stores, or from our professional suppliers.

Today, we are going to discuss carnosine, which is a dipeptide composed of the amino acids -- histidine and alanine. The L form is bioactive. It is often confused with another powerful dipeptide -- carnitine. The first aspect about carnosine that caught my interest was the fact that it is present in very high amounts in skeletal muscle. Carnosine has four major functions:

1. It is involved in activation of myofibrillar-ATPase in skeletal muscle which, in turn, activates actomyosin resulting in contraction.<sup>1</sup>

We have known that skeletal muscle actomyosin has been activated by calcium for many years.<sup>2</sup> It must be noted that carnosine, unlike calcium, works only on skeletal muscles of vertebrates.<sup>3</sup>

2. Carnosine has multiple antioxidant capabilities. Most antioxidants work against specific substances that induce oxidant damage. As an example, beta carotene works against singlet oxygen, while vitamin E has its main affect on lipid peroxides. Carnosine has been shown in various studies to quench singlet oxygen, trap peroxy radicals, inhibit DNA-damaging gamma irradiation, and bind transition metals rendering them unable to participate in the highly toxic fenton reaction.<sup>4</sup>

3. Carnosine is a powerful intramuscular buffering agent.<sup>5</sup> When we exercise anaerobically lactic acid is increased. (The mechanism of increased lactic acid in exercise -- production versus accumulation -- will be discussed in a future article). Increased lactic acid leads to a decrease in muscle pH, which can lower the activity of enzymes required for muscular contraction,<sup>6</sup> and reduce cellular antioxidant activity.<sup>7</sup> Thus, carnosine has the ability to retard cellular acidity and maintain pH at homeostatic levels.

In a study of intramuscular buffering capacity, it was found that sprinters and rowers possessed greater carnosine levels in their muscles than did marathoners who had more carnosine than untrained subjects.<sup>8</sup> In other words, athletes in anaerobic sports have a potentially great ergogenic aid in L-carnosine.

4. Animal studies have shown that carnosine ingestion can shorten the healing process after injury by stimulating the rate of glycosaminoglycan production.<sup>9</sup>

In conclusion, L-carnosine could be the ergogenic aid of the 1990s. It is amazing that this one supplement has the theoretical potential to (1) enhance strength by its ability to stimulate muscle contraction, (2) increase endurance by combating the effects of lactic acid, (3) protect the body

from exercise-induced free radical damage, and (4) possibly shorten the times wounds take to heal. Currently, I know of no company that sells L-carnosine individually. Small amounts are present in some of the lactic acid-buffering products available in gyms and health food stores. By the time this is published, I am hopeful that this nutrient will be available. As soon as I find out more information concerning L-carnosine, I will let you know through this column. This will include brand availability and dosages.

### *References*

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