

# The new L-Carnitine with a focus on MUSCLE and ENERGY

SOMETIMES, A WELL-KNOWN and valued supplement can be transformed to provide significant new benefits. Such is the case with L-carnitine. Propionyl-L-carnitine is a form that until very recently was restricted to medical uses. Now it finally is available more generally as glycine propionyl-L-carnitine or Glycocarn™, which is a patented compound. Many health food shoppers will be surprised by the difference found with this *next generation* of L-carnitine. This is the L-carnitine with a focus on muscular energy, exercise recovery and reduced fatigue.

by Dallas Cloutre, Ph.D.

L-carnitine is an amino acid supplied in limited quantities by the diet and also manufactured in the body, mainly in the liver and the kidneys. Produced from the essential amino acid lysine, the body's synthesis of L-carnitine requires the vitamins C, B-6 and niacin, along with iron and the amino acid methionine. L-carnitine is concentrated in the heart and the skeletal muscles, and also in the brain and in the sperm. It's primary role is as a biocatalyst. It serves to transport fatty acids across the membrane of the cell and into the mitochondria, where these fatty acids are oxidized for energy. L-carnitine also aids in the removal of waste products from the mitochondria. Moreover, it increases the rate of oxidation of fats in the liver, and this suggests that it plays a role in improving energy generation from this angle as well. Its impact upon fat metabolism is sufficient that the *Physician's Desk Reference* has recommended dosages of 600-1200 mg three times per day for the treatment of some forms of heart disease and for some conditions involving elevated blood lipids.

L-carnitine supplementation can supply a bundle of benefits. There is no doubt that a cellular deficiency of L-carnitine can lead to symptoms such as fatigue, muscle weakness, obesity, plus elevated blood lipid and triglyceride levels. L-carnitine is very safe, so supplementation provides insurance in cases where there may be a question whether or not levels are sufficient. There are many anecdotal instances in which the supplement has helped to reduce excess weight, and Jeffrey Bland, Director of the Bellevue Medical Laboratory, has argued that in the proper dosages, L-carnitine supplementation during dieting can help to control the negative effects of ketosis (the accumulation of waste products of fat metabolism) in those who are susceptible to this problem. There is also evidence that some forms of obesity may be related to a genetic propensity to produce less L-carnitine, and liver and kidney problems will similarly reduce the

body's production since some four-fifths of our L-carnitine total is produced internally by these organs. Finally, L-carnitine penetrates into the mitochondria themselves. It is here that most free radicals are generated as food is oxidized to produce energy. There is evidence that L-carnitine serves to spare antioxidants, such as vitamin C, although the mechanism by which this is done has not yet been uncovered.

Some researchers argue that increasing the level of L-carnitine in the system does not increase the rate or the amount of fatty acids used for energy except in cases where L-carnitine has been deficient, or in cases of special disorders. The experiences of healthy athletes with supplementation have been



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mixed. However, the results with healthy athletes are probably not appropriate for comparison with those individuals suffering from excess weight or related difficulties. More importantly, current findings indicate that the mixed results came about because earlier researchers did not know what to look for and were not using the appropriate dosage levels. Furthermore, there is very good reason to believe that in the case of athletes

(and likely also dieters) the wrong form of L-carnitine generally has been used.

What is meant by the “wrong form” of L-carnitine? Simply this: L-carnitine comes in two forms that are particularly active, but active for different purposes. Acetyl-L-carnitine is especially active in neuronal tissues, whereas propionyl-L-carnitine is especially active in lean muscle tissue. The form of L-carnitine supplemented needs to be matched to the purpose intended.

Acetyl-L-carnitine (acetyl carnitine) is involved in the same metabolic functions as is L-carnitine in its other forms, but acetyl-L-carnitine offers greater protection for the brain and for the neurons more generally. As an antioxidant, acetyl-L-carnitine protects neurons from damage caused by superoxide radicals. One reason may be that the molecular structure of acetyl-L-carnitine resembles that of the neurotransmitter acetylcholine. Research on preventing age-related mental mitochondrial decay and declines in mental abilities—perhaps even reversing some age-related mental declines—has stressed the combination, furthermore, appears to prevent the more generalized age-related decline in metabolic functioning.

Propionyl-L-carnitine has its own set of strengths. It is used medically for treating peripheral vascular disease, atherosclerotic and diabetic angiopathies, and congestive heart failure. In combination with acetyl-L-carnitine, propionyl-L-carnitine is used for treating chronic fatigue syndrome, and symptoms of age-related testosterone deficiency. Indeed, it seems to reduce the symptoms of androgen decline in older men as well as does testosterone in terms of improvements in sexual dysfunction, depression and fatigue—but without the prostate and other side effects of testosterone supplementation.

The focus of this form of L-carnitine, therefore, is on the muscles, such as the heart, and the vascular system. Compared with at least one other form of L-carnitine, propionyl-L-carnitine appears to produce greater increases in cellular L-carnitine concentrations. Researchers believe that it is transported more easily into muscle fibers and may better support muscle-cell energy production, perhaps because it increases the flow of pyruvate into the Krebs' Cycle. Propionyl-L-carnitine also exhibits significant free radical scavenging activity and helps to prevent blood from coagulating too readily. Thus, the availability of GlycoCarn™ as a non-medical (hence less concentrated) source of propionyl-L-carnitine is good news. And one should not forget that the amino acid glycine, which is part of GlycoCarn™, has benefits of its own.

Athletes in particular may be pleased with the benefits of GlycoCarn™. The propionyl-L-carnitine component of GlycoCarn™ increases the oxidation of both glucose and lactate, increases exercise capacity, increases both mental and overall energy, and improves muscle glycogen stores while increasing time to muscular fatigue. Of course, like other forms of L-carnitine, propionyl-L-carnitine improves the function of the mitochondria, and in those who are overweight it should produce a significant increase in the rate at which fats are oxidized to supply energy. In other words, GlycoCarn™ offers both the expected benefits to athletes and non athletes alike. ■

For references, send a SASE to **totalhealth**.