

L-Carnitine



The Metabolic Support Nutrient

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Designs for Health's Line of Carnitine Products

CarniClear™ - supersaturated raspberry/mint flavor
L-Carnitine liquid; 2500 mg per teaspoon

Carnitine Synergy™ capsules - 400 mg L-Carnitine Tartrate
with 100 mg Acetyl-L-Carnitine

Carnitine Tartrate powder - 2800 mg per teaspoon

L-Carnitine is a compound naturally occurring in all foods, but significant amounts are only found in dark meats (due to high concentration of mitochondria), for example: lamb (190 mg/4 oz), beef (143 mg/4 oz), poultry (13 mg/4oz), fish (3-10 mg/4oz), cheese (1-13 mg/4oz), rice (0.3 mg/4oz), tomato (0.1 mg/4oz). Approximately 20 mg/day of carnitine is synthesized in the human body (kidney and liver) from methionine and lysine, requiring other cofactor nutrients such as iron and vitamins C, B3 and B6. Many metabolic states may require more than this synthesized amount. Carnitine supplementation may be especially necessary for vegetarian diets or when dark meats are consumed in small amounts, because neither preformed carnitine nor its precursor amino acids are ingested in adequate amounts to support optimal health.

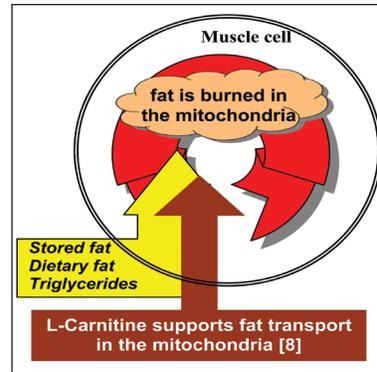
Carnitine supplementation in the amount of 1-6 g/day was shown to provide metabolic support for the following:⁷

- Many metabolic states that require an enhanced oxidation of fat, such as: excess body fat, high triglycerides, sustained exercise (aerobic or resistance training), low carbohydrate/high fat diets
- A variety of conditions that require an intensive support of the heart muscle and the immune system cells
- Other conditions such as: ADHD, pregnancy, infant nutrition, low sperm motility, chronic fatigue, Raynaud's syndrome, dialysis complications
- Side effects from: interferon therapy for Hepatitis C, HIV anti-virals or chemotherapy

Carnitine supports the metabolism of fat during weight loss diets.

L-Carnitine is an indispensable nutrient that supports the transport of fat into the part of the cell (the mitochondria), where it can be burned and converted into energy. Several studies have shown that L-carnitine supplementation improves the body's efficiency to burn fat, even if the subjects are not overtly deficient in carnitine.²

One study investigated the effect of 4 weeks of supplementation with 1g L-carnitine three times per day on 100 overweight patients following a diet of 1200 Kcal/day. The carnitine group lost an average of 9.7 lb vs 7.8 lb in the placebo group. Thus, L-carnitine supplementation supported the weight loss process with an additional 2.1 lb in 1 month. The authors concluded that "the study supports the assumption formulated on the basis of other studies that carnitine supplementation leads to increased



METABOLIC ROLE OF L-CARNITINE

desirable weight loss, over and above diet and exercise."³ Authors have also emphasized that L-carnitine's metabolic advantage will be especially realized when administered along with a regimen that ensures a caloric deficit through adequate diet plus exercise. Special attention should be given to the amount of carbohydrate ingested.

Another study showed that supplementation with L-carnitine increased the loss of fat in the urine, in addition to increasing the fat burning for energy.⁷ This shows two different venues in which L-carnitine provides a metabolic advantage.

Carnitine supports the preservation of lean body mass, especially during anaerobic exercise and fat loss.

It is especially important to preserve lean body mass during fat loss in order to prevent a reduction in metabolic rate. Carnitine supplementation was shown in several studies to support an actual increase in lean body mass, in addition to reducing the amount of exercise-induced muscle tissue damage.¹¹ This benefit applies to both resistance and endurance type exercises. This means that carnitine supplementation prior to a workout results in less muscle soreness.

Carnitine supports the metabolism of fat during exercise and spares carbohydrate stores.

Fat burning is intensified during endurance exercise, and L-carnitine was shown to increase the efficiency of this process, allowing the body to tap into fat stores more than sugar stores (the blood glucose or the glycogen from liver and muscles).^{5, 13} In other words, for any given amount of calories burned in an exercise bout, more calories will be derived from fat than from sugar if supplemented with L-carnitine. This will also reduce the chance of becoming hypoglycemic during exercise and reduce the likelihood of sugar cravings afterward.

Carnitine supports enhanced exercise performance.

L-Carnitine was shown to improve exercise performance, probably by enhancing the delivery of fat fuel to the muscles. 4 g per day of L-carnitine, over a period of 2 weeks increased a typical marker of aerobic capacity (VO₂ max) by 6%.¹² It was also shown to increase the anaerobic threshold, delaying the event where the muscles feel a "burn" from lactic acid.

Carnitine supports the heart muscle and related conditions: congestive heart failure, ischemia, myopathy.

“L-Carnitine is a useful therapeutic agent for the treatment of congestive heart failure in combination with traditional pharmacological therapy.”⁶ This is probably due to the fact that carnitine is supporting the delivery of fat to the heart muscle, which is its main fuel source. A review of the literature emphasizes the results of the three trials with carnitine, which have shown significant benefits for patients with myocardial ischemia.⁹

Carnitine supports the normalization of blood lipids: triglycerides, HDL, Lp(a).

“Serum-lipid concentrations were determined in patients treated with 900 mg/day. Serum-triglyceride was significantly reduced and concentrations continued to decline as carnitine administration continued.”¹⁰ “1 g per day of L-carnitine over a period of 10-15 weeks caused a substantial increase in HDL.”¹⁴

One study found L-carnitine to lower serum triglycerides by 28%, total cholesterol by 12%, while raising HDL by 12%.^{15, 16} Another study concluded: “from a general sample of 3525 cardiopathic patients treated with 2 g daily of L-carnitine during 1 year...after 12 months of administration only 282 patients showed abnormal levels of cholesterolemia.”⁹

“L-Carnitine (2 g/day) significantly reduced Lp(a) levels (-7.7% versus baseline and -11.7% vs placebo treatment), the reduction being more dramatic in the subjects with the more marked elevations. In a significant number of subjects, the reduction of Lp(a) resulted in a return of this major cardiovascular risk parameter to the normal range.”⁴

Carnitine supports various conditions.

“Conditions which seem to benefit from supplementation of L-carnitine include anorexia, chronic fatigue, coronary vascular disease, diphtheria, hypoglycemia, male infertility, muscular myopathies, pregnancy and Rett syndrome. In addition, preterm infants, dialysis patients, and HIV+ individuals seem to be prone to a deficiency of L-carnitine, and benefit from supplementation...under some experimental conditions pretreatment has favored aerobic processes and resulted in improved endurance performance.”⁸

How to Take Carnitine

In general, L-carnitine will be absorbed faster and with higher peak plasma when ingested on an empty stomach, because it does not compete for absorption with other amino acids or peptides. When taken on an empty stomach, plasma levels of carnitine will remain elevated for 3-4 hours. If high blood concentrations throughout 24 hours are desired, carnitine should be taken multiple times per day in doses of 1-2 g, for example first thing in the morning and around 2-3 hours after any meal or snack. It is not recommended late in the day due to its energizing effect. Do not take high doses too fast, as it may have a laxative effect.

Carnitine is especially useful to take right before exercise, for both resistance and endurance training. When taken with meals, it will achieve a lower but more prolonged elevated plasma level, about 7-8 hours, supporting at first the metabolism of the fat ingested with meals and subsequently that of the fat released from the adipose tissue.

It is important to keep in mind that when consuming an excessively high carbohydrate diet, fat release from the adipose tissue is impaired by high levels of insulin. In this case, fat cannot be transported into the mitochondria with the help of carnitine for it to be burned off, because it does not have a chance to first get in the bloodstream. The only benefit that carnitine can have in this case would be to support the transport of the fat absorbed from the meals into the mitochondria for burning. As a result, carnitine may reduce the chance of gaining body fat during a diet high in carbohydrates and fat, but fat loss is very unlikely in this metabolic situation. So, in order to maximize fat loss and benefit from L-carnitine supplementation, the amount of daily carbohydrate intake should be minimized and adjusted to match general activity levels and exercise type and duration.

Consider combining with phosphatidylcholine

L-carnitine absorption and retention in muscle is enhanced by phosphatidylcholine⁷ (available from DFH in powder and softgels).

CarniClear™

Supplement Facts		
Serving Size 5 ml (approx. 1 teaspoon)		
Servings Per Container 47		
Amount Per Serving	% Daily Value	
Pantothenic Acid (as d-Calcium Pantothenate)	100 mg	1000%
L-Carnitine	2500 mg	*
*Daily Value not established.		

Other Ingredients: Vegetable glycerin, deionized water, raspberry and mint natural flavors.

Carnitine Synergy™

Supplement Facts		
Serving Size 1 capsule		
Amount Per Serving	% Daily Value	
L-Carnitine (from L-Carnitine Tartrate)	400 mg	*
Acetyl-L-Carnitine	100 mg	*
*Daily Value not established.		

Other Ingredients: Stearates (vegetable source), microcrystalline cellulose, silicon dioxide.

Carnitine Tartrate

Supplement Facts		
Serving Size 1 gram (approx. ¼ teaspoon)		
Servings Per Container 100		
Amount Per Serving	% Daily Value	
L-Carnitine (from L-Carnitine Tartrate)	700 mg	*
* Daily Value not established.		

Other Ingredients: Vegetable stearate.

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