L-Carnitine

An Amino Acid Essential for Fat Metabolism

- Enhances energy levels and exercise performance and recovery
- Promotes fat burning
- Supports cardiovascular health and immunity
- Clinically effective dose and form

Gluten Free  Vegan  Non-GMO  Sports Nutrition  Weight Management

AOR Code  Variant
AOR04270  120 VEGI-CAPS

Details
L-Carnitine is an amino acid needed for fat burning, energy production and muscle recovery. It is synthesized by the body from the essential amino acids lysine and methionine, and can also be obtained from red meat. For this reason, L-carnitine deficiency is quite common among vegetarians and even health-conscious people who simply avoid red meat. L-Carnitine plays a central role in the metabolic breakdown of certain fatty acids and their subsequent transport into the mitochondria, the power plants inside cells, for use in the production of energy.

L-Carnitine is primarily used as a weight loss aid, to increase energy or to enhance muscular recovery after a workout. It is essential to maintaining a healthy metabolism, which in turn is critical for reducing the risk of many age and lifestyle-associated disorders. Human studies using oral L-carnitine have produced significant positive results in anorexia nervosa, metabolic syndrome, cardiovascular problems, high cholesterol, hyperglycemia, chronic fatigue syndrome, thyroid dysfunction and kidney problems, among others.

Athletes, workout buffs, and ill patients who want to improve their functional capacity can benefit from supplementing with carnitine, as can those looking for metabolic support. Vegetarians and people who avoid red meat may want to supplement with carnitine to ensure good health, energy levels, proper muscle function and optimal fat utilization.

Label Info
Discussion
L-Carnitine, a derivative of the amino acid lysine, supports fat metabolism, delays fatigue during physical activity and helps improve physical performance when used in conjunction with a training regimen. L-Carnitine also supports the muscle recovery process during resistance training by supporting antioxidant capacity, reducing muscle tissue damage and supporting its repair.

Product Variation

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<td>AOR04270</td>
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Supplements Facts

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<th>Serving Size: 1 Capsule</th>
<th>Amount</th>
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<td>L-Carnitine (tartrate)</td>
<td>500 mg</td>
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Non-medical ingredients:
microcrystalline cellulose, sodium stearyl fumarate. Capsule: hypromellose.

Guarantees

AOR™ guarantees that all ingredients have been declared on the label. Contains no wheat, gluten, corn, nuts, peanuts, sesame seeds, sulphites, mustard, soy, dairy, eggs, fish, shellfish or any animal byproduct.

Adult Dosage

Take 2 capsules twice daily with food, 2-4 hours before exercise, or as directed by a qualified health care practitioner.

Cautions

Consult a health care practitioner prior to use if you are pregnant or breastfeeding or have a liver or kidney disease or seizure disorder.

Source

Pharmaceutical synthesis

Main Application

- Energy/Fatigue
- Athletic performance
- Cardiovascular health
- Weight management

Disclaimer

The information and product descriptions appearing on this website are for information purposes only, and are not intended to provide or replace medical advice to individuals from a qualified health care
professional. Consult with your physician if you have any health concerns, and before initiating any new diet, exercise, supplement, or other lifestyle changes.

Research

Background

Metabolic Functions of L-Carnitine

L-Carnitine is an amino acid synthesized by the body from the essential amino acids lysine and methionine, and can also be obtained from red meat – particularly lamb. For this reason, L-carnitine deficiency is quite common among vegetarians and even health-conscious people who simply avoid red meat, and an L-carnitine deficiency as a result of this can have some ironic consequences for such a health-conscious segment of the population. This is because L-carnitine plays a central role in the metabolic breakdown of long-chain fatty acids and their subsequent transport into the mitochondria for their oxidation and use in the production of cellular energy.

This makes L-carnitine essential to maintaining a healthy metabolism, which in turn is critical for avoiding age and lifestyle-associated disorders such as Metabolic Syndrome, Type II diabetes, cardiovascular disease, and others. L-carnitine deficiencies were not identified until 1972, making the study of L-carnitine’s crucial importance to metabolism an ongoing topic of research.

Exercise, Heart Health & Immunity

L-carnitine has now been extensively studied for its effectiveness in protecting muscle tissues during exercise and improving recovery time, for enhancing energy production and function of the mitochondria and for supporting cardiovascular health and immunity.

Research

Most studies examining the clinical potential of L-carnitine have used exogenous, supplemental L-carnitine, and these have produced significant findings. These findings include human studies on anorexia nervosa, athletic performance, angina, ischemia, peripheral vascular disease, cardiomyopathy, myocardial infarctions, hyperlipidemia, blood sugar instability, chronic fatigue syndrome, hepatitis, HIV, hyperthyroidism, and renal failure. In the latter, L-carnitine use is even recommended by the National Kidney Foundation for the alleviation of anemia associated with chronic renal failure. Anemia is a symptom targeted by L-carnitine supplementation in anorexia nervosa patients as well, improving weight gain, physical performance and appetite in combination with adenosylcobalamin (a cofactor of B12).

Cardiovascular Conditions

L-carnitine also increased walking time for peripheral vascular disease patients by nearly 80% in one double-blind, placebo-controlled study, while significantly increasing the survival rate among cardiogenic shock patients in two others. Long-term supplementation among heart patients have produced improvements in ejection fraction, Weber classification (a standardized test of cardiac performance), peak VO2 consumption, arterial and pulmonary blood pressure, and cardiac output. This is in addition to decreasing the mortality rate among myocardial infarction survivors by 12.5%
after a year of L-carnitine supplementation at 4 grams daily, according to one study.

**Blood Lipids and Blood Sugar Levels**

Hyperlipidemia, a condition characterized by excess levels of fat in the blood (and a major force behind a poor HDL/LDL ratio of cholesterol), has also been targeted by L-carnitine research, with most studies showing 2 grams to be an effective daily dose for reducing triglyceride levels, either as an adjuvant or stand-alone therapy. Injections of L-carnitine have also been used among diabetics to successfully improve insulin sensitivity and alleviate the symptoms of diabetic neuropathy.

In patients with type 2 diabetes and hypercholesterolemia, 2g/day of L-carnitine significantly reduced Lp(a) (lipoprotein a) levels after 6 months from 29.6 to 23.4 mg/dL, compared to the placebo (27.8 to 26.7 mg/dL).

A study on type 2 diabetics over 3 months found that 2g/day of L-carnitine significantly improved the following parameters: oxidized LDL levels decreased by 15.1 compared with 3.0 U/L, LDL cholesterol decreased by 0.45 compared with 0.16 mmol/L, triglycerides decreased by 1.02 compared with 0.09 mmol/L, apolipoprotein A1 concentrations decreased by 0.12 compared with 0.03 mg/dL, apolipoprotein B-100 concentrations decreased by 0.13 compared with 0.04 mg/dL, thiobarbituric acid–reactive substance concentrations decreased by 1.92 compared with 0.05, and conjugated diene concentrations decreased by 0.72 compared with 0.11 in the placebo group.

**Physical Activity and Sports Performance**

One study found that 2g/day of L-carnitine L-tartrate minimized chemical damage to muscle tissue after exercise and enhanced the repair process in healthy, active 40-60 year old subjects. Specifically, improvements were seen in the biochemical markers of purine metabolism (ie, hypoxanthine, xanthine oxidase), free radical formation (malondialdehyde), muscle tissue disruption (myoglobin, creatine kinase), and muscle soreness after physical exertion.

One study on 16 long-distance runners receiving 2g/day of L-carnitine for 1 month showed significant increases in the pyruvate dehydrogenase complexes as well as increased performance and improved oxygen consumption during exercise. Another study on similar subjects also found improved activity in rotenone-sensitive NADH cytochrome c reductase, succinate cytochrome c reductase and cytochrome oxidase, respiratory chain enzymes in the mitochondria. Supplementation also resulted in increased total and free carnitine.

The effects on sports performance of L-Carnitine was measured in 110 top boy and girl athletes (rowers, kayak-canoers, swimmers, weightlifters and medium and long-distance runners) after an acute dose and after 3 weeks of consuming 1g per day orally. Significant improvements were found for FFA, triglycerides, lactic acid, evoked muscular potential, plasma carnitine, urine carnitine, and others. Free carnitine permits a larger quantitiy of FFA to enter the mitochondria and be used more as an energy source during both endurance and explosive efforts.

**Energy and Fatigue**

Studies using L-carnitine in chronic fatigue syndrome (CFS) have been successful. One such study was a crossover trial where L-carnitine was directly compared to the drug amantadine (often prescribed to treat CFS in Multiple Sclerosis [MS] patients). The results were that amantadine was
poorly tolerated by the CFS patients, forcing 15 of the 30 to drop out of the treatment due to side
effects – with no statistically significant improvements among those who remained. After a 2-week
washout period, the second 8-week phase of the study began – this time with L-carnitine as the
intervention. Only one patient withdrew from this phase of the study, and significant improvements
were recorded in 12 of the 18 standard parameters used to measure the degree of CFS symptoms.

One 6-month study on 66 centenarians administered 2g of L-carnitine per day. The study noted
significant changes in the following parameters: reduction of total fat mass, increases total muscular
mass, and facilitates an increased capacity for physical and cognitive activity by reducing fatigue and
improving cognitive functions. Total fat mass (-1.80 compared with 0.6 kg), total muscle mass (3.80
compared with 0.8 kg), plasma concentrations of total carnitine (12.60 compared with -1.70 ?mol),
plasma long-chain acylcarnitine (1.50 compared with -0.1 ?mol), and plasma short-chain acylcarnitine
(6.0 compared with -1.50 ?mol). Significant differences were also found in physical fatigue (-4.10
compared with -1.10), mental fatigue (-2.70 compared with 0.30), fatigue severity (-23.60 compared
with 1.90), and MMSE(4.1 compared with 0.6).

Liver & Kidney Health and Immunity

L-carnitine has also been linked to liver health, particularly through its ability to control serum
ammonia levels. In fact, several studies with hepatic encephalopathy patients have confirmed not only
this ability on the part of L-carnitine, but also the ability to improve mental function in this condition as
measured by NCT-A, an accepted psychometric test for mental status in such patients. As mentioned
earlier, L-carnitine supplementation in patients with renal failure has been so extensive that its use has
even been advocated by the National Kidney Foundation. In one eight-month study, only 3 grams of
intravenously administered l-carnitine per week was required to improve left ventricular ejection
fraction (which is taxed heavily during renal failure) by more than 30%. L-carnitine supplementation
has also been studied in HIV-positive patients, both as stand-alone and adjuvant therapy; l-carnitine
enhances CD4 immune cells in the former while protecting them in the latter, thus effectively making l-
carnitine an immune system enhancer.

Hyperthyroidism

Hyperthyroidism and male infertility have also been subjects for l-carnitine supplementation. Since
endogenous l-carnitine plays a marginally inhibitory role in the activity of thyroid hormones, it was
hypothesized that increasing l-carnitine levels via supplementation would have a positive effect on
hyperthyroid patients. The hypothesis proved correct in at least one study, where daily doses as low
as 2 grams (for 6 months) prevented and reversed symptoms of hyperthyroidism, including the latter’s
effect on bone mineralization.

Male Fertility and Prenatal Health

L-carnitine has also been linked to increased sperm counts, leading to a number of studies with it
among infertile males. These studies, which used 2-3 grams of l-carnitine daily in periods generally
ranging from 2 to 4 months, were successful in increasing both sperm count and motility. Finally,
there is also some evidence to suggest that L-carnitine might be useful for women during prenatal
periods; one short-term study (5 days) showed that 4 grams of L-carnitine combined with the drug
betamethasone reduced the incidence of respiratory distress syndrome as well as mortality in
premature newborns.
Market Trends

L-Carnitine is mostly used as a weight-loss supplement to enhance metabolism or as a post-workout recovery agent in the sports nutrition industry.

It is also prescribed for primary L-Carnitine deficiency, and is growing in popularity as an adjunctive treatment for those with chronic kidney failure.

AOR Advantage

AOR offers high daily doses of both the traditional form of L-Carnitine as well as acetyl-L-carnitine (see AOR’s ALCAR) to meet the needs of those requiring it for metabolic as well as those who benefit from its cognitive supporting effects.

References


Sandor A. Butyrobetaine is equal to L-carnitine in elevating L-carnitine levels in rats. Biochim Biophys Acta. 1991 May 8;1083(2):135-8


Abstract

Radioisotopic determination of L-carnitine content in foods commonly eaten in Western countries


L-Carnitine is a vitamin-like nutrient essential for energy production and lipid metabolism in many organs and tissues such as skeletal muscle and heart. Even if L-carnitine can be synthesized, most of the carnitine present in human body is provided by food. Until now, no large study has been conducted where the content in L-carnitine of various foods was analyzed. The objective of this study was to determine the level of free L-carnitine present in food commonly consumed in Western countries. A radioisotopic assay was used to estimate L-carnitine content in raw and processed foods. From this study, it clearly appeared that meat products were the best sources for L-carnitine. Dairy products, seafood and fish are generally relatively low in carnitine whereas vegetables are mostly very low in carnitine. An omnivorous regimen allows to meet the general recommendation on L-carnitine intake. Vegetarian are clearly below recommendation and their carnitine homeostasis has to be carried out by a functional biosynthesis.

Studies concerning chronic and acute effects of L-carnitine on some biological parameters in elite athletes.


Drgan G, Vasiliu A, Georgescu E, Dumas I.

Chronic and acute effects of L-carnitine have been recorded in a group of elite athletes by a prospective double blind placebo controlled trial. Forty top athletes (20 boys, kayak-canoë, 10 weightlifters and 10 girls, rowers) received orally 3 g L-carnitine daily for 3 weeks while 38 top athletes (20 kayak-canoë, 8 weightlifters and 10 rowers) received the same medicine as placebo. Significant changes were registered in the treated group concerning FFA and triglycerides, strength index, VO2max., urinary mucoproteins and in the control group concerning Ld (distal latency). All athletes were under medical supervision and had a controlled training program and food. The effects of a single oral dose (4 g L-carnitine were recorded in a group of 18 top weightlifters under basal conditions and 90? after L-carnitine ingestion. Significant changes in the treated group were registered for the FFA, triglycerides, urinary mucoproteins and distal latency of the right and left median nerve. Based on these data the authors recommend this aminoacid both for chronic and acute effects as a physiological mean for the biological preparation of elite athletes during hard training and competitions.