

L-Carnitine

An Important Substrate for Heart and Muscle Function

DESCRIPTION

Douglas Laboratories' L-Carnitine supplements supply pure, natural L-carnitine in capsule form.

FUNCTIONS

L-carnitine is necessary for fatty acid metabolism and energy production in cardiac and skeletal muscle. It is involved in fatty acid oxidation as part of the carnitine shuttle. L-carnitine shuttles fatty acids from the cytosol (the cell fluid) into the mitochondria (the cell's powerhouses) for oxidation and energy production. L-carnitine is necessary in muscle whenever fat is utilized as an energy source. Heart muscle always uses fat for its continuous energy demands. Skeletal muscle begins using fat only after its glycogen reserves are exhausted. This happens after about one hour of continuous, strenuous exercise, e.g., long-distance running, bicycling, swimming, or mountain climbing.

Widely distributed in foods from animal, but not plant sources, L-carnitine is also synthesized by the liver and kidney from two essential amino acids, lysine and methionine. Human skeletal and cardiac muscles contain relatively high L-carnitine concentrations which they receive from plasma, since they are incapable of L-carnitine biosynthesis themselves. About 95 % of the body's L-carnitine stores are located in skeletal and heart muscle. L-carnitine is considered a conditionally essential nutrient. In healthy people, plasma L-carnitine levels are adequately maintained by the body's own synthesis and dietary sources. However, low L-carnitine plasma levels can be caused by hereditary (primary) L-carnitine deficiency syndrome, or by secondary L-carnitine deficiency. Patients with heart failure excrete large amounts of L-carnitine in their urine.

Oral L-carnitine is readily absorbed across the intestinal mucosa and into the bloodstream. It is then taken up from the portal vein into the liver and subsequently released into the systemic circulation. Most cells have a specific carnitine transporter.

Dietary L-carnitine comes mainly from animal foods. Average non-vegetarian diets provide about 100 to 300 mg of L-carnitine per day. Vegetarian diets often provide only trace amounts, since vegetables, fruits, and cereals are negligible sources of L-carnitine.

INDICATIONS

L-carnitine may be a useful nutritional adjunct for individuals who wish to support heart muscle function or skeletal muscle performance.

FORMULA (#R250)

Each capsule contains:

L-Carnitine..... 250 mg

SUGGESTED USE

One capsule per day or as directed as a physician. It is recommended that L-carnitine be taken with meals. Capsules may be pulled apart and the powder mixed with food or liquids if desired.

SIDE EFFECTS

No adverse side effects have been reported

STORAGE

Store in a cool, dry place, away from direct light. Keep out of reach of children. L-carnitine readily takes on moisture from the air. After opening the bottle, replace the lid immediately, and keep the bottle tightly closed as much as possible.

References

Adamo S, Siliprandi N, Di Lisa F, Carrara M, Azzurro M, Sartori G, Vita G, Ghidini O. Effect of L-carnitine on ethanol and acetate plasma levels after oral administration of ethanol in humans. *Alcohol Clin Exp Res* 1988;12:653-4.

Arenas J, Huertas R, Campos Y, Diaz AE, Villalon JM, Vilas E. Effects of L-carnitine on the pyruvate dehydrogenase complex and carnitine palmitoyl transferase activities in muscle of endurance athletes. *FEBS Lett* 1994;341:91-3.

Breningstall GN. Carnitine deficiency syndromes. *Pediatr Neurol* 1990;6:75-81.

Brevetti G, di Lisa F, Perna S, Menabo R, Barbato R, Martone VD,

- Siliprandi N. Carnitine-related alterations in patients with intermittent claudication: indication for a focused carnitine therapy. *Circulation* 1996;93:1685-9.
- Campos Y, Huertas R, Lorenzo G, Bautista J, Gutierrez E, Aparicio M, Alesso L, Arenas J. Plasma carnitine insufficiency and effectiveness of L-carnitine therapy in patients with mitochondrial myopathy. *Muscle Nerve* 1993;16:150-3.
- Corbucci GG, Lettieri B. Cardiogenic shock and L-carnitine: clinical data and therapeutic perspectives. *Int J Clin Pharmacol Res* 1991;11:283-93.
- Davini P, Bigalli A, Lamanna F, Boem A. Controlled study on L-carnitine therapeutic efficacy in post-infarction. *Drugs Exp Clin Res* 1992;18:355-65.
- de los Reyes B, Navarro JA, Perez-Garcia R, Liras A, Campos Y, Bornstein B, Arenas J. Effects of L-carnitine on erythrocyte acyl-CoA, free CoA, and glycerophospholipid acyltransferase in uremia. *Am J Clin Nutr* 1998;67:386-90.
- Digiesi V, Cantini F, Bisi G, Guarino G, Brodbeck B. L-carnitine adjuvant therapy in essential hypertension. *Clin Ter* 1994;144:391-5.
- Fujiwara M, Nakano T, Tamoto S, Yamada Y, Fukai M, Takada K, Ashida H, Shimada T, Ishihara T, Seki I. [Effect of L-carnitine in patients with ischemic heart disease]. *J Cardiol* 1991;21:493-504.
- Ghidini O, Azzurro M, Vita G, Sartori G. Evaluation of the therapeutic efficacy of L-carnitine in congestive heart failure [published erratum appears in *Int J Clin Pharmacol Ther Toxicol* 1989 Aug;27(8):418]. *Int J Clin Pharmacol Ther Toxicol* 1988;26:217-20.
- Giamberardino MA, Dragani L, Valente R, Di Lisa F, Saggini R, Vecchiet L. Effects of prolonged L-carnitine administration on delayed muscle pain and CK release after eccentric effort. *Int J Sports Med* 1996;17:320-4.
- Goa KL, Brogden RN. L-Carnitine. A preliminary review of its pharmacokinetics, and its therapeutic use in ischaemic cardiac disease and primary and secondary carnitine deficiencies in relationship to its role in fatty acid metabolism. *Drugs* 1987;34:1-24.
- Kendler BS. Carnitine: an overview of its role in preventive medicine. *Prev Med* 1986;15:373-90.
- Kendler BS. Recent nutritional approaches to the prevention and therapy of cardiovascular disease. *Prog Cardiovasc Nurs* 1997;12:3-23.
- Matsui S, Sugita T, Matoba M, Murakami E, Takekoshi N, Shinka T, Matsumoto I. Urinary carnitine excretion in patients with heart failure. *Clin Cardiol* 1994;17:301-5.
- Mondillo S, Faglia S, D'Aprile N, Mangiacotti L, Campolo MA, Agricola E, Palazzuoli V. [Therapy of arrhythmia induced by myocardial ischemia. Association of L- carnitine, propafenone and mexiletine]. *Clin Ter* 1995;146:769-74.
- Palazzuoli V, Mondillo S, Faglia S, D'Aprile N, Camporeale A, Gennari C. [The evaluation of the antiarrhythmic activity of L-carnitine and propafenone in ischemic cardiopathy]. *Clin Ter* 1993;142:155-9.
- Pepine CJ. The therapeutic potential of carnitine in cardiovascular disorders. *Clin Ther* 1991;13:2-21; discussion 1.
- Pugliese D, Sabba C, Ettore G, Berardi E, Antonica G, Godi L, Palasciano G, Lee SS, Albano O. Acute systemic and splanchnic haemodynamic effects of L-carnitine in patients with cirrhosis. *Drugs Exp Clin Res* 1992;18:147-53.
- Regitz V, Shug AL, Fleck E. Defective myocardial carnitine metabolism in congestive heart failure secondary to dilated cardiomyopathy and to coronary, hypertensive and valvular heart diseases. *Am J Cardiol* 1990;65:755-60.
- Scholte HR, Luyt-Houwen IE, Vaandrager-Verduin MH. The role of the carnitine system in myocardial fatty acid oxidation: carnitine deficiency, failing mitochondria and cardiomyopathy. *Basic Res Cardiol* 1987;82:63-73.
- Scholte HR, Rodrigues Pereira R, Busch HF, Jennekens FG, Luyt-Houwen IE, Vaandrager-Verduin MH. Carnitine deficiency, mitochondrial dysfunction and the heart. Identical defect of oxidative phosphorylation in muscle mitochondria in cardiomyopathy due to carnitine loss and in Duchenne muscular dystrophy. *Wien Klin Wochenschr* 1989;101:12-7.
- Siliprandi N, Sartorelli L, Ciman M, Di Lisa F. Carnitine: metabolism and clinical chemistry. *Clin Chim Acta* 1989;183:3-11.
- van Es A, Henny FC, Kooistra MP, Lobatto S, Scholte HR. Amelioration of cardiac function by L-carnitine administration in patients on haemodialysis. *Contrib Nephrol* 1992;98:28-35.
- Vecchiet L, Di Lisa F, Pieralisi G, Ripari P, Menabo R, Giamberardino MA, Siliprandi N. Influence of L-carnitine administration on maximal physical exercise [see comments]. *Eur J Appl Physiol* 1990;61:486-90.

**These statements have not been evaluated by the Food and Drug Administration.
This product is not intended to diagnose, treat, cure, or prevent any disease.**

**Manufactured by
Douglas Laboratories
600 Boyce Road
Pittsburgh, PA 15205
800-245-4440**