

PC L-Carnitine



PC

Be Well Stay Well Age Well

*PC L-Carnitine, a highly stabilized form of the amino acid L-carnitine, supports cardiovascular health, pulmonary function, and muscle recovery from exercise. L-carnitine supports fat utilization and energy production in the mitochondria and is found in abundance in heart and skeletal muscle. PC L-Carnitine contains 60% pure L-carnitine and 32% natural L-tartaric acid.**

All Phillips Clinic Formulas Meet or Exceed cGMP Quality Standards

Clinical Applications

- Supports Cardiovascular, Neurological, and Endocrine System Health*
- Supports Fat Utilization and Energy Generation*
- Supports Post-Exercise Muscle Recovery*
- Provides 680 mg of Stabilized L-Carnitine per Two-Capsule Dose*

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Discussion

L-carnitine is a conditionally essential micronutrient synthesized from the essential amino acids L-lysine and L-methionine primarily in the human brain, liver, and kidney. Production is a multi-step process and requires adequate niacin, pyridoxine, vitamin C, and iron. Once synthesized, carnitine is transported to other parts of the body, especially cardiac and skeletal muscle where 98% of total body carnitine is confined.*^[1]

Carnitine plays an important role in fat and carbohydrate metabolism and energy production by transporting long-chain fatty acids into the mitochondria where beta-oxidation of the fatty acids produces energy in the form of ATP (adenosine-5'-triphosphate). It transports short- and medium-chain fatty acids out of the mitochondria and assists in the liberation of coenzyme A, further promoting ATP synthesis. Carnitine facilitates oxidation of glucose, branched-chain amino acids, and ketones, and is required for the oxidation of medium-chain fatty acids in cardiac and skeletal muscle, tissues that use fatty acids as their primary fuel.*^[1,2]

Carnitine requirements may vary under certain conditions—for example, overnutrition or aging—and supplementation may support energy and glucose metabolism during these times. Researchers studying carnitine function and requirements utilized supplementation to support energy and substrate metabolism in an animal model. The results suggested that orally administered L-carnitine does indeed support complete fatty acid oxidation, normal mitochondrial fuel metabolism, and glucose tolerance.^[3] According to the Council for Responsible Nutrition, the observed safe level for carnitine supplementation in humans appears to be 2,000 mg per day, although higher doses have been tested and tolerated.*^[4]

Muscle fuel metabolism also depends on carnitine when fatty acids become the primary energy source for muscles during ongoing low to moderate exercise. Increasing total muscle carnitine content in healthy humans may support physiological function by reducing muscle glycolysis and increasing glycogen storage, fat oxidation, and work output.^[5,6] A randomized, placebo-controlled human subject study suggested that carnitine can improve exercise tolerance and inspiratory muscle strength, as well as reduce lactate production.^[7] A six-month, randomized, double-blind, placebo-controlled study of 50 children suggested that oral supplementation with L-carnitine helped support normal carnitine levels in the body with statistically significant positive effects on support of lung function.*^[8]

The role of carnitine in normal fertility has been investigated with meta-analysis of nine randomized controlled trials suggesting that carnitine may be effective in improving pregnancy rate and sperm kinetics, though further research is warranted.^[9] In some individuals, carnitine supplementation may support cardiovascular health and triglyceride and HDL levels already within the normal range.*^[10,11]

Carnitine participates in cell volume and fluid balance, liver lipid metabolism, and antioxidant activity. Ongoing research suggests that carnitine supplementation may effectively help maintain the health and function of the cardiovascular, nervous, immune, and endocrine systems, as well as the kidneys and the liver.*^[12]

***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.**

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Supplement Facts

Serving Size: 1 Capsule

Servings Per Container: 60

Amount Per Serving %Daily Value		
L-Carnitine (from 500 mg of L-carnitine tartrate)	340 mg	**

** Daily Value not established.

Other Ingredients: HPMC (capsule), stearic acid, magnesium stearate, and silica.

Directions

Take one capsule twice daily between meals, or as directed by your healthcare practitioner.

References

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3. Noland RC, Koves TR, Seiler SE, et al. Carnitine insufficiency caused by aging and overnutrition compromises mitochondrial performance and metabolic control. *J Biol Chem*. 2009 Aug 21;284(34):22840-52. [PMID: 19553674]
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5. Stephens FB, Constantin-Teodosiu D, Greenhaff PL. New insights concerning the role of carnitine in the regulation of fuel metabolism in skeletal muscle. *J Physiol*. 2007 Jun 1;581(Pt 2):431-44. Review. [PMID: 17331998]
6. Wall BT, Stephens FB, Constantin-Teodosiu D, et al. Chronic oral ingestion of L-carnitine and carbohydrate increases muscle carnitine content and alters muscle fuel metabolism during exercise in humans. *J Physiol*. 2011 Feb 15;589(Pt 4):963-73. [PMID: 21224234]
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8. Al-Biltagi M, Isa M, Bediwy AS, et al. L-carnitine improves the asthma control in children with moderate persistent asthma. *J Allergy (Cairo)*. 2012;2012:509730. [PMID: 22162707]
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11. Kendler BS. Supplemental conditionally essential nutrients in cardiovascular disease therapy. *J Cardiovasc Nurs*. 2006 Jan-Feb;21(1):9-16. Review. [PMID: 16407731]
12. Flanagan JL, Simmons PA, Vehige J, et al. Role of carnitine in disease. *Nutr Metab (Lond)*. 2010 Apr 16;7:30. [PMID: 20398344]

Cautions

Consult your healthcare practitioner before use. Keep out of reach of children. Avoid if allergic to any ingredient.

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