L-Carnitine Tartrate SAP

*Science-based fatty acid metabolism and antioxidant support**

L-Carnitine plays an important role in fatty acid metabolism, and has important antioxidant and anti-inflammatory properties.*[1] L-Carnitine is a nonessential amino acid synthesized primarily in the liver and kidneys from the amino acids lysine and methionine.* L-Carnitine is stored in skeletal muscles, brain, heart, and sperm, and therefore plays a functional role in each of these tissues.* Deficiency in L-carnitine may be associated with certain medications, angina, and vegan or vegetarian diets.* Symptoms of deficiency may include fatigue, muscle weakness, and a decreased tolerance to metabolic stress.*[1]

SUPPLEMENT FACTS

Serving Size: 1 Capsule — **Servings:** 90

	Amount Per Serving	% Daily Value
L-Carnitine (From 750 mg of L-carnitine tartrate)	500 mg	**

**Daily Value not established

Other ingredients: Vegetable magnesium stearate in a vegetable capsule composed of vegetable hypromellose and purified water.

This product is non-GMO.

Contains no: Gluten, soy, wheat, corn, eggs, dairy, yeast, citrus, preservatives, artificial flavor or color, starch, or sugar.

L-Carnitine Tartrate SAP contains 90 capsules

DIRECTIONS FOR USE

Adults: Start with 1 capsule twice daily with food and gradually increase to 2 capsules twice daily with food or as directed by your healthcare practitioner. Take 2–4 hours prior to exercise. Consult a healthcare practitioner for use beyond 6 months.

INDICATIONS

L-Carnitine Tartrate SAP may:

- Be used to help prevent stable angina.*
- Be used to help prevent pain associated with peripheral vascular disease (PVD).*
- Increase sperm count and mobility.*
- Help prevent cancer cachexia.*
- Improve recovery time for athletes.*

SAFETY AND INTERACTIONS

- L-Carnitine is considered to be a safe supplement with rare side effects that may include nausea or gastric upset. L-Carnitine does interact with some medications, so if you are taking any of the medications below, please speak with your healthcare practitioner before taking L-carnitine:
  - Isotretinoin (Accutane) can cause side effects similar to those seen with carnitine deficiency, including muscle pain and weakness, high cholesterol, and liver concerns. Taking L-carnitine with this medication may improve these side effects.
  - Valproic acid (Depakote) – Taking L-carnitine concurrently with this medication may prevent any deficiency and reduce the side effects of valproic acid.
  - Doxorubicin – Concurrent use of L-carnitine may help protect cardiac cells against the toxicity that can result from doxorubicin.
  - Thyroid hormone – L-Carnitine may reduce the amount of thyroid hormone that is able to get into cells.

PURITY, CLEANLINESS, AND STABILITY

All ingredients listed for all **L-Carnitine Tartrate SAP** lot numbers have been tested by a third-party laboratory for identity, potency, and purity.

*** 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.**

Scientific Advisory Panel (SAP): adding nutraceutical research to achieve optimum health

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L-CARNITINE BIOCHEMISTRY

Carnitine is a cofactor that is required to metabolize free long-chain fatty acids into acylcarnitines, which are then transported into mitochondria for β-oxidation.[2] This form of energy production is the primary fuel source for both heart and skeletal muscle. Carnitine can be synthesized via methylated L-lysine with *S*-adenosyl methionine (SAM).[2] Cofactors important for this process include magnesium, ascorbic acid, iron, pyridoxal-5′-phosphate, niacin, and methionine, as well as the cofactors necessary for the methylation pathway.[2] If patients are deficient in any of the cofactors, this may result in a relative deficiency of carnitine, which may have an impact on proper functioning of skeletal muscle, heart, or sperm function.

ANGINA

L-Carnitine may help improve duration of exercise and recovery time in patients with stable angina.[2] A six-month trial using 2 g/d L-carnitine in patients with exercise-induced stable angina demonstrated a reduction in the number of premature ventricular contractions at rest, improved exercise tolerance, increased maximal systolic arterial blood pressure, and reduced ST-segment depression during maximal effort.[2] There was also a reduction in the number of cardioactive pharmaceuticals needed in patients supplementing L-carnitine.[2]

In a separate randomized, placebo-controlled, crossover study investigating stable effort-induced angina, patients were given L-carnitine or placebo.[2] Twenty-two percent of the patients in the L-carnitine group reported being free of angina, compared to nine percent in the placebo group.[2] Results indicated a reduction in ECG indices of ischemia and improved exercise tolerance with L-carnitine supplementation.[2]

INTERMITTENT CLAUDICATION

A review article exploring the use of supplementing L-carnitine in patients with intermittent claudication examined 17 articles that met their inclusion criteria.[3] Researchers found that of the 5 randomized control trials, 4 demonstrated significant improvements in walking performance following dosing of between 300 mg/d and 600 mg/d of oral L-carnitine or propionyl-L-carnitine (PLC).[3] Average improvements compared to placebo showed an improvement in pain-free walking distance as well as for maximal walking distance by 23–132 m and 104 m, respectively, following carnitine intervention.[3]

MALE FERTILITY

L-Carnitine plays an essential role in maintaining male fertility. In a study examining sperm motility, count, and morphology, researchers found that infertile subjects had a significantly lower amount of seminal free L-carnitine compared to fertile controls, and that subjects in the azoospermic group had the lowest levels of L-carnitine.[4] In another study, researchers found a significant positive correlation between seminal plasma total carnitine concentration and total sperm count.[5] Researchers concluded that seminal carnitine levels may be a useful test when evaluating male infertility.[5]

CANCER CACHEXIA

In patients with cancer, cachexia is a major concern and a likely determinate of longevity. In a review study, researchers presented evidence regarding the use of carnitine supplementation for treating cachexia in patients with cancer. Data showed that cancer patients had low serum carnitine levels, and that L-carnitine supplementation resulted in improvement in fatigue as well as quality of life.[1]

ATHLETES

L-Carnitine can enhance vascular endothelial function, which may lead to improving blood flow to muscle tissue, resulting in a decrease in hypoxic stress.[6] In a direct assessment of muscle-tissue damage using an MRI, researchers found that L-carnitine supplementation reduced muscle damage related to hypoxic stress.[6]

Other aspects of L-carnitine with regards to athletic performance have had mixed results. There are some studies that have shown a positive impact on $VO_{2\ max}$; however, others have not supported those findings.[2] There are also some studies that demonstrate using L-carnitine during exercise may enhance fat metabolism, while others fail to observe a benefit in body-fat percentage reduction.[2] It appears likely that if an athlete is deficient in L-carnitine, they may benefit from supplementation; however, athletes with sufficient L-carnitine supplementation may have limited effect on $VO_{2\ max}$ or fat metabolism.

REFERENCES

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