Acetylcarnitine SAP

*Science-based support for cognitive function**

Acetyl-L-carnitine is an active form of carnitine that is synthesized in the body or obtained through dietary sources, in particular red meats.* For this reason, many people who eat a vegetarian diet may have a relative deficiency.* Acetyl-L-carnitine has the ability to cross the blood-brain barrier and neural cell membranes, and therefore can be helpful in conditions affecting the nervous system.*[1] There are studies that document acetyl-L-carnitine may be useful in the prevention of Alzheimer's symptoms.* Acetyl-L-carnitine may also be able to assist in preventing mental fatigue associated with fibromyalgia and chronic fatigue syndrome.* Compared to L-carnitine, it has the ability to assist in cognition, which has not been attributed to the L-carnitine form.*

SUPPLEMENT FACTS

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

	Amount Per Serving	% Daily Value
L-Carnitine	500 mg	**
From 750 mg of acetyl-L-carnitine hydrochloride providing 637.5 mg of acetyl-L-carnitine.		

**Daily Value not established

This product is non-GMO.

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

Each bottle contains 90 capsules.

DIRECTIONS FOR USE

Adults: Start with 1 capsule twice daily with food and gradually increase to 3 capsules daily with food or as directed by your healthcare practitioner. Consult a healthcare practitioner for use beyond 6 months.

INDICATIONS

Acetylcarnitine SAP may help:

- Prevent symptoms of Alzheimer's disease or dementia.*[2]
- Prevent pain and fatigue associated with fibromyalgia.*[3]
- Improve energy in elderly patients.*[4]
- Prevent decreases in luteinizing hormone (LH) associated with hypothalamic amenorrhea.*[5]
- Prevent mental fatigue associated with chronic fatigue syndrome.*[6]

SAFETY

Overall, acetyl-L-carnitine is considered to be a safe supplement, with rare side effects that can include nausea or gastric upset. Acetyl-L-carnitine may interact with some medications; therefore, if you are taking medications used to treat thyroid dysfunction or seizures, or blood-thinning medications such as coumadin, please speak with your healthcare practitioner before taking acetyl-L-carnitine.

PURITY, CLEANLINESS, AND STABILITY

All ingredients listed for all **Acetylcarnitine 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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For healthcare professional use only.

Acetyl-L-carnitine, when dosed orally, absorbs in the jejunum by simple diffusion.[1] Acetyl-L-carnitine is an active form of carnitine that has the ability to cross the blood-brain barrier and nervous tissue membranes.[1] The precise mechanism of action is still unknown, but one theory is that acetyl-L-carnitine has the ability to enhance neuronal metabolism in the mitochondria via its cholinergic neural transmission activity.[1] Acetyl-L-carnitine may also help by acting as an antioxidant and reducing the oxidative stress in cerebral spinal fluid, which in turn would prevent cell death and neuronal damage.[1]

FIBROMYALGIA

Fibromyalgia is characterized as a chronic condition that manifests with sleep and energy disturbances, and widespread pain.[2] In a double-blind, placebo-controlled study, patients with fibromyalgia were given 500 mg of acetyl-L-carnitine orally twice a day for 2 weeks, plus 1 intramuscular injection of 500 mg acetyl-L-carnitine, or placebo; then oral dosing increased to 3 times a day for 8 weeks or placebo.[2] Patients where monitored at 2, 6, and 10 weeks, and assessed for tender points, sum of pain threshold, self-perceived stiffness, fatigue, sleep, work status, and depression on the Hamilton scale.[2] Researchers found the number of positive tender points reduced significantly in both groups until 6 weeks of treatment; however, at 10 weeks, the acetyl-L-carnitine group continued to improve, whereas the placebo group remained unchanged.[2] In the parameters of depression and musculoskeletal pain, there was a statistically significant difference noted between the groups.[2] Researchers concluded that acetyl-L-carnitine may be beneficial for patients with fibromyalgia to assist with pain and mental health.[2]

ALZHEIMER'S DISEASE

Some studies have found that supplementing with acetyl-L-carnitine in patients with Alzheimer's disease may help in slowing progression, predominantly in younger onset patients.[3] In a study to assess the outcome of acetyl-L-carnitine supplementation on patients with probable Alzheimer's disease, researchers designed a 1-year-long, double-blind, placebo-controlled trial.[3] Patients were treated with 1 g of acetyl-L-carnitine three times a day or placebo. Patients were assessed using the Alzheimer's disease assessment scale cognitive component and the clinical dementia rating scale.[3] The overall assessment found that both groups declined at the same rate based on the measures used; however, in a sub-analysis by age, researchers found that patients under age 65 on acetyl-L-carnitine declined more slowly than their counterparts on placebo.[3] This study suggests that younger patients with onset of Alzheimer's may benefit from acetyl-L-carnitine supplementation; however, further studies in this subset of patients are needed.[3]

HYPOTHALAMIC AMENORRHEA

Hypothalamic amenorrhea (HA) is a condition characterized by neuroendocrine impairment that negatively impacts endocrine function, mainly within the reproductive axis.[4] Patients usually present with low estrogen and low LH. Researchers looked at participants with HA and divided them into 2 groups based on their LH levels.[4] Participants with an LH under 3 mIU/ml (low LH) were placed in group A, and participants with LH over 3 mIU/ml (normal LH) were placed in group B.[4] Both groups then received 1 g/d of acetyl-L-carnitine for 16 weeks. Participants baseline hormonal assessment, naloxone test (LH, FSH, cortisol), and pulsatility test (LH and FSH) were measured both before and after the 16 weeks of treatment.[4] Researchers found that group A showed a statistically significant increase in LH levels from an average of 1.4 to 3.1 mIU/ml, as well as improvement in the LH pulse amplitude.[4] There were no changes reported in group B.[4] Researchers concluded that there may be a specific role of acetyl-L-carnitine on reducing stress-induced abnormalities in patients with low LH affected by hypothalamic amenorrhea.[4]

FATIGUE

Fatigue is an extremely common complaint in elderly patients. Researchers explored supplementing acetyl-L-carnitine in elderly patients with fatigue.[5] Fatigue was measured in patients meeting four or more of the Holmes major criteria, or at least six of Fukuda minor criteria.[5] At the end of the treatment period, there were statistically significant differences in physical fatigue, muscle pain, mental fatigue, and the severity of fatigue.[5] There was an improvement in functional status and cognitive function, as well as improvements in mini mental state examination.[5] Researchers concluded that administering acetyl-L-carnitine may improve both physical and mental status in elderly patients.[5]

CHRONIC FATIGUE SYNDROME (CFS)

In an open randomized trial, patients with CFS were divided into 3 groups. Group A received 2 g/d acetyl-L-carnitine, group B received 2 g/d propionyl-L-carnitine, and group C received a combination of both.[6] Patients were monitored over 24 weeks and rated on global clinical impression of change, as well as secondary endpoints including multidimensional fatigue inventory and the McGill pain questionnaire.[6] Researchers found that treatment yielded considerable improvements in clinical global impression in 59% of group A patients, 63% of group B patients, and 37% of group C patients.[6] Group A showed a significant improvement in mental fatigue, whereas group B showed an improvement in general fatigue.[6] Researchers found that in group A, the changes in plasma carnitine levels correlated with clinical improvement, an association not observed in the other 2 groups.[6] Researchers concluded that acetyl-L-carnitine showed a beneficial effect on mental fatigue and attention concentration.[6]

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Acetylcarnitine SAP

Science-based support for cognitive function

NFH®

INDICATION-SPECIFIC DOSAGE SUMMARY BASED ON HUMAN CLINICAL RESEARCH#

#Please note these suggestions are guidelines based on the clinical studies. Evidence for efficacy and safety has been qualitatively (study quality in terms of study design, sample size, appropriate methods of analysis, use of appropriate placebo/control, bias etc) assessed and has been rated using a 5 star ★ rating classification.

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Indication	Suggested dosage	Supporting evidence and study outcomes	Study design	Outcomes measures/ selection criteria for studies	Safety	Evidence quality rating
Neural and Cognitive Function						
Depression[1]	6 capsules/ day for 8 weeks	Reduction of depression symptoms, fewer adverse effects compared to other anti-depressant medication*	12 Randomized controlled trials (n=447) avg. dose 3 g/day, median period 8 weeks (range 3-24 weeks)	Change of depressive symptoms - acetylcarnitine vs placebo and/or other anti-depressants. Hamilton Rating Scale most commonly used	Frequency of adverse events similar to controls, overall reduced adverse events compared to antidepressant medication	★★★★★
Mild cognitive impairment and Alzheimer's disease[2]	3-6 capsules/ day for 3-12 months	Significant improvement in clinical scales and psychometric tests seen first at 3 months and further improvement seen over time*	21 Randomized, double-blind, placebo controlled, parallel (n=1204) dose 1.5-3 g/ day, 3-12 months)	Disturbances of attention, memory, higher intellectual functions, and performance. Clinical test summary, clinician's judgement	Adverse events similar to placebo and mild	★★★★★
Peripheral neuropathic pain[3]	4-6 capsules/ day for 52 weeks	Significant reduction of visual analogue scale scores, similar effect between oral and intramuscular administration.* More effective in diabetic than non-diabetic patients*	4 Randomized placebo-controlled trials (n=471, 3g/day orally, or 1 g/day intramuscular for 10-14 days, 2 g/day orally for 355 days.)	Changes in clinical and neurophysiological symptoms of peripheral neuropathy, visual analogue scale	No serious adverse effects. Common side effects - gastrointestinal disorders, headache, paresthesia, biliary colic, hyperesthesia, retching. Adverse events similar in acetylcarnitine and control group	★★★★
Diabetic peripheral neuropathy[4]	3 capsules/ day for 24 weeks	Reduced neuropathy symptom and disability scores, improved neurophysiological parameters.* Acetylcarnitine as effective as methylcobalamin*	Randomized, double-blind, positive-controlled, multi-center trial (n=232, dose acetylcarnitine 1.5 g/day or methylcobalamin 0.5 mg/day for 24 weeks)	Neuropathy symptom score, neuropathy disability score, neurophysiological parameters	Nine adverse events, but not linked to treatment. Gastrointestinal distress, hiccups, nausea, and abdominal distension	★★★★★
Pain management in methadone withdrawal[5]	4 capsules/ day for 3 weeks	Reduced withdrawal symptom scores in 5 days and pain scores in 1 week with acetylcarnitine treatment*	Randomized, double-blind, placebo-controlled (n=30, acetylcarnitine 2 g/day for 3 weeks; orally for 1st week, intravenously for rest of the study)	Withdrawal symptoms and pain evaluated with short opiate withdrawal syndrome scale, Huskisson's analogue scale for pain	No adverse events	★★★★
Fatigue[6]	8 capsules/ day for 25 weeks	Decrease of fatigue - mental and physical severity.* Improvement in functional status and cognitive functions.* Improvement in sleep disorders and muscle pain*	single center, randomized, double blind, placebo-controlled (n=96 >70yrs age. 4g/day dose for 180 days)	Wessely and Powell scores to measure fatigue, fatigue severity scale, physical functioning scale, MMSE for cognitive status	No adverse events	★★★★

Male Sexual Health						
Idiopathic oligoasthenoteratozoospermia[7]	2 capsules acetylcarnitine + 4 capsules of L-carnitine tartrate SAP per day for 12-24 weeks	Significant increase in forward sperm motility, total motile spermatozoa and number of pregnancies*	7 randomized, placebo-controlled trials (n=693, dose L-carnitine 2g/day + acetylcarnitine 1g/day for 12-24 weeks)	Concentration and volume of spermatozoa, percentage of total sperm motility and forward motility, number of pregnancies	No adverse events	★★★★
Idiopathic asthenozoospermia[8]	2 capsules acetylcarnitine + 4 capsules of L-carnitine tartrate SAP and NAC SAP 2 capsules/day (trials with NAC were conducted separately). Duration - 3-6 months	Improvement in sperm motility, morphology*	7 randomized, placebo-controlled trials (n=621, dose- L-carnitine 2 g/day, acetylcarnitine 1g/day, n-acetyl-cysteine (NAC) 600 mg/day. Separate trials conducted for NAC, L-carnitine and acetylcarnitine studied together	Sperm concentration, volume, motility, morphology, hormone analysis	No adverse events	★★★★
Female Sexual Health						
Polycystic ovary syndrome (PCOS)[9]	2 capsules/day for 12 weeks (in addition to pioglitazone and metformin)	Reduction in insulin, luteinizing hormone, improvement in body circumference.* Improved stress scores and menstrual cycles*	Randomized, double-blind, placebo-controlled trial (n=147, dose acetylcarnitine 500 mg + metformin and pioglitazone twice a day for 12 weeks)	Perceived stress scale, profile of mood states. Measurement of luteinizing hormone, insulin, follicle-stimulating hormone, adiponectin, testosterone, insulin resistance	No adverse events	★★★★
Hepatic Encephalopathy						
Hepatic encephalopathy[10]	4 capsules/day for 60-90 days	Improved serum ammonia levels and number connection test completion time*	7 randomized placebo-controlled trials (n=660, dose acetylcarnitine 2 g/day for 60-90 days)	Serum ammonia concentration, number connection test as per West-Haven criteria	Minor adverse events reported infrequently	★★★★

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