



Carnitine (L-carnitine)

Overview

Carnitine is a substance that helps the body turn fat into energy. Your body makes it in the liver and kidneys and stores it in the skeletal muscles, heart, brain, and sperm.

Usually, your body can make all the carnitine it needs. Some people, however, may not have enough carnitine because their bodies cannot make enough or can't transport it into tissues so it can be used. Some other conditions, such as angina or intermittent claudication, can also cause low levels of carnitine in the body, as can some medications.

Carnitine has been proposed as a treatment for many conditions because it acts as an antioxidant. Antioxidants fight harmful particles in the body known as free radicals, which damage cells and tamper with DNA. Antioxidants can neutralize free radicals and may reduce or help prevent some of the damage they cause.

Some of the conditions carnitine may help treat are serious. Serious diseases and conditions require conventional medical treatment, and you should talk to your health care provider before taking carnitine. For other conditions, such as fatigue or improving athletic performance, carnitine seems safe but may not help much.

Heart Conditions

- Angina -- Some good evidence shows that carnitine can be used along with conventional treatment for stable angina. Several clinical trials show that L-carnitine and propionyl-L-carnitine can help reduce symptoms of angina and improve the ability of people with angina to exercise without chest pain. Do not self-treat chest pain with carnitine, however. See your health care provider for diagnosis and conventional treatment, and take carnitine only under your health care provider's supervision.
- Heart attack -- A few studies have found that carnitine may help when used with conventional medicines after a heart attack, but not all studies agree. Some small studies suggest that people who take L-carnitine supplements soon after a heart attack may be less likely to have another heart attack, die of heart disease, have chest pain and abnormal heart rhythms, or develop heart failure. However, other studies have shown no benefit. Treatment with oral carnitine may also improve muscle weakness. Carnitine should be used along with conventional medication under your health care provider supervision.
- Heart failure -- A few small studies have suggested that carnitine (usually propionyl-L-carnitine) can help reduce symptoms of heart failure and improve exercise capacity in people with heart failure. However, more and larger studies are needed to know for sure.

Peripheral Vascular Disease

Decreased blood flow to the legs from atherosclerosis or hardening of the arteries -- where plaque builds up in the arteries -- often causes an aching or cramping pain in the legs while walking or exercising. This pain is called intermittent claudication, and the reduced blood flow to the legs is called peripheral vascular disease (PVD). Several studies show that carnitine can help reduce symptoms and increase the distance that people with intermittent claudication can walk. Most studies have used propionyl-L-carnitine. Scientists don't know whether L-carnitine would work the same.

Diabetic Neuropathy

Diabetic neuropathy happens when high blood sugar levels damage nerves in the body, especially the arms, legs, and feet, causing pain and numbness. Some small preliminary studies suggest acetyl-L-carnitine may help reduce pain and increase feeling in affected nerves. It is also possible that carnitine can help nerves regenerate. More research is needed.

Exercise Performance

Although carnitine is often taken to boost exercise performance, there is no evidence it works.

Weight Loss

Although L-carnitine has been marketed as a weight loss supplement, there is no scientific evidence to show that it works. Some studies do show that oral carnitine reduces fat mass, increases muscle mass, and reduces fatigue, which may contribute to weight loss in some people.

Alzheimer's Disease and Memory Impairment

The evidence is mixed as to whether carnitine is useful in treating Alzheimer's disease. Several early studies showed that acetyl-L-carnitine, might help slow down the progression of Alzheimer's disease, relieve depression related to senility and other forms of dementia, and improve memory in the elderly. But larger and better-designed studies found it didn't help at all. People should take carnitine for Alzheimer's and other forms of dementia only under the supervision of their health care provider.

Kidney Disease and Dialysis

Because the kidneys make carnitine, kidney disease could lead to low levels of carnitine in the body. If you have kidney disease, your health care provider may prescribe carnitine -- but you shouldn't take it without medical supervision.

Male Infertility

Low sperm counts have been linked to low carnitine levels in men. Several studies suggest that L-carnitine supplements may increase sperm count and mobility.

Erectile Dysfunction

Preliminary studies suggest propionyl-L-carnitine may help improve male sexual function. One study found that carnitine improved the effectiveness of sildenafil (Viagra) in men with diabetes who had not previously responded to Viagra. In another study, a combination of propionyl-L-carnitine and acetyl-L-carnitine improved the effectiveness of Viagra in men who had erectile dysfunction after prostate surgery. More studies are needed.

Peyronie's Disease

Peyronie's disease is characterized by a curvature of the penis that leads to pain during an erection. One promising study compared acetyl-L-carnitine to the medication tamoxifen in 48 men with this condition. Acetyl-L-carnitine worked better than tamoxifen at reducing pain during sex and reducing the curve of the penis. Acetyl-L-carnitine also had fewer side effects than tamoxifen. More research is needed.

Hyperthyroidism

Some research suggests that L-carnitine may help prevent or reduce symptoms of an overactive thyroid, such as insomnia, nervousness, heart palpitations, and tremors. In fact, in one study, a small group of people with hyperthyroidism saw these symptoms improve, and their body temperature become normal, when taking carnitine. But a larger, better-designed clinical trial is needed to see if carnitine really works. In addition, researchers think carnitine may work by blocking the action of thyroid hormone, which could be dangerous for people with low thyroid levels. Don't take carnitine for hyperthyroidism without your doctor's supervision.

Dietary Sources

Red meat (particularly lamb) and dairy products are the main food sources of carnitine. It can also be found in fish, poultry, tempeh, wheat, asparagus, avocados, and peanut butter.

Available Forms

Carnitine is available as a supplement in a variety of forms.

- L-carnitine: the most widely available and least expensive
- Acetyl-L-carnitine: Often used in studies for Alzheimer's disease and other brain disorders
- Propionyl-L-carnitine: Often used in studies for heart disease and peripheral vascular disease

Avoid D-carnitine supplements. They interfere with the natural form of L-carnitine and may produce unwanted side effects.

In some cases, L-carnitine may be taken by prescription or given intravenously by a health care provider.

How to Take It

Pediatric

Don't give carnitine supplements to a child without your child's health care provider's supervision. Your child's health care provider should first make sure that the child has a carnitine deficiency.

Adult

Recommended doses of L-carnitine vary depending on the health condition being treated. The usual dose is between 1 - 3 g per day.

Precautions

Because supplements may have side effects or interact with medications, you should take them only under the supervision of a knowledgeable health care provider.

Side effects are generally mild. High doses (5 or more grams per day) may cause diarrhea. Other rare side effects include increased appetite, body odor, and rash.

People with the following conditions should talk to their health care provider before taking carnitine:

- Peripheral vascular disease
- High blood pressure
- Liver disease from alcoholism (cirrhosis)
- Diabetes
- Kidney disease
- History of seizures

Possible Interactions

If you are being treated with any of the following medications, you should not use carnitine without first talking to your health care provider.

AZT -- In a laboratory study, L-carnitine supplements protected muscle tissue against toxic side effects from AZT, a medication used to treat HIV and AIDS. More studies are needed to know whether L-carnitine would have the same effect in people.

Doxorubicin -- Treatment with L-carnitine may protect heart cells against the toxic side effects of doxorubicin, a chemotherapy medication used to treat cancer, without making the medication any less effective. Always talk to your oncologist before using any complementary or alternative therapy with chemotherapy.

Isotretinoin (Accutane) -- Accutane, a strong medication used for severe acne, can cause liver problems, as measured by a blood test, as well as high cholesterol and muscle pain and weakness. These symptoms are like those seen with carnitine deficiency. Researchers in Greece showed that a large group of people who had side effects from Accutane got better when taking L-carnitine compared to those who took a placebo.

Thyroid hormone -- Carnitine may stop thyroid hormone from getting into cells, and theoretically may make thyroid hormone replacement less effective. If you take thyroid replacement hormone, talk to your health care provider before taking carnitine.

Valproic acid (Depakote) -- The anti-seizure medication valproic acid may lower blood levels of carnitine. Taking L-carnitine supplements may prevent any deficiency and may also reduce the side effects of valproic acid. However, taking carnitine may increase the risk of seizures in people with a history of seizures.

Supporting Research

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Alternative Names

Acetyl-L-carnitine; L-carnitine

Version Info

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