Acetyl-L-Carnitine

(Hypoallergenic)

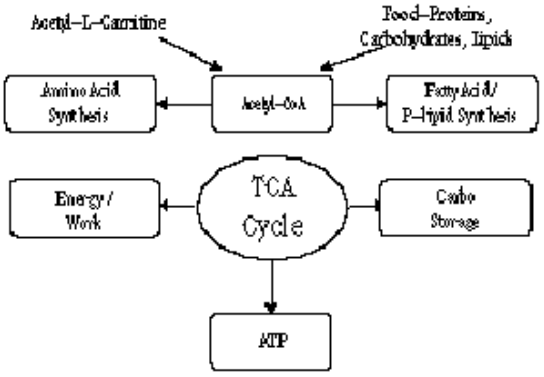
Item # 70650 – 250 mg
Available in bottles of 60 capsules
Item # 70660 – 500 mg
Available in bottles of 100 capsules

The Possible Benefits of Acetyl-L-Carnitine, a Dietary Supplement

- Crucial for the metabolism of protein and carbohydrates, and converting fats into energy
- Positively affects brain chemistry, supporting memory, mood, and energy production
- Provides antioxidant protection for the nervous system

Description

Acetylcarnitine (acetyl–L–carnitine, ALC) is the acetyl–derivative of carnitine. It is a nutrient and a naturally occurring metabolite that is involved in lipid, carbohydrate, and protein metabolism. Though closely related chemically to L-carnitine, which is a semi-essential nutrient, ALC surpasses the metabolic potency of carnitine. ALC is a source of precious acetyl groups that facilitate energetic pathways and which carnitine cannot supply. Acetyls from ALC can be combined with coenzyme A (CoA) metabolized from our foods, to generate acetyl–CoA.



Carnitine's major role is to link up with fatty acids and transport them into the mitochondria, the cell's "powerhouses" for energy production. Once within the mitochondria, the fatty acids are first "activated" by CoA, then chipped into two–carbon fragments that are spliced onto CoA to become acetyl–CoA. The acetyl–CoA molecules can then feed into the tricarboxylic acid cycle that generates chemical bond energy in the form of ATP. However, acetyl–CoA is an important "branch point" metabolite, and this is probably what makes ALC metabolically so potent.

The acetyl groups of ALC, once incorporated into acetyl–CoA, can be used interchangeably in a variety of metabolic pathways. When energy charge is low, acetyl–CoA stores are being depleted, and (under the influence of the enzyme carnitine acetyltransferase) ALC can be drawn upon to replenish acetyl–CoA. When the cell's energy charge is high, carnitine can be converted back to acetylcarnitine, thereby conserving acetyl until it is needed for energy generation or for other metabolic purposes.

Acetylcarnitine therefore helps "buffer" the acetyl supply inside the cell, but as aging sets in the body's levels of ALC may become limiting. The "family" of carnitines found in the blood and the tissues includes, in addition to carnitine and acetylcarnitine, long–chain acetylcarnitines (LCAC) which have more carbons than the 2 carbons of the acetyl group. The LCAC are likely to interfere with carnitine homeostasis: they tend to "gunk up" fatty acid transport into the mitochondria and inhibit membrane enzymes. As people age, total blood carnitine stays roughly the same but the beneficial acetylcarnitine goes down while the inhibitory LCAC tend to go up.

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Acetylcarnitine supplemented to the diet raises total carnitine and ALC but NOT the LCAC, thereby shifting carnitine homeostasis towards a more healthy state.

As a metabolic source of acetyl–CoA, ALC is also a source of acetyl groups for acetylcholine (ACh). This is a nerve transmitter involved in virtually all the brain's functions. With catalysis by the enzymes choline acetyltransferase and carnitine acetyltransferase, the acetyl– of ALC can be coupled with choline (via acetyl–CoA), to make ACh and generate carnitine as a convenient byproduct.

Although the brain supposedly synthesizes carnitine, total brain carnitine and brain ALC decline with age. ALC from dietary sources can raise brain levels of ALC and total carnitines, and do so more efficiently than dietary carnitine. This effect may be due to acetylcarnitine's property of crossing the blood–brain barrier more freely than does carnitine.

As if all this were not sufficient to render ALC an exceptional nutrient, it has been found to offer another important dimension of benefit that carnitine lacks: antitoxic protective effects. Experimentally, ALC protected nerve cells against oxidative insults, as from MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine) oxidative toxicity and from ischemia. Exposure to ALC also increased antioxidant enzyme activity, and increased cellular glutathione (GSH/reduced) and coenzyme Q10. Markers of oxidative stress such as malondialdehyde (a "lipid peroxide" end–product) were decreased, so ALC seemingly can protect against lipid peroxidation. In lab animals, ALC also inhibited age related accumulation of lipofuscin ("aging") granules in the hippocampus and prefrontal areas of the brain. These protective effects could have occurred through energetic enhancement by ALC, but a more direct "antioxidant" protective effect has not been ruled out. Carnitine was not effective in these studies.

Acetylcarnitine also appears to offer protection against oxidative stress at the mitochondrial level. Experimentally, ALC sustained mitochondrial respiratory chain activity (Complex I and Complex IV) against oxidative challenge. ALC protected proteins of the inner mitochondrial membrane from free radicals, also the mitochondrial DNA/RNA transcriptase enzyme essential for mitochondrial renewal. Again, in all these experiments carnitine failed to show an effect.

Acetylcarnitine appears to be a truly versatile metabolite. According to our interpretation of the available peer–reviewed literature, ALC is an energy carrier, metabolic facilitator, and membrane protectant all rolled into one small molecule. It may also be a potent iron chelator, which property could contribute to its apparent antioxidative effects. This may help explain why metabolically, ALC can do everything that carnitine can, and a whole lot more.

Each capsule contains:	Item no. 70650: Acetyl-L-Carnitine	250 mg
	Item no. 70660: Acetyl-L-Carnitine	500 mg
Other ingredients:	Cellulose, silicon dioxide, stearic acid.	
Suggested Use:	As a dietary supplement, 1 or 2 capsules two or three times per day, or as directed by a healthcare practitioner.	

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