

Acetyl- L-Carnitine

When to Prescribe in Clinic



Acetyl-L-carnitine (ALCAR) is a more readily bioavailable form of L-carnitine, the amino acid derivative. ALCAR is naturally produced by the body, synthesised in the liver and kidneys and distributed to the brain, heart and skeletal muscle amongst other tissues and organs with a high metabolic demand.¹ ALCAR can also be sourced from animal foods, with beef and pork being the highest sources.² ALCAR has been shown to cross the blood-brain barrier more efficiently than L-carnitine,³ meaning it has specific relevance for cognitive and neurological conditions, for which it is most commonly used therapeutically. Daily doses of 1000 mg are generally well-tolerated and have established benefits in five key clinical domains:

1. Supporting Brain Health

In crossing the blood-brain barrier, ALCAR is distinguished from L-carnitine in its neuroprotective and cognitive enhancing functions. It works via the mechanism of donating its acetyl group, thereby contributing to the synthesis of acetylcholine,⁴ a neurotransmitter with important involvement in attention, learning and memory.⁵ It also serves as an antioxidant,⁶ enhances neuronal energy metabolism⁷ and plays roles in modulating mitochondrial activities.⁸

ALCAR's multiple actions in supporting brain health show promise in cases of cognitive decline, neurodegenerative illnesses and fatigue. Clinical trials support its use in ageing patients with cognitive decline.^{9,10}

2. Neurotransmitter Synthesis and Nervous System Health

In addition to contributing to the synthesis of acetylcholine, ALCAR also provides trophic support to both neurons and glial cells.⁹ In protecting neurons from excitotoxicity and supporting peripheral nerve circulation, ALCAR has been shown to reduce neuropathic pain in several cohorts.¹⁰

ALCAR has also been shown to enhance nerve conduction velocity,¹¹ reduce neuronal apoptosis (via its antioxidant

action)¹² and support mitochondrial membrane stability in nerve cells,¹³ making it strongly indicated for neuroinflammatory states.¹⁴

3. Fatty Acid Metabolism

Transportation of long-chain fatty acids into the mitochondria for β -oxidation and energy production is a core metabolic function of ALCAR, as with all carnitines. Tissues in the body with high energy demands, including the brain, heart and skeletal muscle, rely on this critical process for optimal functioning.¹⁵ Patients experiencing mitochondrial disorders, metabolic exhaustion and/or chronic stress, where fatty acid oxidation is impaired, will likely benefit from supplemented ALCAR.

4. Energy Production

As we have seen, ALCAR both stabilises mitochondrial membranes and facilitates mitochondrial fatty acid metabolism, meaning that it helps to maintain energy production from baseline through to peak requirements. Thus, ALCAR supplementation is indicated for cases of, mitochondrial decline and recovery from illness and has been associated with improved endurance¹⁶ and reduced fatigue. It has also been shown to improve physical and mental energy in multiple cohorts.

5. Male Reproductive Health

ALCAR appears to play important roles in optimising sperm motility, maturation, viability, structure and function as well as mitochondrial activity within spermatozoa.¹⁸ This is likely due to its antioxidant properties and effect on enhancing mitochondrial respiration within sperm cells, making it a key supplement in preconception care.¹⁹

1000 mg of ALCAR daily is a well-tolerated dose for this range of broad applications. When its key indications are fully understood, its relevance to a myriad of clinical presentations is clear.

**References available on request.*

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