

# Acetyl-L-Carnitine Arginate Dihydrochloride (ArginoCarn®): Metabolic Effects in Human Subjects

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Dietary supplementation with the nutrient L-carnitine has been extensively studied, in particular as related to fatty acid metabolism and antioxidant activity. New research over the past few years has revealed additional roles for L-carnitine, including positive effects on muscle recovery from strenuous exercise, as well as improved blood flow, possibly mediated by enhanced production/bioavailability of nitric oxide. In relation to the latter, such variables have traditionally been measured in a fasted/rested state. However, more recent evidence indicates that measurement of blood flow, and the biochemical mediators regulating flow, may have greater clinical relevance when measured following a meal challenge. This “challenge” often involves intake of high saturated fat and/or high refined carbohydrate meals. Intake of such nutrients, at a high enough dosage, leads to a significant increase in postprandial blood triglyceride and/or glucose, both of which are directly linked to the production of reactive oxygen and nitrogen species (RONS). These RONS, often referred to as free radicals, have the potential to cause significant harm. In relation to blood flow, excessive RONS generation is often associated with endothelial cell dysfunction (i.e., impaired functioning of the inner lining of blood vessels), and a decrease nitric oxide bioavailability. Endothelial dysfunction is often characterized by an inability of the blood vessels to dilate optimally, is associated with aging, and may lead to cardiovascular problems. Hence, methods of promoting the healthy functioning of endothelial cells are important.

The above scenario is of particular relevance for those with metabolic disorders such as those with impaired fasting glucose (100-125mg/

dL). Such individuals often experience an exaggerated increase in blood triglycerides and glucose following feeding, leading to further impairment in endothelial function. Of course, such observations highlight the absolute importance of optimal dietary intake (in the form of whole food), in addition to the performance of regular, structured exercise on most, if not all days of the week. Both endeavors allow for enhanced lipid and glucose uptake into tissues from the circulation, as well as maintenance of desired body weight. Clearly, these two variables are of greatest importance when attempting to improve overall health.

Assuming that dietary habits are excellent and that regular exercise is a component of the daily regimen, nutritional supplementation may then be considered (but please do not believe that nutritional supplements will replace a poor diet and a lack of physical training—they will not). Within the context of supplementation, L-carnitine may be considered. In particular, we have recently completed a study with Acetyl-L-Carnitine Arginate Dihydrochloride (ArginoCarn®) in a sample of subjects with elevated fasting glucose levels. This form of carnitine is a combination of Acetyl-L-Carnitine molecularly bonded to arginine, the precursor amino acid to nitric oxide biosynthesis. This form is one of the new AminoCarnitines® branded and marketed by Sigma-tau HealthScience, and called ArginoCarn®. In our work with this ingredient we have noted the following:

**Increased Plasma Nitric Oxide:** An interesting finding in our work with ArginoCarn® is the ability of this ingredient to yield an increase in blood nitric oxide (measured as nitrate/nitrite), which acts in blood vessel dilation (i.e., opening). This may be of particular importance for individuals with compromised blood flow due to metabolic or cardiovascular problems.

**Improved Glucose Metabolism:** Although not of statistical significance (perhaps due to our relatively small sample of only 29 subjects), we noted improvements in fasting blood glucose, insulin, and hemoglobin A1c (HbA1c). These findings may have relevance for those with impaired glucose tolerance. This is especially true in light of recent evidence which suggests that HbA1c is an independent risk factor for cardiovascular problems.

Considering the available evidence, ArginoCarn® may support metabolic health, in particular in those who may be metabolically compromised. However, continued research is indeed necessary in order to confirm and extend these initial findings. Until then, all individuals should be committed to following a program of structured eating and physical exercise, two endeavors that have been shown repeatedly to be associated with improved overall health.

**Bio** Richard J. Bloomer holds a PhD in Exercise Physiology and is an Assistant Professor within the Department of Health and Sport Sciences at The University of Memphis. He held prior positions at Duke University Medical Center and Wake Forest University. His research focus is centered on oxidative stress and antioxidant therapy.

