



L-CARNITINE

RESEARCH & REVIEW

A publication from Lonza—The world's leading raw material supplier of L-Carnitine

Issue 2

L-Carnitine
...the supplement your
heart loves.™

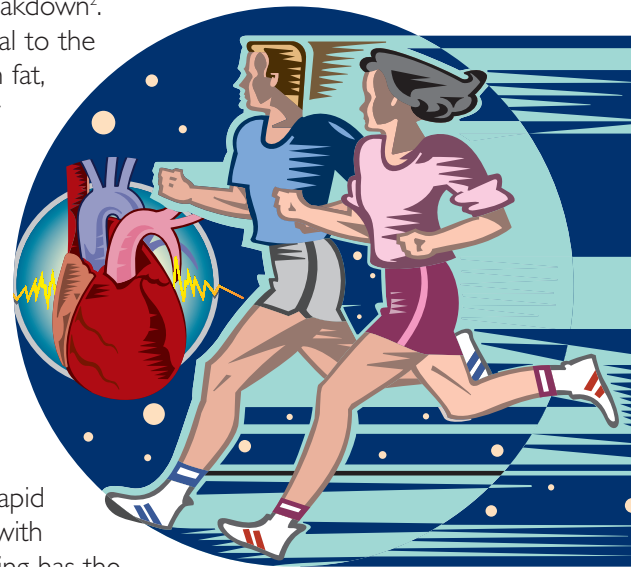
INTRODUCTION

Maintaining cardiovascular health is vital for each and every one of us and undoubtedly involves eating healthy foods, exercising frequently and protecting our hearts with appropriate nutritional supplements. One of the most important and safest supplements for maintaining heart health is L-Carnitine, an amino acid-like and vitamin-like nutrient found naturally within the human body. L-Carnitine's primary physiological function is to facilitate the production of energy from fat¹. For numerous years now, it has been accepted by the scientific community that L-Carnitine is integral to normal heart function. Indeed in Europe, L-Carnitine is widely referred to as the "Heart Vitamin"¹! Although L-Carnitine is typically marketed as a dietary supplement, and the Food and Drug Administration therefore restricts claims to those associated with supporting a healthy cardiovascular system, studies conducted on L-Carnitine's role in the management of cardiovascular conditions provide substantiation in support of dietary supplement claims. Discussions of these studies are solely intended to describe the substantiation underlying dietary supplement claims and are not intended to influence or affect the intended use of L-Carnitine dietary supplement products.

L-Carnitine: Essential for a Healthy Heart

The heart requires an abundant supply of energy to achieve its working capacity. So, where does this energy come from? Well, mostly from the burning of fatty acids - in fact, the heart derives around 70% of its energy from fat breakdown². Since L-Carnitine is central to the formation of energy from fat, the heart is consequently dependent upon L-Carnitine for most of its energy production³.

It is well known that regular exercise is vital for maintaining a healthy heart. While many sports enthusiasts and weekend warriors take L-Carnitine for enhanced performance and more rapid recovery, supplementing with L-Carnitine when exercising has the additional benefit of helping to support healthy heart function. Exercise, while ultimately beneficial for the heart, increases the workload of this vital organ and consequently the heart's energy requirement increases. Supplemental L-Carnitine is helpful in assuring that the heart receives the extra energy it needs during exercise.



Background: Cardiovascular Health

Cardiovascular disease is the leading cause of death in the industrialized world and according to the American Heart Association, in 1995 almost 14 million people in the US had some form of heart disease, be it a heart attack, angina or other heart condition. From a review of scientific literature, it is clear that L-Carnitine's benefits are not confined solely to healthy heart function - extensive clinical data indicates that oral L-Carnitine supplementation is beneficial in maintaining healthy cholesterol levels and, can be used even after cardiovascular conditions develop.

Take Note...

The heart is dependent upon L-Carnitine for most of its energy production³.

HEART MUSCLE: The benefits of L-Carnitine based on science...

Clinical data indicates that L-Carnitine supplementation can support healthy heart muscle⁴ and can significantly increase heart muscle viability⁵.

“Heart attack” is a term with which we are all familiar. In essence, a heart attack (myocardial infarction) occurs when the blood supply to the heart muscle is either severely reduced or completely cut off. This causes damage and death to the heart muscle cells due to lack of oxygen and ultimately may be fatal to the individual.

Sampling of substantiation in support of dietary supplement claims: Clinical data has shown that in addition to routine pharmacological treatment, L-Carnitine supplementation (2g/day for 28 days) results in a significant reduction in average infarct size in individuals who have experienced a recent acute heart attack. Thus, L-Carnitine can help to protect against heart damage following a heart attack⁴. Furthermore, L-Carnitine supplementation (2.97g/day for 8 weeks) can significantly increase heart muscle viability in individuals who have suffered a heart attack⁵.

L-Carnitine supplementation is beneficial in supporting a healthy heartbeat^{4,6}.

Angina is the temporary chest pain which occurs when the heart muscle isn't receiving enough oxygen, while arrhythmia is the scientific term for irregular heartbeat. In 1995, it was estimated that over 7 million people in the US suffer from angina.

Sampling of substantiation in support of dietary supplement claims: In the first study described above, L-Carnitine supplementation was shown to significantly reduce incidence of angina and arrhythmias (Figure 1). Additionally, L-Carnitine was associated with a decreased need for anti-angina and anti-arrhythmic medication⁴.

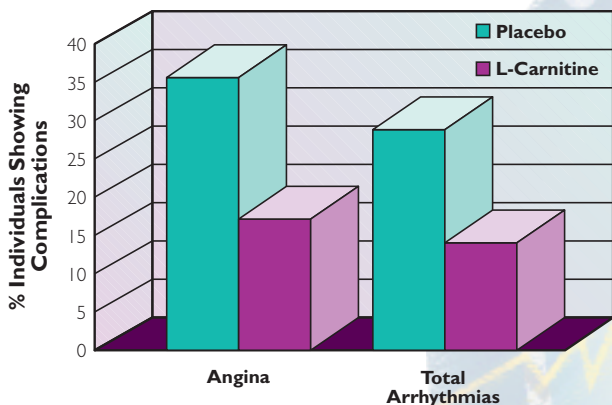


Figure 1. Cardiac complications following placebo and L-Carnitine supplementation (2g/day for 28 days) in 101 post-heart attack subjects (Ref. 4).

In terms of cardiovascular support, perhaps one of the most astounding results of L-Carnitine supplementation was reported in 1992. It was found that in individuals diagnosed as having a recent heart attack, L-Carnitine supplementation, in addition to the pharmacological treatment generally used, led to decreased incidence of arrhythmias and angina and, most importantly, caused a remarkable and significant reduction in mortality – 1.2% in the L-Carnitine group as compared to 12.5% in the control group⁶ (Figure 2).

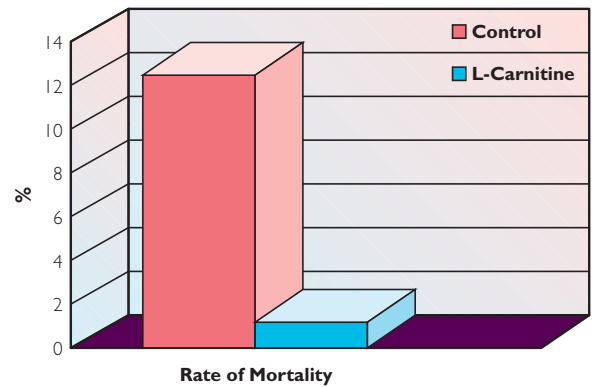


Figure 2. Rate of mortality in post-heart attack subjects following treatment with L-Carnitine (4g/day for 12 months). The rate of mortality is significantly reduced in the L-Carnitine group (81 subjects) as compared to the control group (79 subjects) (Ref. 6).

L-Carnitine supplementation increases exercise tolerance and supports healthy heart function⁷⁻¹⁰.

In people with stable effort-induced angina, the capacity for physical activity is unfortunately limited due to the onset of chest pain upon exercise.

Sampling of substantiation in support of dietary supplement claims: In stable angina, L-Carnitine (2g/day for 6 months), in addition to current medication, has been shown to significantly enhance exercise tolerance, improve cardiac function and reduce consumption of cardioactive drugs⁷.

Take Note...

Clinical research has shown that L-Carnitine supplementation can help to protect against heart damage following a heart attack.

HEART PERFORMANCE: The benefits of L-Carnitine based on science...

Research indicates that L-Carnitine supplementation can significantly support heart function¹¹⁻¹³.



Heart failure is a serious condition in which the quantity of blood pumped by the heart each minute is insufficient to meet the body's normal requirements for nutrients and oxygen. It is a common misconception that heart failure means that the heart has stopped - in fact, the term actually refers to the inability of the organ to keep up with its workload.

Sampling of substantiation in support of dietary supplement claims: L-Carnitine supplementation (3g/day for 4 months), in addition to routine medication, caused a significant improvement in heart function in individuals with heart failure¹¹.

MAINTAINING HEALTHY CHOLESTEROL LEVELS: The benefits of L-Carnitine based on science...

Clinical data indicates that L-Carnitine supplementation is helpful in maintaining healthy blood cholesterol and triglyceride levels⁷.

As we all know only too well, a high level of cholesterol in the blood is a major risk factor for the development of heart disease. Here again, clinical research reports that L-Carnitine supplementation may be beneficial.

Sampling of substantiation in support of dietary supplement claims: In a randomized trial involving individuals with stable angina, supplemental L-Carnitine, in addition to routine medication, was shown to cause a significant decrease in blood cholesterol and triglyceride levels⁷

(Figure 3).

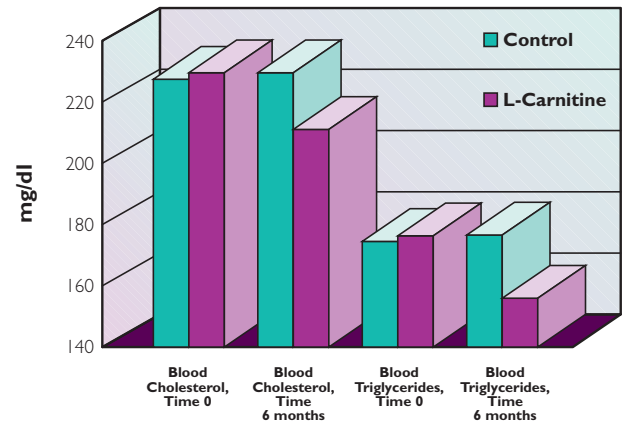


Figure 3. Blood cholesterol and triglyceride values before and after treatment with L-Carnitine (2g/day for 6 months) (Ref. 7).

L-Carnitine's Mechanism of Action in Support of Dietary Supplement Claims

Since oxygen is needed for fat breakdown, in conditions where the heart muscle cells are not receiving enough oxygen, e.g. heart attack and angina, fat breakdown and energy production in the heart muscle is reduced. Furthermore, there is a decrease in the free L-Carnitine concentration in the cardiac cells. These events ultimately lead to impairment of the mechanical functioning of the heart. Scientists agree that L-Carnitine supplementation helps by replenishing the lost L-Carnitine and by enhancing fat breakdown and energy production^{14,15}. In heart failure, there is also a deficiency of free L-Carnitine in the heart and it is thought that supplemental L-Carnitine helps by promoting energy production on the part of the heart muscle cell^{12,13}. In terms of its effects on cholesterol levels, L-Carnitine may act by simply enhancing fat breakdown.

L-Carnitine Magnesium Citrate - Double the Benefit!

Similar to L-Carnitine, magnesium plays an important role in the functioning of the cardiovascular system. L-Carnitine Magnesium Citrate, a special form of L-Carnitine patented by Lonza (US Patent 5,071,874 and other international patents), combines the benefits of L-Carnitine and magnesium in an ideal ratio. This form of L-Carnitine is the perfect heart healthy product because of its double benefit for optimal heart health!

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and so to conclude...

It is clear – L-Carnitine has a well-documented part to play in supporting a healthy cardiovascular system. Everyone knows that “prevention is better than cure”. Consequently, by helping to support healthy heart function and by helping to maintain healthy cholesterol levels, L-Carnitine supplements may be a useful ally in the quest for cardiovascular health.

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Lonza, the leading manufacturer and supplier of the bulk dietary supplement L-Carnitine, is the only supplier who can guarantee 100% pure, natural L-Carnitine - totally free from toxic D-Carnitine. Our L-Carnitine is Kosher certified and is found in infant formula, multivitamins and a wide variety of health products.

Lonza offers the following four forms of L-Carnitine:

L-Carnitine USP Free Base, our unique and patented L-Carnitine L-Tartrate (US Patent 5,073,376 and other international patents), L-Carnitine Magnesium Citrate (US Patent 5,071,874 and other international patents) and Acetyl-L-Carnitine.

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