

Latest Research With Heart Failure Patients Confirms:

New Form of CoQ10 May Dramatically Improve Heart Function

Since its discovery in 1957, Coenzyme Q10 (CoQ10) has been studied extensively for its crucial role in ensuring the health of virtually **all** human tissues and organs. Most cellular functions depend on CoQ10 for the production of ATP (adenosine triphosphate) the body's major form of stored energy. Partnering with other enzymes in the body, CoQ10 plays two vital roles in cellular and bodily health: (1) **energy production** and (2) **free radical protection**.

A sizeable and ever-growing body of research highlights the importance of maintaining adequate CoQ10 levels in the bloodstream. Findings include:

- 1) CoQ10 levels **decline with advancing age**, and this decline may contribute to some manifestations of aging.¹
- 2) Susceptibility to CoQ10 deficiency appears to be greatest in the **heart, brain and immune system**.¹
- 3) CoQ10 is especially important for **cardiovascular health**.^{1,2}
- 4) **Any deficiency in CoQ10** will cause disorders in energy production and result in cell damage.³

Why Two Active Forms of CoQ10 Are Essential for Good Health

Ubiquinone and *ubiquinol* are both active forms of CoQ10, and both are necessary to produce cellular energy. Ubiquinone is the oxidized form of CoQ10 that consumers are most familiar with; it has been taken as a supplement and studied for more than thirty years.⁴

CoQ10 produces and sustains your body's natural energy through a fundamental conversion process. This process can best be described as an ongoing "cycle" where ubiquinone picks up electrons and converts to ubiquinol, which subsequently

scavenges free radicals and hydroxyl radicals (releasing electrons) and converts back to ubiquinone.⁵ Then the cycle repeats. Without this continual conversion process, cellular energy levels cannot be sustained.⁴

Only when ubiquinone has been converted to ubiquinol, the "reduced," antioxidant form of CoQ10, is it available for use in cellular energy production. In addition, ubiquinol is the strongest lipid-soluble antioxidant available, protecting the body's cells from oxidative stress which can damage proteins, lipids and DNA.⁴ In healthy people, 95% of the circulating CoQ10 in the blood exists in the form of ubiquinol.⁶

Since the body must take an extra step in order to convert supplemental CoQ10 in the form of ubiquinone to ubiquinol (the antioxidant form), the efficiency of this conversion process lessens over time. Studies have indicated dramatic declines in total levels of CoQ10 as a normal consequence of aging, along with a marked decrease in the body's ability to make ubiquinol.⁴

Harmful Consequences of Low CoQ10 Levels

Several studies have shown that Coenzyme Q10 levels decline with age.^{7,8} Since a decline or disruption in CoQ10 levels may lead to **illness, decreased energy production** and **suppressed cell function**, supplementation should be considered by all adults who want to reduce the effects of aging. When young and healthy, the human body produces enough CoQ10, but levels typically begin to decrease after age 30.

Aging is a result of the gradual loss of tissue function, caused by altered "gene expression."

Besides its key role in energy production, CoQ10 inhibits age-related alterations in gene expression in cell structure, protein turnover and extracellular matrix (a key regulator of cell and tissue behavior).⁸ Without the protective effects of CoQ10, alterations in gene expression of extracellular matrix molecules may lead to the formation, invasion and spread of certain **cancers**.

Heart and skeletal muscles are particularly dependent on CoQ10. As explained by legendary researcher Dr. Karl Folkers, a 25% deficiency in the body's CoQ10 levels can lead to illness, whereas a greater deficiency of 75% or more may lead to death.⁹ In addition, statistical evidence shows that mortality may result within six months if CoQ10 values remain low.¹⁰

CoQ10 supplementation may be especially important during times of illness, environmental stress or aging. Furthermore, a lack of this vital nutrient may be partly responsible for the age-related deterioration of the **immune system**.^{11,12,13,14}

CoQ10 Improves Heart Function

Although CoQ10 is found naturally in all cells, it is particularly concentrated in tissues having high energy requirements, such as the heart. In 1972, researchers documented a link between CoQ10 deficiency and human heart disease.¹⁴ Since that time, scores of articles have been published on the multiple benefits of CoQ10 for heart health. CoQ10 plays a key role in energy production and all energy-dependent processes, especially **heart muscle contraction**.

A deficiency of CoQ10 has been documented in various types of cardiovascular disease. In addition,

How CoQ10 Gives You Vital Energy

Throughout the inner membrane of the body's cellular energy factories (called mitochondria), electrons are transferred like "hot potatoes" along the various acceptors in what is known as the electron transport chain. Energy transferred from these electrons is eventually used to power the body's cellular activities. CoQ10 is required to collect and transfer these electrons down the chain, enabling the mitochondria to produce ATP, the body's energy "currency." ATP is needed to provide energy for:

- ✓ **Brain function**
- ✓ **Heartbeat**
- ✓ **Muscle movement**
- ✓ **Body heat**
- ✓ **Nerve electricity**
- ✓ **Immunity**

CoQ10, as ubiquinol, has been shown to be a potent antioxidant that protects LDL cholesterol from oxidation.^{4,15} This finding has important implications for heart health, because oxidation of LDL is believed to be an initiating factor in the development of atherosclerosis and clogged arteries.¹⁶

Other research has shown CoQ10 to significantly improve heart function in patients with **cardiomyopathy**,⁷ a weakening of the heart muscle that increases the risk for abrupt cardiac death. It is well known that cardiomyopathy is caused by a decrease in cellular energy production and a disruption in energy flow. Since CoQ10 is documented as being absolutely vital for optimal heart energy and pumping ability, its potential benefit for cardiomyopathy is not surprising.

Help for End-Stage Heart Failure Patients

In a 2004 randomized, placebo-controlled study, CoQ10 was given to patients with end-stage heart failure awaiting cardiac transplantation. The administration of CoQ10 to heart transplant candidates led to a significant improvement in functional status, clinical symptoms, and quality of life. Those receiving CoQ10 showed significant improvement in the 6-minute walk test, and decrease in dyspnea (labored breathing), nocturia (excessive nighttime urination), and fatigue.¹⁷

The most significant result of this study was noted in the 6-minute walk test, where **patients treated with CoQ10 improved their walking performance** from 269 to 382 meters, after 3 months of treatment. By comparison, walking performance in the **placebo group decreased** from 254 to 177 meters during the same time period.¹⁸

An evaluation of several double-blind studies, selected on the basis of quality, shows that Coenzyme Q10 significantly improves **activity, exercise duration** and/or **work capacity** in heart failure patients. These encouraging results with CoQ10 constitute the basis for ongoing randomized, international, multicenter research with CoQ10 as an adjunctive therapy for chronic heart failure.¹⁹

CoQ10 Shields Against Forces Which Age Us Prematurely

CoQ10 is a powerful antioxidant that protects the body from unstable molecular fragments called free radicals.²⁰ Its crucial role in the body's antioxidant network has been described as a "shield against the forces which age us before our time." Most importantly, CoQ10 **recycles vitamin E**, a powerful fat-soluble antioxidant in the body. When vitamin E is recycled, it is able to help keep artery walls free from age-associated plaque buildup.²¹ In addition, CoQ10 has been shown to offer key antioxidant **protection against UV radiation**, the leading cause of both skin aging and skin cancer.²¹

Protection Against Atherosclerosis and Heart Disease

By recycling and restoring used-up vitamin E, CoQ10 provides both direct and indirect antioxidant protection. As a testament to its potent antioxidant power, both animal and human studies show that CoQ10 offers significant protection against the development of atherosclerosis and heart disease.

In a controlled animal study, two groups of rabbits were fed a diet rich in trans fats, known to increase the risk of heart disease. Animals which were supplemented with CoQ10 had **significantly less aortic and coronary artery plaque**. Other heart disease symptoms were also significantly lower in the CoQ10-supplemented rabbits. Moreover, intervention with CoQ10 was associated with an **increase in vitamin E levels** along with a decrease in various markers of oxidative stress, as compared to placebo.²²

CoQ10's potent antioxidant, heart-protective effects have also been confirmed in human studies. One such study involved 144 heart attack patients after acute myocardial infarction (AMI). AMI is defined as the rapid development of heart muscle death, resulting from a sustained and complete reduction of blood flow. In this double-blind trial, AMI patients were randomly assigned to receive either coenzyme Q10 (120 mg/day) or "placebo" for one year.²³

After one year, total cardiac events (24.6% vs. 45%), including non-fatal infarction (13.7% vs. 25.3%) were **significantly lower in the CoQ10 group** than in the control group. Also, mean plasma levels of vitamin E and HDL ("good") cholesterol were significantly higher in the CoQ10 group, and measures of oxidative stress were significantly lower, as compared to placebo. Another significant finding: the prevalence of **fatigue** was only 6.8% in the CoQ10 group, compared to 40.8% in the control group.²³

Choosing the Form of CoQ10 That's Right for You

For young, healthy individuals, ubiquinone should usually be sufficient for supplementation needs. Most healthy, young adults in their twenties and thirties can easily metabolize CoQ10 and convert it into ubiquinol; thus, supplementing with standard commercial CoQ10 (ubiquinone) will likely be the most efficient and cost-effective way to raise CoQ10 levels.

For individuals who are affected by chronic disease, or who are over the age of 40, [ubiquinol](#) supplementation will likely be more beneficial, since the body's ability to produce CoQ10 and convert it into ubiquinol is diminished. Ubiquinol levels have been shown to be suppressed in individuals with cardiovascular, neurological, liver-related and diabetes-related conditions.⁴ Ubiquinol, for example, has dramatically improved absorption of CoQ10 in patients with severe heart failure, and the improvement in plasma CoQ10 levels is correlated with both (1) clinical improvement and (2) improvement in measurement of ejection fraction.²⁴

Advanced Heart Failure Patients Show Dramatic Improvement

“Ejection fraction” is a measurement of the capacity at which your heart is pumping. Healthy individuals typically have ejection fraction levels of 55 to 70 percent. Damage to the heart muscle, such as that sustained following a heart attack, heart-valve problems, or during myocardial infarction or cardiomyopathy, impairs the heart’s ability to eject blood and therefore reduces ejection fraction.

Recently, renowned expert Dr. Peter Langsjoen conducted a clinical trial which involved seven **end-stage congestive heart failure patients**, each of whom had an ejection fraction level below 35 percent. Initially, all of the patients participating in the trial showed symptoms of insufficient heart function while at rest and were unable to carry out any form of physical activity without discomfort. The prognosis for such patients is very poor, with mortality rates as high as 74 percent within 6 months, and 94 percent within 12 months.

This study assessed the effects of changing the patients’ CoQ10 supplementation from ubiquinone to ubiquinol (the reduced form). When switched to supplemental [ubiquinol](#), there was a **dramatic increase in both the patients’ ejection fraction and plasma CoQ10 levels**, with corresponding improvements in the clinical status in all of the patients. The improvements while on ubiquinol were so significant that six of the seven patients in the study survived longer than expected and remained stable for an average of 12 months.²⁴

This study clearly demonstrates the importance of using ubiquinol, especially as we age and begin to require more protection against diseases caused by oxidative stress. But the immense volume of CoQ10 research conducted over the past 50 years indicates that the ubiquinone form has its own unique benefits. To take advantage of the full range of benefits of CoQ10, consider adding ubiquinol by age 40, when the body’s ability to convert ubiquinone to ubiquinol generally becomes less efficient, and adjust dosage according to age or health condition. Less ubiquinol is required to get the same therapeutic effect as ubiquinone, because it is pre-converted and ready for immediate use by the body.

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