

Ubiquinol

The Crucial Nature of CoQ10

Coenzyme Q10 (CoQ10) is a vitamin-like substance found in virtually all cells of the human body, including the heart, liver, and skeletal muscles, and in most plant and animal cells. CoQ10 functions as a carrier to transfer electrons across the membrane of the mitochondria — the energy-producing ‘factories’ within cells — to drive production of adenosine triphosphate (ATP), or cellular energy.

Heart muscles have the greatest concentration of mitochondria — 5,000 per cell — which is one reason why CoQ10 is so important for cardiovascular function. In its reduced form, ubiquinol, CoQ10 acts as an antioxidant to protect proteins, LDL cholesterol, and mitochondrial DNA from oxidative damage. Research has shown that CoQ10 supplementation exerts a sparing effect on vitamin E in healthy subjects, helping to maintain its antioxidant state. It also reduces levels of lipid peroxidation — the pivotal reaction in the cause of atherosclerosis — and thus reduces the risk of cardiovascular disease. It has also been established that people with a variety of cardiovascular disorders — including congestive heart failure, hypertension, aortic and mitral valve diseases, diabetic cardiomyopathy, and congenital valvular defects — are prone to myocardial CoQ10 deficiency.

- Hypertension (high blood pressure): A pilot study showed that in patients with hypertension, CoQ10 supplementation led to statistically significant decreases in systolic and diastolic blood pressure.
- Congestive heart failure (a disease in which the heart does not adequately maintain circulation): At least five double-blind, placebo-controlled trials have found that CoQ10 significantly reduces the severity of symptoms in congestive heart failure patients.

- **Cardiomyopathy (heart muscle disease):** Two studies have yielded very positive results in treating cardiomyopathy with CoQ10. In each study, over 80% of patients showed significant improvements in cardiac function.
 - **Angina pectoris (chest pain):** Several small trials have shown that CoQ10 supplementation decreases angina episodes and increases exercise capacity.
 - **Heart attack recovery:** A double-blind trial found that heart attack survivors who supplemented with CoQ10 for 28 days afterwards experienced fewer heart-related problems than those who took placebo.
- CoQ10 supplementation has also been demonstrated to prevent the plasma CoQ10 decrease caused by the statin drug simvastatin — without affecting its cholesterol-lowering effect.

Brain Wellness

There is substantial evidence that oxidative damage and mitochondrial dysfunction may play a key role in the pathogenesis of neurodegenerative diseases including:

- **Parkinson's disease.** Two trials have indicated that CoQ10 supplementation may slow the progression of Parkinson's and produce a mild improvement in symptoms.
 - **Alzheimer's disease.** While no clinical trials have been published on CoQ10 and Alzheimer's disease, researchers at a 2004 meeting of Academy of Health did note that: "Because mitochondrial dysfunction has been postulated in AD, a randomized controlled trial of CoQ10 appears warranted."
- As an antioxidant, CoQ10 protects proteins, LDL cholesterol, and mitochondrial DNA from oxidative damage.*

- *As a participant in the production of cellular energy, CoQ10 helps ensure the body's biggest energy consumers — the heart and the brain — are well-fed.*

Because of these two crucial functions, CoQ10 can lower blood pressure, enhance cardiac function in patients with cardiomyopathy, improve symptoms of congestive heart failure, relieve angina, and increase recovery from heart attack. Additionally, it may slow the progression and improve the symptoms of neurodegenerative diseases such as Parkinson's disease.

CoQ10 Absorption Dilemma

Of course, none of these benefits can be realized if CoQ10 is not absorbed by the cells — and research indicates that the cells uptakes only a small fraction of traditional powder-based (crystalline) CoQ10.

In order to be absorbed, all nutrients must first be in a water-soluble form. Unfortunately, because of its structure, CoQ10 is highly lipophilic (fat-loving) — and practically insoluble in water. This lipophilic nature makes CoQ10's absorption:

- **Poor:** Less than 6% of orally administered CoQ10 permeates the gastro-intestinal tract into the blood.
- **Highly variable:** Some individuals absorb considerably less CoQ10 than others.
- **Strongly dependent on stomach contents:** Foods rich in fat enhance absorption.

Making matters worse, CoQ10 is a large molecule, contributing to its poor absorption. Plus, when CoQ10 is produced commercially, crystals are formed that melt when they reach 118°F or 48°C. Upon cooling, CoQ10 recrystallizes, which frequently results in even larger crystals — and further lowers CoQ10 bioavailability.

Several factors can deplete CoQ10 levels in the body

- Aging
- Certain medications, such as statin drugs
- Certain disease states

The Crystal-Free CoQ10 Solution

In order to improve bioavailability, some manufacturers have sought to reduce the particle size of CoQ10, thus increasing its surface area. Suspending fine particles in an emulsion or paste is an effective means of increasing bioavailability. However, there is an even more effective solution: achieving complete solubility.

- *D-Limonene*: Extracted from the oil of citrus fruits, food-grade d-Limonene acts as a non-polar organic solvent that solubilizes CoQ10, without causing significant chemical interactions or degradation.

The end result is a liquid, crystal-free, completely soluble CoQ10 — providing superior bioavailability — that does not require heat or synthetic, chemical solvents and that fully resists recrystallization at ambient temperatures.

- *Tocopherols*: A form of vitamin E, tocopherols enhances the biological function of CoQ10, which in turn helps maintain the antioxidant state of vitamin E.