Coenzyme Q-10

**WHAT IS IT KNOWN AS?**
While the compound is commonly known as coenzyme Q-10, it is sometimes abbreviated as CoQ10 or Co-Q10. Its scientific name is ubiquinone, ubidecarenone or mitoquinone.

**HOW DOES IT WORK?**
Although coenzyme Q-10 has a structure similar to vitamins E and K, it is not classified as a vitamin. It is an important component within the mitochondria, which are the main source of cell energy. At the cellular level, coenzyme Q-10 contributes to the production of adenosine triphosphate (ATP), a key component of oxidative metabolism (1-3).

Without coenzyme Q-10, energy stores may become depleted, thereby decreasing the effectiveness of organs such as the heart.

Coenzyme Q-10 also acts as an important antioxidant and membrane stabilizer, eliminating those chemicals from the body that could damage cell walls (1). In fact, the compound has been shown to protect against oxidation of LDL (low-density lipoprotein), or "bad cholesterol", which is related to the formation of plaque inside the arteries of the heart (4). Coenzyme Q-10 is also involved in processes that move energy and minerals around and between heart muscle cells.

Coenzyme Q-10 is found naturally throughout the body, and at high concentrations in organs such as the pancreas, liver, kidney and heart. Produced inside the tissues of these organs, it is fat soluble and acts like a vitamin (1). The quantity of

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**Coenzyme Q-10 protects:**
- The body's energy stores maintaining the heart's effectiveness
- Against oxidation of "bad cholesterol" which is related to plaque formation within coronary arteries
Coenzyme Q-10 found inside the body is significantly less than is felt to represent a therapeutic dosage. When administered orally, coenzyme Q-10 reaches its maximum concentration within the blood in five to 10 hours and remains at relatively high levels for up to 34 hours.

Patients with certain diseases, including congestive heart failure (CHF), have low levels of coenzyme Q-10, with the lowest levels found in those with the most severe symptoms. In addition, patients who benefit most from a coenzyme Q-10 supplement have the lowest natural levels of coenzyme Q-10 (1, 5-7). Supplementation appears to raise these levels in the serum (8).

In addition, coenzyme Q-10:
• prevents oxidative stress, which seems to be the beneficial mechanism at work in treating congestive heart failure.
• is associated with increased ATP synthesis, membrane protection and the reduction of free radicals in the treatment of angina (chest pain) (1).
• may protect against heart toxicity associated with the chemotherapy drug doxorubicin (Adriamycin). While no mechanism has been established for this effect, the correction of coenzyme Q-10 deficiencies and the scavenging of free radicals has been suggested (1).

HAS IT BEEN STUDIED IN HEART DISEASE?

Coenzyme Q-10 has been used in heart disease to treat:
- congestive heart failure
- chest pain (angina)
- high blood pressure (hypertension)
- mitral valve prolapse (a condition characterized by blood flow back into the heart's upper chamber)

and to prevent:
- heart toxicity associated with doxorubicin (Adriamycin) chemotherapy (9).

Coenzyme Q-10 has also demonstrated benefits in patients undergoing coronary artery bypass surgery (10).

HAS IT BEEN STUDIED IN HEART DISEASE?

Congestive Heart Failure
Clinical trials suggest that coenzyme Q-10 can significantly improve the quality of life and decrease hospitalization rates for patients with mild to severe congestive heart failure. The signs and symptoms associated with the condition's symptoms such as shortness of breath, lower extremity edema (accumulation of fluids in the legs), an enlarged liver and insomnia are reduced as well (11-13). However, coenzyme Q-10 does not appear to improve the strength of the heart's contraction (which is measured as the ejection fraction) or the exercise tolerance in congestive heart failure patients (8,12,14,15).

Angina
Coenzyme Q-10 has been shown to improve the symptoms of chest pain, (angina pectoris), and to improve exercise tolerance in patients with chronic stable angina (16). In a placebo-controlled study of 12 patients, there was a trend toward reduced angina and decreased use of the drug nitroglycerin in patients taking coenzyme Q-10. In treated patients, there was a significant increase in exercise capacity, with less
of 40 patients, those who received coenzyme Q-10 had less heart muscle injury with surgery, as well as fewer irregular heart rhythms, during postoperative recovery.(10) While this isolated study hardly establishes its role in cardiac surgery, it does indicate a potential benefit for coenzyme Q-10, and demonstrates the need for additional research.

Mitral Valve Prolapse
A less studied use for coenzyme Q-10 includes treating the symptoms associated with mitral valve prolapse, a condition wherein blood flows back into the upper chamber of the heart. At this point there is insufficient data to draw any meaningful conclusions.

IS IT FOR ME?

Congestive Heart Failure
While studies utilizing coenzyme Q-10 in patients with congestive heart failure have not shown an improvement in patient survival, the strength of the heart's contraction or a patient's exercise tolerance, the only randomized study undertaken found an improvement in quality of life in those patients who received the compound (8). Therefore, for patients who have congestive heart failure, coenzyme Q-10 may be a useful supplement to traditional drug therapy. ACE inhibitors, digoxin (Lanoxin), beta blockers and diuretics remain the cornerstones of drug treatment for this condition and should never be substituted for a supplement such as coenzyme Q-10. Coenzyme Q-10 should serve as a complement to traditional medications.

Angina
Coenzyme Q-10 may decrease chest pain in patients with coronary artery disease. It may also improve exercise tolerance in this group of patients. As the available data is quite limited, patients with chest pain should never take coenzyme Q-10 in place of traditional medications.

Study Results with coenzyme Q-10:

- **Congestive heart failure patients had an improved quality of life**
- **Angina patients had a significant increase in exercise capacity**
- **51% of high blood pressure patients were able to discontinue between one and three medications**
Coenzyme Q-10 appears to be beneficial, it should be considered as a supplement to proven medical therapy.

**High Blood Pressure**

High blood pressure, the most common cause of stroke, remains a major risk factor for heart disease as well. For a patient with high blood pressure, the desired systolic blood pressure (blood pressure measured during heart contraction) should be less than 140 mm Hg, and diastolic blood pressure should be less than 90 mm Hg. In order to achieve these goals, many patients require several medications, and all medications have potential side effects. Therefore, traditional drug therapy for high blood pressure may be supplemented with coenzyme Q-10 in hopes of limiting the number and dosage of medications required, but it should never be utilized by itself for this purpose, nor substituted for proven therapies. Limited research has been performed in this area, and more information is required in order to better understand the role of coenzyme Q-10 in treating high blood pressure.

**IS IT SAFE?**

Coenzyme Q-10 is generally considered safe when used in quantities lower than 300 mg per day. There have been no reports of significant toxicity with this dosage in studies lasting up to one year.(1,3,11,14,15) However, in dosages exceeding 300 mg per day, coenzyme Q-10 may adversely affect the liver (see laboratory interactions). In rare instances coenzyme Q-10 has been reported to cause gastric distress (0.39%), loss of appetite (0.23%), nausea (0.16%) and diarrhea (0.12%).(1-3)

**ARE THERE ANY REPORTED INTERACTIONS WITH HERBS, SUPPLEMENTS OR DRUGS?**

**Herb and supplement interactions:**

**Drug interactions:** Insulin requirements may be reduced in people with diabetes and therefore may require more frequent glucose monitoring and alterations in insulin dosing (3). Warfarin (Coumadin) effectiveness may be reduced when used together with coenzyme Q-10. Vitamin K-like properties have been attributed to coenzyme Q-10, possibly resulting in an increase in blood clotting. In fact, four patients have experienced decreased effectiveness from warfarin while taking coenzyme Q-10 (18,19). Increased monitoring with more frequent laboratory testing is thus appropriate in patients taking warfarin together with coenzyme Q-10.

Coenzyme Q-10 used together with antihypertensive medications (medications to reduce blood pressure) may lead to further reductions in blood pressure. Thus caution is warranted when coenzyme Q-10 is administered while taking any such drug (17). "Statin" cholesterol-lowering medications such as cerivastatin (Baycol), fluvastatin (Lescol), lovastatin (Mevacor), pravastatin (Pravachol), simvastatin (Zocor) and atorvastatin (Lipitor) may all reduce coenzyme Q-10 levels; however, the clinical significance of this finding has not been established (20).

**Oral hypoglycemic** drugs used for glucose control in people with adult onset diabetes - drugs such as glyburide (Micronase), acetohexamide (Dymelor) and tolazamide (Tolinase) - have been found to reduce coenzyme Q-10 levels. However, chlorpropamide (Diabinese), glipizide (Glucotrol), and tobutamide (Orinase) have not been found to reduce coenzyme Q-10 serum levels. There is no data
coronary artery bypass surgery: the suggested dosage is 50 mg three times a day beginning 7 days prior to surgery.
• Patients taking doxorubicin (Adriamycin): a dosage of 50 mg once a day has been associated with decreased toxicity of the heart muscle (3).

REFERENCES


