Coenzyme Q10

Scientific Names:

Ubiquinone, Ubidecarenone, Mitoquinone[1-3]

Common Names:

Co-Enzyme Q10, Coenzyme Q10, Co-enzyme Q-10, Co Enzyme Q 10, CoQ, CoQ10, Co Q 10, Co-Q-10, CoQ-10, CO Q10, Q10, Vitamin Q10[1-3]

Description of active ingredients:

Coenzyme Q10 is the active ingredient. The term "Coenzyme" denotes it is an organic, nonprotein molecule. The "Q" refers to the quinone chemical group and the "10" refers to the 10 isoprenyl chemical subunits.[3]

Mechanism of Action (MOA):

Coenzyme Q-10 is a fat-soluble, vitamin-like compound that is naturally found in most tissue of the human body. It is essential for life and health of every living cell. The highest concentrations are found in the heart, liver, kidney, and pancreas. The lowest concentrations are found in the lungs.

The human body produces coenzyme Q-10. Humans can replenish coenzyme Q10 from dietary sources, including meats and seafood. Everything living or once living contains coenzyme Q10.

Within the cell, coenzyme Q-10 is mostly present in the mitochondria (40-50%). It is the electron acceptor for the mitochondrial electron transport chain. It is also a cofactor used in processes of aerobic respiration, aerobic metabolism, oxidative metabolism, and cell respiration. Coenzyme Q10 primary function are as an antioxidant, membrane stabilizer and production of adenosine triphosphate (ATP) in the oxidative respiration process. As an antioxidant and its role in ATP, coenzyme Q10 offers many therapeutic benefits. Also, coenzyme Q10 has been shown to help preserve myocardial sodium-potassium ATPase activity and stabilize myocardial calcium dependent ion channels.

Current indications and efficacy:

Indication	Efficacy
Mitochondrial disorders, inherited or acquired disorders that limit energy production in the cell of the body	According to clinical studies, when coenzyme Q10 was given for six months, it seemed to reduce the symptoms associated with mitochondrial encephalomyopathies. However, the onset is slow and took six months to see maximum effect. The FDA has approved UbiQGel (a specific coenzyme Q10 formation) for mitochondrial encephalomyopathies, including MELAS (myoclonic epilepsy with lactic acidosis and stroke-like episodes) syndrome, Kearns-Sayre syndrome, and MERRF (myoclonus epilepsy with ragged red fibers).[1-2,5-6]
Congestive heart failure (CHF), in combination with other medications	According to clinical studies (pts with NYHA class III and IV disease), there is conflicting data that coenzyme Q10 is effective on ejection fraction, exercise tolerance, cardiac output, and stroke volume. There is no evidence that coenzyme Q10 can help heart failure when taken alone. However, studies have shown coenzyme Q10 (doses of 100-200mg/day) to have favorable effects when taken with heart failure drugs.[1, 7]

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Chest Pain (angina)	In one clinical study, coenzyme Q10 showed fewer incidents of angina pectoris compared to placebo. All the patients in the study all had a positive history of myocardial infarction. The findings suggest that coenzyme Q10 can provide rapid protective effects in patients with AMI if administered within 3 days of the onset of symptoms.[8]
High blood pressure (hypertension)	55% of patients who take coenzyme Q10 (doses of 75-360mg/day) have shown to have a 25.9 mmHg reduction in systolic blood pressure with 12 weeks of therapy. Studies have also shown that when coenzyme Q10 is added to other antihypertensives seems to provide an additional blood pressure lowering effect and might allow dosage reduction or discontinuation of some antihypertensives medications.[1,9] One study showed a mean decrease in systolic blood pressure from 151mmHg to 139mmHg and a mean diastolic blood pressure decrease from 92mmHg to 84mmHg when adding coenzyme Q10 to antihypertensive medication regimens.
Parkinson's Disease	Coenzyme Q10 at high doses (1200mg/day) appears to slow the progressive deterioration of function in early PD when compared to placebo.[1,10]
Improving the immune system of people with HIV/AIDS	Patients with HIV/AIDS have shown to have a decline in coenzyme Q10. Taking coenzyme Q10 supplement (doses of 200mg/day) have shown to increase plasma levels therefore improve the immune system, which coenzyme Q10 may have immunostimulatory activity.[1,11]
Reducing damage to the heart from doxorubicin (Adriamycin)	Patients receiving doxorubicin have a decline in coenzyme Q10 therefore taking coenzyme Q10 may reduce the cardiotoxicity effects of doxorubicin.[1,12]
Coenzyme Q10 deficiency	Cases of coenzyme Q10 deficiency presenting with symptoms of weakness, fatigue, and seizures, coenzyme Q10 supplement have improved those symptoms.[1,13]
Huntington's disease	Studies have shown coenzyme Q10 does not slow the progression of Huntington's Disease. Some researchers have suggested it may take higher doses to show a clinically significant effect.[1,14]
Improving blood sugar control in people with diabetes	Studies have not shown to improve glycemic control or reduce insulin requirements in Type 1 or Type 2 diabetic patients.[1,15]
Improving exercise performance	Studies have shown that coenzyme Q10 does not improve aerobic power in athletes. More research is needed.[1,16]
Dental disease, when applied directly to the teeth and gums	Insufficient data. Need more evidence.
Breast cancer	There's primary evidence that coenzyme Q10 might be helpful in advanced breast cancer along with surgery and conventional therapy plus other antioxidants and omega-3 and omega-6 fatty acids.[1,17]
Migraines	One studied showed coenzyme Q10 reduced the number of days with migraine and reduce migraine frequency when compared to baseline.[18]

Contraindications/Allergies:

- Consult your physician if you are pregnant or breastfeeding before taking this medication[1]
- If you have liver problems, it is recommended to get advice from your physician before taking this medication[1]

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Dosage forms, recommended doses, duration:

Coenzyme Q10 capsules/tablets comes in different dosage formations: 25mg, 30 mg, 50 mg, 75 mg, and 100mg. Formulations containing soybean oil have superior bioavailability compared to other formulations.[1-3]

Recommended doses for common indications of coenzyme Q10 are:

- Congestive Heart Failure (CHF): 50 – 100 mg in two or three divided doses[1]
- Angina: 150 – 600 mg in two or three divided doses[1]
- HTN: 75-360mg/day in divided doses[9]
- Mitochondria Disorders: 400 – 600mg/day in divided doses[6]
- Coenzyme Q10 deficiency: 150mg/day[13]
- Migraines prophylaxis: 150mg/day[18]
- Gum disease: 25 mg two times a day[1]
- Parkinson Disease: 1200mg/day[10]

Drug interactions:

Antidepressants, Tricyclic/Phenothiazines – might inhibit enzymes in the heart that are dependent on coenzymes Q10. This may contribute to the cardiac toxicity.[1*]
Antihypertensive drugs – Certain antihypertensives drugs (hydralazine, clonidine, and hydrochlorothiazide) can inhibit enzymes depend on coenzyme Q10, but only shown in animals studies.[1*]
Beta-Blocker – Some beta-blocker, particularly propanolol inhibit coenzyme Q10 dependent enzymes in the myocardium. Preliminary evidence suggests that this inhibition contribute to the negative inotropic effects of beta-blockers. Advice patients only to use coenzyme Q10 supplements with the advice of their physician.[1]
Chemotherapeutic Agents – Inhibition of coenzyme Q10 dependent enzymes contribute to the cardiotoxicity effects associated with doxorubicin.[1*]
Hypoglycemic Agents – Evidence has shown that some hypoglycemia agents can inhibit enzymes that are dependent on coenzymes Q10.[1*]
Insulin – Advice patients there is chance that coenzyme Q10 might affect blood glucose levels.
Warfarin – Coenzyme is chemically similar to menaquinone and may have vitamin K-like procoagulant effects. Therefore, it is advised to closely monitor patients taking both warfarin and coenzyme Q10.[1]
Red Yeast – Red yeast might reduce levels of coenzyme Q10 levels.[1*]

[*]Note: Drugs that decrease endogenous serum levels of coenzyme Q10, patients may benefit in taking supplemental Coenzyme Q10.[1]

Drug-Disease interactions:

Biliary Obstruction, Hepatic insufficiency: Coenzyme Q10 plasma levels can increase in patients with biliary obstruction or hepatic insufficiency.[1]
Hypotension, Hypertension: Coenzyme Q10 has been associated with lowering blood pressure. It can have synergistic effects with other antihypertensives medications.[1]
Smokers: Tobacco smoke can deplete body stores of coenzyme Q10.[1]

Other Safety Issues:

For most adults, coenzyme Q10 is tolerated well and safe. However, it can cause some mild side effects including stomach upset, loss of appetite, nausea, and diarrhea. It also might lower blood pressure, so it is recommended to monitor blood pressure closely of those with low blood pressure. Dividing the total daily dose into two or three smaller doses a day can help reduce side effects.[1]

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