Coenzyme Q10

En Español (Spanish Version)

Supplement Forms/Alternate Names:
- Ubiquinone

Principal Proposed Uses
- Congestive Heart Failure; Cardiomyopathy; Heart Attack Recovery; Hypertension; Nutrient Depletion/Interference Caused by Various Medications

Other Proposed Uses
- Amyotrophic Lateral Sclerosis (Lou Gehrig's Disease); Asthma; Diabetes; Kidney Failure; Migraine Headaches; Parkinson's Disease; Periodontal Disease; Preeclampsia and Pregnancy-induced Hypertension; Sports Performance Enhancement; Tinnitus

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Coenzyme Q_{10} (CoQ_{10}), also known as ubiquinone, is a major part of the body's mechanism for producing energy. The name of this supplement comes from the word ubiquitous, which means "found everywhere." Indeed, CoQ_{10} is found in every cell in the body. It plays a fundamental role in the mitochondria, the parts of the cell that produce energy from glucose and fatty acids.

Japanese scientists first reported therapeutic properties of CoQ_{10} in the 1960s. Some evidence suggests that CoQ_{10} might assist the heart during times of stress on the heart muscle, perhaps by helping it use energy more efficiently.

CoQ_{10}'s best-established use is for congestive heart failure, but the evidence that it works is not entirely consistent. Ongoing research suggests that it may also be useful for other types of heart problems, Parkinson's disease, and several additional illnesses. It is generally used in addition to, rather than instead of, standard therapies.

CoQ_{10} supplementation might also be of value for counteracting side effects of certain prescription medications.

Sources

Every cell in your body needs CoQ_{10}, but there is no dietary requirement as the body can manufacture CoQ_{10} from scratch.

Therapeutic Dosages

The typical recommended dosage of CoQ_{10} is 30 mg to 300 mg daily; higher daily intakes have been used in some studies.

CoQ_{10} is fat soluble and may be better absorbed when taken in an oil-based soft gel form rather than in a dry form such as tablets and capsules.[1,81] Dividing the total daily dosage up into two or more separate doses may produce higher blood levels.[81]

A finely ground up ("nanoparticular") form of the supplement appears to be much better absorbed than standard CoQ_{10} products.[86]

Therapeutic Uses

Although not all studies have been positive, some evidence supports the use of CoQ_{10} for treating congestive heart failure.[33-36,51-52,66,83] Keep in mind that CoQ_{10} is taken *along with* conventional medications, not as a replacement for them.

Weaker evidence suggests that this supplement may be useful for heart attack recovery,[63,64,67,68] cardiomyopathy,[5-7] hypertension,[8-11,58] diabetes,[40,58] strengthening the heart prior to heart surgery,[69] and migraine headaches.[75] Although CoQ_{10} has been widely advertised as effective for treating and Parkinson's disease, in fact, there is only minimal evidence that it works, and some evidence that it does not work.[57,65,86]

CoQ_{10} has shown the potential to prevent heart damage and other side effects caused by certain types of cancer chemotherapy.[59-61] This evidence is weak, however, and as yet it cannot be stated with any certainty that CoQ_{10} is actually helpful.[70]

CoQ_{10} has shown some preliminary promise as an aid to the treatment of kidney failure.[49]

Note: People with severe illnesses, such as heart disease, cancer, or kidney failure, should not use CoQ_{10}, or any supplement, except under physician supervision.

Highly preliminary studies suggest CoQ_{10} might be helpful for amyotrophic lateral sclerosis.[13,14] CoQ_{10} has been tried but not found effective for the treatment of Huntington's disease.[48]

Certain medications may interfere with the body's production of CoQ_{10}, or partially block its function. The best evidence regards cholesterol-lowering drugs in the statin family, such as lovastatin (Mevacor), simvastatin (Zocor), and pravastatin (Pravachol), along with the supplement red yeast rice (which contains naturally occurring statins). These medications impair CoQ_{10} synthesis as an inevitable side effect of their mechanism of action.[22-25,89] Since these drugs are used to protect the heart, and since CoQ_{10} deficiency could in theory impair heart function, it has been suggested that this side effect may work against the intended purpose of taking statins. Furthermore, one might naturally guess that some of the side effects of statins could be caused by this induced CoQ_{10} deficiency. However, studies designed to determine whether the use of CoQ_{10} supplements actually offers any benefit to people taking statins have returned inconsistent results at best.[76,77,87,88,90,91]

For several other categories of drugs, the evidence that they interfere with CoQ_{10} is provocative but even less reliable. These include oral diabetes drugs (especially glyburide, phenformin, and tolazamide), beta-blockers (specifically propranolol, metoprolol, and alprenolol), antipsychotic drugs in the phenothiazine family, tricyclic antidepressants, methyldopa, hydrochlorothiazide, clonidine, and hydralazine.[26-31] Again, while in theory CoQ_{10} supplementation might be helpful for people using these medications, there is no direct evidence to support this hypothesis.

CoQ_{10} has also been suggested as a performance enhancer for athletes. However, while one double-blind study of 25 highly trained cross-country skiers found some benefit,[15] most studies evaluating potential sports supplement uses of CoQ_{10} have returned negative rather than positive results.[16-21, 78]

CoQ_{10} is also sometimes claimed to be an effective treatment for periodontal disease. However, the studies on

which this idea is based are too flawed to be taken as meaningful.[12] Even weaker evidence, far too weak to rely upon at all, hints that CoQ $_{10}$ might be useful in some cases of tinnitus (ringing in the ear).

One preliminary study of CoQ $_{10}$ for people undergoing treatment for HIV found conflicting results; the supplement appeared to improve general well-being, but it did not protect mitochondria (as the researchers had hoped it would) and actually seemed to worsen symptoms of nerve-related pain (peripheral neuropathy).[71]

Preliminary evidence, far too weak to be relied upon at all, has been used to suggest that coenzyme Q10 might be helpful for asthma,[82] as well as reducing the side effects (specifically, cardiac toxicity) of the cancer chemotherapy drug doxorubicin.[84]

CoQ $_{10}$ has additionally been proposed as a treatment for a wide variety of other conditions, including angina, cancer, male infertility, muscular dystrophy, and obesity, but there is, as yet, no evidence that it is effective.

There is also some evidence that CoQ $_{10}$ may reduce the risk of pre-eclampsia (high blood pressure during pregnancy) in women who are at risk for this condition.[92]

What Is the Scientific Evidence for Coenzyme Q $_{10}$?

Congestive Heart Failure

Most but not all studies tell us that CoQ $_{10}$ can be helpful for people with congestive heart failure (CHF). In this serious condition, the heart muscles become weakened, resulting in poor circulation and shortness of breath.

People with CHF have significantly lower levels of CoQ $_{10}$ in heart muscle cells than do healthy people.[32] This fact alone does not prove that the supplements will help CHF; however, it prompted medical researchers to try using CoQ $_{10}$ as a treatment for heart failure.

The largest study was a 1-year, double-blind, placebo-controlled trial of 641 people with moderate to severe congestive heart failure.[33] Half were given 2 mg per kilogram body weight of CoQ $_{10}$ daily; the rest were given placebo. Standard therapy was continued in both groups. The participants treated with CoQ $_{10}$ experienced a significant reduction in the severity of their symptoms. No such improvement was seen in the placebo group. The people who took CoQ $_{10}$ also had significantly fewer hospitalizations for heart failure.

Similarly positive results were also seen in other double-blind studies involving a total of more than 270 participants.[34-35,53,83] One double-blind study found that in people with heart failure so severe they were waiting for a heart transplant, use of CoQ $_{10}$ improved subjective symptoms.[72]

However, two very well-designed double-blind studies published in 1999 and 2000 enrolling a total of about 85 people with congestive heart failure failed to find any evidence of benefit.[36,54] The reason for this discrepancy is not clear.

Cardiomyopathy

Cardiomyopathy is the general name given to conditions in which the heart muscle gradually becomes diseased. Several small studies suggest that CoQ $_{10}$ supplements are helpful for some forms of cardiomyopathy.[37-39]

Hypertension

An 8-week, double-blind, placebo-controlled study of 59 men already taking medications for high blood pressure found that 120 mg daily of CoQ $_{10}$ reduced blood pressure by about 9% as compared to placebo.[40]

A 12-week, double-blind, placebo-controlled study of 83 people with isolated systolic hypertension (a type of high blood pressure in which only the "top" number is high) found that use of CoQ $_{10}$ at a dose of 60 mg daily improved blood pressure measurements to a similar extent.[50]

Similarly, in a 12-week, double-blind, placebo-controlled trial of 74 people with diabetes, use of CoQ $_{10}$ at a dose of 100 mg twice daily significantly reduced blood pressure as compared to placebo. [58]

Antihypertensive effects were also seen in previous smaller trials, most of which were not double-blind.[41-43]

CoQ $_{10}$ may also be beneficial in reducing the risk of high blood pressure during pregnancy (pre-eclampsia).[92] Two hundred and thirty-five pregnant women at risk for pre-eclampsia were randomized to receive CoQ $_{10}$ (200 mg daily) or placebo for 20 weeks until they delivered their babies. The women in the treatment group had fewer cases of pre-eclampsia compared to those who took the placebo.

Heart Attack Recovery

In a double-blind trial, 144 people who had recently experienced a heart attack were given either placebo or 120 mg of CoQ $_{10}$ daily for 1 year, along with conventional treatment. [63,73] The results showed that participants receiving CoQ $_{10}$ experienced significantly fewer heart-related problems, such as episodes of angina pectoris or arrhythmia, or recurrent heart attacks.

A double-blind study of 49 people who had suffered a full cardiac arrest requiring cardiopulmonary resuscitation (CPR) found that use of CoQ $_{10}$ along with mild hypothermia (chilling of the body) was more effective than mild hypothermia plus placebo.[74]

Note: Individuals recovering from a heart attack should not take any herbs or supplements except under the supervision of a physician.

Parkinson’s Disease

A study published in 2002 raised hopes that CoQ $_{10}$ might help slow the progression of Parkinson’s disease. In this 16-month, double-blind, placebo-controlled trial, 80 people with Parkinson’s disease were given either CoQ $_{10}$ (at a dose of 300 mg, 600 mg, or 1,200 mg daily) or placebo. [57] Participants in this trial had early stages of the disease and did not yet need medication. The results appeared to suggest that CoQ $_{10}$, especially at the highest dose, might have slowed disease progression. However, for a variety of statistical reasons, the results were in fact quite inconclusive.

A subsequent double-blind, placebo-controlled study of 28 people with Parkinson’s disease, which was well-controlled by medications, indicated that 360 mg of CoQ $_{10}$ daily could produce a mild improvement in some symptoms.[65] Based on these results, a more substantial study was undertaken, enrolling 131 people with Parkinson’s disease (again, well-controlled by medications).[86] This repeat trial used a specially finely ground up form of CoQ $_{10}$ that, though taken at a dose of only 300 mg daily, produced blood levels of the supplement equivalent to those produced by 1,200 mg daily of ordinary CoQ $_{10}$. Unfortunately, it didn’t work. While benefits were seen in both the placebo and the CoQ $_{10}$ group, CoQ $_{10}$ failed to prove *more* effective than placebo.

Further trials will be necessary to confirm (or deny) these results.

Diabetes

In the 12-week, double-blind, placebo-controlled trial of 74 people with diabetes mentioned above, use of CoQ $_{10}$ at a dose of 100 mg twice daily significantly improved blood sugar control as compared to placebo. [58] Similar benefits were seen in the 8-week, double-blind, placebo-controlled study of 59 men also described above. [40] However, a third study failed to find any effect on blood sugar control.[62]

Safety Issues

In general, CoQ $_{10}$ appears to be extremely safe. No significant side effects have been found, even in studies that lasted a year.[44,79] However, people with severe heart disease should not take CoQ $_{10}$ (or any other supplement) except under a doctor's supervision.

As noted above, two studies suggest that CoQ $_{10}$ might reduce blood sugar levels in people with diabetes.[45] While this could potentially be helpful for treatment of diabetes, it might present a risk as well; people with diabetes who are using CoQ $_{10}$ might inadvertently push their blood sugar levels dangerously low. However, another trial in people with diabetes found no effect on blood sugar control.[46,58] The bottom line: If you have diabetes, make sure to track your blood sugar closely if you start taking CoQ $_{10}$ (or, indeed, any herb or supplement).

CoQ $_{10}$ chemically resembles vitamin K. Since vitamin K counters the anticoagulant effects of warfarin (Coumadin), it has been suggested that CoQ $_{10}$ may have the same effect.[47,55] However, a small, double-blind study found no interaction between CoQ $_{10}$ and warfarin.[56] Nonetheless, in view of warfarin's low margin of safety, prudence indicates physician supervision before combining CoQ $_{10}$ with warfarin.

CoQ $_{10}$ might also interact with reverse transcriptase inhibitors used for treatment of HIV (for example, lamivudine and zidovudine). These medications can cause damage to the mitochondria, the energy-producing subunits of cells, leading in turn to a variety of side effects, including lactic acidosis (a dangerous metabolic derangement), peripheral neuropathy (injury to nerves in the extremities), and lipodystrophy (cosmetically undesirable rearrangement of fat in the body). The supplement CoQ $_{10}$ has been tried for minimizing these side effects, but unexpected results occurred. In a double-blind, placebo-controlled study, use of CoQ10 improved general sense of well-being in people with HIV-infection using reverse transcriptase inhibitors; however, for reasons that are unclear, it actually worsened symptoms of peripheral neuropathy.[80] For this reason, people with HIV who have peripheral neuropathy symptoms should use CoQ $_{10}$ only with caution.

The maximum safe dosages of CoQ $_{10}$ for young children, pregnant or nursing women, or those with severe liver or kidney disease have not been determined.

Interactions You Should Know About

- You may need more CoQ $_{10}$ if you are taking:
  - Cholesterol-lowering drugs in the statin family
  - Red yeast rice
  - Beta-blockers (specifically propranololmetoprolol, and alprenolol)
  - Antipsychotic drugs in the phenothiazine family
  - Tricyclic antidepressants
  - Methyldopa
  - Hydrochlorothiazide
  - Clonidine
  - Hydralazine
  - Oral diabetes drugs (especially glyburide, phenformin, and tolazamide)
- You should not take CoQ $_{10}$ except on a physician's advice if you are taking:
  - Coumadin (warfarin)
- CoQ $_{10}$ might improve general sense of well-being, but worsen peripheral neuropathy symptoms if you are taking:
  - Reverse-transcriptase inhibitors (for HIV infection)

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