

Coenzyme Q10

AT A GLANCE

Introduction

Coenzyme Q10 is a fat-soluble compound that can be synthesized by the human body and hence cannot be considered a vitamin. Coenzyme Q10 is a member of the 'ubiquinone' family, referring to the ubiquitous presence of these compounds in living organisms. Coenzyme Q10 is also consumed in the diet.

Coenzyme Q10 is primarily found in the energy-producing center of the cell known as the 'mitochondria'. Therefore, the organs with the highest energy requirements, such as the heart and the liver, have the highest coenzyme Q10 concentrations.

Health Functions

A sufficient intake of coenzyme Q10 (ubiquinone) is important as it helps the body to

- convert energy from carbohydrates and fats to the form of energy used by the cells
- protect, as an 'antioxidant', cells, tissues and organs against the damaging effects of free radicals, believed to contribute to the aging process as well as the development of a number of health problems including heart disease and cancer.

Disease Risk Reduction

Aging

As an antioxidant, coenzyme Q10 helps to neutralize harmful free radicals, which are one of the causes of aging. Various factors, such as aging and stress, can lower the levels of coenzyme Q10 in the body and as a result the ability of cells to withstand stress and regenerate declines. The levels of coenzyme Q10 in the body almost inevitably decline with age.

In some animal studies, rodents treated with supplemental coenzyme Q10 lived longer than their untreated counterparts. The effects of coenzyme Q10 supplements on human longevity remain unknown.

Heart disease

A symptom of many diseases involving the heart and blood vessels is atherosclerosis, the condition in which an artery wall thickens as the result of a build-up of fatty materials such as cholesterol. As an antioxidant, coenzyme Q10 can potentially inhibit damaging effects contributing to the development of atherosclerosis.

Coenzyme Q10 supplementation has shown promising effects in inhibiting atherosclerosis; more research is needed to determine its role in disease prevention.

Other Applications

Please note:

Any dietary or drug treatment with high-dosed micronutrients needs medical supervision.

Genetic mitochondrial disorders

Coenzyme Q10 supplementation has shown to be beneficial in individuals with inherited abnormalities in the function of mitochondrial energy generation. In those rare patients with genetic defects in the body's own coenzyme Q10 production, supplementation has resulted in substantial improvement.

Heart disease

Research suggests that the beneficial effect of coenzyme Q10 in the prevention and treatment of heart disease is mainly due to its ability to act as an antioxidant.

One clinical study, for example, found that people who received daily coenzyme Q10 supplements within three days of a heart attack were significantly less likely to experience subsequent heart attacks and chest pain. In addition, these same patients were less likely to die of heart disease than those who did not receive the supplements.

Heart failure

Levels of coenzyme Q10 are low in people with congestive heart failure, a debilitating disease that occurs when the heart is not able to pump blood effectively. This can cause blood to pool in parts of the body, such as the lungs and legs. Results from several clinical studies suggest that coenzyme Q10 supplements help to reduce swelling in the legs, enhance breathing by reducing fluid in the lungs, and increase exercise capacity in people with heart failure; other studies have not shown such effects. A recent larger multicentre study in people with chronic heart failure found that adjuvant treatment with coenzyme Q10 reduces major adverse cardiovascular events.

High blood pressure

Several clinical studies involving small numbers of people suggest that coenzyme Q10 may lower blood pressure.

More research with greater numbers of people is needed to assess the value of coenzyme Q10 in the treatment of high blood pressure ('hypertension').

High cholesterol

Levels of coenzyme Q10 tend to be lower in people with high cholesterol compared to healthy individuals of the same age. In addition, certain cholesterol-lowering drugs called 'statins' appear to deplete natural levels of coenzyme Q10 in the body.

Taking coenzyme Q10 supplements has shown to correct the deficiency caused by statin medications without affecting the medication's positive effects on cholesterol levels.

Heart surgery

Clinical research indicates that introducing coenzyme Q10 prior to heart surgery, including bypass surgery and heart transplantation, can reduce damage caused by free radicals, strengthen heart function, and lower the incidence of irregular heart beat ('arrhythmias') during the recovery phase.

Diabetes

High blood pressure, high cholesterol, and heart disease are all common problems associated with diabetes.

Research indicates that coenzyme Q10 supplements may improve heart health and blood sugar and may help manage high cholesterol and high blood pressure in individuals with diabetes.

Despite some concern that coenzyme Q10 may cause a sudden and dramatic drop in blood sugar ('hypoglycemia'), two clinical studies of people with diabetes given coenzyme Q10 showed no such adverse effect. Thus, it has been concluded that coenzyme Q10 supplements could be used safely in diabetic patients as adjunct therapy for cardiovascular diseases.

Parkinson's disease

In Parkinson's disease, decreased activity of elements involved in energy production in mitochondria and increased oxidative stress in a special part of the brain are thought to play a role. As part of the energy producing process and antioxidant coenzyme Q10 might be beneficial in the treatment of Parkinson's disease.

A study in patients with early Parkinson's disease showed that supplementation with coenzyme Q10 was associated with slower deterioration of brain function compared to placebo. These promising findings need to be confirmed in larger clinical trials.

Breast cancer

Although a few case reports suggest that coenzyme Q10 supplementation may be beneficial as an additional treatment to conventional therapy for breast cancer, the lack of controlled clinical trials makes it presently impossible to determine the potential effects of coenzyme Q10 supplementation in cancer patients.

Periodontal (gum) disease

Gum disease is a widespread problem that is associated with swelling, bleeding, pain, and redness of the gums. Clinical studies have reported that people with gum disease tend to have low levels of coenzyme Q10 in their gums.

In a few clinical studies involving small numbers of subjects, coenzyme Q10 supplements caused faster healing and tissue repair.

Additional studies in humans are needed to evaluate the effectiveness of coenzyme Q10 when used together with traditional therapy for periodontal disease.

Other disorders

Preliminary clinical studies also suggest that coenzyme Q10 may boost athletic performance and decrease symptoms of fatigue and muscle damage, improve immune function in individuals with immune deficiencies such as AIDS, improve symptoms of tinnitus, and may be beneficial in cosmetics for healthy skin.

Intake Recommendations

Presently, health authorities have not established specific dietary intake recommendations for coenzyme Q10.

Some researchers suggest daily doses of 30–200 mg coenzyme Q10 for adults 19 years and older.

As coenzyme Q10 is fat-soluble, it should be taken with a meal containing fat for optimal absorption.

Supply Situation

The average daily intake of coenzyme Q10 from food is estimated to be around 10 mg in several European countries.

Deficiency

It is generally assumed that with a varied diet, the body's own production provides sufficient coenzyme Q10 for healthy individuals.

Decreased blood levels of coenzyme Q10 have been observed in individuals with diabetes, cancer, and congestive heart failure, and in people taking lipid lowering medications (see Safety).

No coenzyme Q10 deficiency symptoms have been reported in the general population.

Sources

Primary dietary sources of coenzyme Q10 include oily fish (such as salmon and tuna), organ meats (such as liver), and whole grains.

Safety

To date, there have been no reports of significant adverse side effects of coenzyme Q10 supplementation at doses as high as 1,200 mg/day.

Some people have experienced gastrointestinal symptoms (e.g., nausea, diarrhea, appetite suppression, and heartburn) when taking high doses of coenzyme Q10 supplements.

Because controlled safety studies in pregnant and breast-feeding women are not available, the use of coenzyme Q10 supplements by such women should be avoided.

Drug interactions

Please note:

Because of the potential for interactions, dietary supplements should not be taken with medication without first talking to an experienced healthcare provider.

Authored by Dr Peter Engel in 2010, reviewed and revised by Dr. D. Raederstorff on 18.04.2017