

CoQ10 and Cancer

(NCI Report)

The following information is from a U.S. Government web site (the National Cancer Institute at the National Center for Complementary and Alternative Medicine).

What is the history of the discovery and use of coenzyme Q10 as a complementary or alternative treatment for cancer?

Coenzyme Q10 was first identified in 1957. Its chemical structure was determined in 1958. Interest in coenzyme Q10 as a potential treatment for cancer began in 1961, when a deficiency of the enzyme was noted in the blood of cancer patients. Low blood levels of coenzyme Q10 have been found in patients with myeloma, lymphoma, and cancers of the breast, lung, prostate, pancreas, colon, kidney, and head and neck.

Studies have yielded information about how coenzyme Q10 works in the body to produce energy and act as an antioxidant. Some studies have suggested that coenzyme Q10 stimulates the immune system and increases resistance to disease. In part because of this, researchers have theorized that coenzyme Q10 may be useful as an adjuvant therapy for cancer. (Adjuvant therapy is treatment given following the primary treatment to enhance the effectiveness of the primary treatment.)

How is coenzyme Q10 administered?

Coenzyme Q10 is usually taken by mouth as a pill (tablet or capsule). It may also be given by injection into a vein (IV). In animal studies, coenzyme Q10 is given by injection. Have any preclinical (laboratory and animal) studies been conducted using coenzyme Q10?

Laboratory studies of coenzyme Q10 have focused on describing its chemical structure and how it works in the body. Animal studies have found that coenzyme Q10 stimulated the immune system and increased resistance to disease. Coenzyme Q10 helped to protect the hearts of animals given the anticancer drug doxorubicin, which can cause damage to the heart muscle.

Have any clinical trials (research studies in humans) been conducted with coenzyme Q10?

The promising results from animal studies of coenzyme Q10 and the anticancer drug doxorubicin led researchers to test coenzyme Q10 in a randomized clinical trial with 20 patients. (A randomized clinical trial is a study in which the participants are assigned by chance to separate groups that compare different treatments; neither the researchers nor the participants can choose which group.) The researchers examined whether coenzyme Q10 would protect the heart from the damage caused by doxorubicin. The results of this trial and others have confirmed that coenzyme Q10 decreases the effects of doxorubicin on the heart. However, no report of a randomized clinical trial of coenzyme Q10 as a treatment for cancer has been published in a peer-reviewed, scientific journal.

Have other studies of coenzyme Q10 been conducted in people?

Three other small studies were conducted using coenzyme Q10 as a dietary supplement in patients undergoing conventional cancer treatment. In these studies, the researchers explored the potential use of coenzyme Q10 as an adjuvant therapy for cancer.

The first study, which was conducted in Denmark, involved 32 breast cancer patients. All of the participants received coenzyme Q10 and several other dietary supplements, in addition to their

standard treatment. Six of the patients were reported to show some signs of remission (disappearance of the signs and symptoms of cancer). However, the data were not complete, and information that suggested remission was presented for only three of the six patients. All of the participants reported decreased use of painkillers, improved quality of life, and absence of weight loss during treatment.

In a followup study, one new patient and one of the patients who had a reported remission were treated with high doses of coenzyme Q10 for 3 to 4 months. Both of the patients had breast cancer remaining after surgery. After the period of high-dose coenzyme Q10 supplementation, both patients appeared to experience complete regression (decrease in the size or extent) of their remaining cancer. However, it is not known which of the six patients with a reported remission in the first study took part in the followup study.

In a third study conducted by the same researchers, three breast cancer patients were given high-dose coenzyme Q10 and followed for 3 to 5 years. One patient had complete remission of cancer that had spread to the liver, another had remission of cancer that had spread to the chest wall, and the third had no evidence of breast cancer remaining after surgery.

It is important to note that problems with the design of these studies may have influenced their results. For example, the studies did not have control groups (all patients received coenzyme Q10), and there may have been differences in the characteristics of patients who were selected for the followup study and those who were not. Other factors that may have affected the results include the following: the participants received a variety of supplements in addition to coenzyme Q10, and they received standard treatment either during or just before coenzyme Q10 supplementation. Therefore, it is impossible to determine whether any of the beneficial results was directly related to coenzyme Q10 therapy.

There have also been anecdotal reports that coenzyme Q10 has increased the survival of patients with cancers of the pancreas, lung, colon, rectum, and prostate. (Anecdotal reports are incomplete descriptions of the medical and treatment history of one or more patients.) The patients described in these reports also received treatments other than coenzyme Q10, including chemotherapy, radiation therapy, and surgery.

Have any side effects or risks been reported from coenzyme Q10?

No serious side effects have been reported from the use of coenzyme Q10. Some patients using coenzyme Q10 have experienced mild insomnia (inability to sleep), elevated levels of liver enzymes, rashes, nausea, and upper abdominal pain. Other reported side effects have included dizziness, visual sensitivity to light, irritability, headache, heartburn, and fatigue.

Patients should talk with their health care provider about possible interactions between coenzyme Q10 and prescription drugs they may be taking. Certain drugs, such as those that are used to lower cholesterol or blood sugar levels, may reduce the effects of coenzyme Q10. Coenzyme Q10 may also alter the body's response to warfarin (a drug that prevents the blood from clotting) and insulin.

Are there any other potential drawbacks to taking coenzyme Q10?

Coenzyme Q10 is used by the body as an antioxidant. Antioxidants protect cells from free radicals, which are highly reactive chemicals that can damage cells. Some conventional cancer therapies, such as anticancer drugs and radiation treatment, kill cancer cells in part by causing free radicals to form. Researchers are studying whether using coenzyme Q10 along with conventional therapies is positive (i.e., does not interfere with the effects of the conventional therapies, or increases the therapies' beneficial effects on cancer cells while protecting normal cells) or negative (i.e., interferes with the therapeutic effects).

Has the Food and Drug Administration (FDA) approved coenzyme Q10 for use in the United States?

Several companies distribute coenzyme Q10 as a dietary supplement. In the United States, dietary supplements are regulated as foods, not drugs. This means that evaluation and approval by the FDA are not required before marketing, unless specific health claims are made about the supplement. It should be noted that, because dietary supplements are not formally reviewed for manufacturing consistency, there may be variation in the composition of the supplement from one batch to another. Also, to conduct clinical drug research with humans in the United States, researchers must file an Investigational New Drug (IND) application with the FDA. Because an IND application is highly confidential, it is not known whether one has been submitted or approved for the study of coenzyme Q10 as a treatment for cancer.