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## REPORT

### CoQ10 and Cancer Treatment

By William Faloon

For more than a decade, **Life Extension®** has reported on small clinical studies that demonstrate beneficial effects in those with certain **cancers** who supplement with **coenzyme Q10**.

More recent studies have not only documented clinical improvements, but also have identified probable mechanisms by which CoQ10 may help slow tumor growth. Some of these mechanisms include **immune augmentation**, suppression of **vascular endothelial growth factor** (that facilitates tumor angiogenesis), and reduction of **inflammatory markers** that may facilitate cancer cell propagation.

**Melanoma** and **breast cancer** are two types of malignancies for which CoQ10 has demonstrated substantial clinical benefit.<sup>1,2</sup> Regrettably, the media and cancer establishment have ignored these promising discoveries that could save many lives.

For example, a recent melanoma study compared the effects of administering **alpha interferon** with or without daily **CoQ10** (400 mg). There was an astounding **10-fold lower** risk of **metastasis** in the **CoQ10**-supplemented group! This effect was even more pronounced for those with more advanced melanoma, where **CoQ10**-supplemented patients were **13 times less** likely to develop metastasis. Alpha **interferon** is an immune boosting drug that can induce side effects so severe that patients have to discontinue it. In this study,<sup>2</sup> only 22% of **CoQ10**-supplemented patients developed side effects compared to **82% not** taking supplemental **CoQ10**.

Our editorials have harshly criticized the **National Cancer Institute** for failing to fund larger studies in order to ascertain exactly how effective CoQ10 may be as an adjuvant cancer therapy.

It is our pleasure to reprint an update by the **National Cancer Institute** that presents their views on the role that CoQ10 may play in cancer treatment. Considering that this report emanates out of a federal agency that is normally biased against alternative therapies, we are quite pleased with the relative balance this report provides.

We do take issue with the National Cancer Institute's insinuation of CoQ10 side effects, as these are likely the result of the underlying cancer and/or problems inflicted by toxic chemo drugs. Of the tens of thousands of healthy **Life Extension®** members who use CoQ10, none report these side effects.

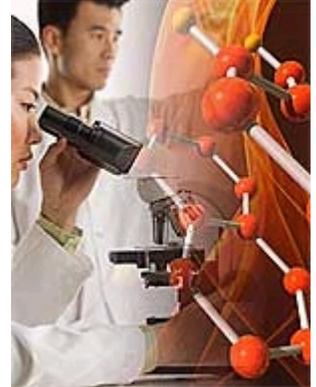
### QUESTIONS AND ANSWERS ABOUT COENZYME Q10

#### What is coenzyme Q10?

Coenzyme Q 10 is a compound that is made naturally in the body. The Q and the 10 in coenzyme Q10 refer to the groups of chemicals that make up the coenzyme. Coenzyme Q10 is also known by these other names:

- CoQ10.
- Q10.
- Vitamin Q10.
- Ubiquinone.
- Ubidecarenone.

A coenzyme helps an enzyme do its job. An enzyme is a protein that speeds up the rate at which natural chemical reactions take place in cells of the body. The body's cells use coenzyme Q10 to make energy needed for the cells to grow and stay

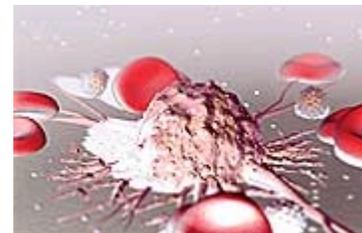


healthy. The body also uses coenzyme Q10 as an antioxidant. An antioxidant is a substance that protects cells from chemicals called free radicals. Free radicals can damage DNA (deoxyribonucleic acid). Genes, which are pieces of DNA, tell the cells how to work in the body and when to grow and divide. Damage to DNA has been linked to some kinds of cancer. By protecting cells against free radicals, antioxidants help protect the body against cancer.

Coenzyme Q10 is found in most body tissues. The highest amounts are found in the heart, liver, kidneys, and pancreas. The lowest amounts are found in the lungs. The amount of coenzyme Q10 in tissues decreases as people get older.

### **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 possible treatment for cancer began in 1961, when it was found that some cancer patients had a lower than normal amount of it in their blood. 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 suggest that coenzyme Q10 may help the immune system work better. Partly because of this, coenzyme Q10 is used as adjuvant therapy for cancer. Adjuvant therapy is treatment given following the primary treatment to increase the chances of a cure.

### **WHAT IS THE THEORY BEHIND THE CLAIM THAT COENZYME Q10 IS USEFUL IN TREATING CANCER?**

Coenzyme Q10 may be useful in treating cancer because it boosts the immune system. Also, studies suggest that CoQ10 analogs (drugs that are similar to CoQ10) may prevent the growth of cancer cells directly. As an antioxidant, coenzyme Q10 may help prevent cancer from developing.

Refer to the PDQ health professional summary on coenzyme Q10 for more information on the theory behind the study of coenzyme Q10 in the treatment of cancer.

### **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 OR ANIMAL) STUDIES BEEN CONDUCTED USING COENZYME Q10?**

A number of preclinical studies have been done with coenzyme Q10. Research in a laboratory or using animals is done to find out if a drug, procedure, or treatment is likely to be useful in humans. These preclinical studies are done before any testing in humans is begun. Most laboratory studies of coenzyme Q10 have looked at its chemical structure and how it works in the body. The following has been reported from preclinical studies of coenzyme Q10 and cancer:

- Animal studies found that coenzyme Q10 boosts the immune system and helps the body fight certain infections and types of cancer.
- Coenzyme Q10 helped to protect the hearts of study animals that were given the anticancer drug doxorubicin, an anthracycline that can cause damage to the heart muscle.
- Laboratory and animal studies have shown that analogs of coenzyme Q10 may stop cancer cells from growing.

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### HAVE ANY CLINICAL TRIALS (RESEARCH STUDIES WITH PEOPLE) OF COENZYME Q10 BEEN CONDUCTED?

There have been no well-designed clinical trials involving large numbers of patients to study the use of coenzyme Q10 in cancer treatment. There have been some clinical trials with small numbers of people, but the way the studies were done and the amount of information reported made it unclear if benefits were caused by the coenzyme Q10 or by something else. Most of the trials were not randomized or controlled. Randomized controlled trials give the highest level of evidence:

- In randomized trials, volunteers are assigned randomly (by chance) to one of 2 or more groups that compare different factors related to the treatment.
- In controlled trials, one group (called the control group) does not receive the new treatment being studied. The control group is then compared to the groups that receive the new treatment, to see if the new treatment makes a difference.

Some research studies are published in scientific journals. Most scientific journals have experts who review research reports before they are published, to make sure that the evidence and conclusions are sound. This is called peer review. Studies published in peer-reviewed scientific journals are considered better evidence. No randomized clinical trials of coenzyme Q10 as a treatment for cancer have been published in a peer-reviewed scientific journal.

The following has been reported from studies of coenzyme Q10 in people:

### RANDOMIZED TRIAL OF COENZYME Q10 AND DOXORUBICIN

A randomized trial of 20 patients looked at whether coenzyme Q10 would protect the heart from the damage caused by the anthracycline drug **doxorubicin**. The results of this trial and others have shown that coenzyme Q10 decreases the harmful effects of doxorubicin on the heart.

### STUDIES OF COENZYME Q10 AS AN ADJUVANT THERAPY FOR BREAST CANCER

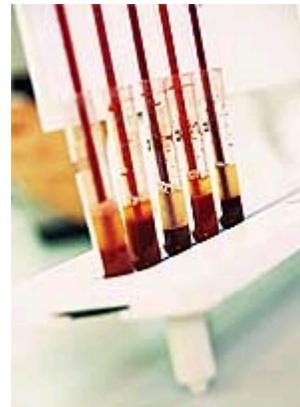
Small studies have been done on the use of coenzyme Q10 after standard treatment in patients with breast cancer:

In a study of coenzyme Q10 in 32 breast cancer patients, it was reported that some signs and symptoms of cancer went away in 6 patients. Details were given for only 3 of the 6 patients. The researchers also reported that all the patients in the study used less pain medicine, had improved quality of life, and did not lose weight during treatment.

- In a follow-up study, two patients who had breast cancer remaining after surgery were treated with high doses of coenzyme Q10 for 3 to 4 months. It was reported that after treatment with high-dose coenzyme Q10, the cancer was completely gone in both patients.
- In a third study led by the same researchers, 3 breast cancer patients were given high-dose coenzyme Q10 and followed for 3 to 5 years. The study reported that 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 breast cancer found after surgery.

It is not clear, however, if the benefits reported in these studies were caused by coenzyme Q10 therapy or something else. The studies had the following weaknesses:

- The studies were not randomized or controlled.
- The patients used other supplements in addition to coenzyme Q10.



- The patients received standard treatments before or during the coenzyme Q10 therapy.
- Details were not reported for all patients in the studies.

## ANECDOTAL REPORTS OF COENZYME Q10

Anecdotal reports are incomplete descriptions of the medical and treatment history of one or more patients. There have been anecdotal reports that coenzyme Q10 has helped some cancer patients live longer, including patients with cancers of the pancreas, lung, colon, rectum, and prostate. The patients described in these reports, however, 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. The most common side effects include the following:

- Insomnia (being unable to fall sleep or stay asleep).
- Higher than normal levels of liver enzymes.
- Rashes.
- Nausea.
- Pain in the upper part of the abdomen.
- Dizziness.
- Feeling sensitive to light.
- Feeling irritable.
- Headache.
- Heartburn.
- Feeling very tired.

It is important to check with health care providers to find out if coenzyme Q10 can be safely used along with other drugs. Certain drugs, such as those that are used to lower cholesterol, blood pressure, or blood sugar levels, may decrease the effects of coenzyme Q10. Coenzyme Q10 may change the way the body uses warfarin (a drug that prevents the blood from clotting) and insulin.



As noted in Question 1, the body uses coenzyme Q10 as an antioxidant. Antioxidants protect cells from free radicals. Some conventional cancer therapies, such as anticancer drugs and radiation treatments, kill cancer cells in part by causing free radicals to form. Researchers are studying whether using coenzyme Q10 along with conventional therapies has any effect, good or bad, on the way these conventional therapies work in the body.

### IS COENZYME Q10 APPROVED BY THE US FOOD AND DRUG ADMINISTRATION (FDA) FOR USE AS A CANCER TREATMENT IN THE UNITED STATES?

Coenzyme Q10 is sold as a dietary supplement and is not approved by the FDA for use as a cancer treatment. In the United States, dietary supplements are regulated as foods, not drugs. This means that approval by the FDA is not required before coenzyme Q10 is sold, unless specific health claims are made about the supplement. Also, the way companies make coenzyme Q10 is not regulated. Different batches and brands of coenzyme Q10 supplements may be different from each other.

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## References

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1. Basic Clin Pharmacol Toxicol. 2007 Jun;100(6):387-91.
2. Melanoma Res. 2007 Jun 17(3):177-83.

treatment. You should consult with a healthcare professional before starting any diet, exercise or supplementation program, before taking any medication, or if you have or suspect you might have a health problem. You should not stop taking any medication without first consulting your physician.