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Published by
Healthy Choices for Mind and Body
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CoEnzymeQ10 Controversy

By Ann Gerhardt, MD *February 2010*

Bottom line at the top: Coenzyme Q_{10} (CoQ_{10}) is the rage right now, sold to cure what ails you. The problem is, no good research proves that it does. Supplements might help if you have moderate to severe heart failure. If you take statins and are malnourished or don't eat much animal protein, you might benefit from CoQ_{10}. A low dose is probably best. Take it along with other low-dose anti-oxidants including vitamin E, to minimize the possibility of CoQ_{10} converting to a pro-oxidant.

CoQ_{10}'s most important role is as an integral part of the chain of reactions that produce energy in almost every cell in the body. It also acts as an anti-oxidant.

When an anti-oxidant works, it temporarily loses its anti-oxidant capacity until it can be regenerated. Until it is, it may act as a *pro*-oxidant, possibly causing damage instead of preventing it. CoQ_{10} regenerates vitamin E. The vitamin E: CoQ_{10} connection works both ways – Vitamin E also regenerates oxidized CoQ_{10}. They both keep LDL-cholesterol particles from oxidizing and clogging arteries.

Do we need supplements? Normal people on omnivorous diets don't need to take coenzyme Q supplements, since it is in the animal products we eat. We also make it from protein and a byproduct of the cholesterol synthesis pathway. It takes good nutrition to make it, since calories, protein, vitamins B3, B6, pantothenic acid, folate and B12 all contribute to its synthesis.

Someone with lousy nutrition might benefit from supplements, but the effect would be limited, since CoQ_{10} can't produce energy alone – We also need calories and a slew of other nutrients to produce energy.

How about taking it for its anti-oxidant effect? Not much data exists to tell us whether CoQ_{10} supplements act as anti-oxidants or pro-oxidants. In one study, it didn't work to decrease DNA oxidant damage in smokers, who have high oxidant stress. We need more studies, both with and without vitamin E.

The one group proven to benefit from CoQ_{10} is patients with mitochondrial encephalomyopathy. You probably don't have this severe disease, and neither do the people who usually take CoQ_{10} supplements.

Do people who take statins need CoQ_{10} supplements? CoQ_{10} was relegated to back-room physiology until statins became the universal heart disease treatment. Statins, like Pravachol, Lipitor, Crestor, lovastatin and Zocor, block a key enzyme in cholesterol synthesis. This enzyme acts early in the chain of reactions leading to cholesterol, cutting off not only cholesterol production but all the other things that are produced along the way. One of these is CoQ_{10}.

I've written a more academically thorough version of this article that gives much more scientific background. Please contact DrG if you want a copy. drg@healthychoicesformindandbody.org

Statins can cause muscle soreness and weakness, known as statin-induced myopathy. Some propose that CoQ_{10} deficiency is the cause, but most good studies of CoQ_{10} supplementation don't report any benefit.

Measuring CoQ_{10} in people who take statins shows some have high, some low and some normal levels. We don't know if those levels corresponded to diet. Routine supplementation of CoQ_{10} along with statins is controversial, but probably not necessary in healthy people who consume a varied diet including animal protein.

So you might say, "It may not help, but why not take it if it has no adverse effects?" **Here's where my gut feeling says we are missing a major piece of information.** The LDL-cholesterol lowering effect of statins does not completely explain their exceptional ability to prevent heart attacks and other diseases. They also exert "pleiotrophic" effects (which means we don't expect them), consisting of anti-inflammatory and anti-oxidant properties. How can a statin do this if it cuts off production of the anti-oxidant CoQ_{10}? Since high levels of anti-oxidants can become pro-oxidant, what if statins' benefit *requires* CoQ_{10} reduction?

Do people with heart disease need supplements? Claims for CoQ_{10} make it sound like it's a done deal, preventing all kinds of heart disease. Unconfirmed studies suggest that CoQ_{10} prevents complications after a heart attack (if started within 3 days), decreases lipoprotein (a) (a particularly bad form of LDL) in patients with acute coronary disease, and lowers hypertensives' blood pressure. It is too early to recommend wouldn't bet on these being confirmed benefits any time soon.

On the other hand, heart *failure* patients should probably take CoQ_{10}, for its role in energy generation. Though there are mixed results, the **bulk of studies of CoQ_{10} in patients with moderate to severe heart failure are positive**. CoQ_{10} reduces hospitalizations and serious complications, improved clinical signs and symptoms, and improved quality of life and exercise capacity. It does not prevent death.

Other alleged benefits:

- Protects skin cells in test tubes from radiation damage. Effects in real people are unknown.
- The elderly: A study of people over 90 years old found frequent CoQ_{10} deficiency (possibly due to poor nutrition), but we have no studies of supplementation to see if any symptom or function improves.
- Prevention of perio-dontal disease: Claims are so far unjustified.
- Prevention or treatment of cancer: Claims are so far unjustified
- Immune function: White blood cells from people with higher blood vitamin E and CoQ_{10} levels (without supplements) kill pathogens better. We don't know what CoQ_{10}supplements would do for people with frequent infections.
- Inflammation: It lowers CRP, a marker of inflammation, in baboons, especially if given with vitamin E. No human studies yet.
- Hypertension: Low dose $CoQ_{10,}$ along with vitamin E, reduced high blood pressure in patients living in Boise ID, compared to vitamin E alone. Are Boise-ites just different, or would this generalize to other populations as well?
- General health: There have been no studies examining CoQ_{10} supplementation for general health, and the effects of prophylactic use are not known.

Dosing and side effects: Oral CoQ_{10} is poorly absorbed unless delivered in an oil-based capsule or liquid. We don't have a clue about the best dose. Typical dosing begins at 60mg per day but has been given at dosages as high as 15 mg per kg per day.

Since it is a natural substance, the US Food and Drug Administration does not regulate CoQ_{10}. The side effect profile seems safe, but any consequences of a pro-oxidant effect would be delayed and hard to pin on any one factor. One group reported no adverse effects after 6 years on 100mg per day.

We don't usually measure CoQ_{10} levels, but if we could, it wouldn't tell us whether or not it is functional as an anti-oxidant or in need of regeneration to be any good.

Do we need to take it with vitamin E, and, if so, how much is enough but not too much? If we get the balance wrong, are we doing more harm than good? Inquiring minds need more answers.