Multitasking with
Coenzyme Q10

Mel Borins, MD, CCFP, FCFP

Coenzyme Q10 is an essential element of the mitochondrial electron transport chain. Its main function is the production of adenosine triphosphate. It may also act as an antioxidant preventing lipid peroxidation and is an indirect stabilizer of calcium channels to decrease calcium overload. It is also known by the names vitamin Q10, CoQ and ubiquinone. It has become a common ingredient in many vitamin-mineral preparations and its use by patients as a single agent is growing.

What do the studies show?

Mitochondrial deficiency cytopathies

- Though I have never seen a mitochondrial deficiency disorder, there are a number of studies that show coenzyme Q10 (CoQ10) improves cardiac conduction defects in patients with Kearns-Sayre syndrome. Muscle weakness and fatigue are improved in patients with chronic muscular dystrophies and neurogenic atrophies. There are also trials showing CoQ10's possible benefit in patients with mitochondrial encephalomyopathies.

Heart failure

- A randomized, double-blind, placebo-controlled pilot, three-month trial of CoQ10 therapy in 35 patients with heart failure showed significant improvements in symptoms and a trend towards improvements in exercise time.[1] Although other trials also found improvement in dyspnea and edema, most of the trials were of a small number and inadequate methodology. Since trials using statins for hyperlipidemia and congestive heart failure have shown decreased levels of CoQ10, some physicians have been recommending using CoQ10 when using statins.

Hypertension

- Patients were given CoQ10, 60 mg, twice daily in a randomized, double-blind, 12-week, placebo-controlled trial of 46 men and 37 women with isolated systolic hypertension. The mean reduction in systolic blood pressure of the CoQ10-treated group was 17.8 mmHg +/- 7.3 mmHg.[2] There were hardly any side-effects. Eight published trials of CoQ10 in hypertension show a mean decrease in systolic blood pressure of 16 mmHg and a 10-mmHg drop in diastolic blood pressure. Despite small studies and many confounding variables, CoQ10 may prove to have a role as an adjunct or an alternative to conventional agents in the treatment of hypertension.

Cardiac surgery

- Sixty-two patients undergoing elective cardiac surgery were randomized to receive oral CoQ10, 300 mg, per day or placebo for two weeks preoperatively. Pectinate trabeculae from right atrial appendages were excised and mitochondria were isolated and studied. Trabeculae were subjected to 30 minutes of hypoxia and contractile recovery was measured. Patients receiving CoQ10 had a significant increase in CoQ10 levels in serum, atrial trabeculae and isolated mitochondria compared with placebo levels. Mitochondrial respiration (adenosine diphosphate/oxygen ratio) was more efficient and the mitochondrial malondialdehyde content was lower with CoQ10 than with placebo. After 30 minutes of hypoxia *in vitro*, pectinate trabeculae isolated from patients receiving CoQ10 exhibited a greater recovery of developed force compared with placebo.
- Another double-blind, placebo-controlled, randomized study assessed the effect of CoQ10 on patients with end-stage heart failure and determined

Cont'd on page 38

if CoQ10 could improve the pharmacologic bridge to heart transplantation. Thirty-two patients with end-stage heart failure awaiting heart transplantation were randomly allocated to receive either CoQ10, 60 mg units/day, or placebo for three months. All patients continued their regular medication regimen. Twenty-seven patients who completed the study showed significant improvement in the six-minute walk test and a decrease in dyspnea (New York Heart Association classification), nocturia and fatigue. No significant echocardiography changes were noted after three months of treatment.

Post-myocardial infarction

- Seventy-three patients in a randomized, double-blind, controlled trial were given CoQ10, 120 mg per day, over one year after an acute myocardial infarction. Total cardiac events (24.6% vs. 45.0%), including non-fatal infarction (13.7% vs. 25.3%) and cardiac deaths, were significantly lower in the intervention group compared to the control group. The adverse effect of treatments showed that fatigue (40.8% vs. 6.8%) was more common in the control group than in the CoQ10 group.[3]

Diabetes and blood pressure

- Seventy-four patients with uncomplicated Type 2 diabetes and dyslipidemia were involved in a randomized, double-blind, placebo-controlled trial. Patients were randomly assigned to receive an oral dose of CoQ10, 100 mg, twice daily; fenofibrate, 200 mg, each morning, and both or neither for 12 weeks. Fenofibrate did not alter blood pressure or HbA(1c) levels. There was a three-fold increase in plasma CoQ10 concentration as a result of CoQ10 supplementation. CoQ10 significantly decreased systolic (-6.1 mmHg +/ -2.6 mmHg) and diastolic (-2.9 mmHg +/-1.4 mmHg, P=0.048) blood pressure and HbA(1c) (-0.37% +/- 0.17%).[4]

Migraine

- CoQ10, 100 mg/day, three times daily, was used in 42 migraine patients in a double-blind, randomized, placebo-controlled trial. CoQ10 was superior to placebo for attack frequency, headache days and days with nausea in the third treatment month and was well-tolerated; the 50% responder rate for attack frequency was 14.4% for placebo and 47.6% for CoQ10 (number needed to treat: 3). The researchers concluded that CoQ10 is efficacious and well-tolerated.[5]

Parkinson's disease

- A randomized, double-blind placebo-controlled trial of 80 patients using CoQ10, 1,200 mg per day, found a less functional decline (up to 44%) compared to placebo. Another study of only 28 patients taking 360 mg per day showed mild symptomatic improvement.

Side-effects

On average, side-effects and drug interactions were rare and less than 1% of patients reported gastrointestinal symptoms like nausea, diarrhea, heartburn, appetite suppression and epigastric discomfort.

Although many health-care professionals are using coenzyme Q10 extensively, many physicians are waiting for larger confirmatory trials to prove its efficacy. Dx

Dr. Borins would like to thank Bob Dytyniak for his help with the literature search.

Dr. Borins is an Associate Professor, Faculty of Medicine, University of Toronto, and a Staff Member, St. Joseph's Health Centre, Toronto, Ontario. **www.melborins.com**.

References

1. Rosenfeldt F, Hilton D, Pepe S, et al: Systematic review of effect of coenzyme Q10 in physical exercise, hypertension and heart failure. Biofactors 2003; 18(1-4):91-100.
2. Burke BE, Neuenschwander R, Olson RD: Randomized, double-blind, placebo-controlled trial of coenzyme Q10 in isolated systolic hypertension. South Med J 2001; 94(11):1112-7.
3. Singh RB, Neki NS, Kartikey K, et al: Effect of coenzyme Q10 on risk of atherosclerosis in patients with recent myocardial infarction. Mol Cell Biochem 2003; 246(1-2):75-82.
4. Hodgson JM, Watts GF, Playford DA, et al: Coenzyme Q10 improves blood pressure and glycaemic control: A controlled trial in subjects with Type 2 diabetes. Eur J Clin Nutr 2002; 56(11):1137-42.
5. Sandor PS, Di Clemente L, Coppola G, et al: Efficacy of coenzyme Q10 in migraine prophylaxis: A randomized controlled trial. Neurology 2005; 22; 64(4):713-5.