The MOSS NUTRITION REPORT

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Product Review

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CoQH SELECT™ – OUR NEW UBIQUINOL PRODUCT

As we all know, coenzyme Q10 has been available as a supplement in *ubiquinone* form for many years and has experienced impressive popularity for very good reasons, largely related to the participation of this nutrient in energy production via the electron transport chain in mitochondria. However, because CoQ10 is fat soluble and, therefore, very poorly absorbed in its standard powdered commercial form, efficacy has been very unpredictable. To remedy this absorption issue, coenzyme Q10 has been marketed in several different forms over the years. Probably the most successful form in terms of enhanced absorption has been the reduced form called *ubiquinol*. Because of this we are excited to introduce to the **Moss Nutrition Select** line **CoQH Select™**, which provides ubiquinol in the form of CoQH-CF®, a patent pending formulation that contains well-researched Kaneka QH™ ubiquinol plus additional factors to provide enhanced stability and increased absorption.

Why did we choose to offer you ubiquinol in general and as CoQH-CF® specifically? To answer this question I would like to review an excellent paper on the subject of coenzyme Q10 bioavailability entitled "Plasma coenzyme Q10 response to oral ingestion of coenzyme Q10 formulations" (Bhagavan HN & Chopra RK. *Mitochondrion*, Vol. 7S, pp. S78-S88, 2007). This paper is truly impressive because it not only discusses absorption of ubiquinol in detail but virtually of all other commercially available forms as well.

The paper begins by providing a basic overview of coenzyme Q10 biochemistry and physiology:

"Structurally it is similar to vitamin K and its chemical nomenclature is 2,3-dimethoxy-5-methyl-6-decaprenyl-1,4-benzoquinone (*trans* configuration). CoQ10 functions like a vitamin in the body, but it is not considered one because unlike vitamins it is synthesized in the body. CoQ10 has a fundamental role in cellular bioenergetics as a cofactor in the mitochondrial electron transport chain and is essential for the production of ATP. The functions of CoQ10 in the body go beyond its role in the mitochondria. CoQ10 in its reduced form as the hydroquinone (ubiquinol) is a potent lipophilic antioxidant and thus protects intra- and extra-cellular components from free radical damage."

However, despite this free radical quenching property, the authors still feel the primary role of supplemental CoQ10 is energy production:

"Most of the beneficial effects of CoQ10 may be attributed to its fundamental role in mitochondrial energy production."

Next Bhagavan and Chopra discuss the physical properties of CoQ10 that make it so poorly absorbed in a supplemental form and how the supplement industry has responded to remedy the situation:

"CoQ10 in its pure form is a powder (crystalline) that is insoluble in water and has limited solubility in lipids, and therefore it is poorly absorbed. The importance of product formulation on CoQ10 bioavailability has been suggested previously. CoQ10 products currently available on the market include powder-based compressed tablets, chewable tablets, powder-filled hard-shell capsules and softgels containing an oil suspension. The rationale for the latter is that the presence of fat may promote better absorption of CoQ10 since it is lipophilic. In addition, several solubilized formulations of CoQ10 in softgel and liquid forms have become available in recent years. While there is a choice of dosage forms available, one major issue concerning their use whether as a dietary supplement for

general well-being or for therapeutic purposes is their potential low efficacy. An important determinant of efficacy is absorption/ bioavailability of CoQ10 in the various health products."

With the above in mind, it is interesting to note that ubiquinone is converted to ubiquinol in the gut lining prior to uptake into the systemic circulation, meaning that virtually all circulating CoQ10 is in the form of ubiquinol:

"That the pharmacokinetic profiles of ubiquinone and ubiquinol are identical is not surprising due to the fact that circulating CoQ10 is almost entirely in the form of ubiquinol and that the conversion of ubiquinone to ubiquinol occurs in the enterocytes prior to its lymphatic transport into circulation."

The goal of this paper was to examine the large body of research on the absorbability of these various CoQ10 forms. The studies were divided into four categories, one of which applies to **CoQH Select™:**

"The fourth category deals with a comparison of the powder-based non-solubilized products with the newer solubilized CoQ10 formulations."

In addition, Bhagavan and Chopra differentiated studies in another way that makes this paper even more useful clinically. They considered the impact of dosage:

"The differentiation of low/moderate and high dose was somewhat arbitrary, with the low/moderate dose range covering a dose of 30 mg to 300 mg per day and the high dose range from 300 mg to 3000 mg per day."

Finally, the authors differentiated in terms of duration:

"One criterion for inclusion in the chronic dosing studies was a minimum of two weeks duration since this assured steady state concentrations of plasma CoQ10."

Results relating to ubiquinol

Bhagavan and Chopra considered several different studies on ubiquinol, some of which used Kaneka QH™, the actual brand of ubiquinol included in **CoQH Select™**. Unless otherwise noted, the results that follow pertain to generic ubiquinol. One study that employed Kaneka QH™, considered the following:

"Data from a recent study are available where the plasma CoQ10 concentrations were determined following supplementation with 90 mg, 150 mg, and 300 mg of CoQ10 as ubiquinol as an oil suspension for four weeks."

As you will see, the results were quite impressive:

"At a daily dose of 300 mg ubiquinol for 4 weeks, plasma ubiquinol concentration reached a markedly high value of 8.413 μmol/L, an 11-fold increase over baseline. Likewise, the increase per 100 mg values was also remarkably high compared with results obtained with both high and low/moderate dose powder-based CoQ10 formulations in the form of ubiquinone."

In the discussion section of the paper Bhagavan and Chopra offer the following commentary on the study just discussed above:

"In terms of increase over baseline (fold) and next increase per 100 mg CoQ10 ingested, these numbers are impressive indicating superior absorption of CoQ10 in the form of ubiquinol. The fact that there was only a slight difference between the 90 mg, 150 mg, and 300 mg doses with respect to increase per 100 mg (2.926, 2.457, and 2.550, respectively) indicates that the efficiency of absorption was not appreciably affected with increasing doses of ubiquinol in this dose range."

In another study children were supplemented with ubiquinol at both low and high doses. These doses were 1 mg/kg/day and 10 mg/kg/day for one month. The latter dose would be equivalent to 600 mg per day in a 60 kg (approximately 130 pounds) adult. Again, the results, were quite impressive:

"The plasma response at this dosage was comparable to data from studies involving much higher doses of CoQ10 as ubiquinone (2400 mg-3000 mg a day). The increase in per 100 mg CoQ10 ingested was also much higher at the 600 mg dose with solubilized ubiquinol as compared with other high dose studies using much higher doses of powder-based CoQ10 formulations as ubiquinone."

As suggested in the following quote, what appeared to impress Bhagavan and Chopra the most about this study was how well ubiquinol performed at a dose much lower than that of ubiquinone:

"According to the authors, after correcting for body weight differences, the dosage of CoQ10 (as ubiquinol) employed in their study was approximately 3-fold lower than that reported by Shults et al. using a specific chewable CoQ10 tablet formulation at a daily dose of 2400 mg."

Another positive study employing a single dose of ubiquinol as Kaneka QH™ noted the following results:

"In a very recent study, ubiquinol as an oil suspension was tested at two doses, viz. 150 mg and 300 mg. The C_{max} values (6h) were 2.173 µmol/L and 3.686 µmol/L, and the increases over plasma baseline concentrations were 2.3-fold and 4.7-fold, respectively. Both the net increase in plasma ubiquinol concentration and the increase per 100 mg were higher as compared with single dose studies using non-solubilized CoQ10 formulations in the form of ubiquinone at similar dosages."

Some final comments from the Bhagavan and Chopra paper

What follows are some interesting facts about ubiquinol that were included in the concluding section of the Bhagavan and Chopra paper. First, consider the following:

"Highest plasma CoQ10 concentration reported thus far is 10.7 µmol/L using a solubilized ubiquinol formulation."

Next the authors offer a thought on why it is so important to have plasma levels as high as possible:

"Plasma concentrations need to be high (i.e. higher than 'normal' values) in order to promote uptake by peripheral tissues and possibly also to cross the blood brain barrier. The plasma threshold for uptake appears to be different for different tissues. Among non-solubilized formulations of CoQ10, ubiquinol has been found to be superior to ubiquinone in its plasma CoQ10 response."

As I hope you can see, unless cost is an overriding factor ubiquinol appears to be the obvious best choice for coenzyme Q10 supplementation. Furthermore Kaneka QH™ has performed in a particularly impressive manner clinically. Moss Nutrition **CoQH Select™** provides 100 mg of ubiquinol in a unique, patent-pending formulation that combines research-recommended Kaneka QH™ with alpha-lipoic acid, d-Limonene, and capric and caprylic acids to help protect against crystallization and oxidation. We hope you will consider **CoQH Select™** whenever you are considering coenzyme Q10 supplementation with your patients.

CoQH Select™ - Moss Nutrition Select

Contents: 60 Soft Gels (100 mg per capsule)

OUR BASIC CoQ10 PRODUCT: COENZYME Q10 (100 mg)

As demonstrated in the research reviewed above, ubiquinol (as found in **CoQH Select™**) offers superior absorption and clinical outcomes compared to standard ubiquinone (as found in our basic Moss Nutrition **Coenzyme Q10** product). Why, then, might you ever chose to recommend your patients to use our basic **Coenzyme Q10** rather than **CoQH Select™**? The answer, in my opinion, simply relates to cost: ubiquinone is significantly less expensive than ubiquinol per unit volume. Because of this, consider the following rationale for opting to use our Moss Nutrition **Coenzyme Q10** product with certain patients:

The fact that CoQH Select™ *is a superior product does not make* Coenzyme Q10 *worthless! In fact, hundreds of studies published during the last 20-30 years have confirmed the clinical benefit of standard coenzyme Q10 ubiquinone. For healthy patients with good digestive function who require supplemental coenzyme Q10 on a long term basis,* Coenzyme Q10 *offers a very cost effective, clinically effective option.*

Coenzyme Q10 – Moss Nutrition Select

Contents: 60 VC (100 mg per capsule)