# Coenzyme Q10: A Life Extension Nutrient & The Crystallization Problem

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Coenzyme Q10 (CoQ10) has two functions that are scientifically well understood and accepted: it is a fat-soluble antioxidant, and it is a key component of the mitochondrial electron transport chain for the production of cellular energy/adenosine triphosphate (ATP) in cells throughout the body.

Several clinical trials report that CoQ10 supplementation can benefit people suffering from a wide range of age-related diseases. However, the purpose of this article is to discuss two important CoQ10-related issues that have not yet received adequate attention. One is the crystallization problem, which substantially inhibits the absorption of CoQ10 supplements. The second one involves demonstrating that coenzyme Q10 supplementation can extend lifespan and improve quality of life for most people.

## The Crystallization Problem

The melting point of CoQ10 is 122-125°F (50-52° C), which is over 20° F higher than body temperature.[1] When taken orally, CoQ10 crystallizes (like water turning into ice). We cannot absorb 'clumps' of CoQ10, so it must remain in its single molecular form in solution.

Unfortunately, many people do not get the optimal amount of CoQ10 from supplements they take because when CoQ10 is taken orally, it forms crystals, which cannot be absorbed.

Since CoQ10 is critically important for ATP production and as a key antioxidant protecting cellular membranes, especially mitochondrial cellular membranes against free radical damage, it is important for practitioners to know how to obtain highly absorbable CoQ10 for their patients.

Pharma Nord is a Denmark-based company that is one of the largest European manufacturers of dietary supplements. Pharma Nord has developed a unique patented process to produce a highly absorbable form of coenzyme Q10. The study below documents that Pharma Nord's Bio-Quinone® brand of CoQ10 achieves much greater absorption and higher plasma levels of CoQ10 than other brands.

## Coenzyme Q10 Absorption Study

In 2019, Prof. Guillermo López-Lluch of Spain conducted a double-blind, cross-over study comparing the absorption of seven different CoQ10 supplement formulations. They measured plasma CoQ10 concentrations over 48 hours, after a single 100 mg dose. There was a 4-week washout period between the individual tests. The results showed that Pharma Nord's CoQ10 ubiquinone achieved 3 to 10 times greater CoQ10 plasma levels than the other formulas tested.[2] Also, Pharma Nord's brand of ubiquinone achieved nearly double the absorption of a ubiquinol preparation.

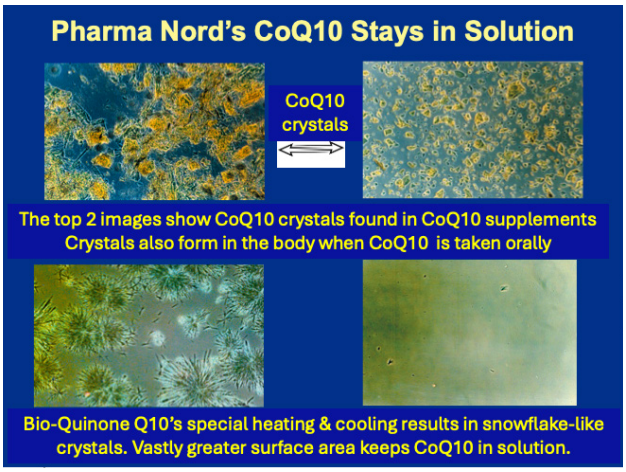
Nearly all companies marketing a CoQ10 supplement dissolve their CoQ10 in an oil base. In most of these products, the CoQ10 crystallizes in the capsule. This can be easily visualized when the contents are viewed under a microscope.

## The Recrystallization Problem

Some supplements successfully keep CoQ10 solution in the capsule. However, when the capsule is ingested, and contents are released into the gut, which is an environment that is 20° F below its melting point, the CoQ10 quickly crystallizes. This explains why most CoQ10 supplements have very low absorption rates. The issue is not dose-dependent, rather it is how much of what you ingest actually gets absorbed.

Pharma Nord utilizes soybean oils with slightly different melting points in their CoQ10 production process. The CoQ10/oil mixture is then subjected to gradual heating and cooling processes while undergoing a specialized mixing procedure. This process results in the formation of snowflake-like crystals that have a vastly greater surface-to-volume ratio, allowing the crystals to dissolve fully in the carrier lipids at body temperature.

**Industry Acceptance**. Pharma Nord's willingness to fund studies documenting the superior absorbability of




their Bio-Quinone CoQ10 has resulted in their product being selected for use in a majority of the large CoQ10 clinical trials conducted globally. To date, more than 100 human studies have been conducted using Pharma Nord's Bio-Quinone Active CoQ10 GOLD, and 26 of these studies are randomized, double-blind, placebo-controlled studies with 30 or more participants.

Myoqinon is a Pharma Nord CoQ10 product that is an approved medicine in several European countries. Myoqinon is identical to Pharma Nord's Bio-Quinone, which is marketed as a nutritional supplement in the U.S. The fact that Myoqinon is recognized as an approved medicine in Europe gives additional credibility to Pharma Nord's CoQ10.

**Biosynthesis of CoQ10 Declines with Age**

In humans, the biosynthesis of CoQ10 peaks around age 20 to 25. Thereafter, age-related production of CoQ10 gradually declines. Although the decline varies across tissues, in the heart, the production of CoQ10 at age 65 was reported to decline by 50%.[3]

**Drugs that Deplete CoQ10**

Prescription drugs that deplete CoQ10 are another factor that contributes to accelerated biological aging in many elderly individuals. I reviewed this topic in my book titled "The Drug-Induced Nutrient Depletion Handbook".[4] CoQ10-depleting drugs, which are taken with increasing frequency by elderly individuals, include statins, thiazide diuretics, beta-blockers, oral hypoglycemics, and chemotherapeutics. **A FREE copy of my *Quick Reference Guide to Drug-Induced Nutrient Depletions* is available at: naturalpharmacist.net/dind**

**CoQ10 Supplementation & Life Extension**

In the 1980s, Emile Bliznakov, MD, conducted a study that demonstrated CoQ10's potential as a life-extension nutrient. Bliznakov divided 100, 16–18-month-old female white mice (equivalent to 60-70-year-old humans), into two groups. Fifty mice received CoQ10, and fifty served as controls. After 36 weeks, 100% of the control mice had died while 40% of the CoQ10-treated mice were still alive. At week 56, which is double the expected lifespan of these mice, 10% of the CoQ10-treated mice were still alive and thriving.[5]

In a personal conversation with Dr. Bliznakov, he shared the following visual differences between the two groups with me. At 30 weeks, the fur on the control mice was dull, coarse, matted, and on some mice, clumps of hair had fallen out, leaving bald patches. The control mice also had very little energy and spent most of their time lying in their cages and not socializing. However, the fur on the CoQ10-treated mice had a healthy sheen, and the mice still exhibited high levels of activity and socialization.

Bliznakov's study provided conclusive evidence (in mice) that supplementation with CoQ10 increases lifespan and substantially improves the quality of life in the treated animals.

**Is Aging a Disease?**

The medical establishment in the United States (FDA, CDC, AMA, NIH) still does not recognize aging as a disease. However, the exclusion is being challenged as an increasing number of scientists argue that aging should be considered as a disease.[6-9]

It has been stated that, "not only does aging lend itself to be characterized as a disease, but the advantage of doing so is that, by rejecting the seeming fatalism of the label "natural," it better legitimizes medical efforts to either eliminate it or get rid of those undesirable conditions associated with it."[10]

Recognizing aging as a disease would motivate grant-funding agencies to increase funding for aging research, thereby stimulating the development of therapies and procedures to slow the process of biological aging.

**CoQ10 & the Mitochondrial Free Radical Theory of Aging**

The adult human body contains approximately 37 trillion cells, and mitochondria are present in all cells except red blood cells.[11] Each cell typically contain from 100s to 1000s of mitochondria, which varies depending on the energy requirements of the cell.[12]

Liver cells reportedly contain from 1000 to 2000 mitochondria per cell.[13] Cardiomyocytes (heart muscle cells), which are the most energy-demanding cells in the body, have 5000 to 8000 mitochondria per cell.[14]

The adult human body is estimated to contain about 10 million billion mitochondria, which accounts for approximately 10% of our body weight.[15] Each of the mitochondria requires CoQ10 to function, implying that the body requires enormous amounts of CoQ10.

In 1956, Denham Harman, MD, PhD, proposed the Free Radical Theory of Aging.[16] In 1972, Harman modified his original theory into "The Mitochondrial Free Radical Theory of Aging (MFRTA)".[17] This shift emphasized that free radical damage to mitochondria is a fundamental hallmark of biological aging.[18]

Harmon's theory also explains why CoQ10 plays such a critical role as a regulator of biological aging. In addition to transferring electrons to produce ATP in the 100 million billion mitochondria within the body, CoQ10 is also a fat-soluble antioxidant that helps prevent free radical damage to mitochondria, which are generated by electron leakage during energy production.

**Free Radical Exposure**

Humans get exposed to free radicals from many sources, both internal and external. It is estimated that approximately 90% of these free radicals are generated within the mitochondria.[19] This fact again draws attention to the paramount importance of CoQ10 as a key antioxidant to slow the process of mitochondrial damage, which parallels the process of biological aging.

**Ubiquinone & Ubiquinol**

CoQ10 exists in two interconvertible forms, ubiquinone and ubiquinol. Ubiquinone is an electron carrier in the mitochondrial electron transport chain that enables energy production by cycling between an oxidized (ubiquinone) and reduced (ubiquinol) form of CoQ10. When ubiquinone accepts two electrons and two protons from Complexes I & II in the electron transport chain, it becomes reduced to ubiquinol, which then transfers the electrons to Complex III, where it is oxidized back to ubiquinone.

**Oral CoQ10: Which Form to Take?**

The renowned CoQ10 scientist William Judy, PhD, conclusively showed that when ubiquinol is taken orally, it immediately gets converted to ubiquinone in the stomach.[20] The ubiquinone form of CoQ10 is yellow-orange in color, whereas the ubiquinol form of CoQ10 is milky white. Ubiquinol is very unstable and quickly oxidizes to ubiquinone. Dr. Judy showed that when ubiquinol is exposed to stomach acid, it immediately turns yellow, indicating that the ubiquinol has been oxidized to ubiquinone.

**Ubiquinol: Misleading Claims & Bad Science**

The absorption study by Lopez-Lluch reviewed previously disproves the misleading claim that ubiquinol is better absorbed than ubiquinone.

Both forms of CoQ10 are important and necessary in the body. Enzyme systems in the body convert ubiquinone (both endogenous and exogenous) to ubiquinol as needed.[21] Hence, it is not necessary to take ubiquinol supplements to get adequate amounts of ubiquinol.

**Ubiquinol is More Expensive**

Orally ingested ubiquinol quickly gets converted to ubiquinone in the gut. Therefore, it does not make sense to spend more money on ubiquinol supplements when they quickly get converted to ubiquinone after ingestion.

**Formulation is More Important than Form**

In his book "Coenzyme Q10: An Insider's Guide", Dr. Judy emphasized that the following procedures are necessary to create a well-absorbed CoQ10 supplement: 1) since CoQ10 is fat-soluble, carrier oils must be used to enhance CoQ10 absorption, 2) a CoQ10 crystal dispersion process is required to dissolve the CoQ10 into single molecules in solution and, 3) using a stable formulation that prevents recrystallization. These criteria lead Dr. Judy to emphasize that the formulation of CoQ10 supplements is more important than the form of CoQ10 (ubiquinone or ubiquinol) used.

Pharma Nord's Bio-Quinone is the only CoQ10 product in the world that meets the three above-mentioned criteria, which results in CoQ10 supplements that are highly absorbable. Your patients will benefit from taking Pharma Nord's Bio-Quinone, which provides the best absorption and highest plasma levels of any CoQ10 supplement available.

**To Order:** Practitioners, if you would like to get product information or order Pharma Nord's coenzyme Q10 products at wholesale prices for yourself or for your patients, send a request to: practitioner@pharmanord.com

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