

# CAVAQ10® – HIGHLY BIOAVAILABLE COQ10

Coenzyme Q10 (CoQ10), also known as “ubiquinone,” is a fat-soluble vitamin-like substance that is found in almost all living cells. It is well known as a redox carrier in the mammalian respiratory transport chain, where it helps to efficiently convert the energy in the food we eat into fuel for the body. As a fat-soluble nutrient, however, CoQ10 is poorly absorbed. Supplying the body with beneficial amounts of CoQ10 can therefore be difficult. CAVAQ10® eliminates these problems.

In addition to its role in energy metabolism, CoQ10 has received a lot of attention as an antioxidant for free-radical scavenging. Studies also indicate a role for CoQ10 in cardiovascular health. While CoQ10 is found in some foods, the average diet provides less than 10mg per day. Aging, stress, certain medications and strenuous exercise or other lifestyle-related factors may reduce the levels of CoQ10 in the body. Using dietary supplements to raise CoQ10 levels is a useful strategy – many products available on the market cannot ensure adequate bioavailability, however.

### CAVAQ10®: the Solution

Thanks to CAVAQ10®, WACKER now offers a highly bioavailable CoQ10 powder. The bioavailability of the cyclodextrin-based CoQ10 formulation has been assessed in various scientific studies.

### In Vitro Bioavailability in a Caco-2 Model (Bhagavan et al., 2007)

#### Setup:

The cellular uptake efficiency by Caco-2 cells (human intestinal cell model) of pure CoQ10 was investigated using four commercial CoQ10 products (A–C: chewable tablets, D: softgel capsule containing solubilized CoQ10) and CAVAQ10®. Samples were subjected to simulated gastric and small intestinal digestion. The filtered aqueous fraction of small intestinal digestate was diluted with cell culture medium and added to different cultures of Caco-2 cells. The percentage of oxidized and reduced CoQ10 in the fractions was measured using HPLC.

#### Results:

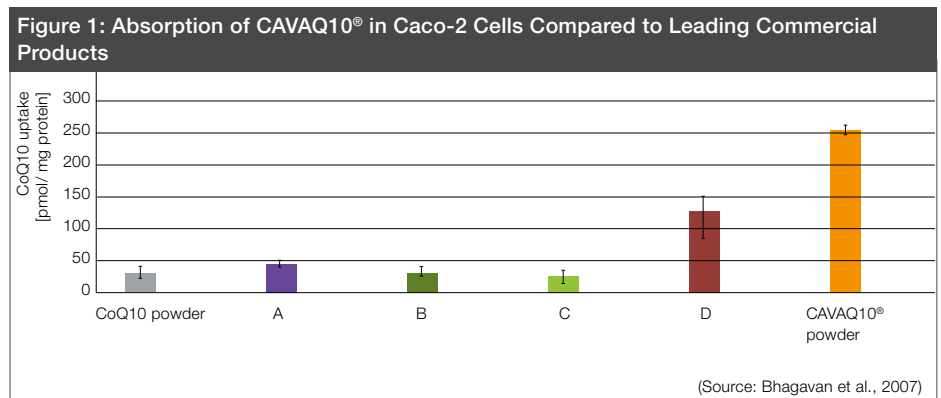
Uptake of the cyclodextrin-encapsulated CoQ10 was up to eight times more efficient than that of other commercial CoQ10 products or of the CoQ10 powder itself.

#### Conclusion:

The results of this study demonstrate the superior performance of CAVAQ10® and clearly underscore the significant increase in bioavailability of CoQ10 in a cyclodextrin-based formulation (see Figure 1).

#### CoQ10 Addresses Current Consumer Trends:

- Anti-aging
- Energy supply
- Heart health



**In vitro uptake efficiency (Caco-2 assay) of various CoQ10 formulations; A – D = commercial CoQ10 products**

**Human Bioavailability in a Clinical Study (Terao et al., 2006)**

**Setup:**

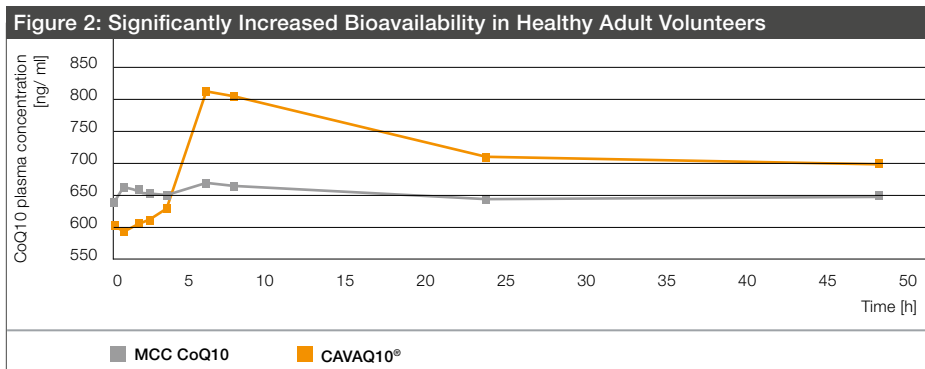
The relative absorption of CAVAQ10® was compared to CoQ10 in a physical mixture of microcrystalline cellulose (MCC) in a clinical setting. Twenty-two individuals (fasted overnight) were given 30 mg CoQ10 orally with a 2-week washout period. After product intake, blood was collected periodically over 48 hours (before administration and after 1, 2, 3, 4, 6, 8, 24, 48 hours). Plasma levels of CoQ10 were determined by HPLC, after which the relative absorption was calculated.

**Results:**

The subjects receiving the CAVAQ10® showed 18-fold higher bioavailability (as measured by the AUC plasma concentration of CoQ10) when compared to the control, a physical mixture of microcrystalline cellulose (MCC) and CoQ10 (see Figure 2).

**Conclusion:**

The results of this *in vivo* study corroborate the observations from the prior *in vitro* assay, i.e., significantly increased bioavailability of CoQ10 in a cyclodextrin-based formulation. Furthermore, these data suggest that CAVAQ10® can provide the benefits of this redox carrier to a much greater extent than pure CoQ10.



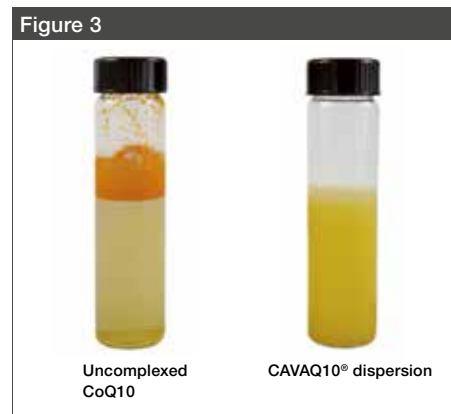
18-fold higher bioavailability (as measured by AUC) for CAVAQ10® vs. negative control (Terao et al., 2006).

**For a Variety of Applications**

A large variety of liquid CoQ10 formulations (mostly oil-based) is available on the market and is commercially available as supplement products. CAVAQ10® offers the bioavailability benefits of these liquid, mostly oil-based formulations, but – because it is formulated with cyclodextrin – comes as a dry, free-flowing powder. CAVAQ10® is thus especially well suited for use in dry or powdery dietary supplement products, such as tablets, capsules and nutritional bars. Since it disperses easily in aqueous systems, it is also suitable for use in beverages. CAVAQ10® only contains CoQ10 and gamma-cyclodextrin a naturally occurring cyclic oligosaccharide that is enzymatically produced from starch. It is commercially available in large volumes and in food-grade quality. Our experts are looking forward to partnering with you to help you create the healthy, bioavailable products of tomorrow.

**Proven Solutions**

Thanks to CAVAQ10®, WACKER now offers a highly bioavailable coenzyme Q10 powder. Up to now, bioavailable CoQ10 could only be obtained in liquid, oil-based formulations. WACKER's powder-based CoQ10 formulation allows our customers to develop entirely new product lines.



CAVAQ10® is a coenzyme Q10 powder that disperses easily in aqueous systems.



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