

# COENZYME Q10 - GAMMA CYCLODEXTRIN COMPLEX IS A POWERFUL NUTRACEUTICAL FOR ANTI-AGING AND HEALTH IMPROVEMENTS

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**Abstract :** Coenzyme Q10 (CoQ10) is a fat-soluble, vitamin-like, benzoquinone compound that functions primarily as an antioxidant, as a membrane stabilizer and as a cofactor in the oxidative phosphorylation production of adenosine triphosphate (ATP). The solubility of CoQ10 in water is extremely low, resulting in a low bioavailability by oral administration. Therefore, we attempted to improve the low dissolution and bioavailability of CoQ10 by means of complexation with various cyclodextrins. We found that the bioavailability of CoQ10 could be significantly enhanced by complexation with cyclodextrins, especially by the use of  $\gamma$ CD. The CoQ10 -  $\gamma$ CD complex reveals excellent pharmacokinetic properties not only significantly higher area under the CoQ10 concentration curve in blood plasma from time 0-48 hr (AUC) and higher maximum plasma concentration ( $C_{max}$ ), but also the mean plasma levels even after 24 and 48 hours tended to be significantly higher after CoQ10 -  $\gamma$ CD complex administration to healthy adult volunteers when compared with CoQ10 formulated in microcrystalline cellulose and administered in the same way as the complex. We found that this long-lasting high CoQ10 concentration in plasma provides various health benefits. The proven benefits are: 1) Curative effects on damaged human skins by aging, UV and other pollutants in the air, 2) Anti-oxidant activity (study on the reduction of 8-hydroxy-2-deoxy guanosine (8-OHdG) in urine), 3) Muscle augmentation and protection activity (study on the reduction of myogenic enzymes, Creatinine phosphokinase (CPK) and lactate dehydrogenase (LDH)). Furthermore, some combinations of CoQ10- $\gamma$ CD complex with other functional ingredients in formulation are suggested with following claims for anti-aging and health improvements: 1) Analgesic action by reproducing cartilage by the combination with collagen peptide, 2) Anti-fatigue by the enhanced oxidative phosphorylation production of adenosine triphosphate (ATP) by the combination with  $\alpha$ -lipoic acid- $\gamma$ CD complex, 3) Antidote against metabolic syndrome by the combination with  $\alpha$ CD as a special dietary fiber that shows good effects on controlling body weight, on the ratio of LDL- and HDL cholesterol, on the concentration of triglycerides and on the blood sugar level in plasma.