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Trio Q Softgels–An Advanced Unique CoQ10 formulation specially designed as Liquid solubilisate provides vital nutrient support for celluar energy metabolism & oxidative injury

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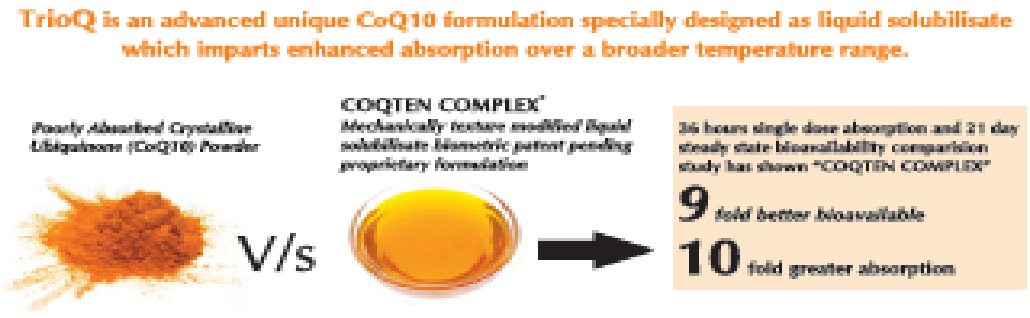
ABSTRACT

Mitochondrian of the cells play a vital role in the production of energy at cellular level which is essential for the survival of a cell. CoQ10 is one of the coenzyme in the electron transport chain in the inner mitochondrial membrane where oxidative phosphorylation occurs for the production of ATP from the reducing equivalents such as NADPH2, FADH2, etc. Besides, CoQ10 works as an antioxidant, protecting lipids and other cell components from oxidation. Thus, it is a particularly promising cardio protective agent. Apart from this there are so many functions of CoQ10 which are vital for the sustenance of life. When cells age, mitochondrial CoQ10 levels decrease. But dietary supplementation has been shown to help, maintain energy production and aid persons against disorders of CoQ10deficiency disorders**.** This review gives an overview of functions of the CoQ10, reports related to consumption versus alleviation of diseases and its importance of dietary supplement in nowadays life.

Keywords: TrioQSoftgels, CoQ10, Energy production, Nutrient.

INTRODUCTION



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CoQ10 is an enzyme which is naturally found in many cells of the body. In fact, it is found in every single mitochondrial cell and about 95% of our body's energy is produced by this way, which converts sugars and fats into energy. It is a component of electron transport chain of inner mitochondrial matrix and participates in The respiration ultimately generating the energy in the form of ATP. Some of the organs such as heart, liver and kidneys have the highest concentrations of CoQ10 as these organs need a lot of energy for their functioning.

CoQ10

CoQ10 structure consists of a benzoquinone with an isoprenoid side chain attached at sixth carbon.CoQ10 can give up electrons easily thus acting as a powerful antioxidant against free radical8**.**CoQ10 along with vitamin E increases the resistance of LDL to oxidation and prevents coronary heart disease9. Ageing also occur due to decline in levels of CoQ110.HMG-CoA reductase inhibitors like lovastatin, simvastatin can cause CoQ10deficiency11.

Researchers revealed that 2.5ug/ml or preferably 3.5ug/ml is required to have a good impact on severely diseased heart12. A study was done on 109 patients suffering from hypertensive heart diseases and isolateddys function. On replacement of CoQ10 there occurred lowering of elevated blood pressure, improvement in diastolic function and a decrease in myocardial thickness in 53 percent of patients13. Diastolic dysfunction is more common in women than in men. So, CoQ10may offer a 'gender advantage' for aging women14. An early research suggested that mitral valve prolapse might be associated with CoQ10 deficienc15.CoQ10 was first isolated by Frederick Crane in1957 from beef heart. Q-indicates its membership in quinone group and Fig.1indicates the no. of isoprenoid units and its side chain1.It was named as ubiquinone by Dr, R.A. Mortan because of its wide spread availability in living organisms2.Dr. Y.Yamamura was the person who organized clinical trial of CoQ10 in human subjects for the first time. An year later, they demonstrated CoQ10 deficiency in case of human heart diseases3.In 1978 Peter Mitchell was awarded nobel prize for CoQ10 and energy transfer4. In 1985 Per langsjoen testedCoQ10 in double-blind fashion and reported it as a valuable nutrient for cardiomyopathy5.Larsernster found that CoQ10 acts as a free radical scavenger 6.

Composition

Coq10 and its implication in disease states

Cardiovascular diseases

Arrythmia

An experimental study was conducted on rabbits. In this, rabbits were given CoQ10before ligation procedure. On isolation of cellular mitochondria 40 minutes after tying a major blood vessel to heart muscle, higher levels of free radicals and lower levels of CoQ10 were identified. Degree of oxidative damage reduced proportionately due top retreatment with CoQ10 dosage16. A study was conducted on 27 patients with premature ventricular ectopic beats; the reduction in premature ventricular contractions (pvc) activity was significantly greater after 4-5weeks of coq10 administration. AlthoughCoQ10 antiarrythmic effect was primarily seenin diabetics. Also a significant reduction of palpitations was noted for hypertensive otherwise healthy patient17.

Myocardial `Protection in Cardiac Surgery

CoQ10 supplementation in pre-operative cardiac patients improved right and left ventricular myocardial ultrastructure, which was measured by light microscopy both pre and postoperative18.Researches even revealed that pretreatment with CoQ10 is effective in preserving heart function following coronary artery bypass surgery(CABG)and valvularsurgery19. Naylar worked with rabbit heart model of coronary insufficiency and reperfusion, presented with CoQ10 role in preserving an oxygen deficient myocardium20.

Atherosclerosis and Lipid Peroxidation

CoQ10 has an unique ability to recycle vitamin E which has tremendous treatment implications, especially when it showed to block lipid peroxidation21.CoQ10 can decrease lipid peroxidation in healthy well nourished adults and in those with arteriosclerotic plaque22.

Thyroid, Adriamycin and CoQ10

Research by Suzuki indicated a direct relationship between cardiac performance andCoQ10 supplementation in patients with thyroid disorders23.Kishi and colleagues performed an animal study which revealed that the administration of CoQ10 was more protective against the damage induced by Adriamycin when compared to vitamin Ealone24.A rat model is treated with Adriamycin, the administration of CoQ10restored blood levels to normal range and prevented ADRIAMYCIN-induced structural changes in the heart25.

Optimum Aging

The free radical theory of aging (1956) stated that free radical reaction, modified by genetic and environmental factors were responsible for the aging and death of all livingborganisms26. Age-related decline in CoQ10levels is observed both in animals andhumans27. CoQ10 can prevent oxidative stress induced apoptosis (cell death) by inhibiting lipid peroxidation in plasma membrane28.

Immunity and Defense

A study was conducted on 6 patients with AIDS or AIDS-related complex who were treated with 200mg of CoQ10 daily. T-cell immunity increased in 3 patients and 5reported symptomatic improvement29.

Cancer

In a study, 83 patients in the United States who had cancer of the breast, lung, prostate, pancreas, colon, stomach, rectum and other sites were found to have deficiency of CoQ10in blood30.

Periodontal Diseases

Several studies revealed that oral administration of CoQ10 to patients with periodontal diseases was effective in suppressing inflammatory changes in gingival which was assessed by gingival index, pocket depth and tooth mobility scores31.

Neurodegenerative Disorders

In a study reported in the New England Journal of Medicine, Alzheimer's patients with nutritional support of vitamin E along with CoQ10 showed a reduction in the progression of their disease32.Human brains experience a progressive reduction in levels ofCoQ10 along with neurotransmitters during ageing process33.Fallon and colleagues conducted a study on rats and confirmed that administration of CoQ10 along with nicotinamide blocks toxin-induced damage to substantia nigra34.Supplemental CoQ10increased NADH oxidation at mitochondrial level which acts as an electron acceptor for plasma membrane – associated NADHdehydrogenase35.

Diabetes

Research revealed that diabetic patients with very low levels of CoQ10 are highly prone to death from congestive heart failure with in an arrow time period36.

Chronic Obstructive Pulmonary Disease (COPD)

Fujimato's data revealed that CoQ10supplementation has favorable results on chronic obstructive pulmonary disease patients, who have low oxygen levels at rest and during exercise37. A study conducted in Stockholm, Sweden revealed that patients with COPD and coronary heart disease had deficiencies in the levels of vitamin E andCoQ10 in plasma and lower leg muscles tissues which might be the result of

malnutrition but also suggested depressed resistance to cell trauma38.

Damaged Skin

At the ninth International Symposiumon Biomedical and Clinical Aspects of CoQ10, Poda and Parker proposed that Coq10 was the first antioxidant to be affected by oxidative stress in the skin. They hypothesized thatCoQ10 could be a sensitive marker to evaluate the antioxidant capacity of topically applied sunscreens and even to measure the affect of exposure to UV in our day to day life39.Apresentation at International CoenzymeQ10Association Conference in Boston (May 1998) suggested that "fountain of youth" effect maybe due to hydration of the skin in combination with the improvement of hyaluronic acid synthesis by CoQ1040.

Infertility

Research demonstrated that sperms rely on additional energy for motility which may be actually dependent on bioenergetics function of CoQ1041.

Athlete

Researchers speculated that high metabolic stress and elevated levels of radical formation in marathon runners along with lower CoQ10and vitamin E levels were indication of a continuing drain on their antioxidant scavenging potential42.Marothon runners who were pretreated with CoQ10 had lower plasma levels of tissue breakdown products compared to their controlled counterparts43.

Muscular Dystrophy

Folker suggested that any patient suffering from muscular dystrophy should be treated with CoQ10 indefinitely44.

Mitochondrial Encephalopathy

In a study, 6 patients suffering with mitochondrial cytopathies were treated with150mg of CoQ10 over 6 month period showed improvement in brain variables and muscle mitochondrial function45.

SUPPORTING STUDIES:

- A study on 12 patients with stable Angina Pectoris were given 150mg/day of CoQ10 has resulted in increased exercise tolerance on thread mill and is proved to be safe and effective in Angina Pectoris.
  - Kamikawa T, Kobayashi A, Yamashita T, Hayashi H, Yamazaki N. Effects of coenzyme Q10 on exercise tolerance in chronic stable angina pectoris. Am JCardiol 1985;56:247-251.
- A study on 27 patients with ventricular premature beats (Arrthymias). They were given 60mg/day CoQ10 enzyme for 4 to 5 weeks which has shown significant reduction in ventricular premature beats.
  - Fujioka T, Sakamoto Y, Mimura G. Clinical study of cardiac arrhythmias using a 24-hour continuous electocardiographic recorder (5 th report) antiarrhythmic action of coenzyme Q10 in diabetics. Tobok J Exp Med 1983;141 (Suppl):453-463.
- A study on 126 patients with dilated cardiomyopathy were given 100mg of CoQ10 for a period of to 24 months showed significant improvement in the cardiac parameters . Hence, helps in treatment of cardiomyopathy .
  - Langsjoen PH, Folkers K, Lyson K, Muratsu K, Lyson T, et al. Effective and safe therapy with coenzyme Q10 for cardiomyopathy. Klin Wochenschr 1988;66:583-590.
- The studies have shown that pre-operative administration of CoQ10 increases the tolerance of the heart to ischemia during aortic cross clamping.
  - Tanaka J, Tominaga R, Yoshitoshi M, Matsui K, Komori M, Sese A, et. al. Coenzyme Q10: the prophylactic effect on low cardiac output following cardiac value replacement. Ann Thorac Surg 1982;33:145-151.

CoQ10 in dietary substances

CoQ10 richest food is sardine and mackerel followed by reindeer muscle meat, pork and beef heart, liver etc. and its quantity varies in other meat substances. Even though plants does not have reasonable amount of CoQ10, some of the plant materials such as broccoli, spinach, soy products, peanuts can improve the CoQ10 levels in the body.CoQ10 levels may be lost by frying or firing. While boiling, food should not be overcooked to spare CoQ10 levels. Canned foods have very low level of CoQ10 when compared to fresh and unprocessed food items. As CoQ10 is a fat soluble substance, it should be taken along with olive or soy bean oil orany other fat substance for a maximum benefit. Dose of the CoQ10 varies according to the health conditions of the person.

- A normal person should have 30 to 60mg.
- Cancer patients - 200 to 600 mg per day.
- Cardiac related problems - 360 mg per day.
- Diabetic patients- 200 mg per day

Limitations of coQ10

- As the biosynthetic pathway for cholesterol and CoQ10 are same, the statin drugs (cholesterol lowering drugs) which are aiming at HMG CoA reductase also reduce the CoQ10 levels in the body.
- CoQ10 may reduce the body's response to blood thinners such as warfarin and therefore should be taken according to the directions of physicians.
- Blood pressure lowering drugs such as beta blockers also has lowering effect on CoQ10.So, these drugs are supplemented with dietary substitutes.

ADVANCED TRIOQ TECHNOLOGY WITHIN

In scientific world it is well known that CoQ10 is not easily absorbed by the body. Dry powder formulation of CoQ10 is not well absorbed because CoQ10 crystals do not fully dissolve in the GI tract.

Advanced TrioQ utilizes revolutionary lipid solubilisate technique that keeps CoQ10 fully dissolved over a broader range of temperature resulting in 10 times greater absorption than the dry powder.

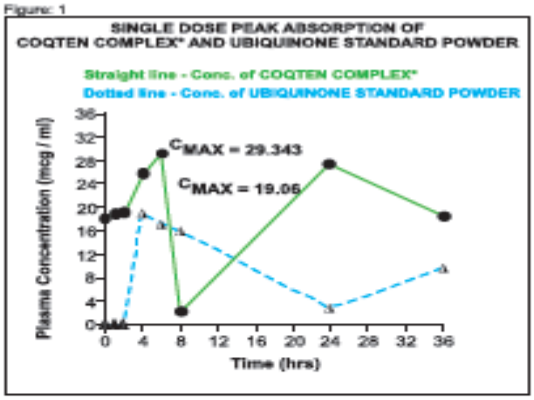
TrioQ is a special blend of CoQ10 in its liquid solubilisate form and certain lipid molecules which helps the transportation of the CoQ10 through different membranes of the body. TrioQ formulation keeps the CoQ10 completely dissolved without forming crystals till absorption in all bodily temperatures.

Transmission reflection microscopic image (TRM) with zero crystals in sample of COQTEN COMPLEX* in TrioQ taken in (IICT) Indian Institute of Chemical Technology Hyderabad Dt. 19.05.2014 Sample Ref.No. 23899

ADVANCED TRIO-Q ABSORPTION IS BACKED UP WITH STRONG PRECLINICAL EVIDENCE:

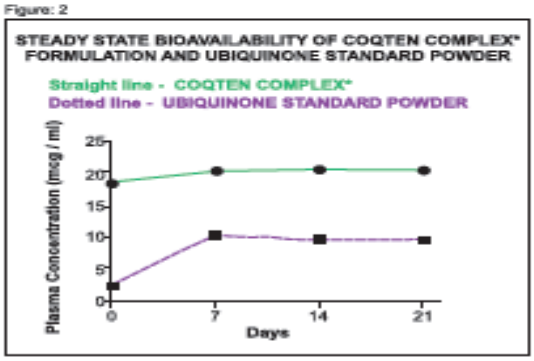
21days pre-clinical study for the determination of study state bioavailability and % absorption of "COQTEN COMPLEX" formulation and powder at different time intervals in rodents has resulted in: 54% greater absorption with 20% of the dosage of Ubiquinone standard powder and nine folds more bioavailable than Ubiquinone standard powder with equivalent dose.

Figure: 1



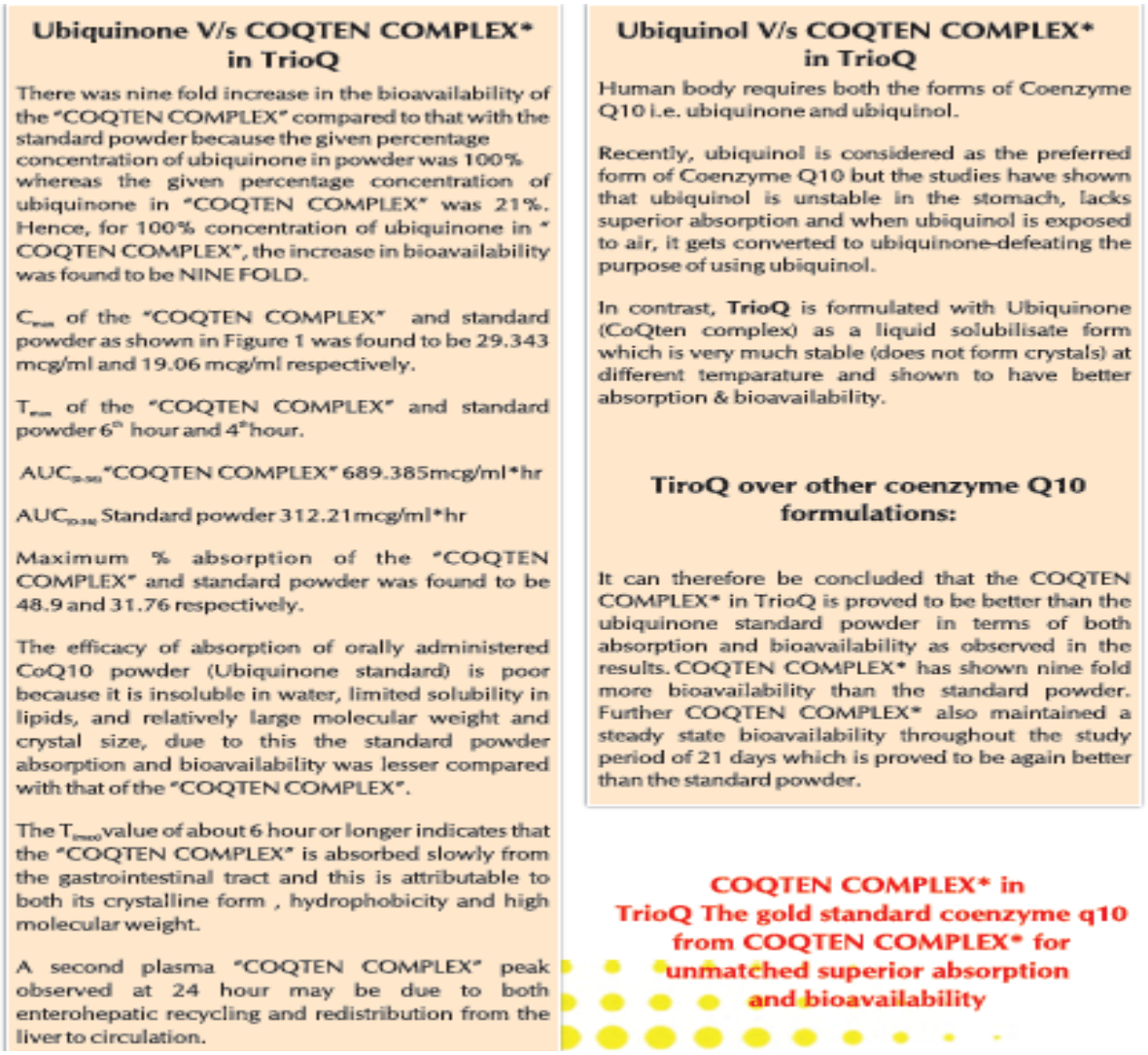
A single dose oral administration of COQTEN COMPLEX* and UBIQUINONE STANDARD POWDER has resulted in higher absorption of COQTEN COMPLEX* with a C_{max} of 29.343 mcg/ml whereas the C_{max} for standard powder was found to be 19.06 mcg/ml.

Figure: 2



"COQTEN COMPLEX*" has shown 54% greater absorption with 20% of the dosage of Ubiquinone standard powder and nine folds more steady state bioavailable than Ubiquinone standard powder with equivalent dose.

Ref:
Pharmacokinetic comparision studies of ubiquinone and coqten complex in rodents by HPLC method.
Study conducted in KLE university's college of pharmacy, Bangalore.



CONCLUSION

CoQ10 is vital compound that keeps the body's metabolism going on. Unfortunately, many doctors will not prescribe it as the dietary supplement for cardiac patients. Though the rationale for CoQ10 in the treatment of wide variety of diseases has been published in a number of studies, it is not use dup to its potential. Without a doctors support, the versatility of the CoQ10 in its functions cannot be capitalized for its therapeutic benefits. Though CoQ10 may not guarantee a cure, it has shown its vast lifesaving potential in selected patients. Related reports of inefficiency of CoQ10 are due to deficiency of other nutrients, enzymes, B vitamins, minerals and cofactors which are necessary for its biosynthesis and utilization by the body.

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