GB

„The relationship between coenzyme Q10, oxidative stress, and antioxidant enzymes activities and coronary artery disease.“

DE

Die Beziehung zwischen Koenzym Q10, oxidativem Stress und Aktivität antioxidativer Enzyme und koronarer Herzkrankheit.

GR

„Η σχέση ανάμεσα στο συνένζυμο Q10, το οξειδωτικό στρες και τη δράση των αντιοξειδωτικών ενζύμων με τη στεφανιαία νόσο.“

FR

La relation entre la co-enzyme Q10, le stress oxydatif et les activités d‘enzymes anti-oxydantes et une pathologie des artères coronaires.

CZ

Vztah mezi koenzymem Q10, oxidačním stresem, aktivitami antioxidačních enzymů a onemocněním koronárních tepen.

ScientificWorldJournal. 2012;2012:792756. doi: 10.1100/2012/792756. Epub 2012 May 3.

The relationship between coenzyme Q10, oxidative stress, and antioxidant enzymes activities and coronary artery disease.

Lee BJ, Lin YC, Huang YC, Ko YW, Hsia S, Lin PT.

Source

School of Nutrition, Chung Shan Medical University, No 110, Section 1, Jianguo N Road, Taichung 40201, Taiwan.

Abstract

A higher oxidative stress may contribute to the pathogenesis of coronary artery disease (CAD). The purpose of this study was to investigate the relationship between coenzyme Q10 concentration and lipid peroxidation, antioxidant enzymes activities and the risk of CAD. Patients who were identified by cardiac catheterization as having at least 50% stenosis of one major coronary artery were assigned to the case group (n = 51). The control group (n = 102) comprised healthy individuals with normal blood biochemical values. The plasma coenzyme Q10, malondialdehyde (MDA) and antioxidant enzymes activities (catalase (CAT), superoxide dismutase (SOD), glutathione peroxidase (GPx)) were measured. Subjects with CAD had significant lower plasma coenzyme Q10, CAT and GPx activities and higher MDA and SOD levels compared to those of the control group. The plasma coenzyme Q10 was positively correlated with CAT and GPx activities and negatively correlated with MDA and SOD. However, the correlations were not significant after adjusting for the potential confounders of CAD with the exception of SOD. **A higher level of plasma coenzyme Q10 (≥ 0.52 μmol/L) was significantly associated with reducing the risk of CAD. Our results support the potential cardioprotective impact of coenzyme Q10.**

PMID: 22645453

GB

„Coenzyme Q10 supplementation reduces oxidative stress and increases antioxidant enzyme activity in patients with coronary artery disease.“

DE

Supplementierung mit Koenzym Q10 reduziert oxidativen Stress und erhöht die Aktivität antioxidativer Enzyme bei Patienten mit koronarer Herzkrankheit.

GR

Η λήψη συμπληρώματος συνενζύμου Q10 μειώνει το οξειδωτικό στρες και αυξάνει την αντιοξειδωτική δράση των ενζύμων σε ασθενείς με στεφανιαία νόσο.

FR

La supplémentation en co-enzyme Q10 réduit le stress oxydatif et accroît l‘activité enzymatique anti-oxydante chez les patients atteints d‘une pathologie des artères coronaires.

CZ

Suplementace koenzymem Q10 snižuje oxidační stres a zvyšuje aktivitu antioxidačních enzymů u pacientů s onemocněním koronárních tepen.

Nutrition. 2012 Mar;28(3):250-5. doi: 10.1016/j.nut.2011.06.004. Epub 2011 Oct 12.

Coenzyme Q10 supplementation reduces oxidative stress and increases antioxidant enzyme activity in patients with coronary artery disease.

Lee BJ, Huang YC, Chen SJ, Lin PT.

Source School of Nutrition, Chung Shan Medical University, Taichung, Taiwan.

OBJECTIVE:

The purpose of this study was to investigate the effect of coenzyme Q10 supplementation on oxidative stress and antioxidant enzyme activity in patients with coronary artery disease (CAD).

METHODS:

This was an intervention study. Patients who were identified by cardiac catheterization as having at least 50% stenosis of one major coronary artery or receiving percutaneous transluminal coronary angioplasty (n = 51) were randomly assigned to the placebo group (n = 14) or one of the two coenzyme Q10-supplemented groups (60 mg/d, n = 19 [Q10-60 group]; 150 mg/d, n = 18 [Q10-150 group]). Intervention was administered for 12 wk. Patients' blood samples were analyzed every 4 wk for plasma coenzyme Q10 concentrations, malondialdehyde (MDA), and antioxidant enzyme (catalase [CAT], superoxide dismutase [SOD], glutathione peroxidase) activity.

RESULTS:

Forty-three subjects with CAD completed intervention study. Plasma coenzyme Q10 concentration increased significantly after coenzyme the Q10-150 intervention ($P < 0.01$). The MDA levels were significantly lower than baseline in the Q10-150 group at week 4 ($P = 0.03$). The Q10-150 group had significantly lower MDA levels than the placebo group at week 8 ($P = 0.03$). With respect to antioxidant enzyme activity, subjects in the Q10-150 group had significantly higher CAT ($P = 0.03$) and SOD ($P = 0.03$) activity than the placebo group at week 12. The plasma coenzyme Q10 concentration was significantly correlated with MDA levels ($r = -0.35$, $P = 0.02$)

and CAT (r = 0.43, P = 0.01) and SOD activity (r = 0.39, P = 0.01). The ratio of plasma coenzyme Q10 to total cholesterol was significantly correlated with SOD activity (r = 0.39, P = 0.02). The ratio of plasma coenzyme Q10 to low-density lipoprotein was significantly correlated with CAT (r = 0.35, P = 0.04) and SOD (r = 0.45, P = 0.01) activity. However, there was no relation between coenzyme Q10 concentration and glutathione peroxidase activity.

CONCLUSION:

Coenzyme Q10 supplements at a dose of 150 mg can decrease oxidative stress and increase antioxidant enzyme activity in patients with CAD. A higher dose of coenzyme Q10 supplements (>150 mg/d) might promote rapid and sustainable antioxidation in patients with CAD.

PMID: 21996047

GB
„Targeting cellular energy production in neurological disorders.“

DE
Targeting der zellulären Energieproduktion bei neurologischen Störungen.

GR
Στοχεύοντας την παραγωγή κυτταρικής ενέργειας σε νευρολογικές διαταραχές.

FR
Cibler la production cellulaire d‘énergie dans les troubles neurologiques.

CZ
Cílená produkce buněčné energie u neurologických poruch.

Expert Opin Investig Drugs. 2003 Oct;12(10):1655-79.

Targeting cellular energy production in neurological disorders.

Baker SK, Tarnopolsky MA.

Source Neurology and Rehabilitation, Room 4U4, Department of Medicine, McMaster University, Hamilton, Ontario, L8N 3Z5, Canada.

Abstract

The concepts of energy dysregulation and oxidative stress and their complicated interdependence have rapidly evolved to assume primary importance in understanding the pathophysiology of numerous neurological disorders. Therefore, neuroprotective strategies addressing specific bioenergetic defects hold particular promise in the treatment of these conditions (i.e., amyotrophic lateral sclerosis, Huntington's disease, Parkinson's disease, Friedreich's ataxia, mitochondrial cytopathies and other neuromuscular diseases), all of which, to some extent, share 'the final common pathway' leading to cell death through either necrosis or apoptosis. **Compounds such as creatine monohydrate and coenzyme Q(10) offer substantial neuroprotection against ischaemia, trauma, oxidative damage and neurotoxins.** Miscellaneous agents, including alpha-lipoic acid, beta-OH-beta-methylbutyrate, riboflavin and nicotinamide, have also been shown to improve various metabolic parameters in brain and/or muscle. This review will highlight the biological function of each of the above mentioned compounds followed by a discussion of their utility in animal models and human neurological disease. The balance of this work will be comprised of discussions on the therapeutic applications of creatine and coenzyme Q(10).

PMID: 14519086

GB

„Effects of acute and 14-day coenzyme Q10 supplementation on exercise performance in both trained and untrained individuals.“

DE

Wirkung von akuter und 14-tägiger Supplementierung mit Koenzym Q10 auf die sportliche Leistung trainierter und untrainierter Personen.

GR

„Αποτελέσματα της εντατικής και 14ήμερης λήψης συμπληρώματος συνενζύμου Q10 στις σωματικές επιδόσεις γυμνασμένων και αγύμναστων ατόμων.“

FR

Effets, d‘une supplémentation aiguë et sur 15 jours en co-enzyme Q10, sur la performance d‘individus entraînés et non entraînés au cours d‘exercices.

CZ

Účinky akutní a 14denní suplementace koenzymem Q10 na výkon při cvičení jak u trénovaných, tak netrénovaných jedinců.

J Int Soc Sports Nutr. 2008 Mar 4;5:8. doi: 10.1186/1550-2783-5-8.

Effects of acute and 14-day coenzyme Q10 supplementation on exercise performance in both trained and untrained individuals.

Cooke M, Iosia M, Buford T, Shelmadine B, Hudson G, Kerksick C, Rasmussen C, Greenwood M, Leutholtz B, Willoughby D, Kreider R.

Source Exercise & Sport Nutrition Lab; Center for Exercise, Nutrition and Preventive Health; Department of Health, Human Performance & Recreation; Baylor University; Waco, TX, USA. matt_cooke@baylor.edu

BACKGROUND:

To determine whether acute (single dose) and/or chronic (14-days) supplementation of CoQ10 will improve anaerobic and/or aerobic exercise performance by increasing plasma and muscle CoQ10 concentrations within trained and untrained individuals.

METHODS:

Twenty-two aerobically trained and nineteen untrained male and female subjects (26.1 +/- 7.6 yrs, 172 +/- 8.7 cm, 73.5 +/- 17 kg, and 21.2 +/- 7.0%) were randomized to ingest in a double-blind manner either 100 mg of a dextrose placebo (CON) or a fast-melt CoQ10 supplement (CoQ10) twice a day for 14-days. On the first day of supplementation, subjects donated fasting blood samples and a muscle biopsy. Subjects were then given 200 mg of the placebo or the CoQ10 supplement. Sixty minutes following supplement ingestion, subjects completed an isokinetic knee extension endurance test, a 30-second wingate anaerobic capacity test, and a maximal cardiopulmonary graded exercise test interspersed with 30-minutes of recovery. Additional blood samples were taken immediately following each exercise test and a second muscle biopsy sample was taken following the final exercise test. Subjects consumed twice daily (morning and night), 100 mg of either supplement for a period of 14-days, and then returned to the lab to complete the same battery of tests. Data was analyzed using repeated measures ANOVA with an alpha of 0.05.

RESULTS:

Plasma CoQ10 levels were significantly increased following 2 weeks of CoQ10 supplementation ($p < 0.001$); while a trend for higher muscle CoQ10 levels was observed after acute CoQ10 ingestion ($p = 0.098$). A trend for lower serum superoxide dismutase (SOD) was observed following acute supplementation with CoQ10 ($p = 0.06$), whereas serum malondialdehyde (MDA) tended to be significantly higher ($p < 0.05$). Following acute ingestion of CoQ10, plasma CoQ10 levels were significantly correlated to muscle CoQ10 levels; maximal oxygen consumption; and treadmill time to exhaustion. A trend for increased time to exhaustion was observed following 2 weeks of CoQ10 supplementation ($p = 0.06$).

CONCLUSION:

Acute supplementation with CoQ10 resulted in higher muscle CoQ10 concentration, lower serum SOD oxidative stress, and higher MDA levels during and following exercise. Chronic CoQ10 supplementation increased plasma CoQ10 concentrations and tended to increase time to exhaustion. Results indicate that acute and chronic supplementation of CoQ10 may affect acute and/or chronic responses to various types of exercise.

PMID: 18318910

GB

„Impact of coenzyme Q-10 on parameters of cardiorespiratory fitness and muscle performance in older athletes taking statins.“

DE

Auswirkung von Koenzym Q-10 auf Parameter kardiorespiratorischer Fitness und Muskelleistung bei älteren Athleten, die Statine einnehmen.

GR

„Επίπτωση του συνενζύμου Q-10 σε παραμέτρους καρδιοαναπνευστικής ικανότητας και μυϊκών επιδόσεων σε αθλητές μεγαλύτερης ηλικίας που λαμβάνουν στατίνες.“

FR

Impact de la co-enzyme Q-10 sur les paramètres de la bonne forme cardiorespiratoire et de la performance musculaire chez les athlètes d‘un certain âge prenant des statines.

CZ

Vliv koenzymu Q10 na parametry kardiorespirační zdatnosti a svalové výkonnosti u starších atletů užívajících statiny.

Phys Sportsmed. 2012 Nov;40(4):88-95. doi: 10.3810/psm.2012.11.1991.

Impact of coenzyme Q-10 on parameters of cardiorespiratory fitness and muscle performance in older athletes taking statins.

Deichmann RE, Lavie CJ, Dornelles AC.

Source Department of Internal Medicine, Ochsner Clinical School, The University of Queensland School of Medicine/Ochsner Clinical School, New Orleans, LA.

Abstract

Many older athletes take statins, which are known to have potential for muscle toxicity. The adverse effects of statins on muscles and the influence thereof on athletic performance remain uncertain. Coenzyme Q-10 (CoQ10) may improve performance and reduce muscle toxicity in older athletes taking statins. **This trial was designed to evaluate the benefits of CoQ10 administration for mitochondrial function in this population.** Twenty athletes aged ≥ 50 years who were taking stable doses of statins were randomized to receive either CoQ10 (200 mg daily) or placebo for 6 weeks in a double-blind, placebo-controlled, crossover study to evaluate the impact of CoQ10 on the anaerobic threshold (AT). Several **secondary endpoints, including muscle function, cardiopulmonary exercise function, and subjective feelings of fitness, were also assessed.** The mean (SD) change in AT from baseline was -0.59 (1.2) mL/kg/min during placebo treatment and 2.34 (0.8) mL/kg/min during CoQ10 treatment (P = 0.116). The mean change in time to AT from baseline was significantly greater during CoQ10 treatment than during placebo treatment (40.26 s vs 0.58 s, P = 0.038). Furthermore, muscle strength as measured by leg extension repetitions (reps) increased significantly during CoQ10 treatment, with a mean (SD) increase from baseline of 1.73 (2.9) reps during placebo treatment versus 3.78 (5.0) reps during CoQ10 treatment (P = 0.031). Many other parameters also tended to improve in response to CoQ10 treatment. Treatment with CoQ10 improved AT in comparison with baseline values in 11 of 19 (58%) subjects and in comparison with placebo treatment values in 10 of 19 (53%) subjects. Treatment with CoQ10 (200 mg daily) did not significantly improve AT in older athletes taking statins. However, **it did improve muscle performance as measured by time to AT and leg strength** (quadriceps muscle

reps). **Many other measures of mitochondrial function also tended to improve during CoQ10 treatment.**

PMID: 23306418

GB
„Bioenergetic and antioxidant properties of coenzyme Q10: recent developments.“

DE
Bioenergetik und antioxidative Eigenschaften von Koenzym Q10: jüngste Entwicklungen.

GR
„Βιοενεργετικές και αντιοξειδωτικές ιδιότητες του συνενζύμου Q10: πρόσφατες εξελίξεις.“

FR
Propriétés bio-énergétiques et anti-oxydantes de la co-enzyme Q10 : développement récents.

CZ
Bioenergetické a antioxidační vlastnosti koenzymu Q10: nejnovější údaje.

Mol Biotechnol. 2007 Sep;37(1):31-7.

Bioenergetic and antioxidant properties of coenzyme Q10: recent developments.

Littarru GP, Tiano L.

Source Institute of Biochemistry, Polytechnic University of the Marche, Via Ranieri, Ancona 60131, Italy. g.littarru@univpm.it

Abstract

For a number of years, coenzyme Q (CoQ10 in humans) was known for its key role in mitochondrial bioenergetics; later studies demonstrated its presence in other subcellular fractions and in plasma, and extensively investigated its antioxidant role. These two functions constitute the basis on which research supporting the clinical use of CoQ10 is founded. Also at the inner mitochondrial membrane level, coenzyme Q is recognized as an obligatory co-factor for the function of uncoupling proteins and a modulator of the transition pore. Furthermore, recent data reveal that CoQ10 affects expression of genes involved in human cell signalling, metabolism, and transport and some of the effects of exogenously administered CoQ10 may be due to this property. Coenzyme Q is the only lipid soluble antioxidant synthesized endogenously. In its reduced form, CoQH2, ubiquinol, inhibits protein and DNA oxidation but it is the effect on lipid peroxidation that has been most deeply studied. **Ubiquinol inhibits the peroxidation of cell membrane lipids and also that of lipoprotein lipids present in the circulation. Dietary supplementation with CoQ10 results in increased levels of ubiquinol-10 within circulating lipoproteins and increased resistance of human low-density lipoproteins to the initiation of lipid peroxidation. Moreover, CoQ10 has a direct anti-atherogenic effect, which has been demonstrated in apolipoprotein E-deficient mice fed with a high-fat diet.** In this model, supplementation with CoQ10 at pharmacological doses was capable of decreasing the absolute concentration of lipid hydroperoxides in atherosclerotic lesions and of minimizing the size of atherosclerotic lesions in the whole aorta. Whether these protective effects are only due to the antioxidant properties of coenzyme Q remains to be established; recent data point out that CoQ10 could have a direct effect on endothelial function. In patients with stable moderate CHF, oral CoQ10

supplementation was shown to ameliorate cardiac contractility and endothelial dysfunction. Recent data from our laboratory showed a strong correlation between endothelium bound extra cellular SOD (ecSOD) and flow-dependent endothelial-mediated dilation, a functional parameter commonly used as a biomarker of vascular function. The study also highlighted that supplementation with CoQ10 that significantly affects endothelium-bound ecSOD activity. **Furthermore, we showed a significant correlation between increase in endothelial bound ecSOD activity and improvement in FMD after CoQ10 supplementation.** The effect was more pronounced in patients with low basal values of ecSOD. Finally, we summarize the findings, also from our laboratory, on the implications of CoQ10 in seminal fluid integrity and sperm cell motility.

PMID: 17914161

GB
„Effect of coenzyme Q10 supplementation on heart failure: a meta-analysis.“

DE
Wirkung der Supplementierung mit Koenzym Q10 auf Herzversagen: eine Metaanalyse.

GR
Αποτελέσματα της λήψης συνενζύμου Q10 στην καρδιακή ανεπάρκεια: μια μετα-ανάλυση.

FR
Effet de la supplémentation en co-enzyme Q10 sur la défaillance cardiaque : une méta-analyse.

CZ
„Vliv suplementace koenzymem Q10 na srdeční slabost: metaanalýza.„

Am J Clin Nutr. 2012 Dec 5. [Epub ahead of print]

Effect of coenzyme Q10 supplementation on heart failure: a meta-analysis.

Fotino AD, Thompson-Paul AM, Bazzano LA.

Source Department of Medicine, School of Medicine, Tulane University, New Orleans, LA.

BACKGROUND:

Coenzyme Q(10) (CoQ(10); also called ubiquinone) is an antioxidant that has been postulated to improve functional status in congestive heart failure (CHF). Several randomized controlled trials have examined the effects of CoQ(10) on CHF with inconclusive results.

OBJECTIVES:

The **objective of this meta-analysis was to evaluate the impact of CoQ(10) supplementation on the ejection fraction (EF)** and New York Heart Association (NYHA) functional classification in patients with CHF.

DESIGN:

A systematic review of the literature was conducted by using databases including MEDLINE, EMBASE, the Cochrane Central Register of Controlled Trials, and manual examination of references from selected studies. Studies included were randomized controlled trials of CoQ(10) supplementation that reported the EF or NYHA functional class as a primary outcome. Information on participant characteristics, trial design and duration, treatment, dose, control, EF, and NYHA classification were extracted by using a standardized protocol.

RESULTS:

Supplementation with CoQ(10) resulted in a pooled mean net change of 3.67% (95% CI: 1.60%, 5.74%) in the EF and -0.30 (95% CI: -0.66, 0.06) in the NYHA functional class. Subgroup analyses showed significant improvement in EF for crossover trials, trials with treatment duration ≤12 wk in length, studies published before 1994, and

studies with a dose ≤100 mg CoQ(10)/d and in patients with less severe CHF. These subgroup analyses should be interpreted cautiously because of the small number of studies and patients included in each subgroup.

CONCLUSIONS:

Pooled analyses of available randomized controlled trials suggest that CoQ(10) may improve the EF in patients with CHF. Additional well-designed studies that include more diverse populations are needed.

PMID: 23221577

GB

„Coenzyme Q(10) supplementation reverses age-related impairments in spatial learning and lowers protein oxidation.“

DE

Supplementierung mit Koenzym Q(10) reversiert alterungsbedingte Beeinträchtigungen des räumlichen Lernens und senkt Proteinoxidation.

GR

„Το Συνένζυμο Q (10) αναστρέφει τις σχετιζόμενες με την ηλικία δυσλειτουργίες στη χωρική εκμάθηση και ελαττώνει την πρωτεϊνική οξείδωση.“

FR

La supplémentation en co-enzyme Q10 inverse les déficiences liées à l‘âge dans la cognition spatiale et réduit l‘oxydation des protéines.

CZ

Suplementace koenzymem Q10 zmírňuje poruchy prostorového učení spojené se stárnutím a snižuje oxidaci proteinů.

Age (Dordr). 2012 Nov 10. [Epub ahead of print]

Coenzyme Q(10) supplementation reverses age-related impairments in spatial learning and lowers protein oxidation.

Shetty RA, Forster MJ, Sumien N.

Source Department of Pharmacology and Neuroscience and Institute for Aging and Alzheimer's Disease Research, University of North Texas Health Science Center at Fort Worth, 3500 Camp Bowie, Fort Worth, TX, 76107, USA, ritu.shetty@unthsc.edu.

Coenzyme Q10 (CoQ) is widely available as a dietary supplement and remains under consideration as a treatment for age-associated neurodegenerative conditions. However, no studies have determined if supplementation, initiated relatively late in life, could have beneficial effects on mild functional impairments associated with normal brain aging. Accordingly, the **current study assessed the effect of CoQ intake in older mice for which cognitive and psychomotor impairments were already evident.** Separate groups of young (3.5 months) and relatively old mice (17.5 months) were fed a control diet or a diet supplemented with low (0.72 mg/g) or high (2.81 mg/g) concentrations of CoQ for 15 weeks. After 6 weeks, the mice were given tests for spatial learning (Morris water maze), spontaneous locomotor activity, motor coordination, and startle reflex. Age-related impairments in cognitive and psychomotor functions were evident in the 17.5-month-old mice fed the control diet, and the low-CoQ diet failed to affect any aspect of the impaired performance. However, in the Morris water maze test, old mice on the high-CoQ diet swam to the safe platform with greater efficiency than the mice on the control diet. The old mice supplemented with the high-CoQ diet did not show improvement when spatial performance was measured using probe trials and failed to show improvement in other tests of behavioral performance. **Protein oxidative damage was decreased in the mitochondria from the heart, liver, and skeletal muscle of the high-CoQ-supplemented mice and, to some extent, in the brain mitochondria.** Contrasting with the deleterious effect of long-term CoQ supplementation initiated during young adulthood previously published, this study suggests that CoQ improves spatial learning and attenuates oxidative damage when administered in relatively high doses and delayed until early

senescence, after age-related declines have occurred. **Thus, in individuals with age-associated symptoms of cognitive decline, high-CoQ intake may be beneficial.**

PMID: 23138632