

Coenzyme Q10: The essential nutrient

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Sir,

Coenzyme Q-10 (CoQ-10 or Ubiquinone) is a naturally occurring quinone that is found in most aerobic organisms from bacteria to mammals. It was first identified in 1940, and isolated from the mitochondria of the beef heart, in 1957. Coenzyme Q10 is also known as Coenzyme Q, CoQ, CoQ10, Ubiquinone, Ubiquinone-Q10, Ubidecarenone, or Vitamin Q10. The various types of Coenzyme Q can be distinguished by the number of isoprenoid side-chains they have. The most common Coenzyme Q in human mitochondria is CoQ10. The 10 refers to the number of isoprene repeats. CoQ10 is ubiquitous in human tissues, although its level is variable. The level of CoQ10 is the highest in organs with high rates of metabolism such as the heart, kidney, and liver (114, 66.5, and 54.9g/g tissue, respectively), where it functions as an energy transfer molecule. The primary biochemical action of CoQ10 is as a cofactor in the electron-transport chain, in the series of redox reactions that are involved in the synthesis of adenosine triphosphate. As most cellular functions are dependent on an adequate supply of Adenosine triphosphate (ATP), CoQ10 is essential for the health of virtually all human tissues and organs. Coenzyme Q10 is one of the most significant lipid antioxidants, which prevents the generation of free radicals and modifications of proteins, lipids, and DNA. In many disease conditions connected with increased generation and the action of reactive oxygen species (ROS), the concentration of coenzyme Q10 in the human body decreases^[1,2] and the deficiency of coenzyme Q10 leads to the dysfunction of the respiratory chain, which is due to the insufficient production of highly energetic compounds, which decrease the efficiency of cells. To protect the cells and organ systems of the body against ROS, humans have evolved a highly sophisticated and complex antioxidant protection system. It involves a variety of components, both endogenous and exogenous in origin, which function interactively and synergistically to neutralize free radicals and include nutrient-derived antioxidants (Vitamin C and E, beta carotene, and polyphenols), antioxidant enzymes (bilirubin, thiols, ubiquinones, and uric acid), metal-binding proteins (albumin, ceruloplasmin, ferritin, and myoglobin), and numerous other antioxidant phytonutrients (plant-derived substances) present in a wide variety of plant foods.^[3] Antioxidants, such as CoQ10, can neutralize free radicals and may reduce or even help prevent some of the damage they cause. CoQ10 improves energy, augments the immune system, and acts as an antioxidant. The potential use of coenzyme Q10 supplements alone or in combination with other drug therapies and nutritional supplements may help prevent or treat some of the following conditions: cardiovascular diseases, high blood pressure, cancer, periodontal diseases, mitochondrial disorders, radiation injury, obesity, diabetes, Parkinson's disease, acquired immune deficiency syndrome (AIDS), gastric ulcers, allergy, migraine headaches, kidney failure, muscular dystrophy, and aging. CoQ10 plays a significant role in boosting the immune system and physical performance, as tissues and cells involved with immune function are highly energy-dependent and therefore require an adequate supply of CoQ10 for optimal function. Primary dietary sources of CoQ10 include oily fish (such as salmon and tuna), organ meats (such as liver), and whole grains. Most individuals obtain sufficient amounts of CoQ10 through a balanced diet, but supplementation may be useful for individuals with particular health conditions. CoQ10 is available as a supplement in several forms, including soft gel capsules, oral spray, hard shell capsules, and tablets. A typical CoQ10 dosage is 30 to 90 mg per day, taken in divided doses, but the recommended amount can be as high as 200 mg per day. CoQ10 is fat-soluble, so it is better absorbed when taken with a meal that contains oil or fat. The clinical effect is not immediate and may take up to eight weeks. Side effects of CoQ10 may include diarrhea and rash; safety of Co q10 in pregnant or nursing women, or children has not been established. It is concluded that Coenzyme Q10 (ubiquinone/ubiquinol) is a fat-soluble quinone with a structure similar to that of vitamin K. It is an effective antioxidant both on its own and in

fusion with vitamin E and is fundamental in powering the body's energy production ATP cycle. CoQ10 is found throughout the body in cell membranes, especially in the mitochondrial membranes, and is chiefly abundant in the heart, lungs, liver, kidneys, spleen, pancreas, and adrenal glands. The whole body content of CoQ10 is only about 500-1500 mg and decreases with age. Coenzyme Q10 is one of the most significant lipid antioxidants that prevents the generation of free radicals and modifications of proteins, lipids, and DNA.

References

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