

Monograph

Coenzyme Q₁₀ Synonyms: ubiquinone; CoQ₁₀

Biochemistry

The primary biochemical action of CoQ_{10} is as a cofactor in the electron-transport chain – a series of oxidation-reduction reactions involved in cellular respiration and the synthesis of ATP.

Pharmacokinetics

 CoQ_{10} can be synthesized *in vivo*. Situations may arise, however, when the need for CoQ_{10} surpasses the body's ability to synthesize it. CoQ_{10} is well-absorbed by oral supplementation as evidenced by significant increases in serum CoQ_{10} levels after supplementation.¹ There is some evidence that CoQ_{10} in oil suspension has the highest bioavailability.²

Mechanisms of Action

 CoQ_{10} , due to its involvement in ATP synthesis, affects the function of all cells in the body, making it essential for the health of all human tissues and organs. CoQ_{10} particularly affects the cells that are the most metabolically active: heart, immune system, gingiva, and gastric mucosa.

Clinical Indications:

Immune Function – enhances phagocytic activity of macrophages and increases granulocyte proliferation.³⁻⁵ Its antioxidant activity helps prevent AIDS-related diseases caused by oxidative stress.⁶ Blood levels of CoQ_{10} are lower in AIDS patients and 200 mg/day increased T-helper/suppresser ratios.⁷

Cancer - prevents metastasis and enhances remission in breast cancer.^{8,9} Mechanisms in cancer include immune system enhancement and antioxidant activity.

Periodontal Disease - Gingival biopsies yield subnormal tissue levels of CoQ_{10} in patients with periodontal disease.¹⁰⁻¹³ Supplementation speeds healing after periodontal surgery.¹⁴⁻¹⁶

Gastric Ulcers - protective of the gastric mucosa due to its antioxidant effects.¹⁷ Production of protective mucus and rapid cell turnover of gastric mucosa are highly energy-dependent processes.

Obesity - Individuals with a family history of obesity have a 50% reduction in thermogenic response to a meal and are often found to have low CoQ_{10} levels.¹⁸ CoQ_{10} , being essential for energy production, can be of benefit.

Physical Performance - Supplementation may enhance aerobic capacity and muscle performance, especially in sedentary individuals.¹⁹

Muscular Dystrophy - CoQ_{10} deficiency is found in cardiac and skeletal muscle in animals and humans with hereditary muscular dystrophy.²⁰⁻²²

Allergy - inhibits release of histamine and SRSA in antigen-challenged animals.23

Cardiovascular Disease - CoQ_{10} is especially indicated for the enhancement of myocardial function by enhancing energy production, improving contractility of the cardiac muscle, and providing potent antioxidant activity, in particular prevention of LDL oxidation. Specific cardiac problems which may benefit from CoQ_{10} include:

- cardiomyopathy²⁴⁻²⁶
- congestive heart failure²⁷⁻²⁹
- angina³⁰
- arrhythmias³¹
- prevention of adriamycin toxicity³²⁻³⁵
- protection during cardiac surgery³⁶
- mitral valve prolapse³⁷
- hypertension³⁸⁻⁴⁰

Male Infertility - CoQ₇ (CoQ₁₀ analog) at 10 mg/day resulted in significant increases in sperm count and motility.⁴¹

Diabetes mellitus - The electron-transport chain is integrally involved in carbohydrate metabolism. CoQ_7 at a daily dose of 120 mg for 2-18 weeks reduced fasting blood sugar by at least 30% in 31% of patients.⁴²

Dosage

Typical dose for most conditions is 30-60 mg BID; some studies on breast cancer treatment used 400 mg daily.

Deficiency

A deficiency may result from: 1) impaired synthesis due to nutritional deficiencies, 2) genetic or acquired defect in synthesis or utilization, 3) increased tissue needs resulting from illness. CoQ_{10} levels decline with advancing age.

Toxicity/Drug-Nutrient Interactions

Cholesterol-lowering drugs such as lovastatin and pravastatin inhibit the enzyme 3-hydroxy-3methyl glutaryl (HMG)-CoA reductase, required for synthesis of cholesterol as well as CoQ_{10} . These drugs may therefore compromise CoQ_{10} status. Beta blockers propranolol and metaprolol inhibit CoQ_{10} dependent enzymes. Phenothiazines and tri-cyclic antidepressants have also been shown to inhibit CoQ_{10} dependent enzymes.

Occasional reports of nausea, anorexia, or skin eruptions have been reported with supplementation of CoQ_{10} .

Review Articles

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