

Product Name: Ubiquinol
Cat. No.: GC45109

Cas. No.	992-78-9		
SMILES	<chem>COC1=C(OC)C(O)=C(C/C=C(C)/CC/C=C(C)/CC/C=C(C)/CC/C=C(C)/CC/C=C(C)/CC/C=C(C)/CC/C=C(C)/CC/C=C(C)/CC/C=C(C)\CC/C=C(CC/C=C(C)/CC/C=C(C)/CC/C=C(C)\C)\C)C(C)=C1O</chem>		
Formula	C ₅₉ H ₉₂ O ₄	M.Wt	865.4
Solubility	Chloroform: Slightly soluble, Ethyl Acetate: Slightly soluble	Storage	Store at -80°C
General tips	For obtaining a higher solubility , please warm the tube at 37 °C and shake it in the ultrasonic bath for a while. Stock solution can be stored below -20°C for several months.		
Shipping Condition	Evaluation sample solution : ship with blue ice All other available size: ship with RT , or blue ice upon request.		

The chemical structure shows a long-chain polyunsaturated fatty acid derivative. It features a central polyene chain with multiple conjugated double bonds. At one end of the chain, there is a substituted phenyl ring with two methoxy groups and two hydroxyl groups. The other end of the chain is a long alkyl chain with several double bonds, including a terminal double bond.

Cell experiment [1]:

Cell lines	Human donor corneal endothelial cells
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Preparation Method Human donor corneal endothelial cells were grown in Optisol-GS storage media at 37°C in an incubator. A 100mM stock concentration of Ubiquinol dissolved in absolute ethanol at 37°C was prepared, and 2ml was added to 20ml of Optisol-GS in the corneal storage chamber for a final concentration of 10µM. For the control group, 2ml absolute ethanol was added to 20ml of Optisol-GS in the corneal storage chamber to ensure equal exposure to ethanol for all cells. After 5 days of storage with supplementation, cells were processed for metabolic and cell viability assays.

Reaction Conditions 10µM; 5 days

Applications Ubiquinol treatment significantly promoted mitochondrial respiration and enhanced cell viability in corneal endothelial cells.

Animal experiment [2]:

Animal models Female C57BL/6J mice

Preparation Method Female C57BL/6J mice (4 weeks old) were housed in standard cages at room temperature (20-26°C) and humidity (40-60%) under a 12/12h light/dark cycle with ad libitum access to autoclaved chow and water. The mice were anesthetized with a mixture of ketamine (100mg/kg) and xylazine (9mg/kg) by intraperitoneal injection. Eyes were treated with 1% proparacaine drops. A 30-gauge needle was inserted into the anterior chamber of the right eye that was connected by flexible tubing to a saline reservoir. By raising the reservoir, intraocular pressure (IOP) was elevated to 70-80mmHg for 50min. Sham treatment was performed in the contralateral eyes by the insertion of a needle in the anterior chamber without saline injection. Retinal ischemia was confirmed by observing the whitening of the iris and loss of the red reflex of the retina. Ischemic C57BL/6J mice were treated with 1% Ubiquinol diet for one month. The retinas of mice were collected for analysis.

Caution: Product has not been fully validated for medical applications. For research use only.

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Dosage form 1% in diet for one month; p.o.

Applications Ubiquinol treatment promoted RGC survival in the transient ischemic retina of mice.

References:

- [1] Skeie J M, Aldrich B T, Nishimura D Y, et al. Ubiquinol supplementation of donor tissue enhances corneal endothelial cell mitochondrial respiration[J]. Cornea, 2020, 39(10): 1285-1290.
- [2] Ju W K, Shim M S, Kim K Y, et al. Ubiquinol promotes retinal ganglion cell survival and blocks the apoptotic pathway in ischemic retinal degeneration[J]. Biochemical and biophysical research communications, 2018, 503(4): 2639-2645.

Background

Ubiquinol, the reduced form of Ubiquinone, acts as a lipophilic antioxidant and dietary supplement [1]. Ubiquinol can efficiently sustain the effect of vitamin E by regenerating vitamin E from the tocopheroxyl radical, and provide cellular defense against oxidative damage [2]. Ubiquinol levels can serve as a useful biomarker for assessing muscle diseases associated with mitochondrial proliferation and oxidative phosphorylation defects [3]. Ubiquinol has been widely used as a nutritional supplement to increase the level of coenzyme Q10 in the blood plasma [4].

In vitro, Ubiquinol treatment (10 μ M) for 5 days significantly enhanced the mitochondrial respiration in corneal endothelial cells and improved mitochondrial function [5]. Treatment with 15 μ g/ml Ubiquinol for 24 hours rescued simvastatin-induced coenzyme Q10 deficiency in human dermal fibroblasts (HDF), and reversed the senescence phenotype [6].

In vivo, dietary supplementation with 1% Ubiquinol for 5 months significantly promoted the survival of retinal ganglion cells (RGCs) and increased the expression level of oxidative phosphorylation complex II in the retina of glaucomatous DBA/2J mice [7]. Daily oral administration of feed supplemented with 1% Ubiquinol for 1 month significantly inhibited the activation of astrocytes and microglia in the transient ischemic retina of mice and prevented cell apoptosis [8].

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References:

- [1] Hosoe K, Kitano M, Kishida H, et al. Study on safety and bioavailability of ubiquinol (Kaneka QH™) after single and 4-week multiple oral administration to healthy volunteers[J]. Regulatory toxicology and pharmacology, 2007, 47(1): 19-28.
- [2] Ernster L, Forsmark-Andree P. Ubiquinol: an endogenous antioxidant in aerobic organisms[J]. The clinical investigator, 1993, 71(Suppl 8): S60-S65.
- [3] Miles L, Miles M V, Tang P H, et al. Ubiquinol: a potential biomarker for tissue energy requirements and oxidative stress[J]. Clinica chimica acta, 2005, 360(1-2): 87-96.
- [4] Zhang Y, Liu J, Chen X, et al. Ubiquinol is superior to ubiquinone to enhance Coenzyme Q10 status in older men[J]. Food & function, 2018, 9(11): 5653-5659.
- [5] Skeie J M, Aldrich B T, Nishimura D Y, et al. Ubiquinol supplementation of donor tissue enhances corneal endothelial cell mitochondrial respiration[J]. Cornea, 2020, 39(10): 1285-1290.
- [6] Marcheggiani F, Kordes S, Cirilli I, et al. Anti-ageing effects of ubiquinone and ubiquinol in a senescence model of human dermal fibroblasts[J]. Free Radical Biology and Medicine, 2021, 165: 282-288.
- [7] Edwards G, Lee Y, Kim M, et al. Effect of ubiquinol on glaucomatous neurodegeneration and oxidative stress: Studies for retinal ganglion cell survival and/or visual function[J]. Antioxidants, 2020, 9(10): 952.
- [8] Ju W K, Shim M S, Kim K Y, et al. Ubiquinol promotes retinal ganglion cell survival and blocks the apoptotic pathway in ischemic retinal degeneration[J]. Biochemical and biophysical research communications, 2018, 503(4): 2639-2645.

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