Vitamin K1

Cat. No.: HY-N0684

CAS No.: 84-80-0

Molecular Formula: $C_{31}H_{46}O_2$

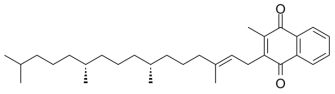
Molecular Weight: 450.7

Target: Endogenous Metabolite

Pathway: Metabolic Enzyme/Protease

Storage:

Pure form	-20°C	3 years
	4°C	2 years
In solvent	-80°C	6 months
	-20°C	1 month



SOLVENT & SOLUBILITY

In Vitro

Ethanol : ≥ 50 mg/mL (110.94 mM)

DMSO : 5.6 mg/mL (12.43 mM; Need ultrasonic and warming)

* "≥" means soluble, but saturation unknown.

Preparing Stock Solutions

Solvent / Mass / Concentration	1 mg	5 mg	10 mg
1 mM	2.2188 mL	11.0939 mL	22.1877 mL
5 mM	0.4438 mL	2.2188 mL	4.4375 mL
10 mM	0.2219 mL	1.1094 mL	2.2188 mL

Please refer to the solubility information to select the appropriate solvent.

In Vivo

1. Add each solvent one by one: Cremophor EL
   Solubility: 20 mg/mL (44.38 mM); Clear solution; Need ultrasonic and warming and heat to 60°C
2. Add each solvent one by one: 10% EtOH >> 40% PEG300 >> 5% Tween-80 >> 45% saline
   Solubility: ≥ 2.5 mg/mL (5.55 mM); Clear solution
3. Add each solvent one by one: 10% EtOH >> 90% (20% SBE-β-CD in saline)
   Solubility: 2.5 mg/mL (5.55 mM); Suspended solution; Need ultrasonic
4. Add each solvent one by one: 10% EtOH >> 90% corn oil
   Solubility: ≥ 2.5 mg/mL (5.55 mM); Clear solution

BIOLOGICAL ACTIVITY

Description Vitamin K1 a naturally occurring vitamin required for blood coagulation and bone and vascular metabolism.

IC_{50} & Target Human Endogenous Metabolite

In Vitro	Phylloquinone (Vitamin K1) is a prenylated naphthoquinone that is synthesized exclusively by plants, green algae, and some species of cyanobacteria, where it serves as a vital electron carrier in photosystem I and as an electron acceptor for the formation of protein disulfide bonds. In humans and other vertebrates, phylloquinone plays the role of a vitamin (vitamin K1) that is required for blood coagulation and bone and vascular metabolism. Phylloquinone from green leafy vegetables and vegetable oil represents the major dietary source of vitamin K for humans[1]. Vitamin K1 treatment causes a significant antiproliferative effect and induces apoptosis in Caco-2, HT-29, and SW480 cell lines, with the involvement of the MAPK pathway. A concomitant and significant decrease in the polyamine biosynthesis occurr[2]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.
In Vivo	Subjects who increase their dietary intake of vitamin K during the follow-up had a 51% reduced risk of incident diabetes compared with subjects who decrease or does not change the amount of phylloquinone intake[3]. Vitamin K supplementation reverses the high fat diet induced bone deterioration by modulating osteoblast and osteoclast activities and prevent bone loss in a high-fat diet-induced obese mice[4]. Application of vitamin K1 to the skin has been used for suppression of pigmentation and resolution of bruising. The effects produced by the topical vitamin K1 shows significant healing when compared with control group in parameters such as wound contraction, epithelialization period, hydroxyproline content and tensile strength[5]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.

PROTOCOL

Cell Assay [2]	Caco-2, HT-29, and SW480 cells are treated with increasing concentrations of vitamin K1 (10, 50, 100, and 200 μM) for 24 h, 48 h, and 72 h. MTT is added to each dish and incubated for 2 h at 37°C. At the end of the incubation period, the medium is removed. The plate is read at 570 nM[2]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.
Animal Administration [4][5]	Rats: For inducing full-thickness wound in rats, the excisional wound model is used. Five groups consisting of 8 rats each are used. Vitamin K cream (1% and 2%, w/w) is prepared in eucerin base and applied on the wound once a day until complete healing had occurred. Healing is defined by decreased wound margin (wound contraction), re-epithelialization, tensile strength and hydroxyproline content. Histopathological examination is also done[5]. Mice: Four-week-old C57BL/6J male mice are fed a 10% fat normal diet group or a 45% kcal high-fat diet group, with or without 200 mg/1000 g vitamin K1 (Normal diet + K1, high-fat diet + K1) and 200 mg/1000 g vitamin K2 (Normal diet + K2, high-fat diet + K2) for 12 weeks[4]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.

CUSTOMER VALIDATION

- J Med Chem. 2021 Sep 21.
- Int J Mol Sci. 2023 Apr 28, 24(9), 8012.

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REFERENCES

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[2]. Orlando A, et al. Vitamin K1 exerts antiproliferative effects and induces apoptosis in three differently graded human colon cancer cell lines. Biomed Res Int. 2015;2015:296721.

[3]. Ibarrola-Jurado N, et al. Dietary phylloquinone intake and risk of type 2 diabetes in elderly subjects at high risk of cardiovascular disease. Am J Clin Nutr. 2012 Nov;96(5):1113-8.

[4]. Kim M, et al. Vitamin K1 (phylloquinone) and K2 (menaquinone-4) supplementation improves bone formation in a high-fat diet-induced obese mice. J Clin Biochem Nutr. 2013 Sep;53(2):108-13.

[5]. Hemmati AA, et al. Topical vitamin K1 promotes repair of full thickness wound in rat. Indian J Pharmacol. 2014 Jul-Aug;46(4):409-12.

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