β-Caryophyllene

Cat. No.: HY-N1415

CAS No.: 87-44-5

Molecular Formula: $C_{15}H_{24}$

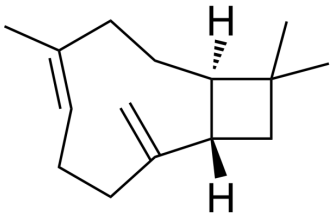
Molecular Weight: 204.35

Target: Cannabinoid Receptor; Endogenous Metabolite

Pathway: GPCR/G Protein; Neuronal Signaling; 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 : ≥ 176.67 mg/mL (864.55 mM)

DMSO : 25 mg/mL (122.34 mM; Need ultrasonic)

H_2O : < 0.1 mg/mL (insoluble)

* "≥" means soluble, but saturation unknown.

Preparing Stock Solutions

Solvent / Mass / Concentration	1 mg	5 mg	10 mg
1 mM	4.8936 mL	24.4678 mL	48.9356 mL
5 mM	0.9787 mL	4.8936 mL	9.7871 mL
10 mM	0.4894 mL	2.4468 mL	4.8936 mL

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

In Vivo

1. Add each solvent one by one: PBS
   Solubility: 100 mg/mL (489.36 mM); Clear solution; Need ultrasonic
2. Add each solvent one by one: 10% EtOH >> 40% PEG300 >> 5% Tween-80 >> 45% saline
   Solubility: ≥ 13.25 mg/mL (64.84 mM); Clear solution
3. Add each solvent one by one: 10% EtOH >> 90% (20% SBE-β-CD in saline)
   Solubility: 13.25 mg/mL (64.84 mM); Suspended solution; Need ultrasonic
4. Add each solvent one by one: 10% EtOH >> 90% corn oil
   Solubility: ≥ 13.25 mg/mL (64.84 mM); Clear solution
5. Add each solvent one by one: 10% DMSO >> 40% PEG300 >> 5% Tween-80 >> 45% saline
   Solubility: ≥ 2.5 mg/mL (12.23 mM); Clear solution
6. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: ≥ 2.5 mg/mL (12.23 mM); Clear solution
7. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: ≥ 2.5 mg/mL (12.23 mM); Clear solution

BIOLOGICAL ACTIVITY

Description	β-Caryophyllene is a CB2 receptor agonist.
IC_{50} & Target	Human Endogenous Metabolite
In Vitro	Among the tested cancer cells, β-Caryophyllene demonstrates selective anti-proliferative effect against three cancer cell lines, namely HCT 116 (colon cancer, IC_{50}=19 μM), PANC-1 (pancreatic cancer, IC_{50}=27 μM), and HT29 (colon cancer, IC_{50}=63 μM) cells, whereas β-Caryophyllene exhibits either moderate or poor cytotoxic effects against ME-180, PC3, K562 and MCF-7. Results show that β-Caryophyllene possesses higher selectivity towards the colorectal cancer cells (HCT 116), with selectivity index (SI)=27.9, followed by PANC-1 and HT 29 cells with SI=19.6 and 8, respectively. The apoptotic index estimated for β-Caryophyllene treatment on HCT 116 cells after 24 h treatment is 64±0.04. β-Caryophyllene at 10 μM concentration, causes significant nuclei condensation after 6 h of treatment. β-caryophyllene exhibits a dose and time-dependent inhibitory effect on the motility of HCT 116 cells[2]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.
In Vivo	Treatment with β-Caryophyllene at different doses does not show any effects on swimming speed during the test. Oral treatment with β-Caryophyllene ameliorates the rise in β-amyloid deposition in the transgenic mice in a roughly dose-dependent manner, and the two higher doses exhibit almost equal effects in modifying the β-amyloid burden. The number of activated astroglial cells is higher in vehicle-treated mouse brains than in β-Caryophyllene-treated mouse brains with different doses. β-Caryophyllene is effective at reducing the enhancement of the COX-2 protein level found in vehicle-treated APP/PS1 mice[1]. Animals treated with β-Caryophyllene display higher values of object recognition index than their vehicle-treated counterparts [t(14)=4.204, P<0.05]. The total time spent in object exploration during the test trial is not significantly different between β-Caryophyllene-treated and vehicle-treated animals (t(14)=0.5874, P>0.05). Treatment with β-Caryophyllene does not significantly alter these seizure-induced neurochemical changes[3]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.

PROTOCOL

Cell Assay [2]	Panel of human cancer cells such as, pancreatic (PANC-1), colorectal (HCT-116 and HT-29), invasive squamous cell carcinoma (ME-180), leukemia (K562), hormone sensitive and invasive breast cancer cell line (MCF-7), and prostatic (PC3) adenocarcinoma cell lines are used. Cells are incubated in a humidified CO_2 incubator at 37°C supplied with 5% CO_2. Inhibitory effect of β-Caryophyllene on proliferation of the cell lines is tested using the MTT assay. The selectivity index (SI) for the cytotoxicity of β-Caryophyllene is calculated using the ratio of IC_{50} of β-Caryophyllene on a normal cell line (NIH-3T3) to the IC_{50} of β-Caryophyllene on cancer cell lines[2]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.
Animal Administration [1]	Male double transgenic APP/PS1 mice and wild-type littermates are used. The mice are group housed (3 to 5 animals/cage) with a 12:12-hour light/dark cycle and ad libitum access to food and water. In this experiment, animals are orally treated by gavage with 16, 48, or 144 mg/kg of β-Caryophyllene every morning for 10 weeks starting at the age of 7 months. All vehicle solutions are used for the respective control animal treatments and the Morris water maze test is performed[1]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.

REFERENCES

[1]. Cheng Y, et al. β-Caryophyllene ameliorates the Alzheimer-like phenotype in APP/PS1 Mice through CB2 receptor activation and the PPARγ pathway. Pharmacology. 2014;94(1-2):1-12.

[2]. Dahham SS, et al. The Anticancer, Antioxidant and Antimicrobial Properties of the Sesquiterpene β-Caryophyllenefrom the Essential Oil of Aquilaria crassna. Molecules.

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[3]. de Oliveira CC, et al. Anticonvulsant activity of β-caryophyllene against pentylenetetrazol-induced seizures. Epilepsy Behav. 2016 Mar;56:26-31.

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