

Product Data Sheet

Product Name: β -Sitosterol

Cat. No.: GN10547

Chemical Properties

Cas. No. 83-46-5

Chemical Name (3S,8S,9S,10R,13R,14S,17R)-17-[(2R,5R)-5-ethyl-6-methylheptan-2-yl]-10,13-dimethyl-2,3,4,7,8,9,11,12,14,15,16,17-dodecahydro-1H-cyclopenta[a]phenanthren-3-ol

SMILES CCC(CCC(C)C1CCC2C1(CCC3C2CC=C4C3(CCC(C4)O)C)C)C(C)C

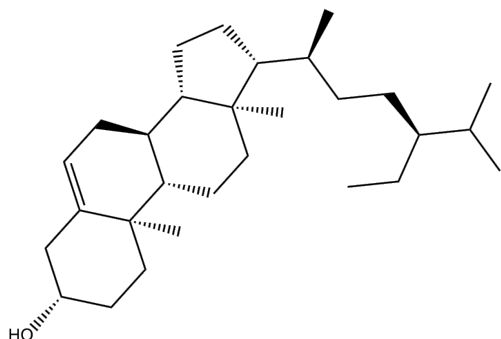
Formula $C_{29}H_{50}O$ M.Wt 414.69

Solubility DMF: 3 mg/ml, Ethanol: 0.25 mg/ml Storage $-20^{\circ}C$, protect from light

General tips For obtaining a higher solubility, please warm the tube at $37^{\circ}C$ and shake it in the ultrasonic bath for a while. Stock solution can be stored below $-20^{\circ}C$ for several months.

Shipping Condition Evaluation sample solution: ship with blue ice All other available size: ship with RT, or blue ice upon request.

Structure



Protocol

Cell experiment [1]:

Cell lines Huh-7 and HCCLM3 (human hepatocellular carcinoma cell lines)

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Preparation Method Huh-7 and HCCLM3 cells were cultured in DMEM media added with 10% fetal bovine serum (FBS) and 100U/mL penicillin/streptomycin in a humidified incubator (37°C, 5% CO₂). The cells were treated with β -Sitosterol at gradient concentrations (5 μ g/mL, 10 μ g/mL, and 20 μ g/mL) for 24, 48, or 72 hours.

Reaction Conditions 5-20 μ g/mL; 24-72h

Applications β -Sitosterol significantly inhibited the viability and proliferation of hepatocellular carcinoma cells in vitro. β -Sitosterol induced G0/G1 phase arrest in the cell cycle and promoted apoptosis, as evidenced by increased BAX and cleaved caspase3 protein levels while reducing BCL2 protein levels. Additionally, β -Sitosterol inhibited cell migration and invasion, and suppressed epithelial-mesenchymal transition (EMT) by promoting E-cadherin proteins and inhibiting N-cadherin, Snail, and Vimentin proteins.

Animal experiment [2]:

Animal models C57BL/6J mice

Preparation Method Mice were intraperitoneally injected with β -Sitosterol at a dose of 100mg/kg 1 hour before behavioral testing. For chronic stress experiments, mice were subjected to 1.5 hours of restraint stress daily for 3 weeks and treated with β -Sitosterol (100mg/kg) or fluoxetine (20mg/kg) or their combination (5mg/kg fluoxetine + 20mg/kg β -Sitosterol).

Dosage form 100mg/kg; i.p.

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Applications

β -Sitosterol significantly reduced anxiety-like behaviors in both naive and chronically stressed mice, as evidenced by increased distance traveled and time spent in the center of the open-field test and elevated plus maze. β -Sitosterol also decreased c-Fos activation in the prefrontal cortex and dentate gyrus, indicating reduced neural activity in brain regions associated with anxiety. Furthermore, β -Sitosterol synergized with sub-effective doses of fluoxetine to enhance anxiolytic effects.

References:

- [1] Wang R, Tang D, Ou L, et al. β -Sitosterol alleviates the malignant phenotype of hepatocellular carcinoma cells via inhibiting GSK3B expression. *Hum Cell*. 2024 Jul;37(4):1156-1169.
- [2] Panayotis N, Freund PA, Marvaldi L, et al. β -sitosterol reduces anxiety and synergizes with established anxiolytic drugs in mice. *Cell Rep Med*. 2021 May 18;2(5):100281.

Background

β -Sitosterol is a natural sterol derived from plants that has a variety of biological activities such as inhibiting cancer development^[1]. β -Sitosterol is also commonly used to study its effects on cardiovascular health^[2]. β -Sitosterol is commonly used to study its effects on cardiovascular health. β -Sitosterol can help lower blood cholesterol levels by modulating cholesterol metabolism, thereby playing a positive role in the prevention of cardiovascular diseases^[3]. β -Sitosterol also has anti-inflammatory activity, allowing β -Sitosterol to participate in the body's inflammatory regulation process and help alleviate some inflammation-related symptoms^[4].

In vitro, treatment of human ovarian cancer cell lines ES2 and OV90 with β -Sitosterol (10, 25, 50 μ g/mL) for 48 hours induces apoptosis, inhibits cell proliferation, reduces mitochondrial membrane potential, increases reactive oxygen species (ROS) and calcium influx, alters intracellular signaling pathways, inhibits cell aggregation, growth, and migration. When used in combination with standard anticancer drugs such as cisplatin (20 μ M) or paclitaxel (20 μ M), β -Sitosterol demonstrates synergistic anticancer effects^[5]. Treatment of human hepatocellular carcinoma cell lines Huh-7 and HCCLM3 with β -Sitosterol (5, 10, 20 μ g/mL) for 24–72 hours significantly inhibits cell proliferation, migration, and invasion, induces apoptosis, inhibits epithelial-mesenchymal transition (EMT), and reduces

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GSK3B expression. Additionally, when used in combination with the GSK3B inhibitor (CHIR-98014; 50nM), β -Sitosterol further enhances the inhibitory effects on hepatocellular carcinoma cell proliferation and invasion^[6].

In vivo, oral administration of β -Sitosterol (200mg/kg) once daily, in combination with intraperitoneal injection of dexamethasone (20mg/kg) once daily, was used to treat 6-week-old C57BL/6 mice for 3 weeks. β -Sitosterol significantly alleviated dexamethasone-induced muscle atrophy in mice, through the regulation of FoxO1-dependent signaling pathways^[7]. Intraperitoneal injection of β -Sitosterol (100mg/kg) in C57BL/6J mice significantly reduced anxiety-like behaviors. β -Sitosterol demonstrated synergistic anxiolytic effects when used in combination with fluoxetine (5mg/kg; i.p.)^[8].

References:

- [1] Arivarasu L. In-Vitro Antioxidant Potential of Beta-Sitosterol: A Preface. Cureus. 2023 Sep 20;15(9):e45617.
- [2] Bao X, Zhang Y, Zhang H, et al. Molecular Mechanism of β -Sitosterol and its Derivatives in Tumor Progression. Front Oncol. 2022 Jun 8;12:926975.
- [3] Babu S, Jayaraman S. An update on β -sitosterol: A potential herbal nutraceutical for diabetic management. Biomed Pharmacother. 2020 Nov;131:110702.
- [4] Rossi A, Bragonzi A, Medede M, et al. β -sitosterol ameliorates inflammation and Pseudomonas aeruginosa lung infection in a mouse model. J Cyst Fibros. 2023 Jan;22(1):156-160.
- [5] Bae H, Park S, Ham J, et al. ER-Mitochondria Calcium Flux by β -Sitosterol Promotes Cell Death in Ovarian Cancer. Antioxidants (Basel). 2021 Oct 8;10(10):1583.
- [6] Wang R, Tang D, Ou L, et al. β -Sitosterol alleviates the malignant phenotype of hepatocellular carcinoma cells via inhibiting GSK3B expression. Hum Cell. 2024 Jul;37(4):1156-1169.
- [7] Hah YS, Lee WK, Lee S, et al. β -Sitosterol Attenuates Dexamethasone-Induced Muscle Atrophy via Regulating FoxO1-Dependent Signaling in C2C12 Cell and Mice Model. Nutrients. 2022 Jul 14;14(14):2894.
- [8] Panayotis N, Freund PA, Marvaldi L, et al. β -sitosterol reduces anxiety and synergizes with established anxiolytic drugs in mice. Cell Rep Med. 2021 May 18;2(5):100281.

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