

Product Data Sheet

Product Name: 25(R)-27-hydroxy Cholesterol

Cat. No.: GC13887

Chemical Properties

Cas. No. 20380-11-4

Chemical Name (25R)-cholest-5-ene-3 β ,26-diol

SMILES O[C@@H]1CC2=CC[C@]3([H])[C@@](CC[C@]4([C@@]3([H])CC[C@]4([H])[C@@H](CCC[C@@H](C)CO)C)C)([H])[C@](C)2CC1

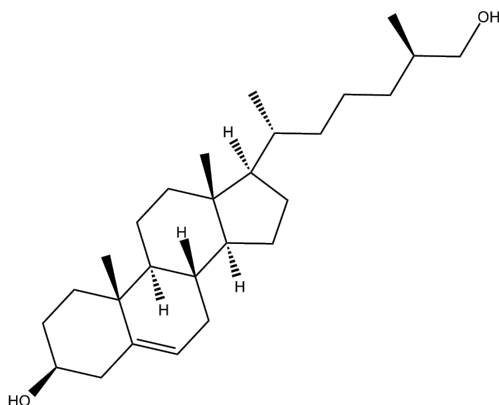
Formula C₂₇H₄₆O₂ M.Wt 402.7

Solubility ≤ 20 mg/ml in ethanol; 0.1mg/ml in DMSO; 2mg/ml in dimethyl formamide Storage Store at 2-8°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.

Structure



Protocol

Cell experiment [1]:

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Cell lines	LNCaP cells
Preparation Method	LNCaP cells were grown in RPMI 1640 medium supplemented with 10% FBS. All cells were maintained with 100U/ml penicillin, 100µg/ml streptomycin 0.25µg/ml amphotericin and were cultured at 5% CO₂ and 37 °C. Stock solutions of 25(R)-27-hydroxy Cholesterol were prepared in 100% ethanol and stored at –80 °C. 25(R)-27-hydroxy Cholesterol stock solution was dissolved in appropriate volumes of media to prepare the working solutions of 1µM. Proliferation assays were performed on black 96 well plates using cell proliferation assay which is based on quantifying cell number by DNA content and membrane integrity. Cells at 50–60% confluence were treated and incubated for 48h in the presence of 1µM 25(R)-27-hydroxy Cholesterol. Cell metabolic activity was determined.
Reaction Conditions	1µM; 48h
Applications	25(R)-27-hydroxy Cholesterol significantly promotes the proliferation of LNCaP cells and significantly increases the metabolic activity of the cells.

Animal experiment [2]:

Animal models	C57Bl/6 mice
Preparation Method	C57Bl/6 mice were randomized into the designated diet or treatment groups before graft. For EO771 tumor implantation experiments, female 8-week-old C57Bl/6 mice were ovariectomized and allowed 1 week for recovery. EO771 cells were then injected into an axillary mammary fat pad. Mice received daily subcutaneous injections of either 25(R)-27-hydroxy Cholesterol (20mg/kg) or vehicle (cyclodextrin) two days after EO771 cell engraftment. Mice were euthanized and tumors removed 8 days after engraftment for flow cytometric analysis.

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Dosage form 20mg/kg/day for 8 days; s.c.

Applications 25(R)-27-hydroxy Cholesterol treatment increased the presence of $\gamma\delta$ -T cells and reduced cytotoxic T cells, promoting tumor progression in mice.

References:

- [1] Raza S, Meyer M, Goodyear C, et al. The cholesterol metabolite 27-hydroxycholesterol stimulates cell proliferation via ER α in prostate cancer cells[J]. Cancer cell international, 2017, 17(1): 52.
- [2] Baek A E, Yu Y R A, He S, et al. The cholesterol metabolite 27 hydroxycholesterol facilitates breast cancer metastasis through its actions on immune cells[J]. Nature communications, 2017, 8(1): 864.

Background

25(R)-27-hydroxy Cholesterol is an agonist of liver X receptor (LXR) α and LXR β , with the EC₅₀ of 0.085 and 0.071 μ M, respectively^[1]. 25(R)-27-hydroxy Cholesterol, also known as (25R)-26-hydroxycholesterol or, 27-hydroxycholesterol, is the major stereoisomer of the endogenous oxygen sterol 27-hydroxycholesterol (comprising about 80% of the natural mixture)^[2]. 25(R)-27-hydroxycholesterol can impact the stability of cholesterol and has been widely used in studies on lipid metabolism control and regulation of the expression of genes related to inflammation^[3].

In vitro, 25(R)-27-hydroxy Cholesterol treatment 1 μ M at for 48 hours significantly promoted the proliferation of LNCaP cells and markedly increased their metabolic activity by activating the activity of estrogen receptor α (ER α)^[4]. Treatment with 5.6 μ M of 25(R)-27-hydroxy Cholesterol for 24 hours can inhibit human rhinovirus (HRV) infection in HeLa cells and reduce the markers of HRV replication^[5].

In vivo, 25(R)-27-hydroxy Cholesterol treatment (20mg/kg/day; s.c.) for 8 days increased the number of $\gamma\delta$ -T cells and reduced cytotoxic T cells, promoting tumor progression in xenograft tumor mouse models^[6]. Before the dark cycle began, intraperitoneal injection of a single dose of 20mg/kg 25(R)-

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27-hydroxy Cholesterol resulted in a rapid decrease in food intake in both male and female C57BL/6J wild-type mice, and increased the inter-meal interval of female mice, the entire effect lasted for 6 hours^[7]. After 25(R)-27-hydroxy Cholesterol (5.5mg/kg/day) was administered by subcutaneous injections to APP/PS1 transgenic mice for 3 weeks, severe lesions occurred in the ileum and colon, and the integrity of the intestinal barrier was impaired, accompanied by the dilation of tight junctions and the downregulation of tight junction proteins (including occludin, tight junction protein 1, tight junction protein 5, and ZO-1) ^[8].

References:

- [1] Fu X, Menke J G, Chen Y, et al. 27-hydroxycholesterol is an endogenous ligand for liver X receptor in cholesterol-loaded cells[J]. Journal of Biological Chemistry, 2001, 276(42): 38378-38387.
- [2] Javitt N B. 25R, 26-Hydroxycholesterol revisited: synthesis, metabolism, and biologic roles[J]. Journal of lipid research, 2002, 43(5): 665-670.
- [3] Kim D, Lee K M, Lee C, et al. Pathophysiological role of 27-hydroxycholesterol in human diseases[J]. Advances in biological regulation, 2022, 83: 100837.
- [4] Raza S, Meyer M, Goodyear C, et al. The cholesterol metabolite 27-hydroxycholesterol stimulates cell proliferation via ER β in prostate cancer cells[J]. Cancer cell international, 2017, 17(1): 52.
- [5] Civra A, Costantino M, Cavalli R, et al. 27-Hydroxycholesterol inhibits rhinovirus replication in vitro and on human nasal and bronchial histocultures without selecting viral resistant variants[J]. Antiviral Research, 2022, 204: 105368.
- [6] Baek A E, Yu Y R A, He S, et al. The cholesterol metabolite 27 hydroxycholesterol facilitates breast cancer metastasis through its actions on immune cells[J]. Nature communications, 2017, 8(1): 864.
- [7] Ye H, Yang X, Feng B, et al. 27-Hydroxycholesterol acts on estrogen receptor α expressed by POMC neurons in the arcuate nucleus to modulate feeding behavior[J]. Science Advances, 2024, 10(28): eadi4746.
- [8] Wang Y, An Y, Ma W, et al. 27-Hydroxycholesterol contributes to cognitive deficits in APP/PS1 transgenic mice through microbiota dysbiosis and intestinal barrier dysfunction[J]. Journal of neuroinflammation, 2020, 17(1): 199.

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