

Product Data Sheet

Product Name: 25-Hydroxycholesterol

Cat. No.: GC33860

Chemical Properties

Cas. No. 2140-46-7

Chemical Name
cholest-5-ene-3 β ,25-diol

SMILES CC(C)(O)CCC[C@@H](C)[C@H]1CC[C@@]2([H])[C@]3([H])CC=C4C[C@@H](O)CC[C@]4(C)[C@@]3([H])CC[C@]12C

Formula C₂₇H₄₆O₂ M.Wt 402.65

Solubility 20mg/mL in ethanol, 2mg/mL in DMF, 5mg/mL in DMSO (Need ultrasonic) Storage Store at -20°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.

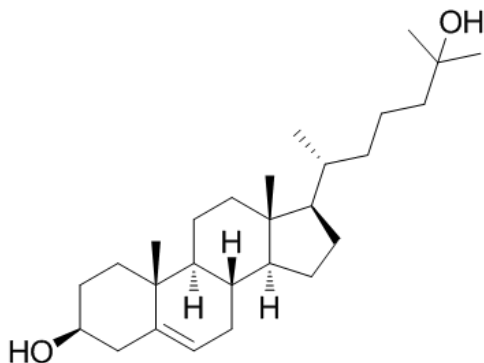
Caution: Product has not been fully validated for medical applications. For research use only.

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Structure



Protocol

Cell experiment [1]:

Cell lines

splenic B220⁺ cells

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Preparation method	Treated cells were diluted to 1×10^5 cells per well (96-well plate) into medium containing the indicated cytokines (TGF- β 1, IL-5, and IL-2) with or without 25-Hydroxycholesterol (250 nM) in triplicate. B cells were grown for an additional 6 days and cells and medium harvested.
Reaction Conditions	250 nM; 6 days
Applications	25-Hydroxycholesterol inhibited IgA secretion when measured on day 6, but had no effect when added on days 4 and 5.
Animal experiment [2]:	
Animal models	Ch25h ^{-/-} mice
Preparation method	mice were treated i.p. with 50 mg/kg 25-Hydroxycholesterol or vehicle (hydroxypropyl beta cyclodextrin) daily for 3 days with sacrifice 4 hours after the final dose.
Dosage form	50 mg/kg; i.p.
Applications	25-Hydroxycholesterol upregulated Chop and the additional ER stress markers BiP and Atf4 in the lungs of naive Ch25h ^{-/-} mice.

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References:

- [1] Bauman D R , Bitmansour A D , McDonald J G ,et al. 25-Hydroxycholesterol secreted by macrophages in response to Toll-like receptor activation suppresses immunoglobulin A production[J].Proceedings of the National Academy of Sciences, 2009, 106(39):16764-16769.
- [2] Madenspacher JH, Morrell ED, McDonald JG, et al. 25-Hydroxycholesterol exacerbates vascular leak during acute lung injury[J]. JCI Insight. 2023 10;8(7):e155448.

Background

25-hydroxycholesterol is a side-chain oxysterol produced by cholesterol metabolism and secreted by macrophages in response to Toll-like receptor (TLR) activation. 25-hydroxycholesterol effectively and selectively inhibits IgA production by B cells, with an EC_{50} of approximately 65nM^[1]. 25-hydroxycholesterol directly regulates lipid metabolism and inflammatory response in hepatocytes through LXR/SREBP-1 and I κ B α /NF κ B signaling^[2]. 25-hydroxycholesterol has antiviral effects and can also regulate transcriptional responses through AP-1 and act as an inflammatory amplifier^[3].

In vitro, 25-hydroxycholesterol (5 μ M) stimulated mouse macrophages for 18 hours, and RNA expression was analyzed by microarray and seven members of the AP-1 family (Fos, Fosb, Fosl1, Fosl2, Jun, Junb, and Jund) was significantly up-regulated^[3]. Treatment of splenic B220⁺ cells with 25-hydroxycholesterol (250 nM) for 6 days resulted in CSR inhibition, thereby inhibiting IgA secretion, but addition on days 4 and 5 had no effect because of the occurrence of Ig heavy chain site rearrangement^[4]. 25-hydroxycholesterol (10^{-4} , 10^{-5} and 10^{-6} M) dose-dependently inhibits the growth of sparse smooth muscle cells in ethanol vehicles^[5].

In vivo, 25-hydroxycholesterol (50 mg/kg; i.p.) upregulates Chop in the lungs of Ch25h^{-/-} mice, as well as the endoplasmic reticulum stress markers BiP and Atf4^[6]. 25-hydroxycholesterol (1.5mg/kg; i.v.) can protect rhesus monkeys from ZIKV virus infection, and 25-hydroxycholesterol (50mg/kg; i.p.) can also prevent ZIKV infection in mice and prevent microcephaly symptoms^[7].

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- [1] McDonald JG, et al. Editorial: 25-Hydroxycholesterol: a new life in immunology[J]. J Leukoc Biol. 2010 Dec;88(6):1071-1072.
- [2] Xu L , Bai Q , Rodriguez-Agudo D ,et al. Regulation of Hepatocyte Lipid Metabolism and Inflammatory Response by 25-Hydroxycholesterol and 25-Hydroxycholesterol-3-sulfate[J]. Lipids, 2010, 45(9): 821–832.
- [3]Elizabeth S. Gold, Alan H. Diercks, Irina Podolsky, et al. 25-Hydroxycholesterol acts as an amplifier of inflammatory signaling[J]. PNAS, 2014,111 (29):10666-10671.
- [4] Bauman D R , Bitmansour A D , Mcdonald J G ,et al.25-Hydroxycholesterol secreted by macrophages in response to Toll-like receptor activation suppresses immunoglobulin A production[J].Proceedings of the National Academy of Sciences, 2009, 106(39):16764-16769.
- [5]Cox D C , Comi K , Goldstein A L .Effects of cholesterol and 25-hydroxycholesterol on smooth muscle cell and endothelial cell growth[J].Lipids, 1988, 23(2):85-88.
- [6]Madenspacher JH, Morrell ED, McDonald JG, et al. 25-Hydroxycholesterol exacerbates vascular leak during acute lung injury[J]. JCI Insight. 2023 10;8(7):e155448.
- [7]Li C , Deng Y Q , Wang S ,et al.25-Hydroxycholesterol Protects Host against Zika Virus Infection and Its Associated Microcephaly in a Mouse Model.[J].Immunity, 2017, 46(3):446.

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