

Product Data Sheet

Product Name: 7-keto Cholesterol

Cat. No.: GC40572

Chemical Properties

Cas. No. 566-28-9

SMILES CC(C)CCC[C@@H](C)[C@@]1([H])CC[C@@]2([H])[C@]3([H])C(C=C4C[C@@H](O)CC[C@]4(C)[C@@]3([H])CC[C@@]21C)=O

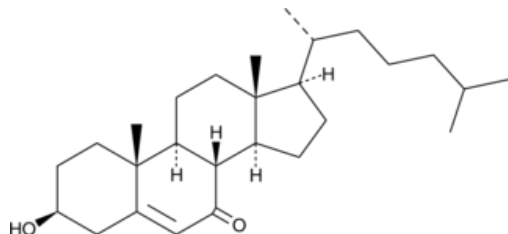
Formula $C_{27}H_{44}O_2$ M.Wt 400.6

Solubility $\leq 20\text{mg/ml}$ in ethanol; 10mg/ml in DMSO; 2mg/ml in dimethyl formamide 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.

Structure



Protocol

Cell experiment [1]:

Cell lines Human umbilical vein endothelial cells (HUVECs)

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

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Preparation Method HUVECs were pretreated with 50μM cholesterol or 7-keto Cholesterol for 18h, followed by 0.1ng/mL TNF-α for an additional 4h. Fresh total protein extracts were isolated from HUVECs using RIPA lysis buffer supplemented with protease and phosphatase inhibitors.

Reaction Conditions 50μM; 18h

Applications 7-keto Cholesterol upregulated the expression of adhesion molecules, particularly E-selectin, on HUVECs. 7-keto Cholesterol also enhanced the expression of IL-8 mRNA, but had no effect on MCP-1 expression.

Animal experiment [2]:

Animal models C57BL/6J mice

Preparation Method Mice were fed a normal laboratory diet (CRF-1), WD, or 7KWD for 3 weeks, and then surgery causing myocardial IR was performed. The WD contained 40% fat, 1% cholesterol and 0.5% cholic acid, and the 7KWD contained 40% fat, 0.9% cholesterol, 0.1% 7-keto Cholesterol and 0.5% cholic acid. Plasma was collected for cholesterol, oxysterol, and triglyceride measurements. Total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, and triglycerides were measured using enzymatic assay kits.

Dosage form Add 0.1% 7-keto Cholesterol to diet; p.o.

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Applications Dietary 7-keto Cholesterol significantly increases plasma oxysterol levels, especially those of 7-ketocholesterol and 7 β -hydroxycholesterol. 7-keto Cholesterol increased the expression of MCP-1 and the accumulation of CCR2-positive cells in heart.

References:

- [1]Tani M, Kamata Y, Deushi M, et al. 7-Ketocholesterol enhances leukocyte adhesion to endothelial cells via p38MAPK pathway[J]. PLoS One, 2018, 13(7): e0200499.
- [2]Uchikawa T, Matoba T, Kawahara T, et al. Dietary 7-ketocholesterol exacerbates myocardial ischemia–reperfusion injury in mice through monocyte/macrophage-mediated inflammation[J]. Scientific reports, 2022, 12(1): 14902.

Background

7-keto Cholesterol is a major oxysterol associated with vascular disease. It is widely present in atherosclerotic plaques and has a stronger atherogenic effect than cholesterol^[1]. 7-keto Cholesterol can inhibit the rate-limiting enzymes involved in the synthesis of bile acids and cholesterol, such as cholesterol 7 α -hydroxylase and HMG-CoA reductase^[2]. 7-keto Cholesterol has pro-inflammatory effects^[3].

In vitro, 7-keto Cholesterol (50 μ M) treatment of human umbilical vein endothelial cells (HUVECs) for 18h upregulated the expression of adhesion molecules (especially E-selectin), enhanced the expression of IL-8 mRNA, and enhanced the activity of NF- κ B^[4]. 7-keto Cholesterol (2.5-40 μ g/mL) treatment of human microvascular endothelial cells (HMVECs) dose-dependently inhibited cell viability and activated caspase-3/7, -8 and -12^[5]. Treatment of vascular smooth muscle cells (VSMCs) with 7-keto Cholesterol (5 μ g/mL) for 24h significantly increased the expression of interleukin-6 (IL-6)^[6].

In vivo, 7-keto Cholesterol (0.1%) added to the diet of mice treated with ischemia-reperfusion (IR) injury for 3 weeks increased the level of 7-keto Cholesterol in mouse plasma and increased the size of myocardial infarction after IR^[7].

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- [1] Brahmi F, Vejux A, Sghaier R, et al. Prevention of 7-ketocholesterol-induced side effects by natural compounds[J]. Critical reviews in food science and nutrition, 2019, 59(19): 3179-3198.
- [2] Morin R J, Peng S K. Cholesterol oxides in plasma and tissues[J]. Biological effects of cholesterol oxides, 1992: 89-101.
- [3] Alba G, Reyes-Quiróz M E, Sáenz J, et al. 7-Keto-cholesterol and 25-hydroxy-1 cholesterol rapidly enhance ROS production in human neutrophils[J]. European journal of nutrition, 2016, 55: 2485-2492.
- [4] Tani M, Kamata Y, Deushi M, et al. 7-Ketocholesterol enhances leukocyte adhesion to endothelial cells via p38MAPK pathway[J]. PLoS One, 2018, 13(7): e0200499.
- [5] Luthra S, Dong J, Gramajo A L, et al. 7-Ketocholesterol activates caspases-3/7,-8, and-12 in human microvascular endothelial cells in vitro[J]. Microvascular research, 2008, 75(3): 343-350.
- [6] Sung S C, Kim K, Lee K A, et al. 7-Ketocholesterol upregulates interleukin-6 via mechanisms that are distinct from those of tumor necrosis factor- α , in vascular smooth muscle cells[J]. Journal of vascular research, 2008, 46(1): 36-44.
- [7] Uchikawa T, Matoba T, Kawahara T, et al. Dietary 7-ketocholesterol exacerbates myocardial ischemia–reperfusion injury in mice through monocyte/macrophage-mediated inflammation[J]. Scientific reports, 2022, 12(1): 14902.

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