

## Product Data Sheet

Product Name: Isolithocholic Acid

Cat. No.: GC47466

### Chemical Properties

Cas. No. 1534-35-6

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

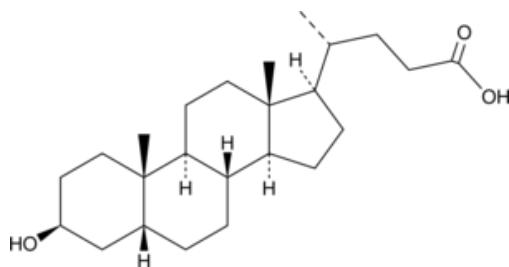
Formula C<sub>24</sub>H<sub>40</sub>O<sub>3</sub> M.Wt 376.6

Solubility DMSO : 13 mg/mL (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.

Structure



### Protocol

#### Cell experiment [1]:

Cell lines *Clostridium difficile*

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

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Overnight *Clostridium difficile* cultures were back diluted 1:10 into pre-reduced BHI plus 100mg/L L-cysteine broth and allowed to grow until OD600 reached mid log (0.45–0.50). The cells were challenged with or without bile acids (Isolithocholic acid) or DMSO (solvent). All tubes were incubated anaerobically at 37°C for 24h. At intervals of 0, 2, 4, and 24h, aliquots were removed and serially diluted. Unheated samples were plated on either BHI agar containing 100mg/L L-cysteine to enumerate only vegetative cells or on brain heart infusion agar with taurocholate (TBHI) agar (BHI containing 100mg/L L-cysteine and 0.1% taurocholate) to enumerate total vegetative cells and spores. After heat treatment (65°C for 20min), samples were plated on TBHI to enumerate total spores. Colonies were counted the next day to determine colony-forming units per milliliters (CFU/mL). Experiments were performed with three biological replicates.

Preparation Method

Reaction Conditions 0.03mM, 0.15mM; 0, 2, 4 and 24h

Applications Isolithocholic acid could reduce the activity of *Clostridium difficile* in a time-dependent manner, and at sub-inhibitory concentrations, it also reduced the expression of the toxin (tcdA).

### Animal experiment [2]:

Animal models C57BL/6J mice

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After the Nonalcoholic Steatohepatitis (NASH) model was successfully established, the mice were randomly divided into two groups: the NASH group, the Isolithocholic acid group. Isolithocholic acid group were administered orally at a dose of 200μL 50mg/kg per day for 8 weeks. After oral administration of BA Preparation Method on the last day of the 8th week, the mice were fasted for 24h and weighed. Blood samples were collected for ALT, AST, TC and TG assays. Liver tissues were collected for histopathological analysis (the methods for H&E staining, Oil red O staining and Sirius red staining were the same as those used for goat examination) and flow cytometry.

**Dosage form**            50mg/kg/day for 8 weeks; p.o.

**Applications**            Isolithocholic acid reduced the levels of ALT, AST, TC and TG in the mouse serum, alleviated the increase in inflammatory cells, lipid droplets and fibrosis. At the same time, the expression levels of IL-17A, Act 1, TRAF 6, ERK, JUN, FOSB, IL-6, TNF-α, S100 A9, IL-23 R, RORγt, MMP-1, PPARγ and FABP 1 were decreased, while the expression levels of IL-2R and Foxp 3 were increased.

### References:

- [1] Kisthardt S C, Thanissery R, Pike C M, et al. The microbial-derived bile acid lithocholate and its epimers inhibit Clostridioides difficile growth and pathogenicity while sparing members of the gut microbiota[J]. Journal of Bacteriology, 2023, 205(9): e00180-23.
- [2] Wang Y, Chen X, Huws S A, et al. Ileal microbial microbiome and its secondary bile acids modulate susceptibility to nonalcoholic steatohepatitis in dairy goats[J]. Microbiome, 2024, 12(1): 247.

### Background

Isolithocholic acid is an isomer of lithocholic acid. Isolithocholic acid is a bile acid formed through microbial metabolism of lithocholic acid or its 3α-sulfate [1]. Isolithocholic acid can be used to regulate lipid metabolism and cholesterol homeostasis [2-3].

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In vitro, Isolithocholic acid (0.625, 1.25, 2.5, 5, 10, 20 and 40μM; 18h) can dose-dependently inhibit the differentiation of initial CD<sup>4+</sup> T cells into TH17 cells, and has no significant effect on cell viability or total cell number [4]. The treatment with isolithocholic acid (0.03mM, 0.15mM; 24h) significantly reduced the viability of *Clostridium difficile*, and at lower inhibitory concentrations, it also decreased the expression of the toxin (tcdA) [5].

In vivo, Isolithocholic acid (50mg/kg/day; 8 weeks) orally administered to a mouse model induced by high-fat diet for Nonalcoholic Steatohepatitis (NASH) reduces the levels of ALT, AST, TC and TG in mouse serum, alleviates the increase of inflammatory cells, lipid droplets and fibrosis. At the same time, the expression levels of IL-17 A, Act 1, TRAF 6, ERK, JUN, FOSB, IL-6, TNF-α, S100 A9, IL-23 R, RORγt, MMP-1, PPARγ and FABP 1 are decreased, while the expression levels of IL-2 R and Foxp 3 are increased [6]. B6Tac mice with a filamentous bacterial (SFB) host fed a powdered diet containing Isolithocholic acid (0.3% w/w; 4 days) have a reduced level of existing TH17 cells in the intestinal lamina propria of mice [7].

### References:

- [1] Batta, A.K., Salen, G., and Shefer, S. Transformation of bile acids into iso-bile acids by *Clostridium perfringens*: Possible transport of 3β-hydrogen via the coenzyme Hepatology 5(6)1126-1131 (1985)
- [2] Lu Y, Du J, Peng S, et al. Therapeutic potential of isoallolithocholic acid in methicillin-resistant *Staphylococcus Aureus* peritoneal infection[J]. The Journal of Antibiotics, 2025, 78(3): 166-180.
- [3] Jiang J, Zhang H, Hussain M, et al. Novel Approaches in Glucose and Lipid Metabolism Disorder Therapy: Targeting the Gut Microbiota–Bile Acid Axis[J]. Biology, 2025, 14(7): 802.
- [4] Hindson J. Bile acid metabolites produced by gut bacteria suppress TH17 cells[J]. Nature Reviews Gastroenterology & Hepatology, 2022, 19(5): 280-280.
- [5] Kisthardt S C, Thanissery R, Pike C M, et al. The microbial-derived bile acid lithocholate and its epimers inhibit *Clostridioides difficile* growth and pathogenicity while sparing members of the gut microbiota[J]. Journal of Bacteriology, 2023, 205(9): e00180-23.
- [6] Wang Y, Chen X, Huws S A, et al. Ileal microbial microbiome and its secondary bile acids modulate susceptibility to nonalcoholic steatohepatitis in dairy goats[J]. Microbiome, 2024, 12(1): 247.
- [7] Paik D, Yao L, Zhang Y, et al. Human gut bacteria produce TH17-modulating bile acid metabolites[J]. Nature, 2022, 603(7903): 907-912.

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