
Product Data Sheet

Product Name: 2-Ketoglutaric acid

Cat. No.: GC30136

Chemical Properties

Cas. No. 328-50-7

SMILES OC(=O)CCC(=O)C(O)=OFormula $C_5H_6O_5$

M.Wt 146.1

Solubility Water : 50 mg/mL (342.23 mM)

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 IPEC-J2 cells

Preparation Method IPEC-J2 cells were cultured in plastic culture flasks (25cm²) in DMEM-H medium containing 10% FBS, 5mM L-glutamine, 100U/mL penicillin, and 100µg/mL streptomycin. When the cells reached 80% confluence, the cells were digested with trypsin and seeded in 6-well culture plates at 8×10^3 cells per well in a humidified incubator at 37 °C with 5% CO₂. After overnight culture, the medium was replaced with basal medium (blank control, groups 1 and 3) and basal medium plus 0.1mM H₂O₂ (groups 2 and 4) for 4 hours. After that, 2mM 2-Ketoglutaric acid was added to groups 3 and 4, and cells were harvested after 2 days of culture to determine cell viability.

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

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Reaction
Conditions 2mM; 48h

Applications 2-Ketoglutaric acid treatment significantly alleviated the H₂O₂-induced decrease in cell viability of IPEC-J2 cells.

**Animal
experiment [2]:**

Animal models C57BL/6 mice

Preparation
Method

Female C57BL/6 mice (8 weeks of age) were housed in an air-conditioned room (23 °C ± 2 °C) with a 12-h light/dark cycle. Mice had free access to food and water. The nutrient composition of the feed was 60.7% nitrogenous extract, 15.2% protein, 12.1% water, 5.0% mineral ash, 4.1% cellulose and 2.9% lipid. Mice were randomly divided into three groups, with 10 mice in each group: control group, 2% dextran sulfate sodium (DSS) group, and 2% DSS+ 2-Ketoglutaric acid group (10mg/kg/day). The body weight of each mouse was assessed for 3 consecutive days, and 2-Ketoglutaric acid was administered orally for 14 days. On day 7, colitis was induced by supplementing the drinking water of mice with 2% DSS for 8 consecutive days. Mice were sacrificed after 15 days, and intestinal samples were collected for analysis.

Dosage form 10mg/kg/day for 14 days; p.o.

Applications 2-Ketoglutaric acid treatment significantly inhibited DSS-induced intestinal injury and abnormal intestinal dysfunction in mice.

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References:

[1] Jiang Q, Liu G, Wang X, et al.

Mitochondrial pathway is involved in the protective effects of alpha-ketoglutarate on hydrogen peroxide induced damage to intestinal cells[J].

Oncotarget, 2017, 8(43): 74820.

[2] Kim S, Jang S H, Kim M J, et al.

Hybrid nutraceutical of 2-ketoglutaric acid in improving inflammatory bowel disease: Role of prebiotics and TAK1 inhibitor[J].

Biomedicine & Pharmacotherapy, 2024, 171: 116126.

Background

2-Ketoglutaric acid is a reversible inhibitor of tyrosinase, with an IC_{50} value of $15 \pm$

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0.5mM^[1]. 2-Ketoglutaric acid is naturally found in organisms and is an intermediate in the production of ATP or GTP in the Krebs cycle^[2]. Widely used as an antioxidant, 2-Ketoglutaric acid reduced cyanide-induced GSH depletion and DNA damage in rat in vitro and in vivo models^[3].

In vitro, 2-Ketoglutaric acid treatment at 0.1mM for 8 days promoted cell growth in C2C12 cells and decreased intracellular glucose consumption and ammonia production^[4]. Pretreatment of rabbit dermal papilla cells with 6mM 2-Ketoglutaric acid for 24h alleviated the H₂O₂-induced decrease in cell viability, reduced ROS accumulation, and restored mitochondrial membrane potential damaged by oxidative stress^[5]. Pretreatment with 5mM 2-Ketoglutaric acid for 30min significantly prevented 5mM potassium cyanide-induced cell toxicity and attenuated mitochondrial dysfunction in rat thymocytes^[6].

In vivo, 2-Ketoglutaric acid treatment via oral administration at a dose of 10mg/kg/day for 14 days significantly inhibited dextran sulfate sodium-induced intestinal injury, and prevented disruption of gut microbial homeostasis in a mouse model of colitis^[7]. Oral administration of 2-Ketoglutaric acid at a dose of 10mg/kg daily for 10 days helped to repair the intestinal barrier damage induced by high altitude exposure in mice^[8].

References:

- [1] Gou L, Lee J, Yang J M, et al. The effect of alpha-ketoglutaric acid on tyrosinase activity and conformation: Kinetics and molecular dynamics simulation study[J]. International Journal of Biological Macromolecules, 2017, 105: 1654-1662.
- [2] Huergo L F, Dixon R. The emergence of 2-oxoglutarate as a master regulator metabolite[J]. Microbiology and Molecular Biology Reviews, 2015, 79(4): 419-435.
- [3] Liu S, He L, Yao K. The antioxidative function of alpha-ketoglutarate and its applications[J]. BioMed research international, 2018, 2018(1): 3408467.
- [4] Yang B, Liu Y, Steinacker J M. α -Ketoglutarate stimulates cell growth through the improvement of glucose and glutamine metabolism in C2C12 cell culture[J]. Frontiers in Nutrition, 2023, 10: 1145236.
- [5] Wang X, Li S, Chen J, et al. Exogenous Alpha-Ketoglutaric Acid Alleviates the Rabbit Dermal Papilla Cell Oxidative Damage Caused by Hydrogen Peroxide Through the ERK/Nrf2 Signaling Pathway[J]. Antioxidants, 2025, 14(4): 455.

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- [6] Bhattacharya R, Rao P V L, Vijayaraghavan R. In vitro and in vivo attenuation of experimental cyanide poisoning by α -ketoglutarate[J]. Toxicology Letters, 2002, 128(1-3): 185-195.
- [7] Kim S, Jang S H, Kim M J, et al. Hybrid nutraceutical of 2-ketoglutaric acid in improving inflammatory bowel disease: Role of prebiotics and TAK1 inhibitor[J]. Biomedicine & Pharmacotherapy, 2024, 171: 116126.
- [8] Sun X, Li W, Chen G, et al. Faecalibacterium duncaniae Mitigates Intestinal Barrier Damage in Mice Induced by High-Altitude Exposure by Increasing Levels of 2-Ketoglutaric Acid[J]. Nutrients, 2025, 17(8): 1380.

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