
Product Data Sheet

Product Name: Maltol
Cat. No.: GC36536

Chemical Properties

Cas. No. 118-71-8

SMILES O=C1C(O)=C(C)OC=C1

Formula $C_6H_6O_3$

M.Wt 126.11

Solubility DMSO: 100 mg/mL (792.96 mM); Water: 7.69 mg/mL (60.98 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 B16F10 cells

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

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Preparation Method	<p>B16F10 cells were maintained in Dulbecco's modified Eagle's medium supplemented with 10% fetal bovine serum and 1% penicillin/streptomycin. B16F10 cells (1×10^5/well) were exposed to Maltol(5 or 10μg/ml in medium) and then treated with α-MSH (100nM) for 72h. For the melanin content assay, the cell pellets were dissolved in 1N NaOH containing 10% dimethyl sulfoxide (DMSO) and subjected to cell lysis for 1h at 80°C. The optical density of melanin content was spectrophotometrically measured with a microplate reader (405nm). In the tyrosinase activity assay, the cell pellets were lysed in PBS containing 1% Triton X-100 for 2h at 80°C. A freshly prepared substrate (L-DOPA, 10mM) was then added and incubated for 30min at 37°C. The resulting absorbance was spectrophotometrically analyzed with a microplate reader (475nm).</p>
Reaction Conditions	5 or 10 μ g/ml; 72h
Applications	Maltol reduced melanin contents and tyrosinase activity.
Animal experiment [2]:	
Animal models	C57BL/6 mice

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Preparation Method	<p>C57BL/6 mice were randomly assigned to four groups (control group, spinal instability group, spinal instability+15mg/kg Maltol group, and spinal instability+30mg/kg Maltol group). The mice in the spinal instability group and Maltol groups were subjected to surgical manipulation to generate the lumbar spine instability model. Following surgery, the corresponding drug treatment was administered according to the grouping. Mice in the control group were treated with phosphate-buffered saline (PBS), while those in the Maltol groups received 15mg/kg or 30mg/kg Maltol (dissolved in PBS) by gavage twice a week, respectively, and the IDD group was not treated with the drug. Subsequently, mice were euthanized 12 weeks after surgery with excessive 1% pentobarbital, and IVD tissues were taken for histological and immunohistochemical analysis.</p>
Dosage form	15 or 30mg/kg; p.o.; twice a week for 12 weeks
Applications	<p>Maltol inhibited the degradation of ECM and inflammatory response, increased anabolic protein expression, decreased catabolic protein expression, and reduced the secretion of inflammatory mediators such as IL-18 and IL-1β.</p>

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References:

[1] Han, N. R., Park, H. J., Ko, S. G., & Moon, P. D. (2023). Maltol has anti-cancer effects via modulating PD-L1 signaling pathway in B16F10 cells. *Frontiers in pharmacology*, *14*, 1255586.

[2] Gong, Y., Qiu, J., Jiang, T., Li, Z., Zhang, W., Zheng, X., He, Z., Chen, W., Wang, Z., Feng, X., Wang, M., & Hong, Z. (2023). Maltol ameliorates intervertebral disc degeneration through inhibiting PI3K/AKT/NF- κ B pathway and regulating NLRP3 inflammasome-mediated pyroptosis. *Inflammopharmacology*, *31*(1), 369–384.

Background

Maltol is a naturally occurring organic compound that is flavour enhancer and flavouring agent^[1]. Maltol is also an antioxidant agent and a metal ion chelator^{[2][3]}. Maltol is usually be used in the field of catalysis, food chemistry, and medicine^{[4][5]}.

In vitro, treatment of B16F10 cells with Maltol (5 or 10 μ g/ml in medium; 72h) reduced

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melanin contents, tyrosinase activity, and expression levels of tyrosinase and tyrosinase-related protein 1, suppressed the proliferative capacity, induced cell cycle arrest, increased apoptotic rates by elevating cleaved caspase-3 and PARP, and demonstrated a synergistic effect with cisplatin in inhibiting growth and promoting apoptosis^[6].

In vivo, Oral treatment of D-galactose-induced liver and kidney aging and injury mice with Maltol (50 or 100mg/kg/day; 4 weeks) activated aging-associated proteins including p53, p21, and p16 followed by inhibiting malondialdehyde (MDA)'s over-production and increasing the levels of antioxidant enzymes^[7]. Oral gavage of Maltol (15 or 30mg/kg; twice a week) for 12 weeks in intervertebral disc degeneration (IDD) mice inhibited the degradation of ECM and inflammatory response by suppressing the PI3K/AKT/NF- κ B pathway and NLRP3 inflammasome-mediated pyroptosis, increased anabolic protein expression, decreased catabolic protein expression, and reduced the secretion of inflammatory mediators such as IL-18 and IL-1 β ^[8].

References:

- [1] Han, Y., Xu, Q., Hu, J. N., Han, X. Y., Li, W., & Zhao, L. C. (2015). Maltol, a food flavoring agent, attenuates acute alcohol-induced oxidative damage in mice. *Nutrients*, 7(1), 682–696.
- [2] Guo, N., , Li, C., , Liu, Q., , Liu, S., , Huan, Y., , Wang, X., , Bai, G., , Yang, M., , Sun, S., , Xu, C., , & Shen, Z., (2018). Maltol, a food flavor enhancer, attenuates diabetic peripheral neuropathy in streptozotocin-induced diabetic rats. *Food & function*, 9(12), 6287–6297.
- [3] Yang, Y., Wang, J., Xu, C., Pan, H., & Zhang, Z. (2006). Maltol inhibits apoptosis of human neuroblastoma cells induced by hydrogen peroxide. *Journal of biochemistry and molecular biology*, 39(2), 145–149.
- [4] Krishnakumar, V., Barathi, D., Mathammal, R., Balamani, J., & Jayamani, N. (2014). Spectroscopic properties, NLO, HOMO-LUMO and NBO of maltol. *Spectrochimica acta. Part A, Molecular and biomolecular spectroscopy*, 121, 245–253.
- [5] Thompson, K. H., Barta, C. A., & Orvig, C. (2006). Metal complexes of maltol and close analogues in medicinal inorganic chemistry. *Chemical Society reviews*, 35(6), 545–556.
- [6] Han, N. R., Park, H. J., Ko, S. G., & Moon, P. D. (2023). Maltol has anti-cancer effects via modulating PD-L1 signaling pathway in B16F10 cells. *Frontiers in pharmacology*, 14, 1255586.

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[7] Sha, J. Y., Li, J. H., Zhou, Y. D., Yang, J. Y., Liu, W., Jiang, S., Wang, Y. P., Zhang, R., Di, P., & Li, W. (2021). The p53/p21/p16 and PI3K/Akt signaling pathways are involved in the ameliorative effects of maltol on D-galactose-induced liver and kidney aging and injury. *Phytotherapy research : PTR*, 35(8), 4411–4424.

[8] Gong, Y., Qiu, J., Jiang, T., Li, Z., Zhang, W., Zheng, X., He, Z., Chen, W., Wang, Z., Feng, X., Wang, M., & Hong, Z. (2023). Maltol ameliorates intervertebral disc degeneration through inhibiting PI3K/AKT/NF- κ B pathway and regulating NLRP3 inflammasome-mediated pyroptosis. *Inflammopharmacology*, 31(1), 369–384.

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