

Product Data Sheet

Product Name: Betanin
Cat. No.: GC31409

Chemical Properties

Cas. No. 7659-95-2

SMILES OC([C@@H]1CC(/C=C/N2C3=CC(O)=C(O[C@@H]4O[C@@H]([C@@H](O)[C@H](O)[C@H]4O)CO)C=C3C[C@H]2C(O)=O)=CC(C(O)=O)=N1)=O

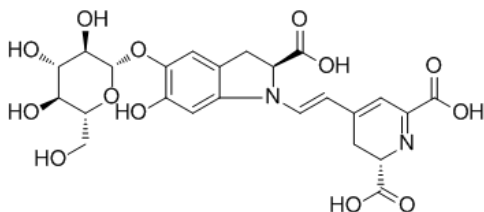
Formula $C_{24}H_{26}N_2O_{13}$ M.Wt 550.47

Solubility Water : 150 mg/mL (272.49 mM) Storage Store at -20°C, protect from light, stored under nitrogen

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 K562 cells

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

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Preparation Method Cells were placed in a 96-well plate and incubated with or without Betanin (10, 20, 40, 80 μ M) for 12, 24, and 48h. Cell viability was determined by MTT assay.

Reaction Conditions 10, 20, 40, 80 μ M; 12, 24, 48h

Applications Betanin inhibits cell viability in a dose- and time-dependent manner.

Animal experiment [2]:

Animal models ICR mice

Preparation Method Forty male ICR mice were randomly divided into four groups: Sham-veh, TMT-veh, TMT-Bet50 and TMT-Bet100. In the TMT groups, neurodegeneration was induced with a one-time intraperitoneal injection of 2.6mg/kg TMT. Betanin-treated groups (Bet) were given oral doses of 50 or 100mg/kg dissolved in normal saline solution. Administrations were started 24h prior to TMT injection and continued for 2 weeks. Anxious behavior and spatial cognition were evaluated, respectively. After behavioral tests, brain oxidative status, hippocampal histology and choline acetyltransferase (ChAT) activity were evaluated.

Dosage form 50、100mg/kg for 2 weeks; p.o.

Applications Betanin 100mg/kg exhibited significant anxiolytic effect, preventive effect on CA1 degeneration and CA1 ChAT activity alteration as well as improvement of spatial learning and memory deficits.

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References:

- [1] Sreekanth D, Arunasree M K, Roy K R, et al. Betanin a betacyanin pigment purified from fruits of *Opuntia ficus-indica* induces apoptosis in human chronic myeloid leukemia Cell line-K562[J]. *Phytomedicine*, 2007, 14(11): 739-746.
- [2] Thong-Asa W, Prasertsri S, Klomkleaw N, et al. The neuroprotective effect of betanin in trimethyltin-induced neurodegeneration in mice[J]. *Metabolic Brain Disease*, 2020, 35: 1395-1405.

Background

Betanin is a red glycoside extracted from beets. It is a water-soluble nitrogen-containing pigment that can be used as a food colorant^[1]. Betanin is unstable and easily degraded under light and high temperature^[2]. Betanin has anti-inflammatory and antioxidant activities and also has neuroprotective effects^[3].

In vitro, Betanin (10-80 μ M) treatment of human chronic myeloid leukemia cell line K562 cells for 12-48h dose- and time-dependently inhibited cell viability, induced cell apoptosis, induced the release of cytochrome c from mitochondria to the cytosol, and reduced membrane potential^[4]. Betanin (15 μ M) treatment of THP-1 cells for 24h significantly induced the expression of IL-1 β , IL-8, and IL-10 mRNA in cells^[5].

In vivo, oral administration of Betanin (100mg/kg) to a neurodegenerative disease model mouse for 2 weeks had a significant anxiolytic effect, prevented hippocampal CA1 degeneration and changes in choline acetyltransferase (ChAT) activity, and improved spatial learning and memory impairment^[6]. Oral administration of Betanin (20mg/kg) to a hyperlipidemic diet-induced oxidative stress rat for 20 days reduced liver malondialdehyde content, increased superoxide dismutase, catalase, and glutathione peroxidase activities, and reversed liver tissue damage^[7].

References:

- [1] Coy-Barrera E. Analysis of betalains (betacyanins and betaxanthins)[M]//Recent advances in natural products analysis. Elsevier, 2020: 593-619.
- [2] Azeredo H M C. Betalains: properties, sources, applications, and stability—a review[J]. *International journal of food science & technology*, 2009, 44(12): 2365-2376.
- [3] Thong-Asa W, Puenpha K, Lairaksa T, et al. Neuroprotective effects of betanin in mice with

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- cerebral ischemia-reperfusion injury[J]. *Experimental Animals*, 2023, 72(3): 336-345.
- [4] Sreekanth D, Arunasree M K, Roy K R, et al. Betanin a betacyanin pigment purified from fruits of *Opuntia ficus-indica* induces apoptosis in human chronic myeloid leukemia Cell line-K562[J]. *Phytomedicine*, 2007, 14(11): 739-746.
- [5] Muramatsu D, Uchiyama H, Higashi H, et al. Effects of heat degradation of betanin in red beetroot (*Beta vulgaris* L.) on biological activity and antioxidant capacity[J]. *Plos one*, 2023, 18(5): e0286255.
- [6] Thong-Asa W, Prasartsri S, Klomkleaw N, et al. The neuroprotective effect of betanin in trimethyltin-induced neurodegeneration in mice[J]. *Metabolic Brain Disease*, 2020, 35: 1395-1405.
- [7] da Silva D V T, Pereira A D A, Boaventura G T, et al. Short-term betanin intake reduces oxidative stress in wistar rats[J]. *Nutrients*, 2019, 11(9): 1978.

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