

## Product Data Sheet

Product Name: Paeoniflorin

Cat. No.: GN10452

### Chemical Properties

Cas. No. 23180-57-6

Chemical Name ((2S,2aR,2a1S,3aR,4R,5aR)-4-hydroxy-2-methyl-2a-(((2S,3R,4S,5S,6R)-3,4,5-trihydroxy-6-(hydroxymethyl)tetrahydro-2H-pyran-2-yl)oxy)hexahydro-2H-1,5-dioxo-2,4-methanocyclobuta[cd]pentalen-2a1-yl)methyl benzoate

SMILES O=C(C1=C([H])C([H])=C([H])C([H])=C1[H])OC([H])([H])[C@@]2([C@@]3([H])C4([H])[H])[C@]4([C@@](C5([H])[H])(C([H])([H])[H])O[C@]2([H])O[C@@]35O[H])O[C@]([C@]([C@@]6([H])O[H])([H])O[H])([H])O[C@@]([C]([H])([H])O[H])([H])[C@@]6([H])O[H])

Formula C<sub>23</sub>H<sub>28</sub>O<sub>11</sub>

M.Wt 480.47

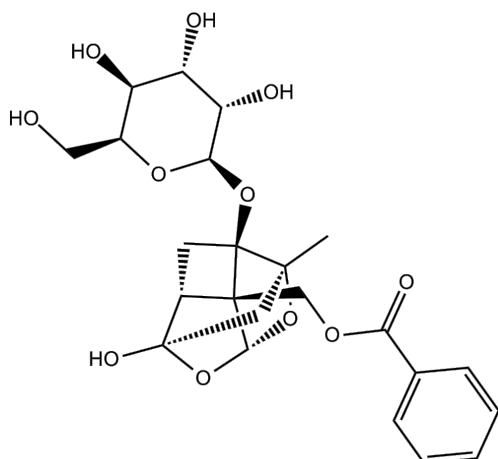
Solubility DMF: 30 mg/mL, DMSO: 30 mg/mL, Ethanol: 30 mg/mL, PBS (pH 7.2): 10 mg/mL

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

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

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### Cell experiment [1]:

Cell lines                      A549 cells (human type II alveolar epithelial cell line)

Preparation Method                      A549 cells were maintained in RPMI-1640 medium supplemented with 10% fetal bovine serum (FBS) at 37°C, 5% CO<sub>2</sub>. For EMT induction, cells were incubated with TGF-β1 (2ng/mL). Paeoniflorin was co-incubated with TGF-β1 at 1-30μM.

Reaction  
Conditions                      1-30μM; 48h

Applications                      Paeoniflorin significantly inhibited TGF-β1-induced epithelial-mesenchymal transition (EMT) in A549 cells, as evidenced by the reversal of morphological changes to a mesenchymal phenotype, reduction of cell migration, up-regulation of epithelial marker E-cadherin, and down-regulation of mesenchymal markers Vimentin and α-SMA.

### Animal experiment [2]:

Animal models                      C57BL/6J mice

Preparation Method                      Mice were intraperitoneally Administered acetaminophen (APAP; 300mg/kg) to induce acute liver injury. Paeoniflorin (50, 100, 200mg/kg) was administered intraperitoneally once daily for 5 consecutive days before APAP injection. Mice were sacrificed 24 hours after APAP administration for serum and liver tissue collection.

Dosage form                      50, 100, 200mg/kg; i.p.; Once daily for 5 days.

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### Applications

Paeoniflorin pretreatment significantly attenuated APAP-induced acute liver injury, as evidenced by reduced serum levels of ALT, AST, ALP,  $\gamma$ -GT, and TBIL, and ameliorated liver histopathological changes including hepatocyte necrosis, inflammatory cell infiltration, and congestion. Paeoniflorin also suppressed oxidative stress by decreasing MDA levels and increasing SOD and GSH activities, and inhibited apoptosis by regulating the Bax/Bcl-2 ratio and cleaved caspase-3 expression. Mechanistically, Paeoniflorin activated autophagy through the MAPK/mTOR signaling pathway, which contributed to its hepatoprotective effects against APAP-induced liver damage.

### References:

- [1] Ji Y, Dou YN, Zhao QW, et al. Paeoniflorin suppresses TGF- $\beta$  mediated epithelial-mesenchymal transition in pulmonary fibrosis through a Smad-dependent pathway. *Acta Pharmacol Sin.* 2016 Jun;37(6):794-804.
- [2] Deng X, Li Y, Chen Y, et al. Paeoniflorin protects hepatocytes from APAP-induced damage through launching autophagy via the MAPK/mTOR signaling pathway. *Cell Mol Biol Lett.* 2024 Sep 7;29(1):119.

### Background

Paeoniflorin is a pinane monoterpene glycoside extracted from the roots of *Paeonia* plants of the Ranunculaceae family, possessing multiple biological activities<sup>[1-2]</sup>. Through mechanisms such as activating adenosine A1 receptors, inhibiting COX-2 expression, and downregulating HIF-1 $\alpha$ , Paeoniflorin exerts anti-inflammatory, immunomodulatory, analgesic, anti-tumor, antioxidant stress, and anti-platelet aggregation effects. Paeoniflorin can be used in research related to rheumatoid arthritis, cardiovascular diseases, neurological disorders, and tumors<sup>[3-4]</sup>.

In vitro, Paeoniflorin (60 $\mu$ M) pretreatment of ER-positive breast cancer cell lines T47D and MCF-7 for 48 hours, followed by combination treatment with Tamoxifen (8 $\mu$ M for T47D, 16 $\mu$ M for MCF-7), Paeoniflorin significantly enhanced Tamoxifen-induced apoptosis, upregulated the Bax/Bcl-2 protein expression ratio and Caspase 3 activity, while inhibiting STAT3 phosphorylation and its downstream target gene c-Myc expression by promoting SIRT4 expression<sup>[5]</sup>. Paeoniflorin (1-30 $\mu$ M) co-treatment

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with TGF- $\beta$ 1 (2ng/mL) in human alveolar epithelial cells A549 for 48 hours, Paeoniflorin significantly inhibited TGF- $\beta$ 1-induced epithelial-mesenchymal transition (EMT), reduced cell migration ability and Vimentin and  $\alpha$ -SMA expression, while downregulating the transcription factor Snail expression through the Smad-dependent pathway and reducing type I and III collagen secretion<sup>[6]</sup>.

In vivo, Paeoniflorin (50, 100, 200mg/kg/day) intraperitoneal injection in acetaminophen (APAP; 300mg/kg)-induced drug-induced liver injury C57BL/6J male mice (preventive administration starting 5 days before modeling, for 5 consecutive days), Paeoniflorin significantly reduced serum ALT, AST, ALP,  $\gamma$ -GT, and TBIL levels, alleviated liver tissue inflammation and edema, and protected hepatocytes from APAP damage by activating autophagy through inhibiting the MAPK/mTOR signaling pathway, reducing oxidative stress and apoptosis<sup>[7]</sup>. Paeoniflorin (5, 10mg/kg/day) intraperitoneal injection in LPS-induced cognitive dysfunction ICR male mice (starting after LPS injection, for 3 consecutive weeks), Paeoniflorin significantly improved spatial memory, recognition memory, and long-term learning ability in mice, and alleviated LPS-induced cognitive deficits by inhibiting the expression of APP, BACE, PS1, and PS2 proteins in the brain and reducing  $\beta$ -amyloid production<sup>[8]</sup>.

### References:

- [1] Zhang L, Wei W. Anti-inflammatory and immunoregulatory effects of paeoniflorin and total glucosides of paeony. *Pharmacol Ther.* 2020 Mar;207:107452.
- [2] Zhang XX, Zuo JQ, Wang YT, et al. Paeoniflorin in Paeoniaceae: Distribution, influencing factors, and biosynthesis. *Front Plant Sci.* 2022 Sep 2;13:980854.
- [3] Ma Y, Lang X, Yang Q, et al. Paeoniflorin promotes intestinal stem cell-mediated epithelial regeneration and repair via PI3K-AKT-mTOR signalling in ulcerative colitis. *Int Immunopharmacol.* 2023 Jun;119:110247.
- [4] Wang XL, Feng ST, Wang YT, et al. Paeoniflorin: A neuroprotective monoterpenoid glycoside with promising anti-depressive properties. *Phytomedicine.* 2021 Sep;90:153669.
- [5] Zhang P, Wu N, Song ZJ, et al. Paeoniflorin Enhances the Sensitivity of ER-Positive Breast Cancer Cells to Tamoxifen through Promoting Sirtuin 4. *Evid Based Complement Alternat Med.* 2022 Jan 15;2022:6730559.
- [6] Ji Y, Dou YN, Zhao QW, et al. Paeoniflorin suppresses TGF- $\beta$  mediated epithelial-mesenchymal transition in pulmonary fibrosis through a Smad-dependent pathway. *Acta Pharmacol Sin.* 2016 Jun;37(6):794-804.
- [7] Deng X, Li Y, Chen Y, et al. Paeoniflorin protects hepatocytes from APAP-induced damage

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through launching autophagy via the MAPK/mTOR signaling pathway. Cell Mol Biol Lett. 2024 Sep 7;29(1):119.

[8] Meng HW, Kim JH, Kim HY, et al. Paeoniflorin Attenuates Lipopolysaccharide-Induced Cognitive Dysfunction by Inhibition of Amyloidogenesis in Mice. Int J Mol Sci. 2023 Mar 2;24(5):4838.

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