

Product Data Sheet

Product Name: DMH-1
Cat. No.: GC14298

Chemical Properties

Cas. No. 1206711-16-1

SMILES CC(C)OC1=CC=C(C=C1)C2=CN3C(=C(C=N3)C4=CC=NC5=CC=CC=C45)N=C2

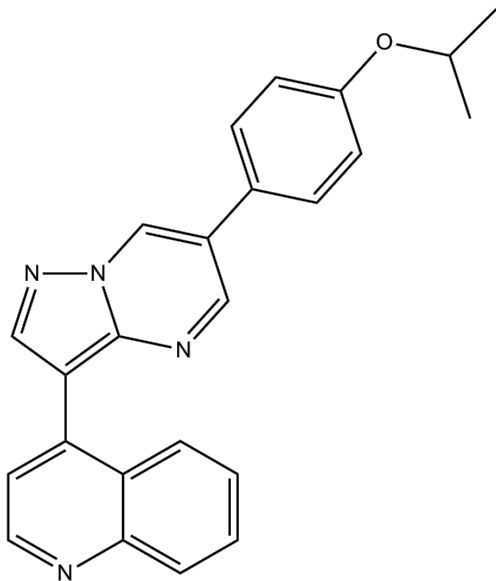
Formula $C_{24}H_{20}N_4O$ M.Wt 380.44

Solubility ≥ 9.511 mg/mL in DMSO 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]:

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Cell lines	Hep3B, HepG2, PLC/PRF/5 cells (human hepatocellular carcinoma cell line)
Preparation Method	Hep3B, HepG2 and PLC/PRF/5 cells were maintained in appropriate medium. Hep3B cells were preincubated with 10nM DMH-1 for 15min before 15min stimulation with 200ng/mL recombinant human BMP13. Hep3B cells were pretreated with 10nM DMH-1 for 20min before 8h stimulation with 200ng/mL recombinant human BMP13 for mRNA analysis. Hep3B cells were treated with 10nM DMH-1 for 15min before 24h stimulation with 200ng/mL recombinant human BMP13 for proliferation assay.
Reaction Conditions	10nM; 15min-24h
Applications	DMH-1 completely blocked BMP13-induced SMAD1/5/9 phosphorylation in Hep3B cells. DMH-1 reduced BMP13-induced ID1 mRNA expression in Hep3B cells. DMH-1 completely inhibited BMP13-induced proliferation of Hep3B cells.
Animal experiment [2]:	
Animal models	Male C57BL/6 mice
Preparation Method	Mice were intraperitoneally injected with 5mg/kg DMH-1 every other day starting 3 days before left anterior descending coronary artery (LAD) ligation and continuing to 28 days after surgery. Cardiac function, infarct size, and fibrosis were assessed by echocardiography, TTC staining, and Masson staining at 28 days after myocardial infarction (MI).
Dosage form	5mg/kg; i.p.; every other day from 3 days before LAD ligation to 28 days after surgery

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Applications	DMH-1 reduced left ventricular ejection fraction and left ventricular fractional shortening. DMH-1 increased left ventricular end-diastolic diameter and left ventricular end-systolic diameter. DMH-1 increased myocardial fibrosis area in the aortic and ventricular sections.
References:	
[1] Kersten V, Seitz T, Sommer J, et al. Bone Morphogenetic Protein 13 Has Protumorigenic Effects on Hepatocellular Carcinoma Cells In Vitro. Int J Mol Sci. 2023 Jul 4;24(13):11059.	
[2] Liu M, Pei J, Zeng C, et al. BMP7 attenuates myocardial injury and preserves cardiac function after myocardial infarction by inhibiting cardiomyocyte pyroptosis. Apoptosis. 2026;31:57.	

Background

DMH-1 is a selective bone morphogenetic protein (BMP) type I receptor ALK2 inhibitor with an IC₅₀ value of 108nM. DMH-1 blocks BMP receptor activation, thereby inhibiting Smad1/5/8 phosphorylation and downregulating Id1, Id2, and Id3 expression. DMH-1 suppresses BMP-mediated osteogenesis, mineralization, and cancer cell proliferation while promoting cardiomyocyte differentiation. DMH-1 can be used in studies related to tumors, stem cell and developmental biology, musculoskeletal and genetic diseases^[1-4].

In vitro, treatment of A549 and H460 cells with 1-5μM DMH-1 for 24-72 hours decreased p-Smad1/5/8 levels and downregulated Id1, Id2, and Id3 mRNA expression. DMH-1 slowed cell migration, reduced cell proliferation, and increased the proportion of dead cells^[5]. Treatment of A549 and H1299 cells with 1μM DMH-1 for 7-14 days reduced viable cell numbers, inhibited colony formation, and decreased soft agar anchorage-independent growth colonies^[6]. Pretreatment of Hep3B cells with 10nM DMH-1 for 15-20 minutes followed by stimulation with 200ng/mL recombinant human BMP13 for 15 minutes to 24 hours blocked BMP13-induced SMAD1/5/9 phosphorylation, reduced ID1 mRNA expression, and inhibited cell proliferation^[7].

In vivo, intraperitoneal injection of 5mg/kg DMH-1 every other day for 16 consecutive days to NSG mice bearing PC3-TxR cells reduced tumor volume and tumor weight and decreased Ki67-positive

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cell proportion in tumor tissue^[8]. After intramuscular injection of Adex-cre and 1.5µg cardiotoxin into the hindlimb of caALK2fl/fl mice, intraperitoneal injection of 10mg/kg DMH-1 for 28 days. DMH-1 reduced the radiographic area of hindlimb heterotopic ossification^[9]. Starting 3 days before left anterior descending coronary artery ligation surgery, intraperitoneal injection of 5mg/kg DMH-1 every other day to C57BL/6 mice until 28 days after surgery. DMH-1 decreased left ventricular ejection fraction and left ventricular fractional shortening, increased left ventricular end-diastolic diameter and left ventricular end-systolic diameter, and aggravated myocardial fibrosis area^[10].

References:

- [1] Hochgerner M, Jiang Y, Sun S, et al. Loss of ALK3 Ameliorates Acute but Aggravates Chronic Lung Inflammation In Vivo. *Immunology*. 2025 Oct;176(2):224-236.
- [2] Zhang X, Miao Y, Li Z, et al. ACVR1 drives neuropathic pain by regulating NLRP3-Induced neuronal pyroptosis through the p38 and Smad1/5/8 pathways. *Neuropharmacology*. 2025 Aug 15;274:110469.
- [3] Luo J, Wang Y, Chang HM, et al. ID3 mediates BMP2-induced downregulation of ICAM1 expression in human endometrial stromal cells and decidual cells. *Front Cell Dev Biol*. 2023 Feb 24;11:1090593.
- [4] Zhang Y, Zhu H, Chang HM, et al. ALK3-SMAD1/5 Signaling Mediates the BMP2-Induced Decrease in PGE2 Production in Human Endometrial Stromal Cells and Decidual Stromal Cells. *Front Cell Dev Biol*. 2020 Sep 15;8:573028.
- [5] Hao J, Lee R, Chang A, et al. DMH1, a Small Molecule Inhibitor of BMP Type I Receptors, Suppresses Growth and Invasion of Lung Cancer. *PLoS ONE*. 2014 Mar 6;9(3):e90748.
- [6] Langenfeld E, Hong CC, Lanke G, et al. Bone Morphogenetic Protein Type I Receptor Antagonists Decrease Growth and Induce Cell Death of Lung Cancer Cell Lines. *PLoS ONE*. 2013 Apr 12;8(4):e61256.
- [7] Kersten V, Seitz T, Sommer J, et al. Bone Morphogenetic Protein 13 Has Protumorigenic Effects on Hepatocellular Carcinoma Cells In Vitro. *Int J Mol Sci*. 2023 Jul 4;24(13):11059.
- [8] Xie C, Wang Z, Ba Y, et al. BMP signaling inhibition overcomes chemoresistance of prostate

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cancer. Am J Cancer Res. 2023;13(9):4073-4086.

[9] Pan H, Fleming N, Hong CC, et al. Methods for the reliable induction of heterotopic ossification in the conditional Alk2Q207D mouse. J Musculoskelet Neuronal Interact. 2020;20(1):149-159.

[10] Liu M, Pei J, Zeng C, et al. BMP7 attenuates myocardial injury and preserves cardiac function after myocardial infarction by inhibiting cardiomyocyte pyroptosis. Apoptosis. 2026;31:57.

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