Muramyl dipeptide

Cat. No.: HY-127090

CAS No.: 53678-77-6

Molecular Formula: $C_{19}H_{32}N_4O_{11}$

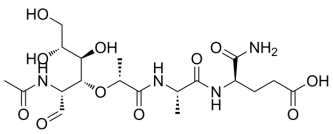
Molecular Weight: 492

Target: p38 MAPK; NOD-like Receptor (NLR)

Pathway: MAPK/ERK Pathway; Immunology/Inflammation

Storage:

Powder	-20°C	3 years
In solvent	-80°C	6 months
	-20°C	1 month



SOLVENT & SOLUBILITY

In Vitro

DMSO : 100 mg/mL (203.25 mM; Need ultrasonic)

H_2O : 50 mg/mL (101.63 mM; Need ultrasonic)

Preparing Stock Solutions

Solvent / Mass / Concentration	1 mg	5 mg	10 mg
1 mM	2.0325 mL	10.1626 mL	20.3252 mL
5 mM	0.4065 mL	2.0325 mL	4.0650 mL
10 mM	0.2033 mL	1.0163 mL	2.0325 mL

Please refer to the solubility information to select the appropriate solvent.

In Vivo

1. Add each solvent one by one: 10% DMSO >> 40% PEG300 >> 5% Tween-80 >> 45% saline
   Solubility: 5 mg/mL (10.16 mM); Clear solution; Need ultrasonic
2. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: 5 mg/mL (10.16 mM); Clear solution; Need ultrasonic
3. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: 5 mg/mL (10.16 mM); Clear solution; Need ultrasonic

BIOLOGICAL ACTIVITY

Description

Muramyl dipeptide (MDP) is a synthetic immunoreactive peptide, consisting of N-acetyl muramic acid attached to a short amino acid chain of L-Ala-D-isoGln. Muramyl dipeptide is an inducer of bone formation through induction of Runx2. Muramyl dipeptide directly enhances osteoblast differentiation by up-regulating Runx2 gene expression through MAPK pathways. Muramyl dipeptide is a NLRP1 agonist[1][2].

IC_{50} & Target	p38 MAPK	NLRP1

In Vitro

Muramyl dipeptide (0.1-10 μg/mL; 24 hours) increases protein expression of Runx2 in a dose-dependent manner[1].
Muramyl dipeptide (0.1-10 μg/mL; 6 hours) increases mRNA levels of Runx2 in a dose-dependent manner[1].
Muramyl dipeptide indirectly attenuates osteoclast differentiation through a decreased RANKL/OPG ratio[1].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Western Blot Analysis[1]

Cell Line:	MC3T3-E1 cells
Concentration:	0.1, 1, 10 μg/mL
Incubation Time:	24 hours
Result:	Increased protein expression of Runx2 in a dose-dependent manner.

RT-PCR[1]

Cell Line:	MC3T3-E1 cells
Concentration:	0.1, 1, 10 μg/mL
Incubation Time:	6 hours
Result:	Increases mRNA levels of Runx2 in a dose-dependent manner.

In Vivo

Muramyl dipeptide can be used in animal modeling to construct animal sepsis models.

Muramyl dipeptide (1.25 mg/kg; i.p.; twice) alleviates bone loss induced by osteoporosis[1].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Animal Model:	RANKL-induced osteoporosis model (Five-week-old C57BL/6 mice)[1]
Dosage:	1.25 mg/kg
Administration:	i.p.; twice (RANKL-induced osteoporosis for 3 weeks and euthanized at 4 weeks)
Result:	Significantly enhanced the trabecular bone volume (BV/TV) and trabecular number (Tb.N).

CUSTOMER VALIDATION

- J Bacteriol. 2020 Sep 23;202(20):e00689-19.
- Research Square Preprint. 2023 Aug 8.

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REFERENCES

[1]. Park OJ, et al. Muramyl Dipeptide, a Shared Structural Motif of Peptidoglycans, Is a Novel Inducer of Bone Formation through Induction of Runx2. J Bone Miner Res. 2017 Jul;32(7):1455-1468.

[2]. V Kaushal, et al. Neuronal NLRP1 inflammasome activation of Caspase-1 coordinately regulates inflammatory interleukin-1-beta production and axonal degeneration-associated Caspase-6 activation. Cell Death Differ. 2015 Oct;22(10):1676-86.

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

Tel: 609-228-6898 Fax: 609-228-5909 E-mail: tech@MedChemExpress.com
Address: 1 Deer Park Dr, Suite Q, Monmouth Junction, NJ 08852, USA