Trimethoprim

Cat. No.: HY-B0510

CAS No.: 738-70-5

Molecular Formula: $C_{14}H_{18}N_4O_3$

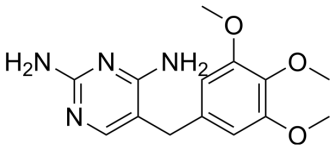
Molecular Weight: 290.32

Target: Antifolate; Bacterial; Antibiotic; Influenza Virus

Pathway: Cell Cycle/DNA Damage; Anti-infection

Storage:

Powder	-20°C	3 years
	4°C	2 years
In solvent	-80°C	6 months
	-20°C	1 month



SOLVENT & SOLUBILITY

In Vitro

DMSO : 50 mg/mL (172.22 mM; Need ultrasonic)

H_2O : 0.67 mg/mL (2.31 mM; Need ultrasonic)

Preparing Stock Solutions	Solvent / Mass / Concentration	1 mg	5 mg	10 mg
	1 mM	3.4445 mL	17.2224 mL	34.4447 mL
	5 mM	0.6889 mL	3.4445 mL	6.8889 mL
	10 mM	0.3444 mL	1.7222 mL	3.4445 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: ≥ 2.5 mg/mL (8.61 mM); Clear solution
2. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: ≥ 2.5 mg/mL (8.61 mM); Clear solution
3. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: ≥ 2.5 mg/mL (8.61 mM); Clear solution

BIOLOGICAL ACTIVITY

Description

Trimethoprim is a bacteriostatic antibiotic and an orally active dihydrofolate reductase inhibitor. Trimethoprim is active against a wide range of Gram-positive and Gram-negative aerobic bacteria. Trimethoprim has the potential for the research of urinary tract infections, Shigellosis and Pneumocystis pneumonia. Trimethoprim can inhibit infection of Influenza A virus in chick embryo when combinated with zinc[1][2][3][4].

IC_{50} & Target

Dihydrofolate reductase, Bacteria[1]

	Influenza A virus[4]
In Vitro	Trimethoprim interrupts folate metabolism by inhibition of the activity of dihydrofolase reductase (DHFR), which reduces dihydrofolate to tetrahydrofolate (THF)[1]. Trimethoprim (3 μg/mL; 1 h) induces protein aggregation and main heat shock proteins (Hsps) in E. coli cells, which indicates that Trimethoprim sulfate presence leads to protein misfolding[1]. Trimethoprim (1.5-3 μg/mL; 1 h) causes induction of DnaK, DnaJ, GroEL, ClpB, and IbpA/B Hsps in E. coli cells exposed to folate and heat stress[1]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.
In Vivo	Trimethoprim (10 mg/kg; i.v.; once every 12 h; 3 d) shows antibacterial activity against H. influenzae, S. pneumoniae, E. coli and N. meningitidis in infected mice[2]. Trimethoprim can be connected with the thiomaltose (TM-TMP) and shows stability with a half-life of about 1 hour in complete serum, and has a MIC value around 1 μM against E. coli[2]. Trimethoprim (10 mg/mL; 0.5 mL; inject with Trimethoprim-Zn combined suspension) decreases the virus titer and increases the survival rate of chicken embryo[4]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Animal Model:	Female C3H/HeOuJ mice (transurethrally infected with a 50 μL suspension containing 1-2×10^7 CFU of E. coli under 3% isoflurane)[2]
Dosage:	10 mg/kg
Administration:	i.v.; once every 12 h; for 3 d
Result:	Showed antibacterial activity against H. influenzae, S. pneumoniae, E. coli and N. meningitidis with CD_{50}s of 150 mg/kg, 335 mg/kg, 27.5 mg/kg and 8.4 mg/kg, respectively in infected mice.

Animal Model:	Fertilized eggs (injected H3N2 virus into amniotic and allantoic space at day 8)[4]
Dosage:	10 mg/mL; 0.5 mL
Administration:	The Trimethoprim-Zn combined suspension was injected into the air sac; single dosage
Result:	Decreased the virus titer and increased the survival rate of chicken embryo. The survival rate peaked at ratio about 0.18 (Zn/Trimethoprim).

CUSTOMER VALIDATION

- Autophagy. 2023 Jun 13;1-17.
- Water Res. 2023 May 21, 120110.
- J Clin Microbiol. 2020 Jan 28;58(2):e01603-19.
- Chemosphere. 2019 Jun;225:378-387.
- J Mol Med (Berl). 2019 Aug;97(8):1183-1193.

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REFERENCES

[1]. El Habbal MH. Combination therapy of zinc and trimethoprim inhibits infection of influenza A virus in chick embryo. Virol J. 2021 Jun 3;18(1):113.

[2]. Laskowska, E., et al., Trimethoprim induces heat shock proteins and protein aggregation in E. coli cells. Curr Microbiol, 2003. 47(4): p. 286-9.

[3]. Brogden, R.N., et al., Trimethoprim: a review of its antibacterial activity, pharmacokinetics and therapeutic use in urinary tract infections. Drugs, 1982. 23(6): p. 405-30.

[4]. Xiaojian Wang, et al. A Trimethoprim Conjugate of Thiomaltose Has Enhanced Antibacterial Efficacy In Vivo. Bioconjug Chem. 2018 May 16;29(5):1729-1735.

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