Piperacillin sodium

Cat. No.: HY-B1286

CAS No.: 59703-84-3

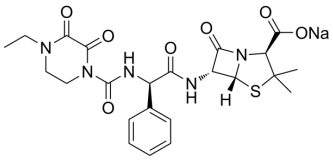
Molecular Formula: $C_{23}H_{26}N_5NaO_7S$

Molecular Weight: 539.54

Target: Bacterial; Antibiotic; Penicillin-binding protein (PBP)

Pathway: Anti-infection

Storage: 4°C, sealed storage, away from moisture
* In solvent : -80°C, 6 months; -20°C, 1 month (sealed storage, away from moisture)



SOLVENT & SOLUBILITY

In Vitro

DMSO : 100 mg/mL (185.34 mM; Need ultrasonic)
H_2O : ≥ 100 mg/mL (185.34 mM)
* "≥" means soluble, but saturation unknown.

Preparing Stock Solutions

Concentration \ Solvent \ Mass	1 mg	5 mg	10 mg
1 mM	1.8534 mL	9.2672 mL	18.5343 mL
5 mM	0.3707 mL	1.8534 mL	3.7069 mL
10 mM	0.1853 mL	0.9267 mL	1.8534 mL

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

In Vivo

1. Add each solvent one by one: PBS
   Solubility: 100 mg/mL (185.34 mM); Clear solution; Need ultrasonic
2. Add each solvent one by one: 10% DMSO >> 40% PEG300 >> 5% Tween-80 >> 45% saline
   Solubility: ≥ 2.5 mg/mL (4.63 mM); Clear solution
3. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: ≥ 2.5 mg/mL (4.63 mM); Clear solution
4. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: ≥ 2.5 mg/mL (4.63 mM); Clear solution

BIOLOGICAL ACTIVITY

Description

Piperacillin sodium is a semisynthetic broad-spectrum β-lactam antibiotic which exhibits potent bactericidal activity against Gram-negative bacteria as well as select Gram-positive strains through penicillin-binding proteins. Piperacillin is most commonly used in combination with the β-lactamase inhibitor Tazobactam[1][2][3].

IC_{50} & Target

β-lactam

In Vitro	Piperacillin (12.5 μg/mL, 24h) inhibits 92% of isolates of Pseudomonas aeruginosa, 82% of Serratia marcescens, 73% of Escherichia coli, 61% of Klebsiella spp, and 42% of Enterobacter spp, most Proteus spp. were extremely susceptible. Piperacillin fails to inhibit the growth of gram-negative bacilli when large inocula were used (minimum inhibitory concentration > 25 μg/ml) [2]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.
In Vivo	Piperacillin (100 mg/kg, i.v., 4 times a day, 5 d) in combination with Tazobactam (HY-B1418)(12.5 mg/kg, i.v., 4 times a day, 5 d) prolongs survival in mice with low inoculum of K. pneumoniae[3]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Animal Model:	BALB/c low inoculum model of K. pneumoniae, KEN-11 strain [3]
Dosage:	100 mg/kg
Administration:	Intravenous injection (i.v.), 4 times a day, 5 d, in combination with Tazobactam (12.5 mg/kg, i.v., 4 times a day, 5 d)
Result:	Enabled all mice survived whereas all control mice died by 5 d, decreased the number of bacteria in lungs compared with control group[. Observed no bacteria in the blood of most mice (except for two mice at the early phase) while bacteria were observed in the blood of control group. Observed few inflammatory cells in the alveoli whereas an influx of numerous inflammatory cells were observed in the control group.

CUSTOMER VALIDATION

- Nat Commun. 2022 Mar 2;13(1):1116.
- Antimicrob Agents Chemother. 2023 May 18;e0160322.
- Microbiol Spectr. 2023 Apr 24;e0069223.
- Microbiol Spectr. 2022 Dec 8;e0303822.
- Biomed Res Int. 2018 Jul 2;2018:3579832.

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REFERENCES

[1]. Fu KP, et al. Piperacillin, a new penicillin active against many bacteria resistant to other penicillins. Antimicrob Agents Chemother. 1978 13(3):358-67.

[2]. Bodey GP, et al. Piperacillin: In Vitro Evaluation. Antimicrob Agents Chemother. 1978 14(1):78-87.

[3]. Harada Y, et al. In vitro and in vivo activities of piperacillin-tazobactam and meropenem at different inoculum sizes of ESBL-producing Klebsiella pneumoniae. Clin Microbiol Infect. 2014 20(11):O831-9.

[4]. Tan JS, et al. Antipseudomonal penicillins. Med Clin North Am. 1995 Jul;79(4):679-93.

[5]. Lau WK, et al. Randomized, open-label, comparative study of piperacillin-tazobactam administered by continuous infusion versus intermittent infusion for treatment of hospitalized patients with complicated intra-abdominal infection. Antimicrob Agents Chemother. 2006 Nov;50(11):3556-61.

[6]. Fu KP, et al. Piperacillin, a new penicillin active against many bacteria resistant to other penicillins. Antimicrob Agents Chemother. 1978 Mar;13(3):358-67.

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