

Product Data Sheet

Product Name: Methicillin (sodium salt)

Cat. No.: GC10917

Chemical Properties

Cas. No. 132-92-3

Chemical Name (2S,5R,6R)-6-[(2,6-dimethoxybenzoyl)amino]-3,3-dimethyl-7-oxo-4-thia-1-azabicyclo[3.2.0]heptane-2-carboxylic acid, monosodium salt

SMILES O=C(N[C@@H]1C(N2[C@]1([H])SC(C)(C)[C@@H]2C([O-])=O)=O)C3=C(OC)C=CC=C3OC.[Na+]

Formula $C_{17}H_{19}N_2O_6S \cdot Na$

M.Wt 402.4

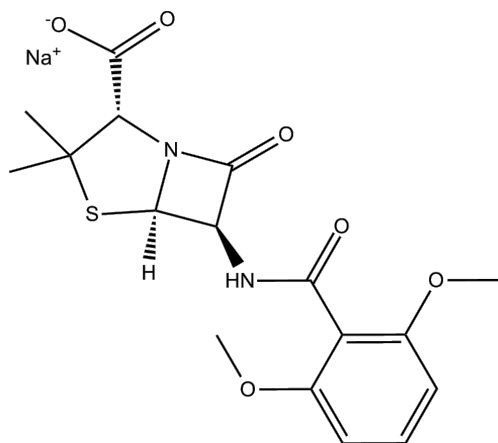
Solubility $\geq 14.4\text{mg/mL}$ in DMSO

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	<i>S. aureus</i>
Preparation method	The rate at which the <i>S. aureus</i> was killed was studied in flasks with heart infusion broth (HIB) containing methicillin. The inoculum in HIB was added to each flask and incubated at 37°C. The final concentrations of antibiotics were 20 µg/ml, and of <i>S. aureus</i> were 3×10^6 /ml. Samples were removed from the flasks at the start of the experiment and at 2, 4, 6, and 24 h. Each sample was serially diluted in 10-fold steps in HIB, and 0.1 ml of each dilution and 1 ml of undiluted sample were plated on the surfaces of blood agar plates. After incubation at 37°C for 48 h the numbers of colonies on the plates were counted and the colony-forming units (CFU) in the flasks were calculated.
Reaction Conditions	20 µg/mL; 24 h
Applications	Methicillin results in a rapid decrease in CFU of <i>S. aureus</i> .
Animal experiment [1]:	
Animal models	<i>S. aureus</i> .-infected rabbits

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Preparation method	Rabbits were anesthetized and cannulated. One day later, each rabbit was inoculated by ear vein with 1 ml of HIB containing 2×10^6 <i>S. aureus</i> . Inoculated control animals were left untreated. In treatment groups, antibiotic therapy was initiated 18 h after infection; the regimens was : methicillin, 40 mg/kg every 6 h.
Dosage form	Intramuscular administration; 40 mg/kg every 6 h; 5 days
Applications	Methicillin reduced mortality in in <i>S. aureus</i> -infected rabbits.
References: [1]. Carrizosa J, Santoro J, et.al. Treatment of experimental Staphylococcus aureus endocarditis: comparison of cephalothin, cefazolin, and methicillin. Antimicrob Agents Chemother. 1978 Jan;13(1):74-7. doi: 10.1128/AAC.13.1.74. PMID: 626493; PMCID: PMC352187.	

Background

Methicillin is a narrow-spectrum beta-lactam antibiotic that acts by inhibiting penicillin-binding proteins (PBP). Methicillin has a good effect on penicillinase producing *S. aureus*. Methicillin is not absorbed orally and must be administered by injection. It can be used to treat septicemia, endocarditis, pneumonia, meningitis, brain abscess, pericarditis, urinary tract infection, skin soft tissue infection, osteomyelitis, pseudomembranous enteritis. Methicillin can also be used to screen for resistant strains [1-3].

Methicillin (20 µg/mL; 24 h) results in a rapid decrease in CFU of *S. aureus*[4]. Methicillin (0-100 µg/mL; 24 h) has a high killing effect on CI-G *S. aureus*. Strain [5].

Methicillin (intramuscular administration; 40 mg/kg every 6 h; 5 days) reduced mortality in in *S. aureus*-infected rabbits[4]. Methicillin (9 µg/ml; 4days; 0.5 ml/day) and a bismuth metal-organic framework (Bi-MOF) can synergistically enhance the therapeutic effect and inhibit the recurrence of

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infection in the tolerant *S. aureus*-induced murine subcutaneous infection model [6].

References:

- [1]. Katsipis G, Pantazaki AA. Serrapeptase impairs biofilm, wall, and phospho-homeostasis of resistant and susceptible *Staphylococcus aureus*. *Appl Microbiol Biotechnol*. 2023 Feb;107(4):1373-1389. doi: 10.1007/s00253-022-12356-5. Epub 2023 Jan 13. PMID: 36635396; PMCID: PMC9898353.
- [2]. Khoshnood S, Heidary M, et al. A review on mechanism of action, resistance, synergism, and clinical implications of mupirocin against *Staphylococcus aureus*. *Biomed Pharmacother*. 2019 Jan;109:1809-1818. doi: 10.1016/j.biopha.2018.10.131. Epub 2018 Nov 26. PMID: 30551435.
- [3]. Xie X, Tong X, et al. Use of mouse primary epidermal organoids for USA300 infection modeling and drug screening. *Cell Death Dis*. 2023 Jan 11;14(1):15. doi: 10.1038/s41419-022-05525-x. PMID: 36631452; PMCID: PMC9833019.
- [4]. Carrizosa J, Santoro J, et al. Treatment of experimental *Staphylococcus aureus* endocarditis: comparison of cephalothin, cefazolin, and methicillin. *Antimicrob Agents Chemother*. 1978 Jan;13(1):74-7. doi: 10.1128/AAC.13.1.74. PMID: 626493; PMCID: PMC352187.
- [5]. Banerjee S, Sionov RV, et al. Anandamide alters the membrane properties, halts the cell division and prevents drug efflux in multidrug resistant *Staphylococcus aureus*. *Sci Rep*. 2021 Apr 22;11(1):8690. doi: 10.1038/s41598-021-88099-6. PMID: 33888802; PMCID: PMC8062478.
- [6]. Yuan, Kai et al. "Multi-roles of nanoscale bismuth metal-organic frameworks: Infectious photoacoustic probe and inhibitor of antibiotics tolerant bacteria via targeting endogenous H₂S." *Nano Today* (2022): n. pag.

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