# Ceftriaxone

**Cat. No.:** HY-B0712

**CAS No.:** 73384-59-5

**Molecular Formula:** $C_{18}H_{18}N_8O_7S_3$

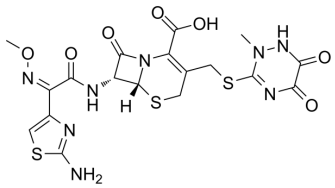
**Molecular Weight:** 554.58

**Target:** Bacterial; Antibiotic; GSK-3; Aurora Kinase

**Pathway:** Anti-infection; PI3K/Akt/mTOR; Stem Cell/Wnt; Cell Cycle/DNA Damage; Epigenetics

**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 : 31.25 mg/mL (56.35 mM; ultrasonic and warming and heat to 60°C)

**Preparing Stock Solutions**

| Solvent / Mass / Concentration | 1 mg | 5 mg | 10 mg |
|---|---|---|---|
| 1 mM | 1.8032 mL | 9.0158 mL | 18.0317 mL |
| 5 mM | 0.3606 mL | 1.8032 mL | 3.6063 mL |
| 10 mM | 0.1803 mL | 0.9016 mL | 1.8032 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 (4.51 mM); Clear solution
2. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: ≥ 2.5 mg/mL (4.51 mM); Clear solution
3. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: ≥ 2.5 mg/mL (4.51 mM); Clear solution

## BIOLOGICAL ACTIVITY

**Description**

Ceftriaxone (Ro 13-9904 free acid) is a broad spectrum β-lactam third-generation cephalosporin antibiotic, which has good antibacterial activity against a variety of gram-negative and positive bacteria. Ceftriaxone is a covalent inhibitor of GSK3β with $IC_{50}$ value of 0.78 mM. Ceftriaxone is an inhibitor of Aurora B. Ceftriaxone has anti-inflammatory, antitumor and antioxidant activities. Ceftriaxone can be used in the study of bacterial infections and meningitis[1][2][3][4][5][6][7].

**$IC_{50}$ & Target**

β-lactam

**In Vitro**

Ceftriaxone (100 μM, 24 h) protects $MPP^+$ treated astrocytes by inhibiting the NF-κB/JNK/c-Jun signaling pathway [3].
Ceftriaxone (500 μM, 24-48 h) effectively inhibits unanchored cell growth in A549, H520 and H1650 lung cancer cells by inhibiting Aurora B[4].

MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Cell Viability Assay[3]

| | |
|---|---|
| Cell Line: | Astrocyte |
| Concentration: | 100 μM |
| Incubation Time: | 24 h |
| Result: | Improved cell viability and increased glutamate uptake after $MPP^+$ expose. |

Western Blot Analysis[3]

| | |
|---|---|
| Cell Line: | Astrocyte |
| Concentration: | 100 μM |
| Incubation Time: | 24 h |
| Result: | Enhanced GLT-1 and GFAP expression.<br>Decreased the expression of p-p50、p-IKKα、p-Relb.<br>Decreased the number of TUNEL-positive cells. |

**In Vivo**

Ceftriaxone (200 mg/kg Intraperitoneal injection for 6 weeks) improves functional markers and oxidative stress and inflammation parameters in a rat model of D-galactose (DGL) -induced liver and kidney injury[5].
Ceftriaxone (200, 400 mg/kg, Intraperitoneal injection) has a protective effect on convulsion induced by Pentylenetetrazol (PTZ) and PTZ-related oxidative damage in rats[6].
Ceftriaxone (100, 200 mg/kg, Intraperitoneal injection) reduces mechanical dysodynia and hyperalgesia by activating GLT-1 in Streptozocin (HY-13753)-induced diabetic rat models[7].

MCE has not independently confirmed the accuracy of these methods. They are for reference only.

| | |
|---|---|
| Animal Model: | DGL-induced rat model[5] |
| Dosage: | 200 mg/kg |
| Administration: | i.p. |
| Result: | Reduced the BUN、Cr 、AST and ALT levels.<br>Attenuated the MDA levels and enhanced GPx and CAT activities.<br>Reduced the levels of IL-1β and TNF-α mRNA. |

| | |
|---|---|
| Animal Model: | PTZ-induced rat model[6] |
| Dosage: | 200, 400 mg/kg |
| Administration: | i.p. 60 min before to PTZ (70 mg/kg) |
| Result: | Both of the two ceftriaxone groups had lower spike percentages than the saline group.<br>Significantly lower MDA levels and higher SOD activity in 200 and 400 mg/kg. |

## CUSTOMER VALIDATION

- Nat Commun. 2022 Mar 2;13(1):1116.
- EBioMedicine. 2022 Apr;78:103943.
- Chemosphere. 2023 Oct 3:344:140353.

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## REFERENCES


[1]. Nahata MC, et al. Ceftriaxone: a third-generation cephalosporin. Drug Intell Clin Pharm. 1985 Dec;19(12):900-6.

[2]. Nassar H, et al. Molecular docking, molecular dynamics simulations and in vitro screening reveal cefixime and ceftriaxone as GSK3β covalent inhibitors. RSC Adv. 2023 Apr 11;13(17):11278-11290.

[3]. Zhang Y, et al. Ceftriaxone Protects Astrocytes from MPP(+) via Suppression of NF-κB/JNK/c-Jun Signaling. Mol Neurobiol. 2015 Aug;52(1):78-92.

[4]. Li X, et al. Ceftriaxone, an FDA-approved cephalosporin antibiotic, suppresses lung cancer growth by targeting Aurora B. Carcinogenesis. 2012 Dec;33(12):2548-57.

[5]. Hakimizadeh E, et al. Ceftriaxone improves hepatorenal damages in mice subjected to D-galactose-induced aging. Life Sci. 2020 Oct 1;258:118119.

[6]. Uyanikgil Y, et al. Positive effects of ceftriaxone on pentylenetetrazol-induced convulsion model in rats. Int J Neurosci. 2016;126(1):70-5.

[7]. Gunduz O, et al. Anti-allodynic and anti-hyperalgesic effects of ceftriaxone in streptozocin-induced diabetic rats. Neurosci Lett. 2011 Mar 10;491(1):23-5.





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