Spectinomycin

Cat. No.: HY-B1828

CAS No.: 1695-77-8

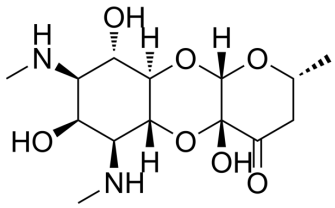
Molecular Formula: $C_{14}H_{24}N_2O_7$

Molecular Weight: 332.35

Target: Antibiotic; Bacterial

Pathway: Anti-infection

Storage: Please store the product under the recommended conditions in the Certificate of Analysis.



BIOLOGICAL ACTIVITY

Description

Spectinomycin is a broad-spectrum antibiotic and inhibits the growth of a variety of gram-positive and gram-negative organisms. Spectinomycin acts by selectively targeting to the bacterial ribosome and interrupting protein synthesis. Spectinomycin is also a noncompetitive inhibitor of td intron RNA[1][2][3][4][5].

IC_{50} & Target

Aminoglycoside

In Vitro

Spectinomycin selectively inhibits protein synthesis in cells and in extracts of Escherichia coli.

Spectinomycin (50 μg/mL) inhibits Escherichia coli growth rapidly and reversibly, and suppresses amino acid incorporation immediately[1].

Spectinomycin (1 μg/mL or 3 μM) inhibits polypeptide synthesis directed either by endogenous messenger RNA or by MS-2 bacteriophage RNA, with maximum inhibition of 70-80% in extracts of Escherichia coli[1].

Spectinomycin blocks the translocation of peptidyl-tRNAs from A-site to P-site by inhibiting the binding of elongation factor G to the ribosome[2].

Spectinomycin interacts specifically with the residues G1064 and 01192 in 16S rRNA and potentially makes it inactive[2].

Spectinomycin exhibits splicing inhibition and dependent on pH changes and Mg^{2+} concentration, indicating electrostatic interactions with the intron RNA[3].

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

In Vivo

Spectinomycin (20 mg/kg; i.m.; 20-100 mg/kg; 9 d) shows the safety in healthy chicks[4].

Spectinomycin (10 mg/kg; i.v.; single dose) has the major elimination pathway by renal excretion, approximately 55% is excreted into the urine in unchanged form[5].

Pharmacokinetics of Spectinomycin in Rat[5]

Parameter	C_0 (μg/mL)	$AUC_{0-\infty}$ (μg•h/mL)	V_d (L/kg)	CL (L/h/kg)	MRT (h)	$T_{1/2\alpha}$ (h)	$T_{1/2\beta}$ (h)	$T_{1/2\gamma}$ (h)	f_e	CL_{renal} (L/h/kg)	E_{ratio}
Non atrioventricular analysis	44.3	16.8	0.756	0.602	0.757	/	/	/	0.553	0.359	1.00

Three-compartment model	37.8	15.7	0.747	0.649	1.11	/	0.237	0.754	19.5	/	/

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

Animal Model:	Arbor Acres plus broiler chicks (15-day-old)[4]
Dosage:	20 mg/kg, 60 mg/kg, 100 mg/kg
Administration:	Intramuscular injection (chest muscles); 9 days
Result:	Showed biosecurity of 20 mg/kg by complete blood count, biochemical parameters, histopathological, clinical signs, body weight gain, and feed conversion ratio (FCR). Resulted minor toxicity of 60 mg/kg.

CUSTOMER VALIDATION

- BMC Vet Res. 2022 Jul 12;18(1):270.
- Patent. US20200368199A1.

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REFERENCES

[1]. Davies J, et al. Inhibition of protein synthesis by spectinomycin. Science. 1965 Sep 3;149(3688):1096-8.

[2]. Brink MF, et al. Spectinomycin interacts specifically with the residues G1064 and C1192 in 16S rRNA, thereby potentially freezing this molecule into an inactive conformation. Nucleic Acids Res. 1994 Feb 11;22(3):325-31.

[3]. Park IK, et al. Spectinomycin inhibits the self-splicing of the group 1 intron RNA. Biochem Biophys Res Commun. 2000 Mar 16;269(2):574-9.

[4]. Khan EA, et al. Safety evaluation study of lincomycin and spectinomycin hydrochloride intramuscular injection in chickens. Toxicol Rep. 2022 Jan 29;9:204-209.

[5]. Madhura DB, et al. Pharmacokinetic profile of spectinomycin in rats. Pharmazie. 2013 Aug;68(8):675-6.

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