Ganciclovir

Cat. No.: HY-13637

CAS No.: 82410-32-0

Molecular Formula: $C_9H_{13}N_5O_4$

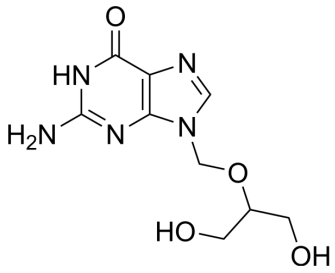
Molecular Weight: 255.23

Target: HSV; Antibiotic; CMV; Nucleoside Antimetabolite/Analog

Pathway: Anti-infection; Cell Cycle/DNA Damage

Storage:

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



SOLVENT & SOLUBILITY

In Vitro

DMSO : 60 mg/mL (235.08 mM; Need ultrasonic)

H_2O : 1.67 mg/mL (6.54 mM; Need ultrasonic)

Preparing Stock Solutions	Mass / Solvent / Concentration	1 mg	5 mg	10 mg
	1 mM	3.9180 mL	19.5902 mL	39.1803 mL
	5 mM	0.7836 mL	3.9180 mL	7.8361 mL
	10 mM	0.3918 mL	1.9590 mL	3.9180 mL

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

In Vivo

1. Add each solvent one by one: PBS
   Solubility: 3.33 mg/mL (13.05 mM); Clear solution; Need ultrasonic and warming and heat to 60°C
2. Add each solvent one by one: 10% DMSO >> 40% PEG300 >> 5% Tween-80 >> 45% saline
   Solubility: 2.08 mg/mL (8.15 mM); Suspended solution; Need ultrasonic
3. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: 2.08 mg/mL (8.15 mM); Suspended solution; Need ultrasonic
4. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: ≥ 2.08 mg/mL (8.15 mM); Clear solution

BIOLOGICAL ACTIVITY

Description

Ganciclovir (BW 759), a nucleoside analogue, is an orally active antiviral agent with activity against CMV. Ganciclovir also has activity in vitro against members of the herpes group and some other DNA viruses. Ganciclovir inhibits the in vitro replication of human herpes viruses (HSV 1 and 2, CMV) and adenovirus serotypes 1, 2, 4, 6, 8, 10, 19, 22 and 28. Ganciclovir has an IC_{50} of 5.2 μM for feline herpesvirus type-1 (FHV-1) and can diffuse into the brain[1][2][3].

IC_{50} & Target	CMV	HSV-1	HSV-2	FHV-1 5.2 μM (IC_{50})

In Vitro

Ganciclovir (BW 759) is an acyclic deoxyguanosine analog structurally similar to acyclovir but with superior activity against CMV. The median Ganciclovir concentration required to inhibit viral replication by 50 percent is 2.15 μM versus 72 μM for acyclovir[4].

The primary mechanism of Ganciclovir action against CMV is inhibition of the replication of viral DNA by ganciclovir-5'-triphosphate (ganciclovir-TP). This inhibition includes a selective and potent inhibition of the viral DNA polymerase. Ganciclovir is metabolized to the triphosphate form by primarily three cellular enzymes: a deoxyguanosine kinase induced by CMV-infected cells; guanylate kinase; and phosphoglycerate kinase[5].

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

In Vivo

Ganciclovir (BW 759) (50 mg/kg; i.p.; twice a day for five injections) significantly decreases white blood cells, red blood cells and platelets in newborn mice, and can diffuse into the brain and the perilymphatic space of the inner ear[3].

Ganciclovir (1-80 mg/kg; i.h.; daily for 5 days) delays murine cytomegalovirus (MCMV)-induced wasting syndrome and mortality[6].

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

Animal Model:	Non-inbred Oncins France 1 (OF1) mice and albino rats non-immunized forMCMV[3]
Dosage:	50 mg/kg
Administration:	Intraperitoneal injection, twice a day for five injections (mice) or 3 days (adult rats) (Pharmacokinetic Study)
Result:	In adult rats, the intracochlear diffusion of Ganciclovir was shown to achieve the same concentration as in blood. In gestating mice, transplacental diffusion was observed, with a fetal-to-maternal blood ratio of 0.5. In newborn mice, the plasma concentration profile of Ganciclovir showed a peak at 2 h followed by a gradual decrease. In adult mice, the concentration peaked at 1 h, but became undetectable by 2 h after injection. Significantly decreased white blood cells, red blood cells and platelets in newborn mice.

Animal Model:	Female SCID mice inoculated with MCMV[6]
Dosage:	0, 1, 10, 80 and 160 mg/kg
Administration:	Subcutaneous injection, once daily for 5 days
Result:	Dose dependently delayed the wasting syndrome and mortality in a dose range up to 80 mg/kg per day, whereas a dose of 160 mg/kg per day induced reversible side-effects.

CUSTOMER VALIDATION

- Cell. 2020 Nov 25;183(5):1402-1419.e18.
- Brain Behav Immun. 2019 Aug;80:394-405.
- J Nanobiotechnology. 2022 Jul 20;20(1):340.
- Sci Data. 2022 Oct 8;9(1):610.
- Antiviral Res. 2021 Jun 28;105124.

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REFERENCES

[1]. Maggs DJ, et al. In vitro efficacy of ganciclovir, cidofovir, penciclovir, foscarnet, idoxuridine, and acyclovir against feline herpesvirus type-1. Am J Vet Res. 2004 Apr;65(4):399-403.

[2]. Boujemla I, et al. Pharmacokinetics and tissue diffusion of ganciclovir in mice and rats. Antiviral Res. 2016;132:111-115.

[3]. Fletcher CV, et al. Evaluation of ganciclovir for cytomegalovirus disease. DICP. 1989 Jan;23(1):5-12.

[4]. Matthews T, et al. Antiviral activity and mechanism of action of ganciclovir. Rev Infect Dis. 1988 Jul-Aug;10 Suppl 3:S490-4.

[5]. Duan J, Paris W, Kibler P, Bousquet C, Liuzzi M, Cordingley MG. Dose and duration-dependence of ganciclovir treatment against murine cytomegalovirus infection in severe combined immunodeficient mice. Antiviral Res. 1998;39(3):189-197.

[6]. Faulds D, et al. Ganciclovir. A review of its antiviral activity, pharmacokinetic properties and therapeutic efficacy in cytomegalovirus infections. Drugs. 1990;39(4):597-638.

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