Cytarabine

Cat. No.: HY-13605

CAS No.: 147-94-4

Molecular Formula: $C_9H_{13}N_3O_5$

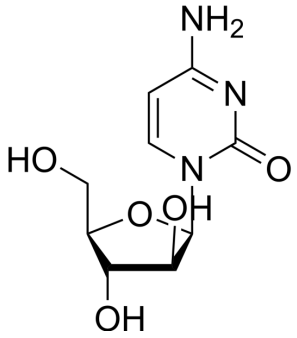
Molecular Weight: 243

Target: DNA/RNA Synthesis; Nucleoside Antimetabolite/Analog; Autophagy; Apoptosis; HSV; Endogenous Metabolite; Orthopoxvirus

Pathway: Cell Cycle/DNA Damage; Autophagy; Apoptosis; Anti-infection; Metabolic Enzyme/Protease

Storage:

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



SOLVENT & SOLUBILITY

In Vitro

H_2O : 48 mg/mL (197.53 mM; Need ultrasonic)

DMSO : 17.3 mg/mL (71.19 mM; Need ultrasonic and warming)

Preparing Stock Solutions

Solvent / Mass / Concentration	1 mg	5 mg	10 mg
1 mM	4.1152 mL	20.5761 mL	41.1523 mL
5 mM	0.8230 mL	4.1152 mL	8.2305 mL
10 mM	0.4115 mL	2.0576 mL	4.1152 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 (411.52 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 (8.56 mM); Clear solution
3. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: ≥ 2.08 mg/mL (8.56 mM); Clear solution
4. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: ≥ 2.08 mg/mL (8.56 mM); Clear solution

BIOLOGICAL ACTIVITY

Description

Cytarabine, a nucleoside analog, causes S phase cell cycle arrest and inhibits DNA polymerase. Cytarabine inhibits DNA synthesis with an IC_{50} of 16 nM. Cytarabine has antiviral effects against HSV. Cytarabine shows anti-orthopoxvirus activity.

IC_{50} & Target	Microbial Metabolite	HSV-1

In Vitro

Cytarabine is phosphorylated into a triphosphate form (Ara-CTP) involving deoxycytidine kinase (dCK), which competes with dCTP for incorporation into DNA, and then blocks DNA synthesis by inhibiting the function of DNA and RNA polymerases. Cytarabine displays a higher growth inhibitory activity towards wild-type CCRF-CEM cells compared to other acute myelogenous leukemia (AML) cells with IC_{50} of 16 nM[1].
Cytarabine apparently induces apoptosis of rat sympathetic neurons at 10 μM, of which 100 μM shows the highest toxicity and kills over 80% of the neurons by 84 hours, involving the release of mitochondrial cytochrome-c and the activation of caspase-3, and the toxicity can be attenuated by p53 knockdown and delayed by bax deletion[2].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

In Vivo

Cytarabine (250 mg/kg) also causes placental growth retardation and increases placental trophoblastic cells apoptosis in the placental labyrinth zone of the pregnant Slc:Wistar rats, which increases from 3 hour after the treatment and peaks at 6 hour before returning to control levels at 48 hour, with remarkably enhanced p53 protein, p53 trancriptional target genes such as p21, cyclinG1 and fas and caspase-3 activity[3].
Cytarabine is highly effective against acute leukaemias, which causes the Cytarabine teristic G1/S blockage and synchronization, and increases the survival time for leukaemic Brown Norway rats in a weak dose-related fashion indicating that the use of higher dosages of Cytarabine does not contribute to its antileukaemic effectiveness in man[4].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

PROTOCOL

Animal Administration [3]

Pregnant rats are injected intraperitoneally (i.p.) with 250 mg/kg of Cytarabine on Day 13 of gestation (GD13). Under the conditions of this experiment, congenital anomalies and growth retardation are detected at a high rate in perinatal fetuses, although the incidence of fetal death is not markedly increased. At 1, 3, 6, 9, 12, 24, and 48 h after the treatment, six dams each are killed by heart puncture under ether anesthesia, and the placentas are collected. As controls, six pregnant rats are injected i.p. with an equivalent volume of PBS on GD13 and killed at the same time point as Cytarabine-treated groups. Of the six dams obtained at each time point, three are used for histopathological analyses and three for reverse transcription-polymerase chain reaction (RT-PCR) analysis.
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

CUSTOMER VALIDATION

- Cell. 2018 Sep 20;175(1):171-185.e25.
- Cancer Cell. 2023 Dec 11;41(12):2136-2153.e13.
- Cell Discov. 2023 Mar 7;9(1):26.
- Cell Death Differ. 2022 Mar 28.
- Leukemia. 2023 Mar 28.

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REFERENCES

[1]. Smee DF, et al. A review of compounds exhibiting anti-orthopoxvirus activity in animal models. Antiviral Res. 2003 Jan;57(1-2):41-52.

[2]. Tobias, S.C. and R.F. Borch, Synthesis and biological evaluation of a cytarabine phosphoramidate prodrug. Mol Pharm, 2004. 1(2): p. 112-6.

[3]. Besirli, C.G., et al. Cytosine arabinoside rapidly activates Bax-dependent apoptosis and a delayed Bax-independent death pathway in sympathetic neurons. Cell Death

Differ, 2003. 10(9): p. 1045-58.

[4]. Yamauchi, H., et al., Involvement of p53 in 1-beta-D-arabinofuranosylcytosine-induced trophoblastic cell apoptosis and impaired proliferation in rat placenta. Biol Reprod, 2004. 70(6): p. 1762-7.

[5]. Richel, D.J., et al., Comparison of the antileukaemic activity of 5 aza-2-deoxycytidine and arabinofuranosyl-cytosine in rats with myelocytic leukaemia. Br J Cancer, 1988. 58(6): p. 730-3.

[6]. Shepshelovich D, et al. Pharmacodynamics of cytarabine induced leucopenia: a retrospective cohort study. Br J Clin Pharmacol. 2015 Apr;79(4):685-91.

[7]. Renis HE. Antiviral activity of cytarabine in herpesvirus-infected rats. Antimicrob Agents Chemother. 1973 Oct;4(4):439-44.

[8]. Gruffaz M, Zhou S, Vasan K, et al. Repurposing Cytarabine for Treating Primary Effusion Lymphoma by Targeting Kaposi's Sarcoma-Associated Herpesvirus Latent and Lytic Replications. mBio. 2018;9(3):e00756-18. Published 2018 May 8.

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