Amantadine

Cat. No.: HY-B0402

CAS No.: 768-94-5

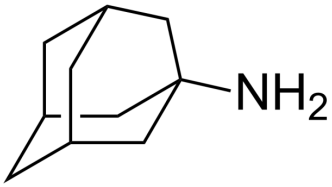
Molecular Formula: $C_{10}H_{17}N$

Molecular Weight: 151.25

Target: Influenza Virus; Orthopoxvirus; SARS-CoV; Apoptosis; CDK; Bcl-2 Family

Pathway: Anti-infection; Apoptosis; Cell Cycle/DNA Damage

Storage: 4°C, protect from light
* In solvent : -80°C, 6 months; -20°C, 1 month (protect from light)



SOLVENT & SOLUBILITY

In Vitro

DMSO : 10 mg/mL (66.12 mM; ultrasonic and adjust pH to 2 with 1M HCl)

Preparing Stock Solutions	Mass / Solvent / Concentration	1 mg	5 mg	10 mg
	1 mM	6.6116 mL	33.0578 mL	66.1157 mL
	5 mM	1.3223 mL	6.6116 mL	13.2231 mL
	10 mM	0.6612 mL	3.3058 mL	6.6116 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: ≥ 1 mg/mL (6.61 mM); Clear solution
2. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: ≥ 1 mg/mL (6.61 mM); Clear solution
3. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: ≥ 0.5 mg/mL (3.31 mM); Clear solution

BIOLOGICAL ACTIVITY

Description

Amantadine (1-Adamantanamine) is an orally avtive and potent antiviral agent with activity against influenza A viruses. Amantadine inhibits several ion channels such as NMDA and M2, and also inhibits Coronavirus ion channels. Amantadine also has anti-orthopoxvirus and anticancer activity. Amantadine can be used for Parkinson's disease, postoperative cognitive dysfunction (POCD) and COVID-19 research[1][2][3][4][5][6].

IC_{50} & Target			
	CDK2	Bcl-2	Bax

In Vitro

Amantadine (0-500 μM, 26 h) inhibits SARS-CoV-2 replication, with IC_{50} concentrations between 83 and 119 μM[4].
Amantadine (0-100 μg/mL, 24-72 h) markedly inhibits the proliferation of HepG2 and SMMC□7721 cells[6].

Amantadine (0-75 μg/mL, 48 h) arrests the cell cycle at the G0/G1 phase and induces apoptosis[6].
Amantadine (0-75 μg/mL, 48 h) reduces the levels of the cell cycle‐related genes and proteins (cyclin D1, cyclin E and CDK2), reduces Bcl-2 and increases the Bax protein and mRNA levels[6].

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

Cell Viability Assay[4]

Cell Line:	Vero E6 cells
Concentration:	500 μM, 100 μM, 20 μM, 4 μM, and 8 nM
Incubation Time:	26 h
Result:	Caused a concentration-dependent reduction (IC_{50}=83 μM) of viral nucleic acids in the supernatant 26 h after infection at 10-500 μM. Caused a concentration-dependent reduction (IC_{50}=119 μM) of viral nucleic acids in the cytosol 26 h after infection.

Cell Proliferation Assay[6]

Cell Line:	Human HCC cell lines (HepG2 and SMMC-7721) and normal hepatocellular cells (L02 cells)
Concentration:	0, 1, 2, 5, 10, 25, 50 and 100 μg/mL
Incubation Time:	24, 48 and 72 h
Result:	Inhibited cellular proliferation in a time- and dose-dependent manner in HepG2 and SMMC-7721 cells.

Cell Cycle Analysis[6]

Cell Line:	HepG2 and SMMC-7721 cells
Concentration:	0, 10, 25, 50 and 75 μg/mL
Incubation Time:	48 h
Result:	Significantly increased the population of HepG2 and SMMC-7721 cells in the G0/G1 phase in a dose-dependent manner, and significantly decreased the number of HepG2 cells in the S phase.

Apoptosis Analysis[6]

Cell Line:	HepG2 and SMMC-7721 cells
Concentration:	0, 10, 25, 50 and 75 μg/mL
Incubation Time:	48 h
Result:	Markedly increased the percentage of apoptotic HepG2 and SMMC-7721 cells (early- and late-stage apoptosis) in a dose-dependent manner.

Western Blot Analysis[6]

Cell Line:	HepG2 and SMMC-7721 cells
Concentration:	0, 10, 25, 50 and 75 μg/mL
Incubation Time:	48 h
Result:	Showed downregulation of cyclin D1, cyclin E and CDK2, and showed a decrease in Bcl-2

	levels and an increase of Bax levels in HepG2 and SMMC-7721 cells.

RT-PCR[6]

Cell Line:	HepG2 and SMMC-7721 cells
Concentration:	0, 10, 25, 50 and 75 μg/mL
Incubation Time:	48 h
Result:	Revealed an increase in Bax and decrease in Bcl-2 genes.

In Vivo

Amantadine (25 mg/kg, IP, once daily for 3 days) inhibits surgery induced neuroinflammation and learning and memory impairment[5].

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Animal Model:	Fischer 344 rats (Four-month old, male, 290-330 g, 15 rats each group)[5]
Dosage:	25 mg/kg
Administration:	IP, once daily for 3 days (the first dose at 15 min before surgery)
Result:	Inhibited surgery induced neuroinflammation and learning and memory impairment, increased GDNF (glial cell line-derived neurotrophic factor) that was co-localized with glial fibrillary acidic protein (an astrocytic marker) in the hippocampus.

CUSTOMER VALIDATION

- Signal Transduct Target Ther. 2021 Mar 27;6(1):134.
- Int J Nanomedicine. 2019 Nov 27;14:9217-9234.

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REFERENCES

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

[2]. Fink K, et al. Amantadine Inhibits SARS-CoV-2 In Vitro. Viruses. 2021 Mar 24;13(4):539.

[3]. Zhang J, et al. Amantadine alleviates postoperative cognitive dysfunction possibly by increasing glial cell line-derived neurotrophic factor in rats. Anesthesiology. 2014 Oct;121(4):773-85.

[4]. Lan Z, et al. Amantadine inhibits cellular proliferation and induces the apoptosis of hepatocellular cancer cells in vitro. Int J Mol Med. 2015;36(3):904-910.

[5]. Suzuki H, et al. Emergence of amantadine-resistant influenza A viruses: epidemiological study. J Infect Chemother. 2003;9(3):195-200.

[6]. Hubsher G, et al. Amantadine: the journey from fighting flu to treating Parkinson disease. Neurology. 2012;78(14):1096-1099.

Caution: Product has not been fully validated for medical applications. For research use only.

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