Donepezil Hydrochloride

Cat. No.: HY-B0034

CAS No.: 120011-70-3

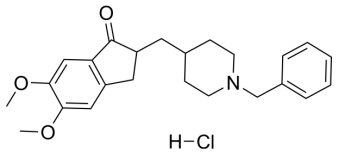
Molecular Formula: $C_{24}H_{30}ClNO_3$

Molecular Weight: 415.95

Target: Cholinesterase (ChE)

Pathway: Neuronal Signaling

Storage: 4°C, sealed storage, away from moisture
* In solvent : -80°C, 6 months; -20°C, 1 month (sealed storage, away from moisture)



SOLVENT & SOLUBILITY

In Vitro

H_2O : 25 mg/mL (60.10 mM; Need ultrasonic)
DMSO : 6.2 mg/mL (14.91 mM; Need warming)

Preparing Stock Solutions

Solvent / Mass / Concentration	1 mg	5 mg	10 mg
1 mM	2.4041 mL	12.0207 mL	24.0414 mL
5 mM	0.4808 mL	2.4041 mL	4.8083 mL
10 mM	0.2404 mL	1.2021 mL	2.4041 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: ≥ 1.25 mg/mL (3.01 mM); Clear solution
2. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: ≥ 1.25 mg/mL (3.01 mM); Clear solution
3. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: ≥ 1.25 mg/mL (3.01 mM); Clear solution

BIOLOGICAL ACTIVITY

Description

Donepezil Hydrochloride (E2020) is a reversible, selective AChE inhibitor with an IC_{50} of 6.7 nM for AChE activity. Donepezil shows high selectivity for AChE over BuChE[1]. Donepezil exhibits neuroprotective effect on Aβ42 neurotoxicity[2].

IC_{50} & Target

AChE

In Vitro

Donepezil's neuroprotective mechanism is related to the enhanced phosphorylation of Akt and GSK-3β and reduced phosphorylation of tau and glycogen synthase[2].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Cell Viability Assay[2]

Cell Line:	Cortical neuronal cells
Concentration:	0.01, 0.1, 1, and 10 μM
Incubation Time:	24 hours
Result:	Exhibited significantly increased cell viability (maximized 89.2±2.1% in MTT, 96.3±5.5% in TBS, and 95.1±3.2% in CCK-8).

Western Blot Analysis[2]

Cell Line:	Cortical neuronal cells
Concentration:	10 μM
Incubation Time:	24 hours before 20 μM Aβ42 exposure for 6 hours
Result:	Effects of Donepezil on Akt and the GSK-3 signaling pathway were statistically significant in the presence of Aβ42 toxicity.

In Vivo

Donepezil treatment (3 mg/kg) significantly prevents the progression of scopolamine-induced memory impairment in mice [3].

A pharmacokinetic study of Donepezil shows a mean peak plasma concentration of donepezil after oral treatment (3 and 10 mg/kg) of approximately 1.2 h and 1.4 h, respectively; absolute bioavailability is calculated as 3.6%[3].

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

Animal Model:	Male imprinting control region (ICR) mice (6 weeks old)[3]
Dosage:	3-10 mg/kg
Administration:	Administered orally
Result:	Pretreatment with 3–10 mg/kg ameliorated scopolamine-induced memory impairment.

Animal Model:	Hairless rats with an average weight of 300 g[3]
Dosage:	3 and 10 mg/kg (Pharmacokinetic Analysis)
Administration:	Administered orally; and blood (250 μL) was collected through the tail vein
Result:	After oral treatment (3 and 10 mg/kg), a maximum concentration (C_{max}) was reached after approximately 1.2 ± 0.4 h and 1.4 ± 0.5 h, respectively, and gradually decreased.

CUSTOMER VALIDATION

- Clin Transl Med. 2021 May 28.
- Eur J Med Chem. 2023 Dec 21, 116071.
- Comput Struct Biotec. 2023 Feb 24.
- Foods. 2022, 11(14), 2095.
- J Integr Neurosci. 2023 May 16, 22(3), 76.

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REFERENCES

[1]. H Ogura, et al. Comparison of inhibitory activities of donepezil and other cholinesterase inhibitors on acetylcholinesterase and butyrylcholinesterase in vitro. Methods Find Exp Clin Pharmacol. 2000 Oct;22(8):609-13.

[2]. Min-Young Noh,et al. Neuroprotective effects of donepezil through inhibition of GSK-3 activity in amyloid-beta-induced neuronal cell death. J Neurochem. 2009 Mar;108(5):1116-25.

[3]. Chang Yell Shin, et al. The Effects of Donepezil, an Acetylcholinesterase Inhibitor, on Impaired Learning and Memory in Rodents. Biomol Ther (Seoul). 2018 May 1;26(3):274-281.

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