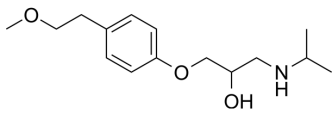
Metoprolol

Cat. No.:	HY-17503
CAS No.:	51384-51-1
Molecular Formula:	$C_{15}H_{25}NO_3$
Molecular Weight:	267.36
Target:	Adrenergic Receptor; Apoptosis
Pathway:	GPCR/G Protein; Neuronal Signaling; Apoptosis
Storage:	4°C, protect from light * In solvent : -80°C, 6 months; -20°C, 1 month (protect from light)



SOLVENT & SOLUBILITY

In Vitro

DMSO : 100 mg/mL (374.03 mM; Need ultrasonic)

Preparing Stock Solutions	Mass / Solvent / Concentration	1 mg	5 mg	10 mg
	1 mM	3.7403 mL	18.7014 mL	37.4028 mL
	5 mM	0.7481 mL	3.7403 mL	7.4806 mL
	10 mM	0.3740 mL	1.8701 mL	3.7403 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: ≥ 2.5 mg/mL (9.35 mM); Clear solution
2. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: ≥ 2.5 mg/mL (9.35 mM); Clear solution

BIOLOGICAL ACTIVITY

Description

Metoprolol is an orally active, selective β1-adrenoceptor antagonist. Metoprolol shows anti-inflammation, antitumor and anti-angiogenic properties[1][2][3].

IC_{50} & Target

β1 adrenoceptor

In Vitro

Metoprolol (0-1000 μg/mL; 24-72 h) shows cytotoxic effect on U937 and MOLT-4 cells dose and time dependently[3].

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

Cell Cytotoxicity Assay[3]

Cell Line:	U937 and MOLT-4 cells

Concentration:	1, 10, 50, 100, 500 and 1000 μg/mL
Incubation Time:	24, 48 and 72 h
Result:	Significantly decreased the viability of U937 and MOLT-4 cells at 1000 μg/mL (3740.14μM) concentration after 48 hours incubation time, significantly reduced the viability of U937 cells at ≥500 μg/ml (≥1870.07μM) concentrations after 72 hours incubation time, and significantly decreased the viability of MOLT4 cells at ≥100 μg/ml (≥374.01μM) concentrations after 72 hours incubation.

In Vivo

Metoprolol (2.5 mg/kg/h; infusion; 11 weeks) reduces proinflammatory cytokines and atherosclerosis in ApoE$^{-/-}$ Mice[1].
Metoprolol (15 mg/kg/q12h; i.g.; 5 days) shows anti-inflammation and anti-virus effects in murine model with coxsackievirus B3-induced viral myocarditis[2].
Metoprolol (2.5 mg/kg; i.v.; 3 bolus injections) significantly decreased activated caspase-9 protein expression and inhibits myocardial apoptosis in coronary microembolization (CME) rats[4].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Animal Model:	Male ApoE$^{-/-}$ mice[1]
Dosage:	2.5 mg/kg/h
Administration:	Via osmotic minipumps, 11 weeks
Result:	Significantly reduced atherosclerotic plaque area in thoracic aorta, reduced serum TNFα and the chemokine CXCL1 as well as decreasing the macrophage content in the plaques.

Animal Model:	Balb/c mice, coxsackievirus B3 (CVB3) induced viral myocarditis (VMC) model[2]
Dosage:	15 mg/kg/q12h
Administration:	Oral gavage, 5 consecutive days
Result:	Reduced pathological scores of VMC induced by CVB3 infection, protected the myocardium against viral damage by reducing serum cTn-I levels. Decreased the levels of myocardial pro-inflammatory cytokines and increase the expression of anti-inflammatory cytokine. Significantly decreased myocardial virus titers.

CUSTOMER VALIDATION

- Chemosphere. 2019 Jun;225:378-387.
- Clin Pharmacol Ther. 2023 Nov 16.
- Environ Toxicol. 2023 Dec 2.
- J Pharmacol Sci. 2020 Sep;144(1):30-42.
- J Pharmaceut Biomed. 2020, 113870.

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REFERENCES

[1]. Ulleryd MA, et al. Metoprolol reduces proinflammatory cytokines and atherosclerosis in ApoE-/- mice. Biomed Res Int. 2014;2014:548783.

[2]. Wang D, et al. Carvedilol has stronger anti-inflammation and anti-virus effects than metoprolol in murine model with coxsackievirus B3-induced viral myocarditis. Gene. 2014 Sep 1;547(2):195-201.

[3]. Hajatbeigi B, et al. Cytotoxicity of Metoprolol on Leukemic Cells in Vitro. IJBC 2018; 10(4): 124-129.

[4]. Su Q, et al. Effect of metoprolol on myocardial apoptosis and caspase-9 activation after coronary microembolization in rats. Exp Clin Cardiol. 2013 Spring;18(2):161-5.

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