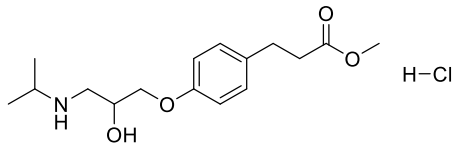
Product data sheet

MedKoo Cat#: 317785 Name: Esmolol Hydrochloride CAS#: 81161-17-3 Chemical Formula: $C_{16}H_{26}ClNO_4$ Molecular Weight: 331.84	
Product supplied as:	Powder
Purity (by HPLC):	≥ 98%
Shipping conditions	Ambient temperature
Storage conditions:	Powder: -20°C 3 years; 4°C 2 years.
	In solvent: -80°C 3 months; -20°C 2 weeks.

1. Product description:

Esmolol Hydrochloride is the hydrochloride salt form of esmolol, a short and rapid-acting beta adrenergic antagonist belonging to the class II anti-arrhythmic drugs and devoid of intrinsic sympathomimetic activity. Esmolol hydrochloride competitively blocks beta-1 adrenergic receptors in cardiac muscle and reduces the contractility and cardiac rate of heart muscle, thereby decreasing cardiac output and myocardial oxygen demands. This agent also decreases sympathetic output centrally and blocks renin secretion. At higher doses, esmolol hydrochloride also blocks beta-2 receptors located in bronchial and vascular smooth muscle, thereby leading to smooth muscle relaxation.

2. CoA, QC data, SDS, and handling instruction

SDS and handling instruction, CoA with copies of QC data (NMR, HPLC and MS analytical spectra) can be downloaded from the product web page under "QC And Documents" section. Note: copies of analytical spectra may not be available if the product is being supplied by MedKoo partners. Whether the product was made by MedKoo or provided by its partners, the quality is 100% guaranteed.

3. Solubility data

Solvent	Max Conc. mg/mL	Max Conc. mM
DMSO	63.67	191.87
DMF	25.0	75.34
Ethanol	45.5	137.11
PBS (pH 7.2)	10.0	30.14
Water	58.0	174.78

4. Stock solution preparation table:

Concentration / Solvent Volume / Mass	**1 mg**	**5 mg**	**10 mg**
1 mM	3.01 mL	15.07 mL	30.14 mL
5 mM	0.60 mL	3.01 mL	6.03 mL
10 mM	0.30 mL	1.51 mL	3.01 mL
50 mM	0.06 mL	0.30 mL	0.60 mL

5. Molarity Calculator, Reconstitution Calculator, Dilution Calculator

Please refer the product web page under section of "Calculator"

6. Recommended literature which reported protocols for in vitro and in vivo study

In vitro study

1. Deng CY, Lin SG, Zhang WC, Kuang SJ, Qian WM, Wu SL, Shan ZX, Yang M, Yu XY. Esmolol inhibits Na+ current in rat ventricular myocytes. Methods Find Exp Clin Pharmacol. 2006 Dec;28(10):697-702. doi: 10.1358/mf.2006.28.10.1037498. PMID: 17235414.

2. Gorelik J, Vodyanoy I, Shevchuk AI, Diakonov IA, Lab MJ, Korchev YE. Esmolol is antiarrhythmic in doxorubicin-induced arrhythmia in cultured cardiomyocytes - determination by novel rapid cardiomyocyte assay. FEBS Lett. 2003 Jul 31;548(1-3):74-8. doi: 10.1016/s0014-5793(03)00743-9. PMID: 12885410.

In vivo study

1. Ruggeri L, Nespoli F, Ristagno G, Fumagalli F, Boccardo A, Olivari D, Affatato R, Novelli D, De Giorgio D, Romanelli P, Minoli L, Cucino A, Babini G, Staszewsky L, Zani D, Pravettoni D, Belloli A, Scanziani E, Latini R, Magliocca A. Esmolol during

cardiopulmonary resuscitation reduces neurological injury in a porcine model of cardiac arrest. Sci Rep. 2021 May 20;11(1):10635. doi: 10.1038/s41598-021-90202-w. PMID: 34017043; PMCID: PMC8138021.
2. Hoareau GL, Beyer CA, Caples CM, Spruce MW, Gilbert Z, Grayson JK, Neff LP, Williams TK, Johnson MA. Esmolol reduces myocardial injury induced by resuscitative endovascular balloon occlusion of the aorta (REBOA) in a porcine model of hemorrhagic shock. Injury. 2020 Oct;51(10):2165-2171. doi: 10.1016/j.injury.2020.07.005. Epub 2020 Jul 3. PMID: 32669205.

7. Bioactivity

Biological target:

Esmolol hydrochloride is a beta adrenergic receptor blocker.

In vitro activity

The results indicated that esmolol reversibly inhibited I(Na) in a concentration-dependent manner, with an IC50 of 74.2 +/- 0.60 micromol l(-1) with a Hill coefficient of 1.02 +/- 0.04. This inhibition was voltage- and frequency-dependent.

Reference: Methods Find Exp Clin Pharmacol. 2006 Dec;28(10):697-702. https://pubmed.ncbi.nlm.nih.gov/17235414/

In vivo activity

Brain histology showed a significant reduction in cortical neuronal degeneration/necrosis in the esmolol group compared to the control one (mean score 0.3 vs. 1.3, $p = 0.03$, Fig. 3A), while only a trend was present in the hippocampal region (mean score 1 vs. 2, $p = 0.11$, Fig. 3B). A marked reduction of microglial activation in the hippocampus was also observed after treatment with esmolol compared to control (mean % 6 vs. 2, $p < 0.001$, Fig. 3C). Significantly lower circulating levels of NSE were measured in esmolol animals compared to controls at 96 h after resuscitation (median 2.2 vs. 21, $p < 0.0001$, Fig. 4A).

Reference: Sci Rep. 2021; 11: 10635. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8138021/

Note: The information listed here was extracted from literature. MedKoo has not independently retested and confirmed the accuracy of these methods. Customer should use it just for a reference only.