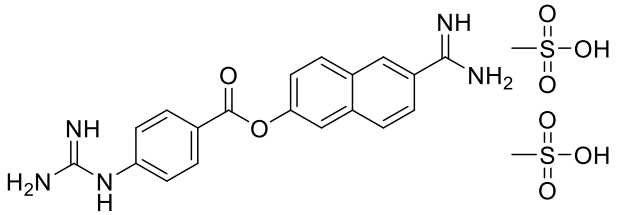
Product data sheet

MedKoo Cat#: 329453 Name: Nafamostat mesylate CAS#: 82956-11-4 (mesylate) Chemical Formula: $C_{21}H_{25}N_5O_8S_2$ Molecular Weight: 539.58	
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:
Nafamostat, also known as FUT-175, is a serine protease inhibitor and an anticoagulant. Nafamostat promotes endothelium-dependent vasorelaxation via the Akt-eNOS dependent pathway. Nafamostat Attenuates Ischemia-Reperfusion-Induced Renal Injury. Nafamostat Attenuates Ischemia-Reperfusion-Induced Renal Injury. Nafamostat protects against acute cerebral ischemia via blood-brain barrier protection. Nafamostat Inhibits TNF-α-Induced Vascular Endothelial Cell Dysfunction by Inhibiting Reactive Oxygen Species Production. Researchers have identified the drug as a potential therapy for COVID-19,[with clinical trials in Japan possibly set to begin in March 2020.

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	10.0	18.5

4. Stock solution preparation table:

Concentration / Solvent Volume / Mass	1 mg	5 mg	10 mg
1 mM	1.85 mL	9.27 mL	18.53 mL
5 mM	0.37 mL	1.85 mL	3.71 mL
10 mM	0.19 mL	0.93 mL	1.85 mL
50 mM	0.04 mL	0.19 mL	0.37 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. Inman RD, Chiu B. Nafamostat mesylate, a serine protease inhibitor, demonstrates novel antimicrobial properties and effectiveness in Chlamydia-induced arthritis. Arthritis Res Ther. 2012 Jun 20;14(3):R150. doi: 10.1186/ar3886. PMID: 22716645; PMCID: PMC3446536.
2. Fuwa M, Kageyama M, Ohashi K, Sasaoka M, Sato R, Tanaka M, Tashiro K. Nafamostat and sepimostat identified as novel neuroprotective agents via NR2B N-methyl-D-aspartate receptor antagonism using a rat retinal excitotoxicity model. Sci Rep. 2019 Dec 31;9(1):20409. doi: 10.1038/s41598-019-56905-x. PMID: 31892740; PMCID: PMC6938488.

In vivo study

1. Fuwa M, Kageyama M, Ohashi K, Sasaoka M, Sato R, Tanaka M, Tashiro K. Nafamostat and sepimostat identified as novel neuroprotective agents via NR2B N-methyl-D-aspartate receptor antagonism using a rat retinal excitotoxicity model. Sci Rep. 2019 Dec 31;9(1):20409. doi: 10.1038/s41598-019-56905-x. PMID: 31892740; PMCID: PMC6938488.
2. Chen T, Wang J, Li C, Zhang W, Zhang L, An L, Pang T, Shi X, Liao H. Nafamostat mesilate attenuates neuronal damage in a rat model of transient focal cerebral ischemia through thrombin inhibition. Sci Rep. 2014 Jul 2;4:5531. doi: 10.1038/srep05531. PMID: 24985053; PMCID: PMC4078306.

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7. Bioactivity

Biological target:

Nafamostat mesylate, a synthetic serine protease inhibitor, is an anticoagulant that supresses T cell auto-reactivity by decreasing granzyme activity and CTL cytolysis.

In vitro activity

To determine whether nafamostat has neuroprotective effects, its effects on NMDA-induced neuronal cell death were first examined in cultured primary rat cortical neurons. Figure 1 shows the concentration–response curves for the effects of nafamostat on NMDA-induced neuronal cell death in comparison with those of MK-801, an authentic NMDA receptor antagonist used as the positive control. In the absence of either nafamostat or MK-801, the application of 25 μM NMDA to the culture medium resulted in 80% reduction in the cell viability, which reached statistical significance. Nafamostat demonstrated a potent and concentration-dependent neuroprotective effect against NMDA-induced neuronal cell death. This effect was statistically significant in the range from 2.5 to 10 μM and reached the peak at 5 μM. As expected, 10 μM MK-801 also provided statistically significant and complete protection against NMDA-induced neuronal cell death. Thus, nafamostat may have an in vitro neuroprotective effect equivalent to that of MK-801, which has been assessed clinically.

Reference: Sci Rep. 2019; 9: 20409. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6938488/

In vivo activity

This study tested the hypothesis that nafamostat mesilate, a serine protease inhibitor, may ameliorate ischemia-induced neuronal damage through thrombin inhibition after ischemic stroke. Focal ischemia was induced in adult Sprague-Dawley rats by occlusion of the middle cerebral artery for 2 hours followed by 22 hours of reperfusion. A high expression level and activity of thrombin are associated with brain damage after ischemic stroke9,12,17,18. Owing to NM's activity as a serine protease inhibitor, we determined whether NM treatment could inhibit thrombin expression and activity in the striatum lesion at 24 hours after MCAO. The results from Western blotting showed that NM treatment dose-dependently decreased the expression of thrombin from an ischemic striatum lesion (Fig. 3A). We also found that brain thrombin activity in the vehicle group at 24 hours after MCAO was significantly higher than that in the sham group; however, NM treatment (0.1 mg/kg and 1 mg/kg) significantly reduced brain thrombin activity at 24 hours after MCAO (Fig. 3B and C). These results show that NM treatment can decrease thrombin expression and activity in the brains of rats after MCAO. hese results suggest that nafamostat mesilate may have a potential therapeutic role for neuroprotection against focal cerebral ischemia through thrombin inhibition.

Reference: Sci Rep. 2014 Jul 2;4:5531. https://pubmed.ncbi.nlm.nih.gov/24985053/