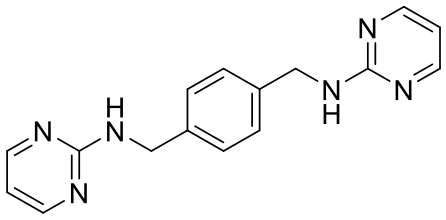
Product data sheet

MedKoo Cat#: 201961 Name: MSX-122 CAS#: 897657-95-3 Chemical Formula: $C_{16}H_{16}N_6$ Exact Mass: 292.14364 Molecular Weight: 292.34	
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:

MSX-122 is a n orally bioavailable inhibitor of CXCR4 with potential antineoplastic and antiviral activities. CXCR4 inhibitor MSX-122 binds to the chemokine receptor CXCR4, preventing the binding of stromal derived factor-1 (SDF-1) to the CXCR4 receptor and receptor activation, which may result in decreased tumor cell proliferation and migration. CXCR4, a chemokine receptor belonging to the GPCR (G protein-coupled receptor) gene family, plays an important role in chemotaxis and angiogenesis and is upregulated in several tumor cell types; it is also a co-receptor for HIV entry into T cells. The chemical structure of MSX-122 is very similar to that of WZ811.

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	0.20	0.70

4. Stock solution preparation table:

Concentration / Solvent Volume / Mass	1 mg	5 mg	10 mg
1 mM	3.42 mL	17.10 mL	34.21 mL
5 mM	0.68 mL	3.42 mL	6.84 mL
10 mM	0.34 mL	1.71 mL	3.42 mL
50 mM	0.07 mL	0.34 mL	0.68 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. Liang Z, Zhan W, Zhu A, Yoon Y, Lin S, Sasaki M, Klapproth JM, Yang H, Grossniklaus HE, Xu J, Rojas M, Voll RJ, Goodman MM, Arrendale RF, Liu J, Yun CC, Snyder JP, Liotta DC, Shim H. Development of a unique small molecule modulator of CXCR4. PLoS One. 2012;7(4):e34038. doi: 10.1371/journal.pone.0034038. Epub 2012 Apr 2. PMID: 22485156; PMCID: PMC3317778.

In vivo study

1. Shu HK, Yoon Y, Hong S, Xu K, Gao H, Hao C, Torres-Gonzalez E, Nayra C, Rojas M, Shim H. Inhibition of the CXCL12/CXCR4-axis as preventive therapy for radiation-induced pulmonary fibrosis. PLoS One. 2013 Nov 7;8(11):e79768. doi: 10.1371/journal.pone.0079768. PMID: 24244561; PMCID: PMC3820649.
2. Liang Z, Zhan W, Zhu A, Yoon Y, Lin S, Sasaki M, Klapproth JM, Yang H, Grossniklaus HE, Xu J, Rojas M, Voll RJ, Goodman MM, Arrendale RF, Liu J, Yun CC, Snyder JP, Liotta DC, Shim H. Development of a unique small molecule modulator of CXCR4. PLoS One. 2012;7(4):e34038. doi: 10.1371/journal.pone.0034038. Epub 2012 Apr 2. PMID: 22485156; PMCID: PMC3317778.

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7. Bioactivity

Biological target:

MSX-122 is an active partial antagonist of CXCR4, inhibiting CXCR4/CXCL12 actions, with an IC50 of ~10 nM.

In vitro activity

To determine whether MSX-122 directly binds to the CXCL12 site on CXCR4, a highly sensitive radiotracer technique, using a fluorine-18 radiolabeled MSX-122 analog (MSX-122F) in which one pyrimidine ring of MSX-122 was labeled by fluorine-18 (Figure 1D) was utilized. It was postulated that MSX-122 bound to CXCR4 can interfere with the "lock and key" mechanism between CXCR4 and CXCL12, which can result in inhibiting key functional signaling such as Matrigel invasion and cAMP modulation without displacing CXCL12. 100 nM MSX-122 effectively blocked invasion of 78% MDA-MB-231 cells while the same concentration of AMD3100 blocked invasion of 62% cells. CXCR4 and CXCL12 are also known to play critical roles in endothelial cell migration and tubular organization. While AMD3100 at 100 nM blocked 43% of CXCL12-induced tubular network formation, MSX-122 blocked 63% at the same concentration (Figure 2B). In conclusion, MSX-122, a small novel molecule that is a partial CXCR4 antagonist without mobilizing stem cells has been developed. This can be safer for long-term blockade of metastasis than other reported CXCR4 antagonists.

Reference: PLoS One. 2012; 7(4): e34038. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3317778/

In vivo activity

To test the impact of CXCR4 blockade with either AMD3100 or MSX-122 on development of radiation-induced PF, AMD3100, 10 mg/kg, s.c. or MSX-122, 10 mg/kg i.p. was administered to Female C57BL/6 mice for 20-weeks. It was found from the initial pilot experiment that a single 20-Gy dose to the lung at the 20-week time-point resulted in fully 90% of untreated mice developing PF confirmed by both trichrome staining-positivity (maximum score 12) and CT scan showing a significant volume with density > -200 HU. Both histology-based and CT-based assessments show that MSX-122 significantly attenuated the development of fibrosis by 70%, while AMD3100 only trended towards reduction in fibrosis (Figure 5A). Representative micrographs of trichrome-staining in each group at low and high power are shown, with obvious blue staining in the vehicle only group indicating significant deposition of collagen (Figure 5B). The AMD3100-treated group showed 50% mortality during the 20-weeks of treatment, while no mortality was observed in the MSX-122- or vehicle-treated (irradiated) groups. These results suggest that the CXCR4/CXCL12-axis is critical in the development of radiation-induced PF in a mouse model and that CXCR4 inhibition may alleviate potential radiation-induced lung injury. Examining possible use of MSX-122 for blocking PF among patients undergoing thoracic irradiation warrants further investigations.

Reference: PLoS One. 2013; 8(11): e79768. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3820649/