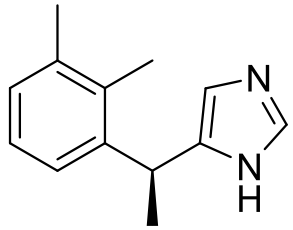
Product data sheet

MedKoo Cat#: 317594 Name: Dexmedetomidine CAS#: 113775-47-6 (free base) Chemical Formula: $C_{13}H_{16}N_2$ Exact Mass: 200.13135 Molecular Weight: 200.28	
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:
Dexmedetomidine, sold under the trade names Precedex and Dexdor, among others, is an anxiolytic, sedative, and analgesic medication. Similar to clonidine, it is an agonist of α2-adrenergic receptors in certain parts of the brain. Dexmedetomidine is notable for its ability to provide sedation without risk of respiratory depression (unlike other commonly used sedatives such as propofol, fentanyl, and midazolam) and can provide cooperative or semi-arousable sedation. Dexmedetomidine hydrochloride is also used in veterinary medicine for dogs and cats. The drug was developed by Orion Pharma.
(Source:https://en.wikipedia.org/wiki/Dexmedetomidine).

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	40.0	199.72
Ethanol	40.0	199.72

4. Stock solution preparation table:

Concentration / Solvent Volume / Mass	1 mg	5 mg	10 mg
1 mM	4.99 mL	24.97 mL	49.93 mL
5 mM	1.00 mL	4.99 mL	9.99 mL
10 mM	0.50 mL	2.50 mL	4.99 mL
50 mM	0.10 mL	0.50 mL	1.00 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. Yang XM, Liu J, Ji J, Xie J. Effects of dexmedetomidine on the deformability of erythrocytes in vitro and in anesthesia. Exp Ther Med. 2014 Jun;7(6):1631-1634. doi: 10.3892/etm.2014.1633. Epub 2014 Mar 27. PMID: 24926356; PMCID: PMC4043598.
2. Tu Y, Liang Y, Xiao Y, Lv J, Guan R, Xiao F, Xie Y, Xiao Q. Dexmedetomidine attenuates the neurotoxicity of propofol toward primary hippocampal neurons in vitro via Erk1/2/CREB/BDNF signaling pathways. Drug Des Devel Ther. 2019 Feb 19;13:695-706. doi: 10.2147/DDDT.S188436. PMID: 30858699; PMCID: PMC6387615.

In vivo study

1. Li J, Chen Q, He X, Alam A, Ning J, Yi B, Lu K, Gu J. Dexmedetomidine attenuates lung apoptosis induced by renal ischemia-reperfusion injury through α2AR/PI3K/Akt pathway. J Transl Med. 2018 Mar 23;16(1):78. doi: 10.1186/s12967-018-1455-1. PMID: 29566706; PMCID: PMC5865375.

Product data sheet

2. Wang Z, Wu J, Hu Z, Luo C, Wang P, Zhang Y, Li H. Dexmedetomidine Alleviates Lipopolysaccharide-Induced Acute Kidney Injury by Inhibiting p75NTR-Mediated Oxidative Stress and Apoptosis. Oxid Med Cell Longev. 2020 Oct 31;2020:5454210. doi: 10.1155/2020/5454210. PMID: 33194004; PMCID: PMC7648709.

7. Bioactivity

Biological target:

Dexmedetomidine is a sedative medication used by intensive care units and anesthetists that targets the α2 receptor with a Ki of 1.08 nM

In vitro activity

Primary hippocampal neurons were cultured for 8 days in vitro and pretreated with or without dexmedetomidine or phosphorylation inhibitors prior to propofol exposure. Dexmedetomidine exerts its neuroprotective effect by binding to imidazoline I1 receptors and modulating histone H3 acetylation in dopaminergic neurons in the striatum via the Erk1/2 signaling pathways. In the present study, pretreatment with dexmedetomidine evidently rescued the propofol-induced downregulation of both the BDNF mRNA (Figure 5B) and reduced levels of the p-Erk1/2, p-CREB, and BDNF proteins (Figure 6B–E). No notable difference was observed in the expression of the Erk1/2 and CREB mRNAs and proteins (Figures 5B and 6B–E) in cells pretreated with or without dexmedetomidine. In conclusion, dexmedetomidine alleviates propofol-induced cytotoxicity toward primary hippocampal neurons in vitro, which correlated with the activation of Erk1/2/CREB/BDNF signaling pathways.

Reference: Drug Des Devel Ther. 2019 Feb 19;13:695-706. https://pubmed.ncbi.nlm.nih.gov/30858699/

In vivo activity

The antioxidant effects and the mechanism of DEX (dexmedetomidine) were studied in a lipopolysaccharide- (LPS-) induced AKI model in mice. As shown in Figure 1(a), survival rate dropped about 80% in mice subjected to LPS injection within 12 hours and continued to decline sharply starting from 12 hours after sepsis, reaching almost 42% by 120 hours after LPS injection. Intravenous administration of 30 μg/kg and 50 μg/kg DEX extended lifetime and increased survival rate compared with the LPS group ($p = 0.038$ and $p = 0.042$). Kidney function was evaluated based on serum Cr and BUN which are the primary indicators of the severity of kidney damage. Levels of BUN and Cr in mice kidneys were significantly higher in the LPS group than in the control group, whereas treatment with DEX decreased serum Cr and BUN levels compared to the LPS group (Figure 1(b)). Furthermore, histological analysis in HE and PAS revealed that mice treated with LPS exhibited severe renal pathological lesions, indicated by widespread tubular necrosis, tubular degeneration, cellular swelling, and inflammatory cell infiltration in renal tissues, whereas DEX treatment significantly reversed these effects (Figure 1(c)). Kidney histology scores in the LPS group were significantly higher than those in the control group, whereas kidney scores in the DEX+LPS group were significantly lower than those in the LPS group. The results suggest that treatment with DEX protects mice from acute kidney injury caused by LPS.

Reference: Oxid Med Cell Longev. 2020 Oct 31;2020:5454210. https://pubmed.ncbi.nlm.nih.gov/33194004/