Small Molecules

Minocycline

Antibiotic with anti-inflammatory and neuroprotective properties

Catalog # 74112 25 mg
74114 100 mg

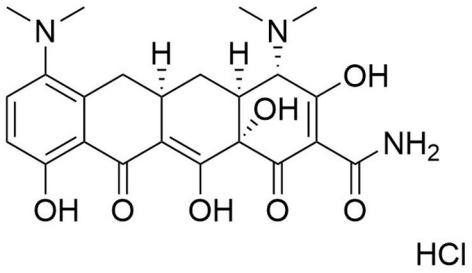
STEMCELL™ TECHNOLOGIES
Scientists Helping Scientists™ | WWW.STEMCELL.COM
TOLL FREE PHONE 1 800 667 0322 • PHONE +1 604 877 0713
INFO@STEMCELL.COM • TECHSUPPORT@STEMCELL.COM
FOR GLOBAL CONTACT DETAILS VISIT OUR WEBSITE

Product Description

Minocycline is a semi-synthetic tetracycline and antibiotic broadly used to treat various bacterial infections. It inhibits bacterial protein synthesis by binding to the 30S ribosomal subunit. It has also been reported to chelate with Ca2+ and Mg2+ (Lambs et al.). Reported to be anti-inflammatory, immunomodulatory, and neuroprotective (Garrido-Mesa et al.), some of its mechanism of actions include inhibiting enzymatic activities of inducible nitric oxide synthase (Amin et al.), matrix metalloproteinases (Golub et al.), and phospholipase A2 (Pruzanski et al.), inhibiting activation of caspase-1 and caspase-3 (Chen et al.), inhibiting activity of poly(ADP-ribose) polymerase 1 (Alano et al.), and reduction of p38 MAPK phosphorylation (Corbacella et al.). This product is supplied as the hydrochloride salt of the molecule.

Molecular Name: Minocycline (Hydrochloride)
Alternative Names: Minomycin; NSC 141993
CAS Number: 13614-98-7
Chemical Formula: $C_{23}H_{27}N_3O_7 \bullet HCl$
Molecular Weight: 493.9 g/mol
Purity: ≥ 98%
Chemical Name: 4,7-bis(dimethylamino)-1,4,4α,5,5α,6,11,12α-octahydro-3,10,12,12α,tetrahydroxy-1,11-dioxo-2-naphthacene-carboxamide, monohydrochloride

Structure:



Properties

Physical Appearance: A crystalline solid

Storage: Product stable at -20°C as supplied. Protect product from prolonged exposure to light. For long-term storage, store with a desiccant.
Stable as supplied for 12 months from date of receipt.

Solubility:
· DMSO ≤ 10 mM
· DMF ≤ 20 mM
For example, to prepare a 5 mM stock solution in DMSO, resuspend 10 mg in 4.05 mL of DMSO.

Prepare stock solution fresh before use. Information regarding stability of small molecules in solution has rarely been reported, however, as a general guide we recommend storage in DMSO at -20°C. Aliquot into working volumes to avoid repeated freeze-thaw cycles. The effect of storage of stock solution on compound performance should be tested for each application.

Compound has low solubility in aqueous media. For use as a cell culture supplement, stock solution should be diluted into culture medium immediately before use. Avoid final DMSO concentration above 0.1% due to potential cell toxicity.

Published Applications

REPROGRAMMING
· Enables derivation of extended pluripotent stem cells from both humans and mice (Yang et al.).
IMMUNOLOGY
· Reduces the production of interleukin-8 elicited by activation of protease-activated receptor 2 in normal human epidermal keratinocytes, thus attenuating the proinflammatory reactions (Ishikawa et al.).
DISEASE MODELING
· Enhances survival of neural stem cells in rat model of Ischemia (Sakata et al.).
· Supports neuroprotective effects in animal models of Parkinson's disease (Du et al.), Huntington's disease (Chen et al.), amyotrophic lateral sclerosis (Zhu et al.), Alzheimer's disease (Choi et al.), multiple sclerosis (Brundula et al.), and spinal cord injury (Festoff et al.; Garrido-Mesa et al.).
· Reduces bone and cartilage damage in rheumatoid arthritis via inhibition of collagenase and proteinase activity (Arsenis et al.; Greenwald et al.).

References

Alano CC et al. (2006) Minocycline inhibits poly(ADP-ribose) polymerase-1 at nanomolar concentrations. Proc Natl Acad Sci USA 103(25): 9685–90.
Amin AR et al. (1997) Post-transcriptional regulation of inducible nitric oxide synthase mRNA in murine macrophages by doxycycline and chemically modified tetracyclines. FEBS Lett 410(2–3): 259–64.
Arsenis C et al. (1992) Tetracyclines (TETs) inhibit the synthesis and/or activity of cartilage proteinases in vivo and in vitro. Matrix Suppl 1: 314.
Brundula V et al. (2002) Targeting leukocyte MMPs and transmigration: minocycline as a potential therapy for multiple sclerosis. Brain 125(Pt 6): 1297–308.
Chen M et al. (2000) Minocycline inhibits caspase-1 and caspase-3 expression and delays mortality in a transgenic mouse model of Huntington disease. Nat Med 6(7): 797–801.
Choi Y et al. (2007) Minocycline attenuates neuronal cell death and improves cognitive impairment in Alzheimer's disease models. Neuropsychopharmacology 32(11): 2393–404.
Corbacella E et al. (2004) Minocycline attenuates gentamicin induced hair cell loss in neonatal cochlear cultures. Hear Res 197(1–2): 11–8.
Du Y et al. (2001) Minocycline prevents nigrostriatal dopaminergic neurodegeneration in the MPTP model of Parkinson's disease. Proc Natl Acad Sci USA 98(25): 14669–74.
Festoff BW et al. (2006) Minocycline neuroprotects, reduces microgliosis, and inhibits caspase protease expression early after spinal cord injury. J Neurochem 97(5): 1314–26.
Garrido-Mesa N et al. (2013) Minocycline: far beyond an antibiotic. Br J Pharmacol 169(2): 337–52.
Golub LM et al. (1991) Tetracyclines inhibit connective tissue breakdown: new therapeutic implications for an old family of drugs. Crit Rev Oral Biol Med 2(3): 297–321.
Greenwald RA et al. (1987) Tetracyclines inhibit human synovial collagenase in vivo and in vitro. J Rheumatol 14(1): 28–32.
Ishikawa C et al. (2009) Tetracyclines modulate protease-activated receptor 2-mediated proinflammatory reactions in epidermal keratinocytes. Antimicrob Agents Chemother 53(5): 1760–5.
Lambs L et al. (1984) Metal ion-tetracycline interactions in biological fluids. Part 3. Formation of mixed-metal ternary complexes of tetracycline, oxytetracycline, doxycycline and minocycline with calcium and magnesium, and their involvement in the bioavailability of these an. Agents Actions 14(5–6): 743–50.
Pruzanski W et al. (1992) Inhibition of enzymatic activity of phospholipases A2 by minocycline and doxycycline. Biochem Pharmacol 44(6): 1165–70.
Sakata H et al. (2012) Minocycline-preconditioned neural stem cells enhance neuroprotection after ischemic stroke in rats. J Neurosci 32(10): 3462–73.
Yang Y et al. (2017) Derivation of pluripotent stem cells with in vivo embryonic and extraembryonic potency. Cell 169(2): 243–57.e25.
Zhu S et al. (2002) Minocycline inhibits cytochrome c release and delays progression of amyotrophic lateral sclerosis in mice. Nature 417(6884): 74–8.

Related Small Molecules

For a complete list of small molecules available from STEMCELL Technologies, visit www.stemcell.com/smallmolecules or contact us at techsupport@stemcell.com.

This product is hazardous. Please refer to the Safety Data Sheet (SDS).