

Small Molecules

CHIR99021

WNT pathway activator; Inhibits GSK3



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

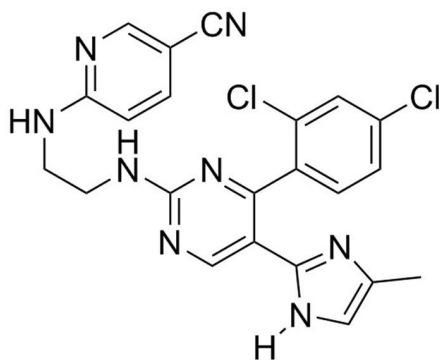
Catalog #	72052	1 mg
	72054	10 mg
	100-1042	25 mg

Product Description

CHIR99021 is an aminopyrimidine derivative that is an extremely potent glycogen synthase kinase (GSK) 3 inhibitor, inhibiting both GSK3 β (IC₅₀ = 6.7 nM) and GSK3 α (IC₅₀ = 10 nM). GSK3 is a serine/threonine kinase that is a key inhibitor of the WNT pathway; therefore CHIR99021 functions as a WNT activator. It shows little activity against a large panel of kinases including CDK2 and other serine/threonine kinases such as MAPK and PKB (Bain et al.).

Molecular Name:	CHIR99021
Alternative Names:	CT 99021
CAS Number:	252917-06-9
Chemical Formula:	C ₂₂ H ₁₈ Cl ₂ N ₈
Molecular Weight:	465.3 g/mol
Purity:	≥ 95%
Chemical Name:	6-[[2-[[4-(2,4-dichlorophenyl)-5-(5-methyl-1H-imidazol-2-yl)-2-pyrimidinyl]amino]ethyl]amino]-3-pyridinecarbonitrile OR 3-Pyridinecarbonitrile, 6-[[2-[[4-(2,4-dichlorophenyl)-5-(4-methyl-1H-imidazol-2-yl)-2-pyrimidinyl]amino]ethyl]amino]- (9Cl)

Structure:



Properties

Physical Appearance:	A crystalline solid
Storage:	Product stable at -20°C as supplied. Protect from prolonged exposure to light. Stable as supplied for 12 months from date of receipt.
Solubility:	· DMSO ≤ 5.3 mM For example, to prepare a 3 mM stock solution in DMSO, resuspend 1 mg in 716 μ L of fresh 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

MAINTENANCE AND SELF-RENEWAL

- Maintains undifferentiated mouse embryonic stem (ES) cells in combination with PD0325901 (Catalog #72182), in the absence of LIF (Ying et al.).
- Promotes self-renewal of human ES cells and mouse epiblast stem cells in combination with IWR-1 (Kim et al.).
- Allows derivation of ES cells from refractory mouse strains (Kiyonari et al.; Ying et al.) and rat (Li P et al.) in combination with other small molecules.
- Maintains human and mouse hematopoietic stem cells in cytokine-free conditions, in combination with Rapamycin (Catalog #73362) (Huang et al.).
- Promotes growth of mouse and human intestinal stem cells (Wang et al.).

REPROGRAMMING

- Enables chemical reprogramming (without genetic factors) of mouse embryonic fibroblasts to induced pluripotent stem (iPS) cells, in combination with Forskolin (Catalog #72112), Tranylcypromine (Catalog #72272), Valproic Acid (Catalog #72292), 3-Deazaneplanocin A (Catalog #72322), and E-616452 (Hou et al.).
- Promotes reprogramming of human somatic cells to iPS cells using OCT4, in combination with other small molecules (Zhu et al.).
- Generates mouse-like or “ground state” iPS cells from human and rat somatic cells, in combination with PD0325901 and A 83-01 (Catalog #72022) (Li W et al. 2009).
- With OCT4, transdifferentiates human CD34+ hematopoietic cells to mesenchymal stem cells (Meng et al.).
- Direct lineage reprogramming of fibroblasts to mature neurons, in combination with Valproic Acid, RepSox (Catalog #73792), Forskolin, SP600125 (Catalog #72642), Gö6983 (Catalog #72462), and Y-27632 (Catalog #72302) (Hu et al.).
- Direct lineage reprogramming of fibroblasts to mature neurons, in combination with Forskolin, ISX-9 (Catalog #73202), SB431542 (Catalog #72232), and I-BET151 (Catalog #73712) (Li X et al.).

DIFFERENTIATION

- Promotes differentiation of insulin-producing cells from human iPS cells (Kunisada et al.).
- Promotes differentiation of cardiomyocytes from human ES and iPS cells (Lian et al.).
- Generates and maintains primitive neural stem cells from human ES cells, in combination with SB431542 and Human Recombinant LIF (Catalog #78055) (Li W et al. 2011).

References

- Bain J et al. (2007) The selectivity of protein kinase inhibitors: a further update. *Biochem J* 408(3): 297–315.
- Hou P et al. (2013) Pluripotent stem cells induced from mouse somatic cells by small-molecule compounds. *Science* 341(6146): 651–4.
- Hu W et al. (2015) Direct conversion of normal and Alzheimer’s Disease human fibroblasts into neuronal cells by small molecules. *Cell Stem Cell* 17(2): 204–12.
- Huang J et al. (2012) Maintenance of hematopoietic stem cells through regulation of Wnt and mTOR pathways. *Nat Med* 18(12): 1778–85.
- Kim H et al. (2013) Modulation of β -catenin function maintains mouse epiblast stem cell and human embryonic stem cell self-renewal. *Nat Commun* 4: 2403.
- Kiyonari H et al. (2010) Three inhibitors of FGF receptor, ERK, and GSK3 establishes germline-competent embryonic stem cells of C57BL/6N mouse strain with high efficiency and stability. *Genesis* 48(5): 317–27.
- Kunisada Y et al. (2012) Small molecules induce efficient differentiation into insulin-producing cells from human induced pluripotent stem cells. *Stem Cell Res* 8(2): 274–84.
- Li P et al. (2008) Germline competent embryonic stem cells derived from rat blastocysts. *Cell* 135(7): 1299–310.
- Li W et al. (2009) Generation of rat and human induced pluripotent stem cells by combining genetic reprogramming and chemical inhibitors. *Cell Stem Cell* 4(1): 16–9.
- Li W et al. (2011) Rapid induction and long-term self-renewal of primitive neural precursors from human embryonic stem cells by small molecule inhibitors. *Proc Natl Acad Sci USA* 108(20): 8299–304.
- Li X et al. (2015) Small-molecule-driven direct reprogramming of mouse fibroblasts into functional neurons. *Cell Stem Cell* 17(2): 195–203.
- Lian X et al. (2013) Directed cardiomyocyte differentiation from human pluripotent stem cells by modulating Wnt/ β -catenin signaling under fully defined conditions. *Nat Protoc* 8(1): 162–75.
- Meng X et al. (2013) Rapid and efficient reprogramming of human fetal and adult blood CD34+ cells into mesenchymal stem cells with a single factor. *Cell Res* 23(5): 658–72.
- Wang F et al. (2013) Isolation and characterization of intestinal stem cells based on surface marker combinations and colony-formation assay. *Gastroenterology* 145(2): 383–95.e1–21.
- Ying Q-L et al. (2008) The ground state of embryonic stem cell self-renewal. *Nature* 453(7194): 519–23.
- Zhu S et al. (2010) Reprogramming of human primary somatic cells by OCT4 and chemical compounds. *Cell Stem Cell* 7(6): 651–5.

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).

PRODUCTS ARE FOR RESEARCH USE ONLY AND NOT INTENDED FOR HUMAN OR ANIMAL DIAGNOSTIC OR THERAPEUTIC USES UNLESS OTHERWISE STATED.

Copyright © 2022 by STEMCELL Technologies Inc. All rights reserved including graphics and images. STEMCELL Technologies & Design, STEMCELL Shield Design, and Scientists Helping Scientists are trademarks of STEMCELL Technologies Canada Inc. All other trademarks are the property of their respective holders. While STEMCELL has made all reasonable efforts to ensure that the information provided by STEMCELL and its suppliers is correct, it makes no warranties or representations as to the accuracy or completeness of such information.