

# Small Molecules

CHIR99021

WNT pathway activator; Inhibits GSK3

Catalog # 72052  
72054

1 mg  
10 mg



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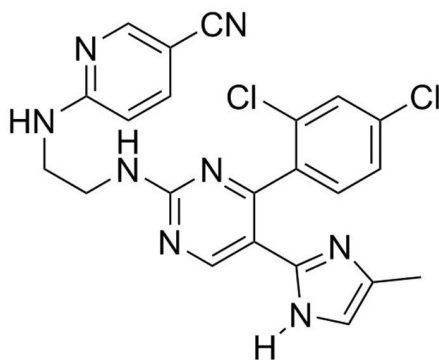
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## Product Description

CHIR99021 is an aminopyrimidine derivative that is an extremely potent glycogen synthase kinase (GSK) 3 inhibitor, inhibiting both GSK3 $\beta$  (IC<sub>50</sub> = 6.7 nM) and GSK3 $\alpha$  (IC<sub>50</sub> = 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<sub>22</sub>H<sub>18</sub>Cl<sub>2</sub>N<sub>8</sub>  
**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  $\mu$ 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

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- Zhu S et al. (2010) Reprogramming of human primary somatic cells by OCT4 and chemical compounds. *Cell Stem Cell* 7(6): 651–5.

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