Nocodazole

Cat. No.: HY-13520

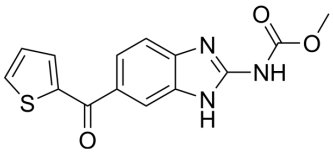
CAS No.: 31430-18-9

Molecular Formula: $C_{14}H_{11}N_3O_3S$

Molecular Weight: 301.32

Target: Microtubule/Tubulin; Bcr-Abl; CRISPR/Cas9; Autophagy; Apoptosis

Pathway: Cell Cycle/DNA Damage; Cytoskeleton; Protein Tyrosine Kinase/RTK; Autophagy; Apoptosis



Storage:

Powder	-20°C	3 years
	4°C	2 years
In solvent	-80°C	2 years
	-20°C	1 year

SOLVENT & SOLUBILITY

In Vitro

DMSO : 20 mg/mL (66.37 mM; Need ultrasonic)

Preparing Stock Solutions

Solvent / Mass / Concentration	1 mg	5 mg	10 mg
1 mM	3.3187 mL	16.5937 mL	33.1873 mL
5 mM	0.6637 mL	3.3187 mL	6.6375 mL
10 mM	0.3319 mL	1.6594 mL	3.3187 mL

Please refer to the solubility information to select the appropriate solvent.

In Vivo

1. Add each solvent one by one: 50% PEG300 >> 50% saline
   Solubility: 5 mg/mL (16.59 mM); Suspended solution; Need ultrasonic
2. Add each solvent one by one: 10% DMSO >> 40% PEG300 >> 5% Tween-80 >> 45% saline
   Solubility: ≥ 2.08 mg/mL (6.90 mM); Clear solution
3. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: ≥ 2 mg/mL (6.64 mM); Clear solution

BIOLOGICAL ACTIVITY

Description

Nocodazole (Oncodazole) is a rapidly-reversible inhibitor of microtubule. Nocodazole binds to β-tubulin and disrupts microtubule assembly/disassembly dynamics, which prevents mitosis and induces apoptosis in tumor cells. Nocodazole inhibits Bcr-Abl, and activates CRISPR/Cas9.

IC_{50} & Target

Abl	ABL(E255K)	ABL(T315I)	BRAF
91 nM (Kd)	120 nM (Kd)	170 nM (Kd)	1.8 μM (Kd)

	BRAF(V600E) 1.1 μM (Kd)	c-KIT 1.6 μM (Kd)	MEK1 1.7 μM (Kd)	MEK2 1.6 μM (Kd)
	MET 1.7 μM (Kd)	PI3Kγ 1.5 μM (Kd)	Microtubule/Tubulin (Kd)	CRISPR/Cas9 (Kd)

In Vitro

Nocodazole exhibits good affinity toward c-KIT, with a K_d value of 1.6 μM in highly malignant human cancer cells.
Nocodazole displays good binding affinity toward the components of the mitogen-activated protein kinase (MAPK) pathway, such as BRAF (K_d=1.8 μM), BRAF(V600E) (K_d=1.1 μM), MEK1 (K_d=1.7 μM), and MEK2 (K_d=1.6 μM)[1]. Nocodazole has the highest affinity for $\alpha\beta_{IV}$ and the lowest affinity for $\alpha\beta_{III}$[2].
Nocodazole (1 nM) induces apoptosis of COLO 205 cancer cells[3].
Nocodazole (≥ 30 μg/mL) significantly increases the percentage of annexin-V-binding cells without significantly modifying average forward scatter of human erythrocytes[4].
In CHO cells, the addition of 1 nM Nocodazole, a concentration that suppresses microtubule dynamics, slows migration and increases the frequency and duration of resting states, but the directionality of the cells is maintained. In contrast to the effects of the low drug concentration, the addition of 70 nM Nocodazole, a concentration that eliminates the microtubule network, causes cells to move much more randomly, i.e., the directionality of the cells toward the wound is lost[6].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

In Vivo

Nocodazole (5 mg/kg/three times per week, i.p.) has antitumor effects in athymic mice bearing COLO 205 tumor xenografts.
Nocodazole (1 nM) + R-41400 dramatically increase the levels of p21/CIP1 and p27/KIP1 protein in the tumor tissues[3].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

PROTOCOL

Cell Assay [3]

Proteins are loaded at 50 μg/lane and separated by 12% (w:v) sodium dodecyl sulfate-polyacrylamide gel electrophoresis, blotted, and probed with antibodies for cyclin E, p53, p21/CIP1, p27/KIP1, glyceraldehyde 3-phosphate dehydrogenase (GAPDH), cyclin A, cyclin D1, cyclin D3, cyclin B, CDK2, CDK4, and cytochrome C. Immunoreactive bands are visualized by incubating with the colorigenic substrates nitroblue tetrazolium and 5-bromo-4-chloro-3-indolyl-phosphate. The expression of GAPDH is used as the control for equal protein loading.
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Animal Administration [3]

COLO 205 cells are grown in RPMI 1640 supplemented with 10% FCS. Cells are harvested through two consecutive trypsinizations, centrifuged at 300×g; for 5 min, washed twice, and resuspended in sterile phosphate-buffered saline (PBS). Cells (5×10^5) in 0.1 mL are injected subcutaneously between the scapulae of each nude mouse. After transplantation, tumor size is measured with calipers, and the tumor volume is estimated. Once tumors reach a mean size of 200 mm^3, animals receive intraperitoneal injections of DMSO (25 μL), R-41400 (50 mg/kg), nocodazole (5 mg/kg), or R-41400 + nocodazole three times per week for 6 wk.
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

CUSTOMER VALIDATION

- Science. 2022 Nov 18;378(6621):eabq7361.
- Nat Methods. 2022 Mar;19(3):331-340.
- Adv Mater. 2022 Jul 28;e2204287.
- Cell Mol Immunol. 2020 May;17(5):496-506.
- ACS Nano. 2024 Jan 10.

See more customer validations on www.MedChemExpress.com

REFERENCES

[1]. Anutosh Ganguly, et al. The role of microtubules and their dynamics in cell migration. J Biol Chem. 2012 Dec 21;287(52):43359-69.

[2]. Park H, et al. Nocodazole is a high-affinity ligand for the cancer-related kinases ABL, c-KIT, BRAF, and MEK. ChemMedChem. 2012 Jan 2;7(1):53-6.

[3]. Keliang Xu, et al. Interaction of nocodazole with tubulin isotypes. Drug Development Research 2002

[4]. Wang YJ, et al. R-41400 potentiates the antitumor effects of nocodazole: In vivo therapy for human tumor xenografts in nude mice. Mol Carcinog. 2002 Aug;34(4):199-210.

[5]. Signoretto E, et al. Nocodazole Induced Suicidal Death of Human Erythrocytes. Cell Physiol Biochem. 2016;38(1):379-92.

[6]. Zhang JP, et al. Efficient precise knockin with a double cut HDR donor after CRISPR/Cas9-mediated double-stranded DNA cleavage. Genome Biol. 2017 Feb 20;18(1):35.

Tel: 609-228-6898 Fax: 609-228-5909 E-mail: tech@MedChemExpress.com

Address: 1 Deer Park Dr, Suite Q, Monmouth Junction, NJ 08852, USA