Doxycycline calcium

Cat. No.: HY-N0565C

CAS No.: 94088-85-4

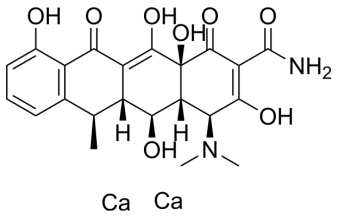
Molecular Formula: $C_{22}H_{24}Ca_2N_2O_8$

Molecular Weight: 524.59

Target: MMP; Bacterial; Antibiotic; Parasite

Pathway: Metabolic Enzyme/Protease; Anti-infection

Storage: Please store the product under the recommended conditions in the Certificate of Analysis.



BIOLOGICAL ACTIVITY

Description

Doxycycline calcium, an antibiotic, is an orally active and broad-spectrum metalloproteinase (MMP) inhibitor[1]. Doxycycline calcium shows antibacterial activity and anti-cancer cell proliferation activity[1][2][3][4][5].

IC_{50} & Target

Tetracycline

In Vitro

Doxycycline calcium (0.01-10 μg/mL, 4 d) affects growth of glioma cells only under high concentrations[2].
Doxycycline calcium (0.01-10 μg/mL, 24 h) decreases MT-CO1 protein content with concentrations of 1 μg/mL and higher in SVG cells[2].
Doxycycline calcium (100 ng/mL, 1 μg/mL; 24 h) reduces proliferation of human cell lines[4].
Doxycycline calcium (0-250 μM, 72 h) inhibits cell viability of breast cancer cells [5].
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Cell Viability Assay[2]

Cell Line:	LNT-229, G55, and U343 glioma cells
Concentration:	0.01, 0.1, 1 or 10 μg/mL
Incubation Time:	4 days
Result:	Affected growth of glioma cells only under high concentration (10 μg/mL).

Cell Viability Assay[2]

Cell Line:	SVG cells
Concentration:	0.01, 0.1, 1 or 10 μg/mL
Incubation Time:	24 hours
Result:	Decreaseed MT-CO1 protein content with concentrations of 1 μg/mL and higher.

Cell Proliferation Assay[4]

Cell Line:	MCF 12A, 293T cells

Concentration:	100 ng/mL, 1 μg/mL
Incubation Time:	96 hours
Result:	Caused reduced proliferation of MCF 12A and 293T cells at 1 μg/mL.

Cell Viability Assay[5]

Cell Line:	MCF-7, MDA-MB-468 cells
Concentration:	0-250 μM
Incubation Time:	72 hours
Result:	Inhibited breast cancer cells in a dose-dependent manner with IC_{50} values for MCF-7 and MDA-MB-468 of 11.39 μM and 7.13 μM respectively.

In Vivo

Doxycycline (oral gavage; 200 or 800 mg/kg; once daily; 3 months) reduces MMP-9 activity in untreated HT mice in a dose-dependent manner[3].
Doxycycline and Tetracycline (HY-A0107), act systemically after absorption from the upper gastrointestinal tract. The main advantage of Doxycycline over Tetracycline is its longer activity, and it can be taken twice or once a day. The peak concentration of both drugs is similar, but in the case of Doxycycline the time to peak concentration is shorter, and half life is significantly longer[6].

Doxycycline (Dox) is often used as an inducer in molecular biology studies to induce gene expression. In cells or model animals that have constructed tetracycline induced expression systems (Tet-On/Tet-Off systems), the expression of target genes can be precisely controlled by adding or removing Dox[7][8][9][10].

Dose reference for Dox induction[7][8][9][10]:
(1) Model animal: male Sprague–Dawley rats
Tet regulatory system：20-3000 ppm of Dox is supplied in diet
(2) Model animal: Cags mice
Tet regulatory system：625 ppm of Dox is supplied in diet
(3) Model animal: Transgenic Wistar rats
Tet regulatory system：2 mg/mL of Dox is supplied in drinking water
(4) Model animal: Transgenic NRMI inbred mice
Tet regulatory system：2 mg/mL of Dox is supplied in drinking water

Dissolution method of Dox[9][10]:
(1) Prepare Dox working solution
Dissolve 100 mg Dox into 50 mL drinking water, add 5% sucrose or 2% saccharin to mask the bitter taste, and refresh the water every three days.
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Animal Model:	6-month-old female Heterozygous Col3a1-deficient (HT) mice[3]
Dosage:	200 or 800 mg/kg
Administration:	Oral gavage; 200 or 800 mg/kg; once daily; 3 months
Result:	Reduced MMP-9 activity in a dose-dependent manner.

CUSTOMER VALIDATION

- Cell. 2023 Feb 2;186(3):591-606.e23.
- Mol Cancer. 2020 Mar 30;19(1):68.
- Mol Cancer. 2020 Sep 9;19(1):139.
- Nat Genet. 2024 Jan 24.
- Nat Microbiol. 2023 Mar;8(3):410-423.

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[2]. Anna-Luisa Luger, et al. Doxycycline Impairs Mitochondrial Function and Protects Human Glioma Cells from Hypoxia-Induced Cell Death: Implications of Using Tet-Inducible Systems. Int J Mol Sci. 2018 May 17;19(5):1504.

[3]. Wilfried Briest, et al. Doxycycline ameliorates the susceptibility to aortic lesions in a mouse model for the vascular type of Ehlers-Danlos syndrome. J Pharmacol Exp Ther. 2011 Jun;337(3):621-7.

[4]. Ethan Ahler, et al. Doxycycline alters metabolism and proliferation of human cell lines. PLoS One. 2013 May 31;8(5):e64561.

[5]. Le Zhang, et al. Doxycycline inhibits the cancer stem cell phenotype and epithelial-to-mesenchymal transition in breast cancer. Cell Cycle. 2017 Apr 18;16(8):737-745.

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[7]. Manfredsson FP, et al. Tight Long-term dynamic doxycycline responsive nigrostriatal GDNF using a single rAAV vector. Mol Ther. 2009 Nov;17(11):1857-67.

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[9]. Konopka W, et al. Tet system in the brain: transgenic rats and lentiviral vectors approach. Genesis. 2009 Apr;47(4):274-80.

[10]. Kistner A, et al. Doxycycline-mediated quantitative and tissue-specific control of gene expression in transgenic mice. Proc Natl Acad Sci U S A. 1996 Oct 1;93(20):10933-8.

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