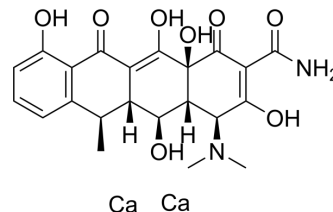


Doxycycline calcium

Cat. No.:	HY-N0565C
CAS No.:	94088-85-4
Molecular Formula:	C ₂₂ H ₂₄ Ca ₂ N ₂ O 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]} .																		
IC₅₀ & Target	Tetracycline																		
In Vitro	<p>Doxycycline calcium (0.01-10 µg/mL, 4 d) affects growth of glioma cells only under high concentrations^[2].</p> <p>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].</p> <p>Doxycycline calcium (100 ng/mL, 1 µg/mL; 24 h) reduces proliferation of human cell lines^[4].</p> <p>Doxycycline calcium (0-250 µM, 72 h) inhibits cell viability of breast cancer cells^[5].</p> <p>MCE has not independently confirmed the accuracy of these methods. They are for reference only.</p> <p>Cell Viability Assay^[2]</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Cell Line:</td> <td>LNT-229, G55, and U343 glioma cells</td> </tr> <tr> <td>Concentration:</td> <td>0.01, 0.1, 1 or 10 µg/mL</td> </tr> <tr> <td>Incubation Time:</td> <td>4 days</td> </tr> <tr> <td>Result:</td> <td>Affected growth of glioma cells only under high concentration (10 µg/mL).</td> </tr> </table> <p>Cell Viability Assay^[2]</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Cell Line:</td> <td>SVG cells</td> </tr> <tr> <td>Concentration:</td> <td>0.01, 0.1, 1 or 10 µg/mL</td> </tr> <tr> <td>Incubation Time:</td> <td>24 hours</td> </tr> <tr> <td>Result:</td> <td>Decreased MT-CO1 protein content with concentrations of 1 µg/mL and higher.</td> </tr> </table> <p>Cell Proliferation Assay^[4]</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Cell Line:</td> <td>MCF 12A, 293T cells</td> </tr> </table>	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 Line:	SVG cells	Concentration:	0.01, 0.1, 1 or 10 µg/mL	Incubation Time:	24 hours	Result:	Decreased MT-CO1 protein content with concentrations of 1 µg/mL and higher.	Cell Line:	MCF 12A, 293T cells
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Incubation Time:	24 hours																		
Result:	Decreased MT-CO1 protein content with concentrations of 1 µg/mL and higher.																		
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

Modeling ON-OFF system for gene expression^{[6][7]}

Background

Doxycycline is often used as an inducer in molecular biology research to induce gene expression. In cells or model animals that have constructed a Tetracycline (Tet; HY-A0107) inducible expression (Tet-ON/Tet-OFF) system, the expression of the target gene can be precisely controlled by adding or removing Doxycycline. Doxycycline can act as an inhibitor of transcriptional activation in the Tetracycline (Tc)-controlled transactivation (tTA) system, and as an inducer of transcriptional activation in the "reverse tTA" system. Doxycycline and Tetracycline both act systemically after being absorbed by the upper gastrointestinal tract. In comparison, the main advantage of Doxycycline is that it has a longer activity and can be taken twice or once a day. Although the peak concentrations of the two are similar, Doxycycline takes a shorter time to reach peak concentration and has a significantly longer half-life^{[6][7][8]}.

Specific Modeling Methods

Rat^[8]: male • adult middle-aged (12-month-old) • Sprague-Dawley rats
 Administration (for GDNF regulation): 3g/kg (Doxycycline; HY-N05655) (dietary with regular food) • po once daily for 6 days • monitored every day

Note

1. In this study^[7], a recombinant adeno-associated virus (rAAV)-based bicistronic tetracycline (tet)-OFF construct was used for dynamic control of GDNF (target gene) expression during long-term expression.
2. 3g/kg dietary DOX produced DOX serum levels equivalent to 1mg/ml DOX in drinking water.

Modeling Record

(1) The expression level of the target gene decreases; (2) The positively correlated phenotype corresponding to the target gene is alleviated.

Correlated Product(s):

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 Feb;56(2):294-305.
- Nat Microbiol. 2023 Mar;8(3):410-423.

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- [1]. Eusebio Manchado, et al. A combinatorial strategy for treating KRAS-mutant lung cancer. *Nature*. 2016 Jun 30;534(7609):647-51.
- [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.
- [6]. Niv Y. Doxycycline in Eradication Therapy of *Helicobacter pylori*--a Systematic Review and Meta-Analysis. *Digestion*. 2016;93(2):167-73.
- [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.
- [8]. 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.
- [9]. 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.

Caution: Product has not been fully validated for medical applications. For research use only.

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