

Product Data Sheet

Product Name: W-7 hydrochloride

Cat. No.: GC17496

Chemical Properties

Cas. No. 61714-27-0

Chemical Name N-(6-aminohexyl)-5-chloronaphthalene-1-sulfonamide hydrochloride

SMILES ClC1=C2C(C(S(=O)(NCCCCCN)=O)=CC=C2)=CC=C1.Cl

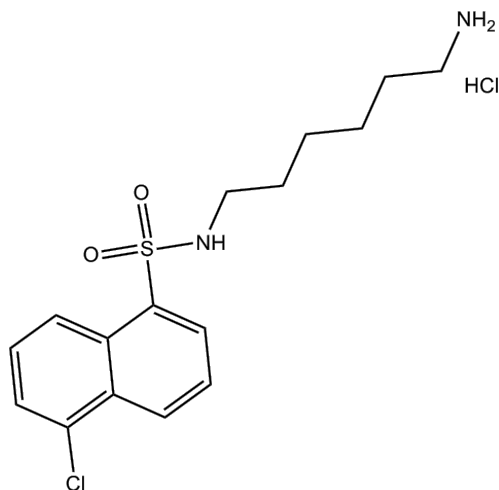
Formula $C_{16}H_{21}ClN_2O_2S \cdot HCl$ M.Wt 377.33

Solubility DMF: 20 mg/ml, DMSO: 14 mg/ml, DMSO:PBS (pH 7.2) (1:1): 0.5 mg/ml, Ethanol: 0.3 mg/ml
Storage Store at -20°C

General tips For obtaining a higher solubility, please warm the tube at 37 °C and shake it in the ultrasonic bath for a while. Stock solution can be stored below -20°C for several months.

Shipping Condition Evaluation sample solution: ship with blue ice. All other available size: ship with RT, or blue ice upon request.

Structure



Protocol

Cell experiment [1]:

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Cell lines CHO-K₁ cells

Preparation Method CHO-K₁ cells were grown in Ham's F-12 medium/5% fetal calf serum at 37°C in humidified 5% CO₂/95% air; 1×10⁴ cells were plated in 35-mm dishes and cultured for 18h. The viability of CHO-K₁ cells treated with various concentrations of W-7 hydrochloride (0.1, 1, 10, and 100μM) for 48h was determined by colony formation.

Reaction Conditions 0.1, 1, 10, and 100μM; 48h

Applications W-7 hydrochloride treatment reduced cell viability of CHO-K₁ in a dose-dependent manner.

Animal experiment [2]:

Animal models Female BALB/c nude mice

Preparation Method Six-week-old female BALB/c nude mice were raised under specific pathogen-free (SPF) conditions and were allowed to freely access food and tap water. 1×10⁷ RPMI 8226 cells were subcutaneously injected into the lateral abdomen of the mice. Seven days after the injection, the mice were randomly divided into two groups, with 10 mice in each group: the vehicle control group (H₂O) and the W-7 hydrochloride group (dissolved in H₂O). The mice were intraperitoneally injected with H₂O and W-7 hydrochloride (3mg/kg) for 5 consecutive days per week for 18 days. The tumor's two-dimensional size was measured twice a week using a vernier caliper, and the tumor volume was calculated using the formula $V=0.5(a \times b^2)$, where a is the long diameter of the tumor and b is the short diameter of the tumor.

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Dosage form 3mg/kg; 5 times a week for 18 days; i.p.

Applications W-7 hydrochloride treatment reduced tumor growth in murine xenograft models.

References:

- [1] Hidaka H, Sasaki Y, Tanaka T, et al. N-(6-aminohexyl)-5-chloro-1-naphthalenesulfonamide, a calmodulin antagonist, inhibits cell proliferation[J]. Proceedings of the National Academy of Sciences, 1981, 78(7): 4354-4357.
- [2] Yokokura S, Yurimoto S, Matsuoka A, et al. Calmodulin antagonists induce cell cycle arrest and apoptosis in vitro and inhibit tumor growth in vivo in human multiple myeloma[J]. BMC cancer, 2014, 14(1): 882.

Background

W-7 hydrochloride is a potent calmodulin antagonist that inhibits the Ca^{2+} -calmodulin-induced activation of myosin light chain kinase with an IC_{50} value of $25\mu\text{M}$ [1]. W-7 hydrochloride enhances thromboxane A2 receptor-mediated signal transduction at the receptor/G protein coupling, leading to the enhancement of phosphoinositide hydrolysis and Ca^{2+} mobilization [2]. W-7 hydrochloride induces apoptosis and blocks the Akt activation[3]. W-7 hydrochloride has been widely used to inhibit peak currents of heterologously expressed $\text{K}_{\text{v}}4.3$ channels in *Xenopus oocytes* [4].

In vitro, W-7 hydrochloride treatment for 1h reduced colony formation of MDA-MB-231 cells with an IC_{50} value of $53\mu\text{M}$ [5]. Treatment with $25\mu\text{M}$ W-7 hydrochloride for 48 hours significantly inhibited the replication of Dengue virus in Huh-7 cells, reducing the secretion of NS1 protein and the expression of NS3 protein[6]. Treatment with $0.5\mu\text{M}$ W-7 hydrochloride for 24 hours significantly inhibited cytochrome c release, caspase-3 activation, reactive oxygen species (ROS) production, and cell death in PC12 cells induced by rotenone[7]. Treatment with $20\mu\text{M}$ W-7 hydrochloride for 150 minutes significantly inhibited secretion of de novo synthesized glycerolipids from McArdle RH-7777 cells[8]. Treatment with $40\mu\text{M}$ W-7 hydrochloride for 24 hours down-regulated cyclins and up-

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regulated p21^{cip1} in RPMI 8226 cells, induced cell apoptosis, accompanied by an increase in intracellular calcium ion levels and depolarization of mitochondrial membrane potential, as well as a decrease in STAT3 phosphorylation level and the reduction in Mcl-1 protein expression^[9].

In vivo, W-7 hydrochloride treatment via intraperitoneal injection at a dose of 3mg/kg (5 days per week) for 18 days reduced tumor growth in RPMI 8226 cell-xenograft mouse models^[9].

References:

- [1] Asano M. Divergent pharmacological effects of three calmodulin antagonists, N-(6-aminohexyl)-5-chloro-1-naphthalenesulfonamide (W-7), chlorpromazine and calmidazolium, on isometric tension development and myosin light chain phosphorylation in intact bovine tracheal smooth muscle[J]. The Journal of pharmacology and experimental therapeutics, 1989, 251(2): 764-773.
- [2] Ohkubo S, Nakahata N, Ohizumi Y. ML-7 and W-7 facilitate thromboxane A2-mediated Ca²⁺ mobilization in rabbit platelets[J]. European journal of pharmacology, 1996, 298(2): 175-183.
- [3] Deb T B, Coticchia C M, Dickson R B. Calmodulin-mediated activation of Akt regulates survival of c-Myc-overexpressing mouse mammary carcinoma cells[J]. Journal of Biological Chemistry, 2004, 279(37): 38903-38911.
- [4] Qu Y J, Bondarenko V E, Xie C, et al. W-7 modulates Kv4. 3: pore block and Ca²⁺-calmodulin inhibition[J]. American Journal of Physiology-Heart and Circulatory Physiology, 2007, 292(5): H2364-H2377.
- [5] Wei J W, Hickie R A, Klaassen D J. Inhibition of human breast cancer colony formation by anticalmodulin agents: trifluoperazine, W-7, and W-13[J]. Cancer chemotherapy and pharmacology, 1983, 11(2): 86-90.
- [6] Bautista-Carbajal P, Soto-Acosta R, Angel-Ambrocio A H, et al. The calmodulin antagonist W-7 (N-(6-aminohexyl)-5-chloro-1-naphthalenesulfonamide hydrochloride) inhibits DENV infection in Huh-7 cells[J]. Virology, 2017, 501: 188-198.
- [7] Lee C S, Park S Y, Ko H H, et al. Inhibition of MPP⁺-induced mitochondrial damage and cell death by trifluoperazine and W-7 in PC12 cells[J]. Neurochemistry international, 2005, 46(2): 169-178.
- [8] Rasouli M, Trischuk T C, Lehner R. Calmodulin antagonist W-7 inhibits de novo synthesis of cholesterol and suppresses secretion of de novo synthesized and preformed lipids from cultured hepatocytes[J]. Biochimica et Biophysica Acta (BBA)-Molecular and Cell Biology of Lipids, 2004, 1682(1-3): 92-101.
- [9] Yokokura S, Yurimoto S, Matsuoka A, et al. Calmodulin antagonists induce cell cycle arrest and

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