

Product Data Sheet

Product Name: Cetrimonium Bromide (CTAB)

Cat. No.: GC15892

Chemical Properties

Cas. No. 57-09-0

Chemical Name hexadecyl(trimethyl)azanium;bromide

SMILES CCCCCCCCCCCCCCCC[N+](C)(C)C.[Br-]

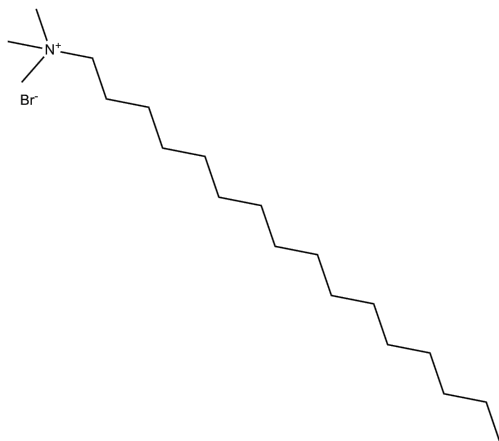
Formula $C_{19}H_{42}N.Br$ M.Wt 364.45

Solubility $\geq 5.3\text{mg/mL}$ in DMSO 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]:

Cell lines NDRG1-deficient DU-145 cells

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

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The NDRG1-deficient DU-145 cells were cultured in RPMI-1640 medium supplemented with 10% fetal bovine serum in a humidified incubator at 37°C and 5% CO₂. The cells were seeded onto culture plates (1.5×10^3 cells per Preparation Method well), cultured overnight, and then treated with different concentrations of Cetrimonium Bromide (0.5, 1, 4, 10, 20, and 50μM) for 48 hours. After adding the MTS reagent and incubating for 2-3 hours, the absorbance at 490nm was measured.

Reaction Conditions 0.5, 1, 4, 10, 20, and 50μM; 48h

Applications Cetrimonium Bromide treatment reduced cell viability of NDRG1-deficient DU-145 cells in a dose-dependent manner.

Animal experiment [2]:

Animal models Male nude mice

HOS cells (2×10^6) suspended in 100μl PBS were subcutaneously inoculated into the backs of 4-week-old male nude mice. Three days after inoculation, the mice were randomly divided into 3 groups (n=4). Subsequently, each group of mice was intraperitoneally injected with Cetrimonium Bromide (20mg/kg) once every 3 days for a total of 20 days. The control group was injected with the same volume of normal saline. During the treatment period, the body weight and Preparation Method tumor size of the mice were monitored every 3 days. After 20 days of Cetrimonium Bromide treatment, the mice were euthanized by cervical dislocation, and the tumors and major organs (including liver, lung, kidney, spleen, and heart) of each group of mice were collected and immersed in 4% formalin solution for immunohistochemical staining and hematoxylin-eosin (H&E) staining. The formula for calculating tumor volume is: $\text{Volume} = \frac{1}{2} (\text{length} \times \text{width}^2)$.

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Dosage form 20mg/kg; every 3 days for 20 days; i.p.

Applications Cetrimonium Bromide treatment resulted in a significant reduction in tumor volume and weight in mice without organ toxicity.

References:

[1] Wissing M D, Mendonca J, Kim E, et al. Identification of cetrimonium bromide and irinotecan as compounds with synthetic lethality against NDRG1 deficient prostate cancer cells[J]. Cancer Biology & Therapy, 2013, 14(5): 401-410.

[2] Da W, Tao L, Zhu Y. The inhibitory effect of CTAB on human osteosarcoma through the PI3K/AKT signaling pathway[J]. International Journal of Oncology, 2021, 59(1): 42.

Background

Cetrimonium Bromide (CTAB), a common used surfactant, act as a drug solubilizer with intrinsic antibacterial properties [1]. Cetrimonium Bromide can reduce the germination rate of Brassica campestris, affect the root elongation after seed germination, decrease the chlorophyll content in plant leaves, and increase the antioxidant enzyme activity of plants [2]. Cetrimonium Bromide has been widely used for the rapid extraction of nucleic acids from plant tissues [3].

In vitro, Cetrimonium Bromide treatment for 48 hours significantly inhibited the viability of HOS, MG63 and U2OS cells, with IC₅₀ values of 4.949, 3.500 and 4.212 μM respectively [4]. 5.0 μM Cetrimonium Bromide treatment for 16 hours significantly reduced the adhesion of SCC4 cells and altered cell morphology [5]. Treatment with 10 μM Cetrimonium Bromide for 48 hours resulted in an increase in the number of apoptotic cells in NDRG1-deficient DU-145 cells, accompanied by an increase in cleaved PARP levels [6].

In vivo, Cetrimonium Bromide treatment (5mg/kg/day; i.p.) for 5 consecutive days can reduce the tumor-forming ability of FaDu cell-bearing mice and slow down tumor growth [7]. Cetrimonium Bromide (13.7mmol/kg) was injected via tail vein once every three days for 30 days, which significantly reduced the metastasis of breast cancer from the 4T1 orthotopic breast cancer model in

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mice to the lungs^[8].

References:

- [1] Carvalho G C, Marena G D, Karnopp J C F, et al. Cetyltrimethylammonium bromide in the synthesis of mesoporous silica nanoparticles: General aspects and in vitro toxicity[J]. Advances in Colloid and Interface Science, 2022, 307: 102746.
- [2] Song U, Kim H E. Assessing the phytotoxicity of cetrimonium bromide in plants using eco-physiological parameters[J]. Journal of Ecology and Environment, 2016, 40(1): 14.
- [3] Allen G C, Flores-Vergara M A, Krasynanski S, et al. A modified protocol for rapid DNA isolation from plant tissues using cetyltrimethylammonium bromide[J]. Nature protocols, 2006, 1(5): 2320-2325.
- [4] Da W, Tao L, Zhu Y. The inhibitory effect of CTAB on human osteosarcoma through the PI3K/AKT signaling pathway[J]. International Journal of Oncology, 2021, 59(1): 42.
- [5] Yue C H, Chen C H, Pan Y R, et al. Cetyltrimethylammonium bromide disrupts mesenchymal characteristics of human tongue squamous cell carcinoma SCC4 cells through modulating canonical TGF- β /Smad/miR-181b/TIMP3 signaling pathway[J]. Anticancer Research, 2021, 41(12): 6095-6104.
- [6] Wissing M D, Mendonca J, Kim E, et al. Identification of cetrimonium bromide and irinotecan as compounds with synthetic lethality against NDRG1 deficient prostate cancer cells[J]. Cancer Biology & Therapy, 2013, 14(5): 401-410.
- [7] Ito E, Yip K W, Katz D, et al. Potential use of cetrimonium bromide as an apoptosis-promoting anticancer agent for head and neck cancer[J]. Molecular pharmacology, 2009, 76(5): 969-983.
- [8] Li N, Chen Y, Yang Y, et al. Cetyltrimethylammonium bromide inhibits the metastasis of breast cancer to the lungs by inhibiting epithelial–mesenchymal transition[J]. Biocell, 2022, 46(6): 1473.

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