

Product Data Sheet

Product Name: Diphenyleneiodonium chloride

Cat. No.: GC12520

Chemical Properties

Cas. No. 4673-26-1

Chemical Name dodecahydrodibenzo[b,d]iodol-5-ium chloride

SMILES C12C(CCCC3)C3[I+](C1CCCC2)[Cl-]

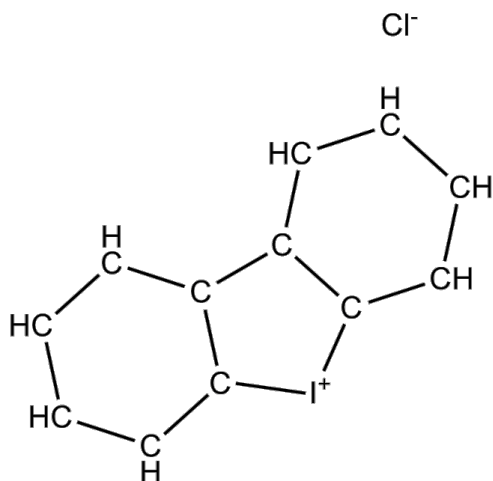
Formula $C_{12}H_8ClI$ M.Wt 314.55

Solubility 500 µg/ml in DMSO, <100 µg/ml in Ethanol, <100 µg/ml in Methanol Storage Desiccate 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 MG-63 cells

Permeabilization of the cytoplasmic membrane of MG-63 cells was achieved by exposing the cells to 12 μ M digitonin for 10min. Permeabilized MG-63 cells were Preparation Method treated with different concentrations of Diphenyleneiodonium chloride (0.625 μ M, 1.25 μ M, 2.5 μ M, 5 μ M, 10 μ M, and 100 μ M) and 0.5% dimethyl sulfoxide (DMSO) as the control.

Reaction Conditions 0.625 μ M, 1.25 μ M, 2.5 μ M, 5 μ M, 10 μ M, and 100 μ M; 30 min

Applications After 30min of treatment, mitochondrial respiration with glutamate/malate (substrates of complex I) decreased with increasing Diphenyleneiodonium chloride concentrations (0.625-100 μ M), reaching its minimum at approx. 5 μ M DPI.

Animal experiment [2]:

Animal models Female BALB/c mice

Preparation Method Mice were rendered neutropenic by a series of cyclophosphamide injections given intraperitoneally (i.p.) 1 day and 1h before infection. This was followed by injection of *S. aureus* ATCC 29213 in the right thigh of mice to establish infection. After 3h post infection, Diphenyleneiodonium chloride and vancomycin at 1mg/kg and 25mg/kg of body weight respectively, were injected i.p. into mice twice at an interval of 3h between injections. Control animals were administered saline in the same volume and frequency as those receiving treatment. After 24h, the mice were sacrificed, thigh tissue were collected from the animal and weighed.

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Dosage form 1 mg/kg; i.p.

Applications Treatment with Diphenyleneiodonium chloride significantly reduced mean bacterial counts in thigh compared to control group, which is comparable to vancomycin. Vancomycin at 25mg/kg caused a reduction of $\sim 1 \log_{10}$ cfu while Diphenyleneiodonium chloride at 1mg/kg caused a reduction of $\sim 1.2 \log_{10}$ cfu in 24h as compared to no-drug control.

References:

[1] Zavadskis S, et al. Effect of Diphenyleneiodonium Chloride on Intracellular Reactive Oxygen Species Metabolism with Emphasis on NADPH Oxidase and Mitochondria in Two Therapeutically Relevant Human Cell Types. *Pharmaceutics*. 2020 Dec 23;13(1):10.

[2] Pandey M, et al. Diphenyleneiodonium chloride (DPIC) displays broad-spectrum bactericidal activity. *Sci Rep*. 2017 Sep 14;7(1):11521.

Background

Diphenyleneiodonium chloride (DPI), as a NADH/NADPH oxidase inhibitor, has possessing potent antimicrobial activity against *Mycobacterium tuberculosis* and *Staphylococcus aureus*^[1].

In vitro, Diphenyleneiodonium chloride exhibited MICs of 0.03mg/L against *M. bovis* BCG, 1mg/L against *S. aureus*, and 0.39 μ M (0.12mg/L) against *M. tuberculosis* H37Rv, but showed weak activity against Gram-negative bacteria with MIC of 4-32mg/L^[1]. Diphenyleneiodonium chloride (0.1mM; 4-12h) inhibited fungal spore germination and bacterial cell proliferation^[2]. Diphenyleneiodonium chloride (5-10 μ M; 3h) reduced Neutrophil Extracellular Traps (NET) formation in neutrophils in a concentration-dependent manner^[3]. Diphenyleneiodonium chloride (0.5-4 μ M; 3 days) dose-dependently inhibited the proliferation of HCT116 cells, inducing cell cycle arrest at both the G1 and G2/M phases^[4]. Diphenyleneiodonium chloride (0.5 μ M; 3 days) induced senescence of MCF-7 cells^[4].

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In vivo, Diphenyleneiodonium chloride (1mg/kg; s.c.; once) protected against the functional and neurohistological damage of bupivacaine-blocked sciatic nerves in a high-fat diet/streptozotocin-induced DN model^[5]. Treatment with 5mg/kg Diphenyleneiodonium chloride intraperitoneally reduced intracellular ROS, inflammatory cell counts, and TNF- α and IL-6 levels in BALF cells of Sprague-Dawley rats relative to LPS-treated controls^[6].

References:

- [1] Pandey M, et al. Diphenyleneiodonium chloride (DPIC) displays broad-spectrum bactericidal activity. *Sci Rep.* 2017 Sep 14;7(1):11521.
- [2] Jung B, et al. Efficacy of Diphenyleneiodonium Chloride (DPIC) Against Diverse Plant Pathogens. *Mycobiology.* 2019 Jan 14;47(1):105-111.
- [3] Ostafin M, et al. Different procedures of diphenyleneiodonium chloride addition affect neutrophil extracellular trap formation. *Anal Biochem.* 2016 Sep 15;509:60-66.
- [4] Piszczatowska K, et al. Inhibition of NADPH Oxidases Activity by Diphenyleneiodonium Chloride as a Mechanism of Senescence Induction in Human Cancer Cells. *Antioxidants (Basel).* 2020 Dec 8;9(12):1248.
- [5] Ji ZH, et al. Diphenyleneiodonium Mitigates Bupivacaine-Induced Sciatic Nerve Damage in a Diabetic Neuropathy Rat Model by Attenuating Oxidative Stress. *Anesth Analg.* 2017 Aug;125(2):653-661.
- [6] Kim SK, et al. Protective effects of diphenyleneiodonium, an NADPH oxidase inhibitor, on lipopolysaccharide-induced acute lung injury. *Clin Exp Pharmacol Physiol.* 2019 Feb;46(2):153-162.

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