

Product Data Sheet

Product Name: Lidocaine hydrochloride (Lignocaine hydrochloride)

Cat. No.: GC33831

Chemical Properties

Cas. No. 73-78-9

SMILES O=C(NC1=C(C)C=CC=C1C)CN(CC)CC.[H]Cl

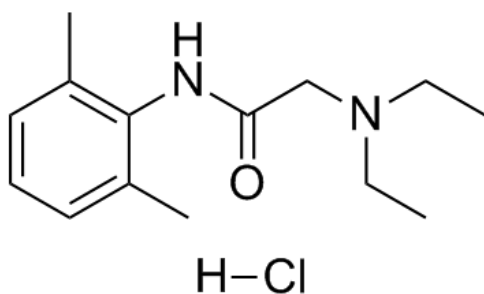
Formula $C_{14}H_{23}ClN_2O$ M.Wt 270.8

Solubility Water : ≥ 36 mg/mL (132.94 mM) Storage 4°C, protect from light

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 MDA-MB-231 cells

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

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MDA-MB-231 cells were cultured in Dulbecco's modified Eagle's medium (DMEM) containing 4.5g/L D-glucose and glutaMAX supplemented with 10% fetal bovine serum and 1% penicillin-streptomycin. Cells were incubated under standard culture conditions (CO₂ 5%, O₂ 95%, 37°C), and experiments were performed at 70% to 100% confluency. MDA-MB-231 cells were cultured in six-well plates and incubated for 24 hours with Lidocaine hydrochloride (100μM). A scratch was created in each well using a small pipettor tip, and the migration of cells was stimulated with 0.1μM CXCL12, after which the scratch wound area was quantified.

Reaction Conditions 100μM; 24h

Applications Lidocaine hydrochloride treatment significantly inhibited CXCL12-induced in vitro migration of MDA-MB-231 cells.

Animal experiment [2]:

Animal models BALB/c nude mice

HepG2 cells (2×10^6) were subcutaneously injected into the right axilla of BALB/c nude mice. The mice were randomly divided into a control group, Lidocaine hydrochloride group, and cisplatin group (n=8 in each group). When the palpable tumor volume reached approximately 50mm³, mice were intraperitoneally injected with PBS solution (as a control), Lidocaine hydrochloride (30mg/kg; twice a week), and cisplatin (3mg/kg; once a week), and tumor growth was observed for 30 days. Tumor width and length were measured every 3 days. Tumor volume was calculated as $(\text{length} \times \text{width}^2)/2$. The body weight of mice was also recorded.

Dosage form 3mg/kg; twice a week for 30 days; i.p.

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Applications Lidocaine hydrochloride treatment inhibited the tumor growth of HepG2 cell xenografts in nude mice without affecting body weight.

References:

- [1] D'agostino G, Saporito A, Cecchinato V, et al. Lidocaine inhibits cytoskeletal remodelling and human breast cancer cell migration[J]. British journal of anaesthesia, 2018, 121(4): 962-968.
- [2] Xing W, Chen D T, Pan J H, et al. Lidocaine induces apoptosis and suppresses tumor growth in human hepatocellular carcinoma cells in vitro and in a xenograft model in vivo[J]. Anesthesiology, 2017, 126(5): 868-881.

Background

Lidocaine hydrochloride (Lignocaine hydrochloride) is an amino-amide-type local anaesthetic that inhibits voltage-insensitive 'flicker' K⁺ channel with an IC₅₀ value of 220μM^[1]. Lidocaine hydrochloride can cross the blood-brain barrier through passive diffusion across membranes and cause the blockade of voltage-gated sodium channels (VGSCs), leading to a reversible block of action potential propagation^[2]. Lidocaine hydrochloride has been widely used in disease models for pain suppression and anti-inflammatory and anti-injury^[3].

In vitro, Lidocaine hydrochloride treatment for 24h inhibited the viability of CCD-1064sk cells with an IC₅₀ value of 613.77μM^[4]. Treatment of SH-SY5Y cells with 10mM Lidocaine hydrochloride for 24h resulted in morphological changes, induced apoptosis, and significantly increased the amount of LDH released into the culture medium^[5]. Treatment with 5μM Lidocaine hydrochloride for 24h attenuated cytokine-induced endothelial and vascular smooth muscle cell injury and increased cell survival^[6].

In vivo, Lidocaine hydrochloride treatment (30mg/kg; twice a week) via intraperitoneal injection for 30 days reduced the tumor growth of HepG2 cell xenografts in nude mice without affecting body weight^[7]. Subcutaneous injection of Lidocaine hydrochloride (30mg/kg) at 12-hour intervals for 3 days rescued the contractile function of the ischemic myocardial region in a mouse model of persistent myocardial ischemia without affecting cardiomyocyte death^[8].

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- [1] Hermanns H, Hollmann M W, Stevens M F, et al. Molecular mechanisms of action of systemic lidocaine in acute and chronic pain: a narrative review[J]. British journal of anaesthesia, 2019, 123(3): 335-349.
- [2] Moreira-Junior L, Leal-Cardoso J H, Cassola A C, et al. Eugenol and lidocaine inhibit voltage-gated Na⁺ channels from dorsal root ganglion neurons with different mechanisms[J]. Frontiers in Pharmacology, 2024, 15: 1354737.
- [3] Karnina R, Arif S K, Hatta M, et al. Molecular mechanisms of lidocaine[J]. Annals of Medicine and Surgery, 2021, 69: 102733.
- [4] Choi W, Ryu H, Fuwad A, et al. Quantitative analysis of the membrane affinity of local anesthetics using a model cell membrane[J]. Membranes, 2021, 11(8): 579.
- [5] Friederich P, Schmitz T P. Lidocaine-induced cell death in a human model of neuronal apoptosis[J]. European journal of anaesthesiology, 2002, 19(8): 564-570.
- [6] de Klaver M J M, Buckingham M G, Rich G F. Lidocaine attenuates cytokine-induced cell injury in endothelial and vascular smooth muscle cells[J]. Anesthesia & Analgesia, 2003, 97(2): 465-470.
- [7] Xing W, Chen D T, Pan J H, et al. Lidocaine induces apoptosis and suppresses tumor growth in human hepatocellular carcinoma cells in vitro and in a xenograft model in vivo[J]. Anesthesiology, 2017, 126(5): 868-881.
- [8] Müller-Edenborn B, Kania G, Osto E, et al. Lidocaine enhances contractile function of ischemic myocardial regions in mouse model of sustained myocardial ischemia[J]. PloS one, 2016, 11(5): e0154699.

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