

Product Data Sheet

Product Name: Tetramethylpyrazine

Cat. No.: GN10585

Chemical Properties

Cas. No. 1124-11-4

Chemical Name 2,3,5,6-tetramethylpyrazine

SMILES CC1=C(N=C(C(=N1)C)C)C

Formula $C_8H_{12}N_2$

M.Wt 136.2

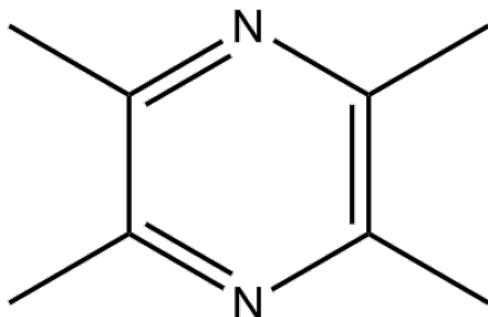
Solubility DMF: 5mg/mL, DMSO: 5mg/mL, Ethanol: 25mg/mL, Ethanol:PBS (pH 7.2) (1:5): 0.16mg/mL

Storage Stored at RT

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 A549 cells

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

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A549 cells were treated with different concentrations of Tetramethylpyrazine (200, 400 and 800µg/mL, respectively) or 200µM indomethacin (IN) for 72h and Preparation Method then collected. The percentages of the cell population at G0-G1, S and G2-M phases were determined with a fluorescence-activated cell sorting (FACS) flow cytometer after propidium iodide staining.

Reaction
Conditions 200, 400, 800µg/mL; 72h

Applications Tetramethylpyrazine induced an accumulation of cells in the G0-G1 phase (from 55.06 to 72.61%), and a concomitant depletion of cells in S phase (from 34.52 to 18.22% at 72h).

Animal experiment [2]:

Animal models Male Sprague–Dawley rats

Preparation Method Male Sprague–Dawley rats (300 to 350g) were anesthetized with chloral hydrate (400mg/kg) administered intraperitoneally. Transient focal cerebral ischemia was produced by clamping the two common carotid arteries (CCAs) and the right middle cerebral artery (MCA) for 90min followed by 3 days reperfusion. In animals receiving sham operations, all surgical procedures were the same as above, but no arterial occlusion was performed. Tetramethylpyrazine (5-40mg/kg) or saline vehicle was injected intraperitoneally 60min prior to the occlusion. After 3 days reperfusion, the brains were quickly removed and chilled in cold PBS for 5min, and 2mm coronal slices were cut using a tissue slicer. Slices were immersed in a PBS solution containing 2% triphenyltertrazolium chloride (TTC) at 37°C for 30min, after which sections were fixed in 10% phosphate-buffered formalin for 45min.

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Dosage form 5-40mg/kg/day; i.p.

Applications Tetramethylpyrazine administrated intraperitoneally significantly protected the brain against ischemic insult as evidenced by the reduction in infarction volume, preservation of neurons, and decrease in brain edema. Tetramethylpyrazine markedly reduced cerebral ischemia/reperfusion-induced inflammatory cell activation and proinflammatory mediator production.

References:

[1] Zheng C Y, Xiao W, Zhu M X, et al. Inhibition of cyclooxygenase-2 by tetramethylpyrazine and its effects on A549 cell invasion and metastasis[J]. International journal of oncology, 2012, 40(6): 2029-2037.

[2] Liao S L, Kao T K, Chen W Y, et al. Tetramethylpyrazine reduces ischemic brain injury in rats[J]. Neuroscience letters, 2004, 372(1-2): 40-45.

Background

Tetramethylpyrazine is an alkaloid isolated from Chuanxiong rhizome, which has anti-inflammatory, antioxidant, anti-tumor, autophagy regulation, vasodilation, angiogenesis regulation, mitochondrial damage inhibition, endothelial protection, and neuroprotection activities^[1, 2]. Tetramethylpyrazine has certain therapeutic effects on central nervous system diseases by inhibiting calcium overload and glutamate excitotoxicity, anti-oxidative/nitrosative stress, reducing inflammatory response, anti-apoptosis, protecting blood-brain barrier (BBB) integrity and promoting synaptic plasticity^[3, 4].

In vitro, Tetramethylpyrazine (200, 400, 800µg/mL) treatment of A549 cells for 72h inhibited cell viability in a dose-dependent manner, induced the aggregation of cells in the G0-G1 phase (increased from 55.06% to 72.61%), and reduced the number of cells in the S phase (decreased from 34.52% to 18.22%)^[5].

In vivo, Tetramethylpyrazine (5-40mg/kg) was injected intraperitoneally to treat rats with ischemic brain injury, which significantly reduced the infarct volume, alleviated brain edema, and significantly

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reduced the activation of inflammatory cells and the production of proinflammatory mediators induced by cerebral ischemia/reperfusion^[6]. Tetramethylpyrazine (5, 10mg/kg) was injected intravenously to treat rats with myocardial ischemia/reperfusion injury, which significantly reduced the myocardial infarct size and induced the expression of heme oxygenase 1 (HO-1)^[7].

References:

- [1] Lin J, Wang Q, Zhou S, et al. Tetramethylpyrazine: a review on its mechanisms and functions[J]. Biomedicine & Pharmacotherapy, 2022, 150: 113005.
- [2] Yang S, Wu S, Dai W, et al. Tetramethylpyrazine: a review of its antitumor potential and mechanisms[J]. Frontiers in Pharmacology, 2021, 12: 764331.
- [3] Liu Y, Yang G, Cui W, et al. Regulatory mechanisms of tetramethylpyrazine on central nervous system diseases: a review[J]. Frontiers in Pharmacology, 2022, 13: 948600.
- [4] Feng F, Xu D Q, Yue S J, et al. Neuroprotection by tetramethylpyrazine and its synthesized analogues for central nervous system diseases: A review[J]. Molecular Biology Reports, 2024, 51(1): 159.
- [5] Zheng C Y, Xiao W, Zhu M X, et al. Inhibition of cyclooxygenase-2 by tetramethylpyrazine and its effects on A549 cell invasion and metastasis[J]. International journal of oncology, 2012, 40(6): 2029-2037.
- [6] Liao S L, Kao T K, Chen W Y, et al. Tetramethylpyrazine reduces ischemic brain injury in rats[J]. Neuroscience letters, 2004, 372(1-2): 40-45.
- [7] Chen S Y, Hsiao G, Hwang H R, et al. Tetramethylpyrazine induces heme oxygenase-1 expression and attenuates myocardial ischemia/reperfusion injury in rats[J]. Journal of biomedical science, 2006, 13(5): 731-740.

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