

Product Data Sheet

Product Name: Urethane (Carbamic acid ethyl ester)

Cat. No.: GC33902

Chemical Properties

Cas. No. 51-79-6

SMILES NC(OCC)=O

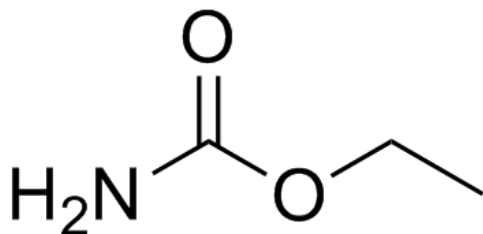
Formula C3H7NO2 M.Wt 89.09

Solubility DMSO : ≥ 125 mg/mL (1403.08 mM); Storage Store at RT
H₂O: ≥ 20 mg/mL

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]:

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

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Cell lines Mouse somatic cells (fibrocytes and epithelial cells), tumor cells (C57 sarcoma and adenocarcinoma 63 malignant cells)

Preparation Method Cells were cultured from mouse tissues using the hanging drop technique in a mixture of rat and fowl plasma and chick embryo extract. Urethane was added to the culture medium at a final concentration of 0.4%.

Reaction Conditions 0.4%; 2–4 days

Applications Urethane inhibited cell growth and mitosis in normal fibroblastic and epithelial cells, reducing mitosis to about half of the control value. In contrast, Urethane stimulated growth and mitosis in C57 sarcoma and adenocarcinoma 63 cells, increasing mitosis by 2 to 4 times compared to controls.

Animal experiment [2]:

Animal models FVB, BALB/c, and C57B6 mice

Preparation Method Mice were intraperitoneally injected with 1g/kg Urethane weekly for 4 weeks or a single injection with 4-month latency. Lung tissues were harvested for analysis of NF-κB activation, inflammation, and tumor formation.

Dosage form 1g/kg; i.p.

Applications Urethane induced NF-κB activation and inflammation in susceptible mouse strains (FVB, BALB/c), leading to increased lung tumor formation. Inhibition of NF-κB in airway epithelial cells reduced tumor formation.

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References:

- [1] LASNITZKI I. Some effects of urethane on the growth and mitosis of normal and malignant cells in vitro. Br J Cancer. 1949 Dec;3(4):501-9.
- [2] Stathopoulos GT, Sherrill TP, Cheng DS, et al. Epithelial NF-kappaB activation promotes urethane-induced lung carcinogenesis. Proc Natl Acad Sci U S A. 2007 Nov 20;104(47):18514-9.

Background

Urethane (Carbamic acid ethyl ester) is an organic compound with an ester structure, which can be used for the synthesis of polyurethane materials^[1], and has also been used as an anesthetic for intravenous injection^[2]. Urethane exerts its sedative, analgesic, and general anesthetic effects by inhibiting the transmission of nerve signals in the central nervous system, reducing the excitability of nerve cells^[3]. However, Urethane has potential carcinogenicity, and long-term exposure or excessive intake can increase the risk of tumor occurrence in organs such as the liver and kidneys, and may also have adverse effects on the reproductive system^[4].

In vitro, Urethane (10mM) perfused rat visual cortical neurons for 10min–2h, followed by depolarizing current stimulation for 1s, significantly inhibited action potential discharge and decreased membrane resistance^[5]. Urethane (0.4%) treated normal mouse somatic cells (including fibroblasts and epithelial cells) and tumor cells (C57 sarcoma and adenocarcinoma 63 malignant cells) for 2 to 4 days, significantly inhibited the growth and mitosis of normal cells, reducing the mitosis rate by about 50%. However, Urethane significantly promoted the growth and mitosis of tumor cells, increasing the mitosis rate by 2 to 4 times^[6].

In vivo, Urethane (1.25–1.5g/kg) was administered intraperitoneally to anesthetize 3–4-month-old Sprague-Dawley rats, significantly inducing glutamate overflow in different brain regions^[7]. Urethane (1g/kg) was administered intraperitoneally to FVB, BALB/c, and C57B6 mice, with susceptible strains (FVB, BALB/c) showing early NF-κB activation and lung inflammation, while the resistant strain (C57B6) failed to activate NF-κB or induce lung inflammation^[8].

References:

- [1] Szelest-Lewandowska A, Masiulanis B, Szymonowicz M, et al. Modified polycarbonate urethane:

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synthesis, properties and biological investigation in vitro. J Biomed Mater Res A. 2007 Aug;82(2):509-20.

[2] Carter DA, Dyer RG. Inhibition by pentobarbitone and urethane of the in vitro response of the adenohipophysis to luteinising hormone-releasing hormone in male rats. Br J Pharmacol. 1979 Oct;67(2):277-81.

[3] Mondino A, González J, Li D, et al. Urethane anaesthesia exhibits neurophysiological correlates of unconsciousness and is distinct from sleep. Eur J Neurosci. 2024 Feb;59(4):483-501.

[4] Sotomayor RE, Collins TF. Mutagenicity, metabolism, and DNA interactions of urethane. Toxicol Ind Health. 1990 Jan;6(1):71-108.

[5] Sceniak MP, Maciver MB. Cellular actions of urethane on rat visual cortical neurons in vitro. J Neurophysiol. 2006 Jun;95(6):3865-74.

[6] LASNITZKI I. Some effects of urethane on the growth and mitosis of normal and malignant cells in vitro. Br J Cancer. 1949 Dec;3(4):501-9.

[7] Beitchman JA, Krishna G, Bromberg CE, et al. Effects of isoflurane and urethane anesthetics on glutamate neurotransmission in rat brain using in vivo amperometry. BMC Neurosci. 2023 Oct 10;24(1):52.

[8] Stathopoulos GT, Sherrill TP, Cheng DS, et al. Epithelial NF-kappaB activation promotes urethane-induced lung carcinogenesis. Proc Natl Acad Sci U S A. 2007 Nov 20;104(47):18514-9.

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