Product Data Sheet

Product Name: Guanylic acid (5'-GMP)
Cat. No.: GC31562

Chemical Properties

Cas. No.	85-32-5		
SMILES	O=P(O)(OC[C@@H]1[C@H]([C@H]([C@H](N2C=NC3=C2N=C(N)NC3=O)O1)O)O)O		
Formula	$C_{10}H_{14}N_5O_8P$	M.Wt	363.22
Solubility	50 mg/mlWater	Storage	Store at -20°C
General tips	For obtaining a higher solubility , please warm the tube at 37 ℃ and shake it in the ultrasonic bath for a while.Stock solution can be stored below -20℃ 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	Guanylic acid (5'-GMP)		

Protocol

Cell experiment [1]:

Cell lines	L5178Y mouse leukemia cells
Preparation Method	L5178Y cells were maintained in Fischer's medium supplemented with 10% dialyzed bovine serum, penicillin, and streptomycin at 37°C. Cells were treated with Guanylic acid at concentrations of 40-200μM, alone or in combination with Bredinin (50μM to 100μM), for 16–40 hours.
Reaction Conditions	40-200μM; 16–40h

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Applications	Guanylic acid reversed Bredinin-induced inhibition of nucleic acid synthesis and chromosomal aberrations in L5178Y cells. In combination with high-dose Bredinin (50μM), Guanylic acid induced cytostatic effects, leading to a 70% increase in cell volume and elevated protein content.

Animal experiment [2]:

Animal models	Wistar rats
Preparation Method	Rats were intraperitoneally administered Guanylic acid at doses of 10, 25, 50, 100, or 150mg/kg 1 hour before behavioral testing. Diazepam (2mg/kg) served as a positive control. Anxiety-like behaviors were evaluated using the light/dark task, elevated plus-maze, and open field tasks. Cerebrospinal fluid (CSF) was collected 1 hour post-injection for purine analysis via HPLC.
Dosage form	10–150mg/kg; i.p.; Single injection.
Applications	Guanylic acid (25 and 50mg/kg) induced anxiolytic-like effects comparable to Diazepam, Guanylic acid significantly increasing time spent in the light compartment of the light/dark apparatus and transitions between light/dark chambers. In the elevated plus-maze, Guanylic acid (25 and 50mg/kg) increased time spent in open arms, without altering locomotor activity or entries into closed/total arms.

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References:
[1] Basta-Kaim A, Budziszewska B, Jaworska-Feil L, et al. Opposite effects of clozapine and sulpiride on the lipopolysaccharide-induced inhibition of the GR-mediated gene transcription in fibroblast cells. Pol J Pharmacol. 2003 Nov-Dec;55(6):1153-8.
[2] Crescimanno G, Mannino M, Casarrubea M, et al. Effects of sulpiride on the orienting movement evoked By acoustic stimulation in the Rat. Pharmacol Biochem Behav. 2000 Aug;66(4):747-50.

Background

Guanylic acid (5'-GMP) is an important nucleotide compound and a component of RNA[1-2]. Guanylic acid is involved in various metabolic pathways and exhibits certain biological activities, such as potential roles in regulating nutrient metabolism and enhancing immunity[3-4].

In vitro, treating L5178Y cells with Guanylic acid (40-200μM) and Bredinin (50-100μM) for 16–40 hours reversed the inhibitory effects of Bredinin on nucleic acid synthesis and chromosomal aberrations in L5178Y cells. Guanylic acid also caused an increase in cell volume and inhibited cell proliferation in L5178Y cells[5].

In vivo, treating adult male Wistar rats with Guanylic acid (10–150mg/kg; intraperitoneal injection) 1 hour prior to testing significantly increased anxiolytic-like behavior. Guanylic acid did not alter cerebrospinal fluid purine concentration or locomotor activity in the rat[6].

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References:
[1] Tansutaphanit S, Haga Y, Kabeya N, et al. Impact of purine nucleotide on fatty acid metabolism and expression of lipid metabolism-related gene in the liver cell of rainbow trout Oncorhynchus mykiss. Comp Biochem Physiol B Biochem Mol Biol. 2023 Jun-Jul;266:110845.
[2] FAIRLEY JL Jr, LORING HS. Growth-promoting activities of guanine, guanosine, guanylic acid, and xanthine for a purine-deficient strain of Neurospora. J Biol Chem. 1949 Jan;177(1):451-9.
[3] Ni X, Han Y, Yu J, et al. Structural basis of the C-terminal domain of SARS-CoV-2 N protein in complex with GMP reveals critical residues for RNA interaction. Bioorg Med Chem Lett. 2024 Dec 1;114:130014.
[4] Molz S, Dal-Cim T, Tasca CI. Guanosine-5'-monophosphate induces cell death in rat hippocampal slices via ionotropic glutamate receptors activation and glutamate uptake inhibition. Neurochem Int. 2009 Dec;55(7):703-9.
[5] Sakaguchi K, Tsujino M, Hayashi M, et al. Mode of action of bredinin with guanylic acid on L5178Y mouse leukemia cells. J Antibiot (Tokyo). 1976 Dec;29(12):1320-7.
[6] Almeida RF, Cereser VH Jr, Faraco RB, et al. Systemic administration of GMP induces anxiolytic-like behavior in rats. Pharmacol Biochem Behav. 2010 Sep;96(3):306-11.

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