

Product Data Sheet

Product Name: L-Glutamic acid

Cat. No.: GA10750

Chemical Properties

Cas. No. 56-86-0

Chemical Name (2S)-2-aminopentanedioic acid

SMILES C(CC(=O)O)C(C(=O)O)N

Formula $C_5H_9NO_4$

M.Wt 147.1

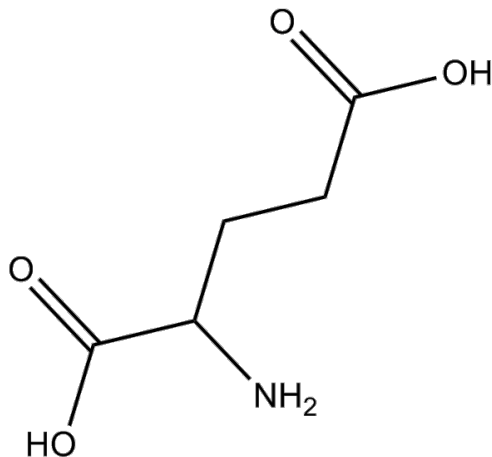
Solubility Soluble to 50 mM in 1eq. NaOH

Storage Store 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 C2C12 cells

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

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To clarify the effect of high concentrations of L-Glutamic acid on the fusion process of C2C12 cells, C2C12 cells that had been differentiated for 3 days in the presence of 0-5mM L-Glutamic acid were labeled using immunofluorescence with an anti-skeletal muscle myosin antibody. The cell phenotype and nuclear counts were analyzed to assess myocyte fusion. Cells positive for myosin heavy chain (MHC) with three or more nuclei were defined as fused cells. To determine whether high concentrations of L-Glutamic acid directly affect the fusion process of C2C12 cells, cells that had been

Preparation Method differentiated for 3 days (when the expression level of fast-twitch MHC reaches a plateau) were stimulated with 5mM L-Glutamic acid for 2 days.

C2C12 cells were differentiated for 2 days in the presence of L-Glutamic acid (0, 0.3, 1 or 5mM), followed by analysis of mGluR5 and NMDAR expression in the plasma membrane and whole cells using Western blotting. N-cadherin or GAPDH was used as the internal standard. After C2C12 cells were differentiated for 3 days, they were further differentiated for 2 days in the presence of L-Glutamic acid (0, 0.3, 1 or 5mM). The expression of mGluR5 and NMDAR in whole cells was analyzed using Western blotting.

Reaction Conditions 0, 0.3, 1 or 5mM; 48h or 72h

Applications A high concentration of L-Glutamic acid inhibited differentiation and fusion of mouse skeletal myoblasts C2C12, which are key processes in myogenesis.

Animal experiment [2]:

Animal models male Swiss albino mice

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Animals were divided into four groups, each comprising 22 mice, which were respectively the sham-operated (SO) group, the ischemia-reperfusion (IR) group, the L-Glutamic acid (L-GA) 400µM/kg treated group, and the memantine (MN) 20mg/kg treated group. Tests were conducted at different time intervals after ischemia-reperfusion (0, 24, 48 and 72h). L-Glutamic acid (intravenous) and MN (intraperitoneal) were administered 30min before surgery. SO and IR mice were given saline (intraperitoneal). Drug treatments were continued every 24h after IR until the end of the study.

Preparation Method Behavioral (at 24, 48 and 72h after IR) and cerebral blood flow (at 0, 24, 48 and 72h after IR) measurements were performed 30min after drug or vehicle administration in the morning. After behavioral testing, cerebral blood flow (CBF) measurements were carried out under mild ether anesthesia. Following CBF measurement, the mice were euthanized. Euthanasia was performed in an anesthetic chamber using ether-soaked cotton wool to induce respiratory depression. Subsequently, the brain was dissected out from the skull. The brain was then microdissected to the cortex, striatum, and hippocampus for the estimation of neurotransmitters and neurobiochemicals.

Dosage form 400µM/kg; once every 24 hours; i.v.

Applications Low dose of L-Glutamic acid attenuated the neurological dysfunctions and excitotoxicity in bilateral common carotid artery occluded mice.

References:

- [1] Ban H, Nobe K, Kobayashi S. Inhibitory effects of high extracellular L-glutamate concentrations on skeletal myogenesis. Sci Rep. 2025 May 19;15(1):17364.
- [2] Ramanathan M, Abdul KK, Justin A. Low dose of L-glutamic acid attenuated the neurological dysfunctions and excitotoxicity in bilateral common carotid artery occluded mice. Behav Pharmacol. 2016 Oct;27(7):615-22.

Background

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L-Glutamic acid is the main excitatory neurotransmitter in the mammalian central nervous system (CNS)^[1]. L-Glutamic acid has two major types of receptors: ionotropic (NMDA-, AMPA-, and kainate-selective iGluRs)^[2] and metabotropic glutamate receptors^[3]. L-Glutamic acid induces excitotoxicity by activating the postsynaptic N-methyl-D-aspartate receptors, leading to neurodegenerative diseases^[4].

In vitro, L-Glutamic acid (0.1 μM) was found to induce differentiation of the cell line of HL-60 promyelocytic leukemia into granulocytes or neutrophils^[5]. L-Glutamic acid (5mM; 24h) rapidly upregulated HIF1α in Raw 264.7 cells in a dose- and time-dependent manner, particularly under hypoxic conditions^[6]. A high concentration of L-Glutamic acid (0, 0.3, 1 or 5mM; 48h or 72h) inhibited differentiation and fusion of mouse skeletal myoblasts C2C12, which are key processes in myogenesis^[7].

In vivo, Low dose of L-Glutamic acid (400 μM/kg; once every 24 hours; i.v.) attenuated the neurological dysfunctions and excitotoxicity in bilateral common carotid artery occluded mice^[4]. L-Glutamic acid (750mg/kg; 24h) can mitigate chlorpyrifos (CPF)-induced oxidative stress in rats^[8].

References:

- [1] Croce N, Bernardini S, Di Cecca S, et al. Hydrochloric acid alters the effect of L-glutamic acid on cell viability in human neuroblastoma cell cultures. J Neurosci Methods. 2013 Jul 15;217(1-2):26-30.
- [2] Bowie D. The many faces of the AMPA-type ionotropic glutamate receptor. Neuropharmacology. 2022 May 1;208:108975.
- [3] Brosnan JT, Brosnan ME. Glutamate: a truly functional amino acid. Amino Acids. 2013 Sep;45(3):413-8.
- [4] Ramanathan M, Abdul KK, Justin A. Low dose of L-glutamic acid attenuated the neurological dysfunctions and excitotoxicity in bilateral common carotid artery occluded mice. Behav Pharmacol. 2016 Oct;27(7):615-22.
- [5] Kostanian IA, Nurieva RI, Novolotskaia EV, et al. Izuchenie vliianiia L-glutaminovoï kisloty na retseptsiiu tsitokinov kletkami HL-60 [Effect of L-glutamic acid on the reception of cytokines by HL-60 cells]. Bioorg Khim. 1998 Jan;24(1):3-9. Russian. PMID: 9551194.
- [6] Rigual MDM, Angulo-Aguado M, Zagorac S, et al. Macrophages harness hepatocyte glutamate to boost liver regeneration. Nature. 2025 May;641(8064):1005-1016.
- [7] Ban H, Nobe K, Kobayashi S. Inhibitory effects of high extracellular L-glutamate concentrations on

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skeletal myogenesis. Sci Rep. 2025 May 19;15(1):17364.

[8] Salyha N, Salyha Y. Protective role of L-glutamic acid and L-cysteine in mitigation the chlorpyrifos-induced oxidative stress in rats. Environ Toxicol Pharmacol. 2018 Dec;64:155-163.

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