L-Theanine

Cat. No.: HY-15121

CAS No.: 3081-61-6

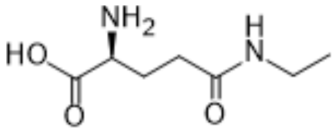
Molecular Formula: $C_7H_{14}N_2O_3$

Molecular Weight: 174

Target: Apoptosis; Endogenous Metabolite; Reactive Oxygen Species

Pathway: Apoptosis; Metabolic Enzyme/Protease; Immunology/Inflammation; NF-κB

Storage: 4°C, sealed storage, away from moisture
* In solvent : -80°C, 6 months; -20°C, 1 month (sealed storage, away from moisture)



SOLVENT & SOLUBILITY

In Vitro

H_2O : 150 mg/mL (862.07 mM; Need ultrasonic)

Preparing Stock Solutions	Concentration / Solvent / Mass	1 mg	5 mg	10 mg
	1 mM	5.7471 mL	28.7356 mL	57.4713 mL
	5 mM	1.1494 mL	5.7471 mL	11.4943 mL
	10 mM	0.5747 mL	2.8736 mL	5.7471 mL

Please refer to the solubility information to select the appropriate solvent.

In Vivo

1. Add each solvent one by one: PBS
Solubility: 100 mg/mL (574.71 mM); Clear solution; Need ultrasonic

BIOLOGICAL ACTIVITY

Description

L-Theanine (L-Glutamic Acid γ-ethyl amide) is a non-protein amino acid contained in green tea leaves, which blocks the binding of L-glutamic acid to glutamate receptors in the brain, and with neuroprotective, anticancer and anti-oxidative activities. L-Theanine can pass through the blood–brain barrier and is orally active[1][2][3].

In Vitro

L-Theanine (L-Glutamic Acid γ-ethyl amide) inhibits the incorporation of extracellular glutamine into neurons, resulting in the suppression of exocytotic release of glutamate[3].
L-Theanine (500 μM; 72 h) protects against excess Dopamine (HY-B0451)-induced neuronal death in presence of astrocytes and increases glutathione level in astrocytes[3].
L-Theanine (0-5 mM; 72 h) is involved in glutathione synthesis[3].
L-Theanine (0.1-5 mM; 24 h) dose-dependently inhibits the viability of melanoma but not normal epidermal melanocytes[4].
L-Theanine (1-5 mM; 24 h) arrests cell cycle at G0/G1 phase, suppresses cell migration, induces apoptosis in A375 cells[4].
L-Theanine (1-5 mM; 24 h) also affects the proliferation, migration, and apoptosis of B16–F10 melanoma cells[4].
L-Theanine shows protective effect on cadmium-induced apoptosis in PC12 cells by inhibiting the mitochondria-mediated pathway and decreased ROS production[5].

MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Cell Proliferation Assay[4]

Cell Line:	A375 and PIG1 cells
Concentration:	0.1, 0.5, 1, 2 and 5 mM
Incubation Time:	24 h
Result:	Dose-dependently decreased the viability of A375, but not PIG1 cells.

Cell Cycle Analysis[4]

Cell Line:	A375
Concentration:	1, 2 and 5 mM
Incubation Time:	24 h
Result:	Led to a dose dependent accumulation of A375 cells in G0/G1 phase and prevented cells from entering the S phase.

Western Blot Analysis[4]

Cell Line:	A375
Concentration:	1, 2 and 5 mM
Incubation Time:	24 h
Result:	Remarkably reduced the expression of proliferating cell nuclear antigen (PCNA), decreased protein levels of cyclinD1, cyclinE1, and cyclin-dependent protein kinase (CDK2 and CDK4). Potentiated the expression of cyclin-dependent kinase inhibitor 1A (CDKN1A, p21). Dose-dependently increased the levels of apoptosis-promoting proteins including BAX and cleaved-caspase3 and decreased the level of antiapoptotic protein BCL-2. Concentration dependently reduced the protein levels of ICAM-1, VCAM-1, MMP9, and MMP2. Dose-dependently increased the p53 expression.

Cell Migration Assay [4]

Cell Line:	A375
Concentration:	1, 2 and 5 mM
Incubation Time:	24 h
Result:	Apparently suppressed the migration.

Apoptosis Analysis[4]

Cell Line:	A375
Concentration:	1, 2 and 5 mM
Incubation Time:	24 h
Result:	Showed pro-apoptotic effect.

RT-PCR[4]

Cell Line:	A375
Concentration:	1, 2 and 5 mM
Incubation Time:	24 h
Result:	Markedly elevated the mRNA levels of Bmal1, Clock, Rora, and Rev-erbβ.

In Vivo

L-Theanine (4.0 mg/kg; p.o.; daily for 14 days) upregulates glutathione contents in striata of normal mice[3].

MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Animal Model:	Healthy male ICR mice weighing 32–34 g[3]
Dosage:	4.0 mg/kg
Administration:	Oral administration, daily for 14 days
Result:	Significantly increased glutathione content in the striatum, but not in the midbrain.

REFERENCES

[1]. Zhang R, et al. L-Theanine inhibits melanoma cell growth and migration via regulating expression of the clock gene BMAL1. Eur J Nutr. 2022 Mar;61(2):763-777.

[2]. Ben P, et al. Protective Effect of L-Theanine on Cadmium-Induced Apoptosis in PC12 Cells by Inhibiting the Mitochondria-Mediated Pathway. Neurochem Res. 2015 Aug;40(8):1661-70.

[3]. Vuong QV, et al. L-Theanine: properties, synthesis and isolation from tea. J Sci Food Agric. 2011 Aug 30;91(11):1931-9.

[4]. Kimura K, et al. L-Theanine reduces psychological and physiological stress responses. Biol Psychol. 2007 Jan;74(1):39-45.

[5]. Takeshima M, et al. l-Theanine protects against excess dopamine-induced neurotoxicity in the presence of astrocytes. J Clin Biochem Nutr. 2016 Sep;59(2):93-99.

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