

Product Data Sheet

Product Name: γ -Linolenic Acid

Cat. No.: GC10283

Chemical Properties

Cas. No. 506-26-3

Chemical Name 6Z,9Z,12Z-octadecatrienoic acid

SMILES CCCCC/C=C\C/C=C\C/C=C\CCCC(=O)O

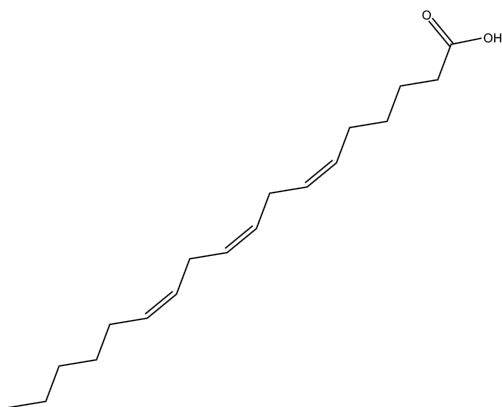
Formula $C_{18}H_{30}O_2$ M.Wt 278.4

Solubility $\leq 100\text{mg/ml}$ in DMSO; 100mg/ml in dimethyl formamide Storage Store at -20°C

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 C6 cells (rat glioma)

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

Tel: (909) 407-4943 Fax: (626) 353-8530 E-mail: tech@glpbio.com

Address: 10292 Central Ave. #205, Montclair, CA, USA

Product Data Sheet

C6 cells underwent cultivation in Dulbecco's modified Eagle's medium (DMEM) which contained 10% fetal calf serum (FCS), 50U/mL penicillin, and 50µg/mL streptomycin. The cell cultures used had reached their exponential growth phase while being maintained in 75cm² flasks under humidified conditions with 5% CO₂ and 95% air at 37°C. C6 cells reached the targeted density were first washed using PBS prior to trypsinization with 0.025% trypsin and 0.02% EDTA for later plating. The cell migration assay was executed with a 24-well Boyden chamber plate equipped with polycarbonate membrane filters that had 8µm pores. The upper part of the Boyden chamber contained C6 cells suspended in DMEM with 10% FCS while the lower chamber held DMEM with 10% FCS.

Preparation Method Following a 12-hour cell adhesion period the medium was replaced with a solution containing γ-Linolenic Acid at a concentration of 100µmol/L. The laboratory established all treatment concentrations before this study. The culture media containing γ-Linolenic Acid received daily replacement for 48 hours. The membrane filter cells received methanol fixation followed by a 30-minute stain with 0.05% crystal violet after incubation. A cotton swab removed the cells present on the filter's upper surface. The membranes received PBS rinses to eliminate the surplus stain. The membranes received 20 minutes of air drying. The number of migratory cells was recorded by counting the cells that moved to the filter's lower side under bright field microscopy at 200× magnification. Filters received counts from five random fields and each treatment underwent triplicate assays.

Reaction Conditions 100µmol/L; 48h

Applications γ-Linolenic Acid (100µmol/L) significantly inhibits the proliferation and migration of C6 cells.

Animal experiment [2]:

Animal models Male Wistar rats

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

Tel: (909) 407-4943 Fax: (626) 353-8530 E-mail: tech@glpbio.com

Address: 10292 Central Ave. #205, Montclair, CA, USA

Product Data Sheet

Preparation Method A total of thirty Male Wistar rats were randomly divided into five groups which included six rats in each group. The control group and indomethacin (IND) group received sunflower oil by oral gavage over 14 successive days. The γ -Linolenic Acid 100 and 150mg/kg groups received oral doses of γ -Linolenic Acid at 100 or 150mg/kg concentrations mixed in sunflower oil containing 15% saturated and 85% unsaturated fatty acids with 14-43% oleic and 44-75% linoleic acids for 14 consecutive days. During the study, rats in the omeprazole 20mg/kg group received oral doses of 20mg/kg omeprazole for 14 continuous days. All the rats except the control group received one oral dose of IND (50mg/kg) on day 14 of the study. For 24 hours before receiving the IND rats were allowed only water access but prohibited from eating. Thiopental Na served as an anesthetic agent for rats at a dosage of 50mg/kg through intraperitoneal injection. The rats received euthanasia through decapitation 4 hours following the administration of IND.

Dosage form 100mg/kg and 150mg/kg for 14 days; p.o.

Applications γ -Linolenic Acid treatment (100 and 150mg/kg) demonstrated protection from gastric damage caused by IND. γ -Linolenic Acid treatment lowered COX1, TNF-1, IL-6 and ICAM levels while elevating PGE2 levels.

References:

- [1] Miyake J A, Gomes R N, Colquhoun A. Gamma-Linolenic acid alters migration, proliferation and apoptosis in human and rat glioblastoma cells[J]. Prostaglandins & Other Lipid Mediators, 2020, 150: 106452.
- [2] Rahimi K, Givi M E, Rezaie A, et al. The protective effects of Gamma-linolenic acid against indomethacin-induced gastric ulcer in rats[J]. British Journal of Nutrition, 2024, 131(11): 1844-1851.

Background

γ -Linolenic Acid functions as an orally omega-6 polyunsaturated fatty acid from borage oil, is a specific inhibitor of β -secretase (BACE1) with IC₅₀ value of 7.6×10^{-5} mol/L and K_i value of $3.5 \times$

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

Tel: (909) 407-4943 Fax: (626) 353-8530 E-mail: tech@glpbio.com

Address: 10292 Central Ave. #205, Montclair, CA, USA

Product Data Sheet

10^{-5} mol/L^[1]. γ -Linolenic Acid is crucial for the normal development of animals and has potential anti-tumor effects^[2]. γ -Linolenic Acid is typically consumed as a part of a dietary supplement^[3].

In vitro, γ -Linolenic Acid showed an IC₅₀ value of 101.59 μ mol/L after 24h in K562 cells for cell proliferation inhibition^[4]. γ -Linolenic Acid (50-150 μ mol/L, 24h) induced the death of K562 cells in a dose-dependent manner, enhanced lipid peroxidation in K562 cells, and promoted the release of cytochrome c, the activation of caspase-3 and the lysis of PARP in K562 cells^[4]. After incubation for 24 hours, γ -Linolenic Acid induced apoptosis with IC₅₀ value of HT-29 colorectal cancer cells at 255 μ mol/L^[5]. Pretreatment with γ -Linolenic Acid (100 μ mol/L) for 1 hour can protect PC12 cells from cell death and reduce intracellular Reactive oxygen species (ROS) accumulation induced by β -amyloid peptide (A β ₂₅₋₃₅), and inhibit the expression of NF- κ B, I κ B- α and MAPK mediated by A β ₂₅₋₃₅^[6]. γ -Linolenic Acid (50-100 μ mol/L, 1h) reduced the phosphorylation of ERK1/2 and JNK induced by A β ₂₅₋₃₅ in a dose-dependent manner^[6]. The treatment with γ -Linolenic Acid at 10 μ g/mL for 48 hours decreased Her-2/neu protein levels in the Her-2/neu-overexpressing cell lines BT-474, SK-Br3, and MDA-MB-453 (breast cancer), SK-OV3 (ovarian cancer), and NCI-N87 (gastrointestinal cancer), resulting in elevated levels of PEA3 transcriptional repressor of Her-2/neu in all cell lines^[7].

In vivo, γ -Linolenic Acid treatment (150mg/kg, p.o.) for 14 days showed a protective effect on gastric injury in rats with gastric ulcers induced by indomethacin (20mg/kg)^[8]. γ -Linolenic Acid normalized antioxidant function by regulating the protein levels of MDA, SOD, GSH and CAT in rat model of gastric ulcers^[8]. In the Sprague-Dawley rat model of accelerated aging, intraperitoneal injection of γ -Linolenic Acid (1mg/kg, 40 days) could improve memory impairment caused by D-fructose (1000mg/kg plus 10% drinking water for 40 days, i.p.) and reduce the formation of advanced glycation end products (AGE)^[9].

References:

- [1] Youn K, Lee J, Yun E Y, et al. Biological evaluation and in silico docking study of γ -linolenic acid as a potential BACE1 inhibitor[J]. Journal of functional foods, 2014, 10: 187-191.
- [2] Mizock B A. Immunonutrition and critical illness: an update[J]. Nutrition, 2010, 26(7-8): 701-707.
- [3] Fan Y Y, Chapkin R S. Importance of dietary γ -linolenic acid in human health and nutrition[J]. The Journal of nutrition, 1998, 128(9): 1411-1414.
- [4] Ge H, Kong X, Shi L, et al. Gamma-linolenic acid induces apoptosis and lipid peroxidation in

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

Tel: (909) 407-4943 Fax: (626) 353-8530 E-mail: tech@glpbio.com

Address: 10292 Central Ave. #205, Montclair, CA, USA

Product Data Sheet

- human chronic myelogenous leukemia K562 cells[J]. Cell biology international, 2009, 33(3): 402-410.
- [5] González-Fernández M J, Ortea I, Guil-Guerrero J L. α -Linolenic and γ -linolenic acids exercise differential antitumor effects on HT-29 human colorectal cancer cells[J]. Toxicology research, 2020, 9(4): 474-483.
- [6] Youn K, Lee S, Jun M. Gamma-linolenic acid ameliorates A β -induced neuroinflammation through NF- κ B and MAPK signalling pathways[J]. Journal of Functional Foods, 2018, 42: 30-37.
- [7] Menendez J A, Vellon L, Colomer R, et al. Effect of γ -linolenic acid on the transcriptional activity of the Her-2/neu (erbB-2) oncogene[J]. Journal of the National Cancer Institute, 2005, 97(21): 1611-1615.
- [8] Rahimi K, Givi M E, Rezaie A, et al. The protective effects of Gamma-linolenic acid against indomethacin-induced gastric ulcer in rats[J]. British Journal of Nutrition, 2024, 131(11): 1844-1851.
- [9] Khan S A, Haider A, Mahmood W, et al. Gamma-linolenic acid ameliorated glycation-induced memory impairment in rats[J]. Pharmaceutical biology, 2017, 55(1): 1817-1823.

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

Tel: (909) 407-4943 Fax: (626) 353-8530 E-mail: tech@glpbio.com

Address: 10292 Central Ave. #205, Montclair, CA, USA