

Product Data Sheet

Product Name: Gallic acid

Cat. No.: GN10388

Chemical Properties

Cas. No. 149-91-7

Chemical Name 3,4,5-trihydroxybenzoic acid

SMILES C1=C(C(=C(C(=C1O)O)O)C(=O)O

Formula $C_7H_6O_5$

M.Wt 170.12

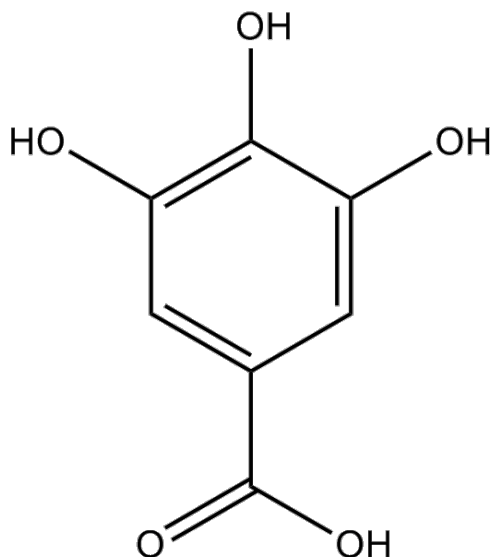
Solubility $\geq 5.95\text{mg/mL}$ in DMSO

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]:

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Cell lines	HeLa cells (human cervical cancer cell line), H446 cells (small cell lung cancer cell line), SH-SY5Y cells (neuroblastoma cell line)
Preparation Method	HeLa, H446 and SH-SY5Y cells were maintained in DMEM/F-12 or RPMI medium supplemented with 10% FBS at 37°C, 5% CO ₂ . Cells were treated with Gallic acid at 50µg/mL for 12h, with live-cell staining of Hoechst 33342, NucView 530 Caspase-3 substrate, IncuCyte Cytotox Red and lipid peroxidation probe, followed by time-lapse confocal microscopy; cells were also co-treated with deferoxamine 200µM or necrosulfonamide 5µM.
Reaction Conditions	50µg/mL; 12h
Applications	Gallic acid induced nuclear condensation, mitochondrial fragmentation, cytochrome c release, caspase-3 activation, plasma membrane rupture, and lipid peroxidation in HeLa, H446 and SH-SY5Y cells. Gallic acid-induced cell death was suppressed by deferoxamine and accompanied by plasma membrane rupture suppression by necrosulfonamide with enhanced sensitivity to cell death.
Animal experiment [2]:	
Animal models	C57BL/6J male mice
Preparation Method	Eight-week-old C57BL/6J male mice were injected intraperitoneally with streptozotocin (65mg/kg) to induce diabetes, then diabetic mice were orally/gavaged or administered daily with Gallic acid (30mg/kg) alone for 4 weeks; kidney tissues and serum/urine samples were collected after 4 weeks for renal function tests, PAS/H&E staining, DHE staining, oxidative stress assays and Western blot of p-AMPK/SIRT1.

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Dosage form	30mg/kg; daily; 4 weeks
Applications	Gallic acid increased body weight, reduced fasting blood glucose, kidney-to-body ratio, serum urea, BUN and creatinine, urine volume, urine albumin and urine total protein, and increased creatinine clearance in diabetic mice. Gallic acid reduced tubulointerstitial lesion score and mesangial matrix index, lowered renal ROS and MDA, restored SOD, CAT and GSH, and restored p-AMPK and SIRT1 levels in kidney tissues.
References:[1] Tang HM, Cheung PCK. Gallic Acid Triggers Iron-Dependent Cell Death with Apoptotic, Ferroptotic, and Necroptotic Features. <i>Toxins</i> . 2019 Aug;11(9):492.[2] Hong Y, Wang J, Sun W, et al. Gallic acid improves the metformin effects on diabetic kidney disease in mice. <i>Renal Failure</i> . 2023;45(1):2183726.	

Background

Gallic acid is a 3,4,5-trihydroxybenzoic acid phenolic compound with antioxidant, anti-inflammatory and antitumor activities. Gallic acid scavenges free radicals through phenolic hydroxyl groups and inhibits NF- κ B and other inflammation-related pathways. Gallic acid is used for oxidative stress-related diseases, inflammatory responses and microbial infections^[1-4].

In vitro, HeLa, H446 and SH-SY5Y cells were treated with 50 μ g/mL Gallic acid for 12 hours. Gallic acid induced iron-dependent cell death with apoptotic, ferroptotic and necroptotic features^[5]. A549 and H1299 cells were treated with 0-400 μ M Gallic acid for 24-72 hours. Gallic acid decreased cell viability, inhibited cell proliferation and colony formation, induced G1/S phase cell cycle arrest, inhibited migration and invasion, triggered apoptosis and induced ferroptosis^[6]. Caco-2 cells were pretreated with 1-10 μ g/mL Gallic acid for 24 hours and then stimulated with 10 μ g/mL LPS for 4 hours. Gallic acid increased Claudin-1, Occludin, ZO-1, Bcl-2 and IL-10 expression, decreased IL-6, IL-1 β , TNF- α , iNOS, Bax and Bad expression, reduced ROS levels and restored SOD, CAT and GSH activities^[7].

In vivo, diabetic C57BL/6J mice received daily oral gavage of 30mg/kg Gallic acid for 4 weeks. Gallic acid improved body weight and fasting blood glucose, reduced kidney-to-body ratio, serum urea,

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BUN, creatinine, urine protein and urine albumin, alleviated tubulointerstitial lesions and mesangial matrix expansion, reduced renal tissue ROS and MDA^[8]. Rotenone-induced ICR mice received 50-100mg/kg Gallic acid by gavage every other day for 5 weeks. Gallic acid alleviated motor deficits, protected striatal and substantia nigra pars compacta neurons, maintained tyrosine hydroxylase-positive dopaminergic neurons, reduced reactive astrocyte activation in the substantia nigra pars compacta^[9]. Middle cerebral artery occlusion (MCAO) C57BL/6J mice received intraperitoneal injection of 150mg/kg Gallic acid. Gallic acid improved neurological function scores, reduced cerebral infarct volume, brain water content and cerebral edema, protected neurons and reduced apoptosis^[10].

References:

- [1] Weian W, Yunxin Y, Ziyan W, et al. Gallic acid: design of a pyrogallol-containing hydrogel and its biomedical applications. *Biomater Sci.* 2024 Mar 12;12(6):1405-1424.
- [2] Tuli HS, Mistry H, Kaur G, et al. Gallic Acid: A Dietary Polyphenol that Exhibits Anti-neoplastic Activities by Modulating Multiple Oncogenic Targets. *Anticancer Agents Med Chem.* 2022;22(3):499-514.
- [3] Fernandes FH, Salgado HR. Gallic Acid: Review of the Methods of Determination and Quantification. *Crit Rev Anal Chem.* 2016 May 3;46(3):257-65.
- [4] Patil SB, Kulkarni YA. Role of gallic acid in the management of diabetes and its complications. *Naunyn Schmiedebergs Arch Pharmacol.* 2026 Mar;399(5):6239-6247.
- [5] Tang HM, Cheung PCK. Gallic Acid Triggers Iron-Dependent Cell Death with Apoptotic, Ferroptotic, and Necroptotic Features. *Toxins.* 2019 Aug;11(9):492.
- [6] Li B, Zhang J, Jiang Y, et al. Gallic acid: A promising anti-non-small cell lung cancer compound targeting early growth response protein-1 for apoptosis and ferroptosis. *Phytomedicine.* 2026;156:158220.
- [7] Chu C, Ru H, Chen Y, et al. Gallic acid attenuates LPS-induced inflammation in Caco-2 cells by suppressing the activation of the NF- κ B/MAPK signaling pathway. *Acta Biochim Biophys Sin.* 2024;56(6):905-15.
- [8] Wang Y, Zhou D, Chen Q, et al. Reuterin alleviates Enterohemorrhagic Escherichia coli O157:H7-induced infectious diarrhea in mice through modulation of the gut microbiota. *World J Microbiol Biotechnol.* 2026;42:555.
- [9] Thong-asa W, Wassana C, Sukkasem K, et al. Neuroprotective effect of gallic acid in mice with rotenone-induced neurodegeneration. *Exp Anim.* 2024;73(3):259-69.

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[10] Hua W, Xu H, Chen R, et al. Gallic Acid Alleviates Cerebral Ischemia-reperfusion Injury in Mice by Mediating Microglial Polarization Through the NLRP3/mTOR Axis. J Neuroimmune Pharmacol. 2025;20:101.

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