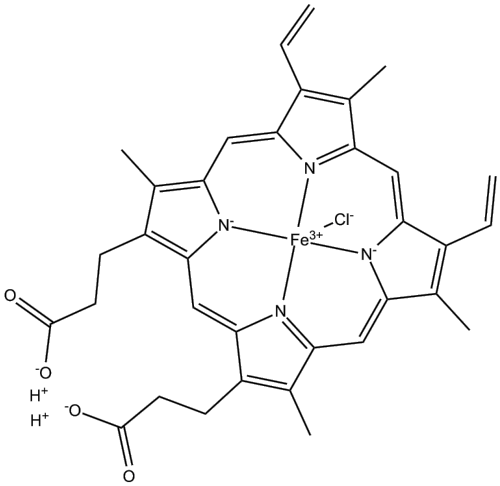
Product Data Sheet

Product Name: Hemin chloride
Cat. No.: GC14591

Chemical Properties

Cas. No.	16009-13-5		
Chemical Name	(SP-5-13)-chloro[7,12-diethenyl-3,8,13,17-tetramethyl-21H,23H-porphine-2,8-dipropanoato(4-)-κN21, κN22, κN23, κN24]-ferrate(2-), dihydrogen		
SMILES	[O-]C(CCC1=C(C=C2[N]3=C4C(C)=C2CCC([O-])=O)[N-]([Fe+3]35([Cl-])[N]6=C7C=C(C(C=C)=C8C)[N-]5C8=C4)C(C=C6C(C=C)=C7C)=C1C)=O.[H+].[H+]		
Formula	$C_{34}H_{30}ClFeN_4O_4 \cdot 2H$	M.Wt	652
Solubility	17.33 mg/mL in DMSO,2.5 mg/mL in NH4OH,0.1 mg/mL in Water	Storage	4°C, protect from light, stored under nitrogen
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	Bovine aortic endothelial cells (BAECs)
Preparation Method	BAECs were cultured in DMEM medium, supplemented with 10% fetal bovine serum (FBS), 4mM L-glutamine, and 1% penicillin/streptomycin at 37°C in an incubator with 5% CO_2. Cells were seeded in a 96-well plate at a density of 1×10^4 cells/well overnight. Cells were treated with different concentrations of Hemin chloride (10, 20, 30, 40, and 50μM) for 24h, and the cell viability was measured.
Reaction Conditions	10, 20, 30, 40, and 50μM; 24h
Applications	Hemin chloride treatment reduced the cell viability of BAECs in a dose-dependent manner.
Animal experiment [2]:	
Animal models	Male CD-1 mice
Preparation Method	Male CD-1 mice (6 weeks old; 30-40g) were housed at 18°C-23°C of temperature and 40%-60% of humidity, with a controlled 12 hours light/dark cycle, and fed standard laboratory mouse chow. Mice received 100μl of 2.5% TNBS in 50% ethanol intrarectal, and were treated daily with 10mg/kg (i.p.) of Hemin chloride for 4 days. The mice received only ethanol was used as a reference. The colon samples of mice were collected for analysis.
Dosage form	10mg/kg/day; 4 days; i.p.

Caution: Product has not been fully validated for medical applications. For research use only.
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Applications	Hemin chloride treatment alleviated the TNBS-induced colitis, and mitigated tissue inflammation in mice.

References:

[1] Higdon A N, Benavides G A, Chacko B K, et al. Hemin causes mitochondrial dysfunction in endothelial cells through promoting lipid peroxidation: the protective role of autophagy[J]. American Journal of Physiology-Heart and Circulatory Physiology, 2012, 302(7): H1394-H1409.

[2] Mateus V, Rocha J, Mota-Filipe H, et al. Hemin reduces inflammation associated with TNBS-induced colitis[J]. Clinical and Experimental Gastroenterology, 2018: 325-334.

Background

Hemin chloride, a substrate of heme oxygenase (HO)-1, induces HO-1 expression on a variety of cells to exert anti-oxidant and anti-inflammatory roles.

A dramatic reduction of cell-associated M. hyorhinis DNA in a dose-dependent manner, with > 90% inhibition at 100 µm Hemin chloride. Hemin chloride treatment profoundly inhibited intracellular M. hyorhinis DNA levels within 10 h to nearly undetectable levels after 48 h[1]. Macrophage exposed to Hemin chloride exhibits modulation of non-opsonic phagocytosis of aged RBCs, ability to kill bacteria and secretion of cytokines.Translocation and sequestration of CD36 within the intracellular storage in the Hemin chloride treated macrophages. It in-turn modulates the global cytokine secretion from macrophages. CD36 has strong affinity for Hemin chloride with a dissociation constant of 1.26 ±0.24 µM[3]. Hemin chloride treatment decreased cell proliferation to 62.5 %, 51.3 %, and 38.8 % in PA-TU-8902, BxPC-3 and MiaPaCa-2 cancer cells, respectively. Enhancement of anti-proliferative effects of statins by Hemin chloride, documented as decreased cell proliferation after 48 h of co-treatment[5]. The presence of Hemin chloride in irradiated lung cancer cells enhanced the productivity of initial ROS, resulting in lipid peroxidation and subsequent ferroptosis[6].

In HDM-induced asthmatic mouse model, Hemin chloride-DCEVs inhalation reduced eosinophils infiltration and mucus secretion in the airway, decreased the levels of IL-4, IL-5, and IL-13 in the lung and the number of Th2 cells in mediastinal lymph nodes (MLNs), and increased the number of Treg

cells in MLNs[2]. Hemin chloride-preconditioned mice exhibited preserved renal cell function, and the tubular injury score at 72h indicated that tubular damage was prevented[4]. When compared with wild-type littermates, the mortality for SS Cttn+/- mice trended to be lower after Hemin chloride infusion and these mice exhibited less severe lung injury and less necroptotic cell death[7].

References:

[1]. Huang H, Dabrazhynetskaya A, et,al.Hemin chloride activation abrogates Mycoplasma hyorhinis replication in chronically infected prostate cancer cells via heme oxygenase-1 induction. FEBS Open Bio. 2021 Oct;11(10):2727-2739. doi: 10.1002/2211-5463.13271. Epub 2021 Sep 9. PMID: 34375508; PMCID: PMC8487054.
[2]. Wu Y, Yu Q, et,al.Hemin chloride-primed dendritic cells suppress allergic airway inflammation through releasing extracellular vesicles. J Leukoc Biol. 2022 Apr;111(4):837-848. doi: 10.1002/JLB.3A0321-175R. Epub 2021 Jul 23. PMID: 34296788; PMCID: PMC9292814.
[3]. Banesh S, Layek S, et,al. Hemin chloride acts as CD36 ligand to activate down-stream signalling to disturb immune responses and cytokine secretion from macrophages. Immunol Lett. 2022 Mar;243:1-18. doi: 10.1016/j.imlet.2022.01.004. Epub 2022 Jan 31. PMID: 35104496.
[4]. Chen HH, Lu PJ, et,al. Heme oxygenase-1 ameliorates kidney ischemia-reperfusion injury in mice through extracellular signal-regulated kinase 1/2-enhanced tubular epithelium proliferation. Biochim Biophys Acta. 2015 Oct;1852(10 Pt A):2195-201. doi: 10.1016/j.bbadis.2015.07.018. Epub 2015 Jul 30. PMID: 26232688.
[5]. Vanova K, Boukalova S, et,al. Heme oxygenase is not involved in the anti-proliferative effects of statins on pancreatic cancer cells. BMC Cancer. 2016 May 12;16:309. doi: 10.1186/s12885-016-2343-9. PMID: 27175805; PMCID: PMC4866069.
[6]. Almahi WA, Yu KN, et,al. Hemin chloride enhances radiosensitivity of lung cancer cells through ferroptosis. Exp Cell Res. 2022 Jan 1;410(1):112946. doi: 10.1016/j.yexcr.2021.112946. Epub 2021 Nov 24. PMID: 34826424.
[7]. Jones NM, Sysol JR,et,al. Cortactin loss protects against Hemin chloride-induced acute lung injury in sickle cell disease. Am J Physiol Lung Cell Mol Physiol. 2022 Jun 1;322(6):L890-L897. doi: 10.1152/ajplung.00274.2021. Epub 2022 May 3. PMID: 35503995; PMCID: PMC9169831.