

Product Data Sheet

Product Name: Heparan Sulfate

Cat. No.: GC30767

Chemical Properties

Cas. No. 9050-30-0

SMILES O=S(OCC1O[C@@H](OC)[C@@H](NS(=O)([O-])=O)[C@@H](OS(=O)([O-])=O)[C@H]1O[C@@H]2OC(C([O-])=O)[C@H](O[C@@H]3OC(COS(=O)([O-])=O)[C@H](O[C@@H]4OC(C([O-])=O)[C@H](OC)[C@H](O)[C@@H]4OS(=O)([O-])=O)[C@H](O)[C@@H]3NS(=O)([O-])=O)[C@H](O)[C@@H]2O)([O-])=O.[n]

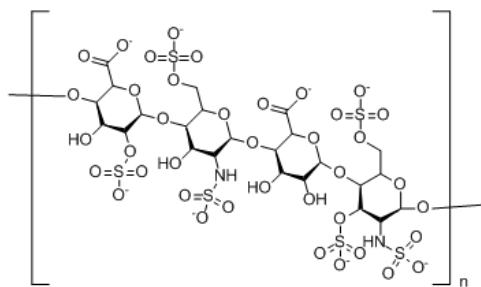
Formula $C_{12}H_{19}NO_{20}S_3$ (monomer) M.Wt 593.47(monomer)

Solubility Water : 47.1 mg/mL Storage Store at -20°C

General For obtaining a higher solubility , please warm the tube at 37 °C and shake it in the tips ultrasonic bath for a while.Stock solution can be stored below -20°C for several months.

Shipping Evaluation sample solution : ship with blue ice All other available size: ship with RT , or Condition blue ice upon request.

Structure



Protocol

Cell experiment [1]:

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Cell lines	MDA-MB231, Hs578t, and MDA-MB468 TNBC cells
Preparation Method	MDA-MB231, Hs578t, and MDA-MB468 cells were maintained in DMEM supplemented with 10% FBS at 37°C, 5% CO ₂ . Cells were treated with 50µM Heparan Sulfate alone or in combination with 20µM OGT2115 for 48h, with 100µM paclitaxel added for the final 6h. Tumorsphere formation efficiency was evaluated after 7 days of culture in 3D Tumorsphere Medium XF.
Reaction Conditions	50µM; 48h
Applications	In combination with OGT2115 and paclitaxel, Heparan Sulfate further decreased cell viability and increased eATP release in all three TNBC cell lines compared to paclitaxel plus OGT2115 alone. Heparan Sulfate also further suppressed tumorsphere formation efficiency across MDA-MB231, Hs578t, and MDA-MB468 cells when combined with paclitaxel and OGT2115.
Animal experiment [2]:	
Animal models	Male Sprague Dawley rats (12-13 weeks old, approximately 400g)

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Preparation Method	Rats were intratracheally inoculated with $3-5 \times 10^8$ CFU <i>Streptococcus pneumoniae</i> to induce pneumosepsis. 24h after inoculation, rats were resuscitated via tail vein with 8mL/kg Ringer's lactate or 5% human albumin supplemented with 7mg/kg Heparan Sulfate over 1h. 15min before sacrifice (5h after start of resuscitation), 70kD FITC-labeled dextran was administered intravenously to assess pulmonary vascular permeability. At sacrifice, blood, lungs, and kidneys were harvested to evaluate pulmonary FITC-dextran leakage, organ edema (W/D ratio), histopathology, endothelial injury markers (Syndecan-1, soluble thrombomodulin, vWF, ICAM-1), and inflammation (plasma IL-6, lung homogenate IL-6 and TNF- α).
Dosage form	7mg/kg; i.v.; single infusion over 1h
Applications	As an add-on to Ringer's lactate or albumin resuscitation, HeparanSulfate did not reduce pulmonary FITC-dextran leakage, pulmonary edema, pulmonary histologic injury scores, or kidney edema compared to resuscitation without HeparanSulfate. Heparan Sulfate did not alter plasma levels of endothelial injury markers Syndecan-1, soluble thrombomodulin, vWF, and ICAM-1, nor did it change plasma IL-6 or lung homogenate IL-6 and TNF- α levels. In a subsequent dose-response study, 21mg/kg Heparan Sulfate showed the lowest pulmonary FITC-dextran leakage and pulmonary W/D ratio among the tested doses.

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References:

[1] Manouchehri JM, Datta J, Marcho LM, et al. The role of heparan sulfate in enhancing the chemotherapeutic response in triple-negative breast cancer. Breast Cancer Research. 2024;26(1):153.

[2] van den Brink DP, Kleinveld DJB, Bongers A, et al. The Effects of Heparan Sulfate Infusion on Endothelial and Organ Injury in a Rat Pneumosepsis Model. J Clin Med. 2023 Oct;12(20):6438.

Background

Heparan Sulfate is a complex polyanionic polysaccharide, regulates important developmental processes in invertebrates and vertebrates. Heparan Sulfate can interact with viral spike proteins and various other proteins, synergistically with ACE2 to promote virus attachment to host cells, and participates in the regulation of tumor cell invasion and metastasis. Heparan Sulfate can be used in research on cancer and COVID-19^[1-4].

In vitro, treatment of TGF- β 3-induced human mesenchymal stem cell chondrogenic differentiation with Heparan Sulfate (100 μ g/mL) for 3-21 days enhanced chondrogenic differentiation, increasing glycosaminoglycan synthesis, cartilage matrix protein secretion, and cartilage-specific gene expression^[5]. Treatment of triple-negative breast cancer cells (MDA-MB 231, MDA-MB 468, Hs 578t) with Heparan Sulfate (50 μ M) together with paclitaxel or OGT2115 for 48 hours significantly inhibited tumor sphere formation^[6].

In vivo, single intravenous infusion of Heparan Sulfate (7-21mg/kg) in rats with pneumosepsis did not reduce pulmonary FITC-dextran leakage, pulmonary edema, pulmonary histological damage, renal edema, or systemic inflammatory levels^[7].

References:

[1] Alotaibi FS, Alsadun MMR, Alsaiari SA, et al. Interactions of proteins with heparan sulfate. Essays Biochem. 2024 Dec 4;68(4):479-489.

[2] Stringer SE, Gallagher JT. Heparan sulphate. Int J Biochem Cell Biol. 1997 May;29(5):709-14.

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- [3] Nadir Y, Brenner B. Relevance of Heparan Sulfate and Heparanase to Severity of COVID-19 in the Elderly. Semin Thromb Hemost. 2021 Jun;47(4):348-350.
- [4] Gomez-Pinilla F, Vu L, Cotman CW. Regulation of Astrocyte Proliferation by FGF-2 and Heparan Sulfate in vivo. J Neurosci. 1995 Mar;15(3):2021-9.
- [5] Chen J, Wang Y, Chen C, et al. Exogenous Heparan Sulfate Enhances the TGF- β 3-Induced Chondrogenesis in Human Mesenchymal Stem Cells by Activating TGF- β /Smad Signaling. Stem Cells Int. 2016;2016:1520136.
- [6] Manouchehri JM, Datta J, Marcho LM, et al. The role of heparan sulfate in enhancing the chemotherapeutic response in triple-negative breast cancer. Breast Cancer Research. 2024;26(1):153
- [7] van den Brink DP, Kleinveld DJB, Bongers A, et al. The Effects of Heparan Sulfate Infusion on Endothelial and Organ Injury in a Rat Pneumosepsis Model. J Clin Med. 2023 Oct;12(20):6438.

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