

Product Data Sheet

Product Name: Streptozocin

Cat. No.: GC17131

Chemical Properties

Cas. No. 18883-66-4

Chemical Name 1-methyl-1-nitroso-3-[2,4,5-trihydroxy-6-(hydroxymethyl)oxan-3-yl]urea

SMILES CN(C(=O)NC1C(C(C(OC1O)CO)O)O)N=O

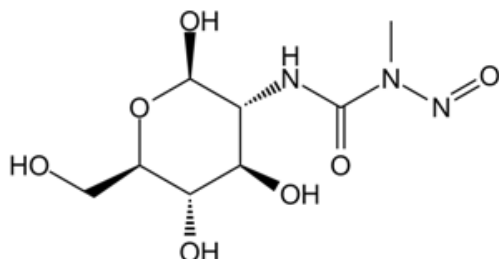
Formula $C_8H_{15}N_3O_7$ M.Wt 265.22

Solubility $\geq 10.3\text{mg/mL}$ in DMSO, $\geq 53.2\text{mg/mL}$ in Water, $\geq 26.5\text{mg/mL}$ in EtOH with gentle warming
Storage -20°C , protect from light, stored under nitrogen, unstable in solution, ready to use.

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 HepG2 cells (human hepatoma cell line)

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Preparation Method HepG2 cells were grown in poly-L-lysine coated flasks in DMEM supplemented with 1% nonessential amino acids, 2mM glutamine and 10% heat-inactivated fetal bovine serum at 37°C, 5% CO₂. HepG2 cells were treated with Streptozocin for 24–48h.

Reaction Conditions 1–20mM; 24–48h

Applications Streptozocin decreased HepG2 cell viability in a dose- and time-dependent manner. Streptozocin induced ROS and RNS production and increased NADPH-dependent membrane lipid peroxidation. Streptozocin decreased mitochondrial GSH, inhibited GSH-reductase and GST activities, and reduced mitochondrial membrane potential. Streptozocin inhibited mitochondrial respiratory chain Complex I and Complex IV activities, suppressed ROS-sensitive aconitase activity, and reduced intracellular ATP content. Streptozocin upregulated iNOS expression, promoted NF-κB p65 nuclear translocation, downregulated anti-apoptotic Bcl-2, increased caspase-3 activity, and induced nuclear condensation in HepG2 cells.

Animal experiment [2]:

Animal models C57BL/6 or CD-1 male mice

Preparation Method Injected Streptozocin (40mg/kg; dissolved in 50mM sodium citrate buffer pH 4.5; freshly prepared) intraperitoneally into C57BL/6 or CD-1 male mice once daily for five consecutive days. During the administration period, provide normal food and 10% sucrose water. On the sixth day, replace the 10% sucrose water with regular water.

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Dosage form 40mg/kg; i.p.; once daily for 5 consecutive days

Applications Repeated low-dose Streptozocin induces type 1 diabetes in mice. Streptozocin caused long-term blood glucose greater than 300mg/dL in mice and increased glomerular filtration rate (GFR).

Animal experiment [3]:

Animal models C57BL/6 or CD-1 male mice

Preparation Method Mice were fasted 6-8h, then intraperitoneally administered nicotinamide (230mg/kg), followed by Streptozocin (dissolved in 50mM sodium citrate buffer pH 4.5; 65mg/kg; i.v.) 15min later. For the high-fat diet combined model, mice were fed 60% fat diet for 3-8 weeks then administered Streptozocin (30-40mg/kg; i.p.) single or twice at weekly interval.

Dosage form 65mg/kg; i.v.; single Injection; 30-40mg/kg,i.p.; single or double injection.

Applications Nicotinamide+Streptozocin caused ~60% β -cell loss, stable moderate hyperglycemia with an insulin-deficient but not insulin-resistant type 2 diabetes phenotype. HFD+STZ caused hyperglycemia associated with hyperinsulinemia and insulin resistance, recapitulating key features of human type 2 diabetes.

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References:

- [1] Raza H, John A. Streptozotocin-induced cytotoxicity, oxidative stress and mitochondrial dysfunction in human hepatoma HepG2 cells. *Int J Mol Sci.* 2012;13(5):5751-5767.
- [2] Vallon V, Schroth J, Satriano J et al. Adenosine A(1) receptors determine glomerular hyperfiltration and the salt paradox in early streptozotocin diabetes mellitus. *Nephron Physiol.* 2009;111(3):p30-8.
- [3] Furman BL. Streptozotocin-Induced Diabetic Models in Mice and Rats. *Curr Protoc.* 2021 Apr;1(4):e78.

Background

Streptozocin is an antibiotic with pancreatic beta-cell toxicity and can be used to establish type 1 and type 2 diabetes models. Streptozocin enters pancreatic islet beta cells through glucose transporter 2 (GLUT2) and releases nitric oxide and free radicals to cause DNA alkylation damage. Streptozocin inhibits DNA synthesis, pyrimidine nucleotide metabolism, and key enzymes of gluconeogenesis^[1-4].

In vitro, treatment of mouse insulinoma MIN6 cells with 5mM Streptozocin for 1 hour followed by incubation with fresh medium containing 1mM N-methyl-2-pyridone-5-carboxamide for 1 hour reduced the increase in intracellular ATP and NAD⁺ levels induced by N-methyl-2-pyridone-5-carboxamide^[5]. Treatment of human hepatocellular carcinoma HepG2 cells with 1-20mM Streptozocin for 24-48 hours induced reactive oxygen species and reactive nitrogen species generation and membrane lipid peroxidation in a dose- and time-dependent manner, and induced a decrease in cell viability^[6]. Treatment of mouse pancreatic beta cell line INS-1 cells with 15-30mM Streptozocin for 1 hour induced cell apoptosis^[7].

In vivo, intraperitoneal injection of Streptozocin (40mg/kg) once daily for 5 consecutive days induced chronic insulinitis and insulin deficiency in C57BL/6 mice^[8]. Single saphenous vein injection of Streptozocin (25-100mg/kg) in male Wistar rats after 16-hour fasting induced diabetes in a dose-dependent manner^[9]. Single intraperitoneal injection, two injections at 24-hour intervals, and three injections at 24-hour intervals of Streptozocin (60mg/kg) in Wistar rats induced diabetes in a dose-

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and frequency-dependent manner, among which two injections of 60mg/kg at 24-hour interval stably maintained diabetic symptoms in rats for 21 days^[10].

References:

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- [2] Moertel CG, Lefkopoulo M, Lipsitz S, et al. Streptozocin-doxorubicin, streptozocin-fluorouracil or chlorozotocin in the treatment of advanced islet-cell carcinoma. N Engl J Med. 1992 Feb 20;326(8):519-23.
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- [6] Raza H, John A. Streptozotocin-induced cytotoxicity, oxidative stress and mitochondrial dysfunction in human hepatoma HepG2 cells. Int J Mol Sci. 2012;13(5):5751-5767.
- [7] Saini KS, Thompson C, Winterford CM, et al. Streptozotocin at low doses induces apoptosis and at high doses causes necrosis in a murine pancreatic β cell line, INS-1. Biochem Mol Biol Int. 1996;39(6):1229-1236.
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