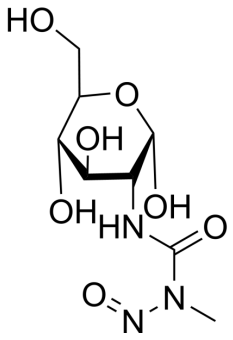
Streptozotocin



Cat. No.:	HY-13753
CAS No.:	18883-66-4
Molecular Formula:	$C_8H_{15}N_3O_7$
Molecular Weight:	265.22
Target:	DNA/RNA Synthesis; DNA Alkylator/Crosslinker; Autophagy; Bacterial; Antibiotic; Apoptosis
Pathway:	Cell Cycle/DNA Damage; Autophagy; Anti-infection; Apoptosis
Storage:	-20°C, sealed storage, away from moisture and light * The compound is unstable in solutions, freshly prepared is recommended.

SOLVENT & SOLUBILITY

In Vitro

DMSO : 250 mg/mL (942.61 mM; Need ultrasonic)

H_2O : 113.3 mg/mL (427.19 mM; Need ultrasonic and warming)

Preparing Stock Solutions

Solvent / Mass / Concentration	1 mg	5 mg	10 mg
1 mM	3.7705 mL	18.8523 mL	37.7045 mL
5 mM	0.7541 mL	3.7705 mL	7.5409 mL
10 mM	0.3770 mL	1.8852 mL	3.7705 mL

Please refer to the solubility information to select the appropriate solvent.

In Vivo

1. Add each solvent one by one: 0.1 M Sodium citrate buffer (pH 4.5)
   Solubility: 200 mg/mL (754.09 mM); Clear solution; Need ultrasonic

BIOLOGICAL ACTIVITY

Description

Streptozotocin (Streptozocin) is an antibiotic widely used in experimental animal models of induced diabetes. Streptozotocin enters B cells via the glucose transporter (GLUT2) and causes the alkylation of DNA (DNA-methylating). Streptozotocin can induce the apoptosis of β cells[1][2][3][4][5][6][7].

IC_{50} & Target

DNA alkylator[1]

In Vitro

The IC_{50} values of Streptozotocin for HL60, K562 and C1498 cells were 11.7, 904 and 1024 μg/ml, respectively[2].

MCE has not independently confirmed the accuracy of these methods. They are for reference only.

In Vivo

Streptozotocin (180 mg/kg, intravenous injection, killed 4 days later) can induce diabetes mellitus and lymphocytopenia in mice[2].

Streptozotocin (STZ) is a classic diabetes modeling agent that induces disease by destroying pancreatic beta cells in

animals. And rats and mice are generally used as animal models. Different injection doses of STZ induce different diabetes models (T1DM, T2DM)[3][4][5].

Dissolution method of Streptozotocin, just for reference[5]:
(1) Solvent preparation: 0.1 mM citrate buffer
Liquid A: Weigh 2.1 g of citric acid (HY-N1428) (MW: 210.14), add double distilled water to 100 mL, and dissolve
Liquid B: Sodium citrate (HY-B2201) (MW: 294.10) 2.94 g. Add double distilled water to 100 mL and dissolve
Citrate buffer: Mix solution A and solution B in a ratio of 1.32:1. Determine pH and adjust to 4.2-4.5. Finally, use a 0.22 μm or 0.45 μm filter to remove impurities.
(2) Streptozotocin working solution preparation
Use the above buffer solution to prepare Streptozotocin injection (prepare in ice bath). The injection solution should be prepared for immediate use or stored at 4°C, and the injection should be completed within 30 minutes.

Streptozotocin is highly water-soluble, allowing for widespread distribution throughout the body after absorption. It can cross the blood-brain barrier, placenta, and enter various tissues.

Streptozotocin undergoes chemical modification in the liver. This metabolic process converts streptozotocin into its active form, methylating DNA and causing damage to beta cells in the pancreas, leading to the induction of diabetes.

The elimination half-life of streptozotocin varies depending on the species and route of administration[12].

1. Induction of Type 1 Diabetes Mellitus (T1DM)[3][4][5]
Background
Induces disease by direct destroying the animal's islet β beta cells.
Specific Mmodeling Methods
Mice: C57BL/6 • female • 10 week-old
Administration: 200 mg/kg • i.p. • single high dose.
Rat: Sprague-Dawley or Wistar rats • male • 8-10 weeks-old
Administration: 65 mg/kg • i.p. • single high dose.
Note
(1) Housed under controlled conditions of 25 °C, 50% relative humidity and a 12 h light (6: 00-18: 00) and 12 h dark cycle, with water and food (containing 18.5% protein) available ad libitum.
(2) Before any invasive procedure, the mice were anesthetized with i.p. injections of Tiletamine/Zolazepam (80 mg/kg) or inhaled isoflurane.
(3) All animals were sacrificed after 8 weeks.
Modeling Indicators
Blood glucose levels in the range of >300 to 600 mg/dl at week 3 for mice.
Correlated Product(s):
Opposite Product(s):
2. Induction of Type 2 Diabetes Mellitus (T2DM)[3][4][5]
Background
The disease is induced by partially destroying the animals' islet β cells, making the peripheral tissue insensitive to insulin, and by feeding them a high-calorie diet.
Specific Mmodeling Methods
Mice: C57BL/6 • female • 10 week-old
Administration: • i.p. • high-fat diet+low-dose injection of 40 mg/kg STZ for 4 days.
Rat: Sprague-Dawley or Wistar rats • male • 8-10 weeks-old
Administration: i.p. • 8 weeks of high-fat diet+low-dose injection of 25 mg/kg STZ for 5 days.
Note
(1) Housed under controlled conditions of 25 °C, 50% relative humidity and a 12 h light (6: 00-18: 00) and 12 h dark cycle, with water and food (containing 18.5% protein) available ad libitum.
(2) Before any invasive procedure, the mice were anesthetized with i.p. injections of tiletamine/zolazepam (80 mg/kg) or inhaled isoflurane.

(3) All animals were sacrificed after 8 weeks.
Modeling Indicators
Hyperinsulinemia and insulin resistance
Correlated Product(s):
Opposite Product(s):
MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Animal Model:	C57BL/6 male mice[2]
Dosage:	180 mg/kg
Administration:	i.v.
Result:	Elevated blood glucose levels after 48 h and reduced body weight. Inhibited splenocyte proliferation in mixed lymphocyte cultures. Increased the level of INF-γ.

CUSTOMER VALIDATION

- Nat Biomed Eng. 2021 Jan;5(1):53-63.
- Nat Biomed Eng. 2020 May;4(5):507-517.
- Sci Transl Med. 2020 Jul 1;12(550):eaba6676.
- Exp Mol Med. 2023 May 1
- Clin Transl Med. 2021 Apr;11(4):e387.

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REFERENCES

[1]. Bennett RA, et al. Alkylation of DNA in rat tissues following administration of streptozotocin. Cancer Res. 1981 Jul;41(7):2786-90

[2]. Szkudelski T. The mechanism of alloxan and streptozotocin action in B cells of the rat pancreas. Physiol Res. 2001;50(6):537-46.

[3]. Akinlade OM, et al. Streptozotocin-induced type 1 and 2 diabetes in rodents: a model for studying diabetic cardiac autonomic neuropathy. Afr Health Sci. 2021 Jun;21(2):719-727.

[4]. Marino F, et al. Streptozotocin-induced type 1 and 2 diabetes mellitus mouse models show different functional, cellular and molecular patterns of diabetic cardiomyopathy[J]. International Journal of Molecular Sciences, 2023, 24(2): 1132.

[5]. Lu Yanrong, et al. Establishment of autoimmune type 1 diabetes model in rhesus monkeys. China CN101804211B.2012-12-05.

[6]. Diab RA, et al. Immunotoxicological effects of streptozotocin and alloxan: in vitro and in vivo studies. Immunol Lett. 2015 Feb;163(2):193-8

[7]. Liu Y, et al. Tangeretin inhibits streptozotocin-induced cell apoptosis via regulating NF-κB pathway in INS-1 cells. J Cell Biochem. 2019 Mar;120(3):3286-3293.

[8]. Kim B, et al. Outbred Mice with Streptozotocin-Induced Diabetes Show Sex Differences in Glucose Metabolism. Int J Mol Sci. 2023 Mar 8;24(6):5210.

[9]. Gurley SB, et al. Impact of genetic background on nephropathy in diabetic mice. Am J Physiol Renal Physiol. 2006 Jan;290(1):F214-22.

[10]. Huang F, et al. Antidiabetic effect of a new peptide from Squalus mitsukurii liver (S-8300) in streptozocin-induced diabetic mice. J Pharm Pharmacol. 2005 Dec;57(12):1575-80.

[11]. Furman BL. Streptozotocin-Induced Diabetic Models in Mice and Rats. Curr Protoc Pharmacol. 2015 Sep 1;70:5.47.1-5.47.20.

[12]. Evan AP, et al. The effect of streptozotocin and streptozotocin-induced diabetes on the kidney. Ren Physiol. 1984;7(2):78-89.

[13]. Yagihashi S. Contribution of animal models to diabetes research: Its history, significance, and translation to humans. J Diabetes Investig. 2023 Sep;14(9):1015-1037.

[14]. Zhang XT, Wang G, Ye LF, Pu Y, Li RT, Liang J, Wang L, Lee KKH, Yang X. Baicalin reversal of DNA hypermethylation-associated Klotho suppression ameliorates renal injury in type 1 diabetic mouse model. Cell Cycle. 2020 Dec;19(23):3329-3347.

[15]. Udumula MP, Mangali S, Kalra J, Dasari D, Goyal S, Krishna V, Bollareddy SR, Sriram D, Dhar A, Bhat A. High fructose and streptozotocin induced diabetic impairments are mitigated by Indirubin-3-hydrazone via downregulation of PKR pathway in Wistar rats. Sci Rep. 2021 Jun 21;11(1):12924.

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