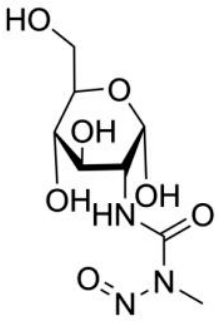
Streptozocin STZ

V02

Cat: S8050
Specification:100mg /1g /5g
Storage: Store at -20℃, avoid light,and it is valid for 2 years.

Product Information
CAS： 18883-66-4
English name： Streptozocin STZ
Alias: N-(Methylnitrosocarbamoyl)-α-D-glucosamine; Streptozotocin
Appearance (Character)： White to yellow powder
Molecular Formula： $C_8H_{15}N_3O_7$
Molecular Weight： 265.2
Purity:≥98%, ≥75% α-anomer basis
Melting point: 121℃ (dec.)
Molecular Sturcture:



Solubility:10mg/ml citric acid buffer solution pH4.2-4.5, 20 mg/mL Water. Its aqueous solution is extremely unstable at room temperature and can decompose into gas and evaporate after half an hour, so it needs to be prepared on demand.
Danger Code: R：40 S：36/37

Introduction

This product is a nitrosourea antibiotic produced by Streptomyces achromogenes. It is different from the lipophilic nitrosoureas in that it has a methyl group at the chloroethyl position and an amino sugar at the other end of the molecule. STZ can decompose the active methyl carbonium ion and form inter-strand cross-linking with DNA, resulting in DNA alkylation. However, its alkylation effect is weaker than other nitrosoureas, while its metabolite methylnitrosourea has a 3-4 times stronger alkylation effect than STZ. STZ can form isocyanate in the body. So it can combine with nucleic acid protein, inhibit DNA polymerase activity, and make it difficult to repair damaged DNA. During the anti-tumor research, it was found that STZ can increase the blood glucose of mice, and can cause diabetes in dogs and monkeys, which is permanent. The diabetes effect of STZ has species differences, which does not cause diabetes in guinea pigs or humans. The mechanism of diabetes is mainly due to the reduction of the content of nicotinamide adenine dinucleotide in pancreatic islet cells, and the glucose group in STZ molecules can allow STZ to enter pancreatic beta cells, causing morphological changes in the beta cell nucleus, leading to chromosome condensation, elongation, and condensation.

It is mainly used for the treatment of pancreatic cancer beta cells or non-beta cell cancers, and has certain therapeutic effects on carcinoid tumors, Hodgkin's disease, colon cancer, and liver cancer. It is an effective DNA methylation reagent that acts on HL-60, K562, and C1498 cells, with IC50 values of 11.7, 904, and 1024 μg/mL, respectively. Laboratories often use diabetes models.

Protocols(*for reference only*):

1. In vivo experiment

1) It can be dissolved in normal saline and used immediately, with a solubility of 30 mg/mL; The common solvent used for diabetes modeling is citric acid buffer solution, and the specific preparation method can be found in the subsequent instructions.
2) It is often used to induce diabetes in animal experiments. This product selectively accumulates in pancreatic beta cells through the low-affinity GLUT 2 glucose transporter.
3) Streptozotocin (60 mg/kg) injection for 4 months induces rapid degranulation of beta cells without necrosis, cataract development, and accumulation of glycogen in the proximal convoluted tubules of the kidney. In 'Streptozotocin diabetic' rats, STZ (100 mg/kg) caused damage to pancreatic exocrine cells, resulting in the persistence of small, potentially secretory granules in the Golgi apparatus of beta cells. STZ has been found to be carcinogenic in rats, mice, and hamsters. STZ alone can induce tumors in the kidneys, liver, lungs, pancreas, and uterus of hamsters. Wistar Kyoto rats with normal blood pressure, WKY, The incidence of tumors in the liver is 70%, in the kidney is 20%, and there is a 10% probability of simultaneous lesions in both the liver and kidney.

2. Take the diabetes model as an example to illustrate the use of STZ

STZ requires a pH4.2-4.5 Cat:C1013 buffer solution prepared with citric acid and sodium citrate.

1) Preparation before injection

Before preparing STZ injection, STZ was placed in a dry sterilized bottle, wrapped in aluminum foil, and precooled in an ice bath with citric acid buffer solution. It was then brought to the animal room for use.

2) Preparation of injection

Rats were weighed after overnight fasting. The rats were divided into groups so that STZ could be dissolved according to the group. Prepare 1% STZ injection with citric acid buffer solution according to the fasting body weight. If the subsequent injection operation is not proficient, it is important not to dissolve STZ all at once.

Note: STZ is prone to inactivation, and it is still required to dry and protect it from light after rapid weighing. It is recommended to use dry aluminum foil (or tin foil) paper.

3) injections

(1) Generally, intraperitoneal injection or tail vein injection is used;
(2) If the injection technique is not proficient, two groups should be injected alternately: dissolve STZ in groups, such as 10 mice/group or 15 mice/group, and complete the injection within 30 minutes.

Note: Most injections require rapid injection.

Common problems:

1. How to store STZ powder after receiving it?

After sub-packaging, seal the bottle with sealing film, wrap it with aluminum foil or tin foil, and place it in a desiccant in a dry tank to maintain a dry state and refrigerate at -20℃ for long-term storage.

2. Why do rats need to be fasted before modeling?

Fasting for more than 12 hours is generally overnight fasting, without water. The longer the fasting time, the more obvious the destructive power of STZ on pancreatic beta cells, that is, the higher the efficacy of the drug. Therefore, the dosage of STZ can be reduced by extending the fasting time.

3. What is the common dose of STZ used in modeling?

Take the average weight of 200 grams of mice as an example:

Type 1 diabetes model: rats dose is 65-70 mg/kg;

Type 2 diabetes model: rats fed with high-sugar and high-fat diet for 1-2 months, with STZ dose of 25-40 mg/kg; or references.

This dose is for reference only. It is recommended to explore the optimal dose through pre-experiment.

4. Is the pre-experiment crucial?

Very important. During the experiment, the dosage of STZ should be based on the results of the pre-experiment. It is best not to blindly use the dosage of STZ as reported in the literature or by others. The average weight of mice, fasting (low-glucose state) drug resistance, fasting duration, injection timing, as well as previous feeding process and sugar measurement timing are all different. It is most scientific to determine the dosage of STZ that is suitable for your own experimental mice through pre-experiment.

5. What is the impact of injection methods on experimental results?

Tail injection, i.e. intravenous injection, has a higher drug utilization rate and can save drug dosage compared to intraperitoneal injection. The disadvantage is that it is not as convenient to operate as intraperitoneal injection.

6. What is the relationship between the propulsion speed and blood glucose during injection?

The rapid injection speed is more likely to cause hyperglycemia, while the slow injection speed is less risky but also less likely to form a model. In routine operations, rapid injection is often required. Of course, the dose of STZ is the main factor determining the level of blood glucose.

7. Is it normal for mice to die after being injected with STZ? How to solve it?

Normal. The individual differences and differences in fasting hypoglycemic resistance in mice lead to different mortality rates. The high initial mortality rate may be mainly due to a sudden increase in blood glucose, which the mice are not accustomed to, or the occurrence of DKA, or ketoacidosis.

(1) Ensure sufficient drinking water. Insufficient drinking water can easily lead to the death of rats.

(2) Both high and low blood sugar levels can lead to the death of mice. To prevent this, one can either inject insulin or temporarily supplement sugar

Pathway 1: insulin supplementation. The common cause of death is high blood sugar. By supplementing with some intermediate-acting insulin, such as Novolin n or NPH neutral protamine zinc insulin, 2-3 units each time, the mortality rate of rats usually decreases after 3-5 days.

Pathway 2: Sugar supplement method. The mice after fasting were already in a hypoglycemic

state when injected, and 20% glucose was injected intraperitoneally 4 hours after modeling to avoid death due to low blood sugar during injection.

(3) Prevent animals from killing each other. In the case of food shortage and insufficient water supply, they will kill each other and eat their own kind, so it is necessary to provide sufficient food and water, preferably in two ways.

(4) Prevent infection. Diabetic rats have a high urine output and moist bedding, which requires frequent changes of bedding, so diabetic rats are more prone to infections than other rats, especially urinary tract infections and abdominal infections. Before and after intraperitoneal injection, subcutaneous injection, blood collection, and other invasive procedures, attention should be paid to disinfection. After each blood glucose measurement, apply tetracycline or aureomycin eye ointment to the wound to prevent infection.

8. After injecting STZ, the model is unsuccessful. How to deal with it?

For those whose models do not meet the standard, STZ can be injected intraperitoneally at a dose of 10 mg-20 mg/kg body weight three days later, which is also easy to establish a model, or regular doses can be injected after the blood glucose returns to normal; But to achieve the desired effect, it is often necessary to restore the normal state and re-create the model.

Note

1. STZ is unstable when it is damp. If it needs to be weighed multiple times, it should be operated and stored in strict accordance with the principle of avoiding moisture. The operating environment, containers, and packaging tools must be kept dry.
2. Avoid leaving it open for a long time to prevent it from getting wet. It will lose its effectiveness within 30 minutes after getting wet, which is similar to the requirement for rapid injection during modeling, as its aqueous solution is unstable.
3. The injection solution should only be prepared before injection, as the STZ aqueous solution is extremely unstable.
4. Our products are non-sterile packaging. If they are used for cell culture, please perform pre-treatment in advance to remove heat-sensitive bacteria, otherwise it will lead to bacterial contamination.
5. The product information is for reference only. If you have any questions, please call 400-968-6088 for consultation.
6. The products are all for scientific research use only. Do not use it for medical, clinical diagnosis or treatment, food and cosmetics, etc. Do not store them in ordinary residential areas.
7. For your safety and health, please wear laboratory clothes, disposable gloves and masks to operate.

Related Products:

C1013 *Sodium Citrate Buffer(0.1mol/L, pH4.5, sterile)*