

Streptozotocin-induced Type 1 Diabetes

Background: Type 1 Diabetes (T1D) is a pathological condition characterized by the loss of insulin-producing β -cells of the pancreatic islets of Langerhans, resulting in a deficiency in insulin production and secretion. The advantages of non-genetic animal models of diabetes compared with the genetically determined ones are caused by their better translatability of the drug candidate testing results to the treatment of this polygenic disease in humans. T1D can be modeled by treating experimental animals (rats or mice) with Streptozotocin (STZ), a compound that has preferential toxicity toward pancreatic β -cells. Selective partial destruction of β -cells leads to reduction in insulin production, decreased levels of circulating insulin, elevated blood glucose levels and, eventually, development of various diabetes associated pathologies, such as diabetic nephropathy, cardiomyopathy, diabetic ulcers, etc. STZ-induced experimental model of T1D can be used for efficacy studies of anti-diabetic drugs, including agents acting on insulin-independent pathways and providing end organ protection from diabetes.

Service Details: Depending on the goals of a particular study, a single high dose (~150 mg/kg) or consecutive multiple low doses (40-50 mg/kg/day for 5 days) of STZ are injected in C57BL mice or Wistar rats to induce the disease state. Induction of diabetes is monitored by routine tests – blood levels of glucose and glycosylated hemoglobin (HbA1c). Markers of diabetes' side effects can be monitored upon request. To develop a standard STZ model of diabetes to test a drug candidate, we suggest using 8-10 animals per each planned experimental group, 5-7 days of STZ treatment, and 4 weeks of post- STZ treatment monitoring body weight, food/water intake, blood glucose and glycosylated hemoglobin levels to confirm that the mice are diabetic. If the study goal is to test an accompanying pathology, the time allowed for disease development may be increased up to 6-8 months.

Deliverable: Report including description of the study design, methodology, raw experimental data, graphs and interpretation.

Sample Submission: Dry compound or compound in pre-made dosing formulation (amount required depends on the dosing levels and schedules). For example, for treating a group of 8 mice at 10 mg/kg, twice daily (b.i.d.) for 1 week, about 16 mg of the test compound is needed.