

Methodological study on the diabetes mellitus induction using streptozotocin

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Streptozotocin (STZ) is commonly used to induce diabetes mellitus in animals. The induction rate and the degree of diabetic condition can vary with STZ administration methods. Male Sprague-Dawley rats of 350-410g body weight were used in the present experiment. They were placed under the controlled environment of $21 \pm 2^\circ\text{C}$ and a 14 hr light-10 hr dark cycle, and fed rodent laboratory pellet diet *ad libitum*. STZ was dissolved in 0.1M citrate buffer (pH4.5), and was administered through a tail vein intravenous injection (TEV group), or a femoral vein intravenous injection (FEV group). Dosages of STZ were as follows: 30mg/kg (n=15), 32mg/kg (n=15), 36mg/kg (n=15), 40mg/kg (n=15) in TEV groups, and 14mg/kg (n=4), 18mg/kg (n=6), 22mg/kg (n=6), 26mg/kg (n=6) in FEV groups. The advantages of a femoral vein injection over a tail vein injection are ease of administration and visibility, allowing a rapid confirmation of venous administration. To determine the degree of diabetic condition, a plasma glucose concentration of the rat fasted for 6 hr was measured using a Bechman Glucose Analyzer II. It has been found that the diabetes induction rate in TEV groups with a STZ dosage of more than 32mg/kg reaches 77% to 92%. A plasma glucose concentration was in the range of 450mg/dL to 480mg/dL. The fasting periods before and after the STZ injection in TEV groups were either 6hr or 12hr, and either 0hr or 6hr, respectively. The results show that the fasting period before and after the injection was not significantly affect the degree of diabetic condition. Rats in FEV groups were not fasted around the STZ injection time. The diabetes induction rate using a femoral vein injection became 100% with a STZ dosage of 26mg/kg. However, it was reduced to 30-50% with a STZ dosage of 18mg/kg and 22mg/kg, and to 0% with 14 mg/kg. The plasma glucose concentrations in FEV groups became 250-380mg/dL. These findings demonstrate that the desirable diabetic condition and high induction rate can be obtained by manipulating certain conditions for STZ administration.