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GLUT-4 DEFFICIENT PROTECTS THE MICE AGAINST THE DIABETIC BLADDER DYSFUNCTION

Hypothesis / aims of study

Glut-4, a muscle cell-membrane protein involved in the transmembrane transportation of glucose has been used as therapeutic target for treatment of diabetic mellitus' complications. Our laboratory has reported failure of the bladder contractility after 9 weeks of diabetes in C57black (C57Bl/6) mice. Our aim was to study the effects of diabetes duration on the bladder function in the Glut-4 knock-out mouse.

Study design, materials and methods

Diabetes was induced by intraperitoneal injection of Streptozotocin (STZ) in wild type (WT) and age matched male Glut-4k/o/ C57Bl/6 mice. Equal number of age, sex, and weight matched C57Bl/6 and Glut-4k/o/ C57Bl/6 mice were used as controls. One pair from each diabetic and non-diabetic group was housed together with free access to water and food. Thirty-four, 36 and 42 weeks after induction of diabetes, the animals underwent anesthesia by urethane (1.5 g/kg, i.p.) and cystometrogram through a P50 tube placed transurethraly. After sacrifice by decapitation, the whole bladder was removed and weighted. Distribution, mean±SE of the data on animal weight; glucose level; bladder weight, capacity, compliance and CMG pressure parameters were compared among the three aged groups using two sided t-test, with p value of <0.05 considered as significant.

Results

Total of 12 animals were used (n=4 in each group). Diabetes caused a significant reduction of the body weight and increase in the bladder weight of 34 weeks-WT animals. The changes in the body and bladder weight of the 36 and 42 weeks age groups of diabetic Glut-4k/o animals were not statistically different from their non-diabetic controls. All diabetic animals showed a significant increase in their bladder capacity compared to non-diabetic controls. However, diabetic 34 weeks-WT mice's increase in the bladder capacity was twice as much as either age group of Glut-4k/o animals. Most importantly, non of the diabetic Glut-4k/o groups showed reduction in their peak micturition pressure as seen in 34 weeks old WT mice.

Interpretation of results

These findings suggest that Glut-4 deficiency has protective effects on decay of the bladder contractility that is seen in STZ induced diabetes in C57Bl/6 mice.

Concluding message

This data supports that notion that diabetic bladder dysfunction could be prevented by manipulation of glucose transport system.

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