P-0412- Bama minipigs diabetes models cannot be successfully induced by high-fat and high-sugar diet alone

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(A-F) Detection of the indicators. Weighing of Bama minipigs (A-B). Measuring the abdomen circumference of Bama minipigs(C). Measuring the body length of Bama minipigs (D). Blood pressure measuring by a large animal sphygmomanometer in Bama minipigs (E-F). (G-H) Comparison of appearances between minipigs in two groups. Miniature pig of the experimental group(G), Miniature pig of the control group(H).

Abstract Objectives To establish diabetes mellitus models of Bama minipigs by feeding high-fat and high-sugar diet alone.

Methods 10 male Bama minipigs aged 2.5 months were randomly divided into experimental group with 8 minipigs and control group with 2 minipigs. The minipigs in control group were fed with common feed, while the minipigs in experimental group were fed with high-fat and high-sugar diet. In modeling period, obesity-related indicators (body weight (BW), abdominal circumference (AC), body mass index (BMI), abdominal circumference/body length (AC/BL) and adipocyte size), blood lipid-related indicators (total cholesterol (TG), triglyceride (TC), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C) and LDL-C/HDL-C), blood pressure-related indicators (systolic and diastolic and mean pressure), impaired blood glucose regulation and insulin resistance-related indicators (fasting blood glucose, fasting insulin, homeostatic model assessment for insulin resistance (HOMA-IR), quantitative insulin sensitivity check index (QUICKI) and the area under insulin curve of oral glucose tolerant test-insulin release test (OGTT-IRT-AUCInsulin)) were measured and analyzed. We used the diagnostic criteria of human diabetes mellitus as diagnosis standards of diabetic minipig models. Statistical analysis was performed by t test, Satterthwaite test and repeated measurement analysis of variance. $P \leq 0.05$ was considered statistically significant.

Results At the age of 10-months, it was found that the AC/BL in the experimental group was significantly higher than the control group ($P \leq 0.05$), and the adipocyte area under the microscope was significantly larger than the control group ($P \leq 0.05$), which confirmed the obesity of the experimental minipigs. The TC and HDL in the experimental group were significantly higher than the control group ($P \leq 0.05$), and the LDL-C/HDL-C ratio was on the contrary ($P \leq 0.05$), which suggested that there was abnormal blood lipid metabolism after feeding of high-fat and high-sugar diet. In the OGTT-IRT test, the OGTT-AUCInsulin in the experimental group was significantly higher than the control group ($P \leq 0.05$), which suggested that there was insulin resistance in experimental minipigs. At 12-months age, one minipig in the control group was dead, so the results of control group were unable to perform statistical analysis. At the age of 24-months, it was found

that the blood pressure, BMI, AC/BL, TC, LDL-C and HDL-C were statistically different in time factor in the experimental group. Compared with 10-months age, the blood pressure of the minipigs increased significantly, and the levels of obesity and dyslipidemia were more severe. While HOMA-IR, QUICKI, fasting blood glucose and insulin were no significant differences in time factor.

(A-D) Adipocyte of minipigs (Subcutaneous fatty tissue HE slices under optical microscope, 1cm showing 100µm). Fat cells of the control group minipigs at week 6(A). Fat cells of the control group minipigs at week 30(B). Fat cells of the experimental group minipigs at week 6(C). Fat cells of the experimental group minipigs at week 30(D).

Conclusions A metabolic syndrome Bama minipig model with abdominal obesity, dyslipidemia and insulin resistance can be induced successfully after 8 months of high-fat and high-sugar diet. However, it was impossible to establish a diabetes model successfully until the minipig is 24 months old in our experiment.