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INVESTIGATION OF METABOLISM OF EXOGENOUS GLUCOSE AT THE EARLY STAGE AND ONSET OF DIABETES MELLITUS IN OTSUKA LONG-EVANS TOKUSHIMA FATTY RATS USING [1,2,3-13C] GLUCOSE BREATH TESTS

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It is difficult to determine which process of glucose metabolism is impaired in diabetic and prediabetic patients. The aim of this study was to evaluate the changes in glycolysis, gluconeogenesis, glucose uptake, and oxidation of exogenous glucose separately at the early stage and onset of diabetes mellitus in Otsuka Long-Evans Tokushima Fatty (OLETF) rats using [1, 2, 3-13C] glucose breath tests. The three types of 13C-glucose breath tests were performed thrice in each period, i.e., 6–12 weeks, 15–18 weeks, and 21–24 weeks after birth at one-week intervals. The 13CO2concentration was measured and was expressed as delta per mil, and a breath 13CO2excretion curve was obtained. The maximal values during breath test time were significantly higher in OLETF rats of all ages and the increases in13CO2excretion were delayed in OLETF rats in all types of breath tests. This suggests that OLETFs had lower glucose metabolism than control rats, and overall glucose metabolism is enhanced with age in both types of rats. Utilization of [2-13C] glucose was suppressed in the early stage of prediabetes, and that of [3-13C] glucose was enhanced just before the onset of diabetes. For the [1-13C] glucose breath test, no significant differences in area under the curve until 180 min were observed between OLETF and control rats at any age. We conclude that reduced gluconeogenesis might play a greater role in regulating plasma glucose levels in the primary stage of prediabetes, whereas increased glucose uptake might begin at the initial stage, and be enhanced at the onset of diabetes. Glucose oxidation was found to not change to a great extent in this diabetic animal model.

Biography

Yoshihisa Urita has completed his PhD at the age of 26 years from Toho University School of Medicine. He is the director of Department of General Medicine and Emergency Care. He has published more than 40 papers in reputed journals.

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