Genotype Arg/Arg, but not Trp/Arg, of the Trp64Arg Polymorphism of the \( \beta \)-3-adrenergic Receptor is Associated with Type 2 Diabetes and Obesity in a Large Population-Based Sample

Toshihide Oizumi

Department of Neurology, Hematology, Metabolism, Endocrinology and Diabetes (DNHMED), Yamagata University School of Medicine, Yamagata, Japan

ABSTRACT

Objective: Despite a large number of studies, no association of the Trp64Arg polymorphism of the \( \beta \)-3-adrenergic receptor gene with obesity and type 2 diabetes has yet to be clearly elucidated. We examined the associations in a large population-based sample.

Research Design and Methods: A total of 1,685 subjects (935 women and 750 men, aged 58.7 ± 12.4 years) from a cohort population (n=3,706) of the Funagata Diabetes Study were divided into three groups according to genotypes: Trp/Trp (n=1,155), Trp/Arg (n=486), and Arg/Arg (n=44). Glucose tolerance was diagnosed according to the 1985 World Health Organization criteria. Subjects who had a BMI 30 kg/m\(^2\) were considered obese. Associations with the traits related to obesity, diabetes, hypertension, and dyslipidemia were also examined. The 2 tests and analysis of variance were used for the association studies and to assess the differences in the traits’ values, respectively.

Results: More subjects with genotype Arg/Arg were obese and had diabetes (13.6% for each) than those with genotype Trp/Trp (3.29%, P<0.001; and 4.16%, P=0.007, respectively) or genotype Trp/Arg (2.06%, P<0.001; and 5.97%, P=0.051, respectively). No significant differences in the frequencies of occurrence of these conditions were observed between genotypes Trp/Arg and Trp/Trp. Traits related to obesity, such as percent body fat (28.82 ± 7.95 vs. 25.93 ± 7.21, P=0.038) and BMI (25.07 ± 3.84 vs. 23.63 ± 3.18, P=0.018), were higher in the genotype Arg/Arg than in the genotype Trp/Trp groups. The adjusted odds ratios of obese and diabetes were each 3.93 and 4.43 (95% C.I., 1.6 to 9.9; and 1.8 to 11.1) for subjects with genotype Arg/Arg.

Conclusions: Genotype Arg/Arg, but not Trp/Arg, of the \( \beta \)-3-adrenergic receptor is likely to be an independent risk factor of both obesity and type 2 diabetes in a large Japanese sample.