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Genotype Arg/Arg, but not Trp/Arg, of the Trp64Arg Polymorphism of the β -3-Adrenergic Receptor is Associated with Type 2 Diabetes and Obesity In a Large Population-Based Sample

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ABSTRACT

Objective : Despite a large number of studies, no association of the Trp64Arg polymorphism of the β -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 χ^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 β -3- adrenergic receptor is likely to be an independent risk factor of both obesity and type 2 diabetes in a large Japanese sample.