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Influence of glutathione S-transferase polymorphisms on type-2 diabetes mellitus risk

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Abstract

Glutathione S-transferase (GST) protects cells against oxidative stress. We evaluated the effect of genetic polymorphisms of the GST gene family on the risk of developing type-2 diabetes mellitus and on glycemic control. We also investigated the effects of smoking combined with these polymorphisms on type-2 diabetes mellitus risk. We enrolled 100 type-2 diabetes mellitus patients and 100 healthy controls matched for age, gender and origin, from the Sinai area of Egypt. Fasting serum glucose, HbA1c and lipid profiles were determined. Two polymorphisms were identified by multiplex PCR within the GST genes: GSTM1 and GSTT1. The proportion of the GSTT1- and GSTM1-null genotypes was significantly greater in diabetic patients when compared to controls. Patients carrying both null polymorphisms had a 3.17-fold increased risk of having type-2 diabetes mellitus compared to those with normal genotypes of these two genes ($P = 0.009$). Additionally, patients with the GSTT1-null genotype had higher levels of triglycerides and very low-density lipoprotein cholesterol compared to those with the GSTT1-present genotype. On the other hand, patients with the GSTM1- null genotype had significantly higher levels of HbA1c and significantly higher diastolic blood pressure compared to those with the GSTM1- present genotype. The interaction between these genotypes and smoking status was not significant. These results give evidence that the GSTT1- and GSTM1-null genotypes, alone or combined, are associated with increased risk of type-2 diabetes mellitus, regardless of smoking status. Only the GSTM1-null genotype had an effect on glycemic control.