The gamma-glutamylcyclotransferase gene variants interact with smoking and vegetable/fruit intake to influence the risk of type 2 diabetes

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Abstract

Background: Imbalance in the system of redox homeostasis is an important link in the pathogenesis of type2 diabetes (T2D). Gamma-glutamyl cyclotransferase is an antioxidant defense enzyme directly involved in the metabolism of glutathione, an endogenous antioxidant.

Aim: The aim of the study was to examine the association of polymorphisms rs38420 (G>A), rs4270 (T>C), rs6462210 (C>T) and rs28679 (G>A) in GGCT gene with the risk of developing T2D.

Materials & Methods: The study included 1022 T2D patients and 1064 healthy volunteers. Genotyping of GGCT gene polymorphism was performed using iPLEX technology on a MassArray Analyzer 4 genome time-of-flight mass spectrometer (Agena Bioscience).

Results: As a result, for the first time, we identified the association of polymorphism rs4270 in the GGCT gene with reduced risk of T2D in the Russian population. We have also established genetic and environmental interactions associated with predisposition to the disease. Protective effect of gamma-glutamyl cyclotransferase gene was observed only in non-smokers under condition of daily consumption of fresh vegetables and fruits, whereas it was not observed in persons with insufficient consumption of plant foods, as well as in all smoking patients. In patients with T2D, the level of hydrogen peroxide and glutathione monomer was sharply increased compared to the controls. SNP rs4270 was also found to be associated with elevated levels of reduced glutathione in the plasma of type 2 diabetics.

Conclusion: Thus, for the first time it was established that polymorphic variant rs4270 in the GGCT gene is associated with a predisposition to T2D, but its relationship with the disease is modulated by smoking and fresh plant foods consumption.

Biography:

Iuliia Azarova has completed her PhD from Kursk State Medical University, Russia and Postdoctoral studies from the same university. She currently serves as a Lecturer at the Department of Biological Chemistry, Kursk State Medical University and does research in Biochemistry, Molecular Biology and Genetics at the Research Institute for Genetics and Molecular Epidemiology, Kursk State Medical University. Their current project is 'Type 2 diabetes mellitus'

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