Relationship between the polymorphisms of catalase and GRB10 gene and the type 2 diabetes in Hungary

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SUMMARY

We determined the reference range of normal blood catalase activity in female and male Hungarian subjects.

We detected the Japanese catalase mutation (A→T substitution in the promoter region at position -21) also in Hungarian hypocatalasemic patients, and two new mutations at the position -20 and -18.

Five novel and two previously reported point mutations were detected in the second exon and its exon/intron boundaries in diabetic patients. Two novel missense mutations on exon 2 (position 96 and 135) cause amino acid substitutions (position 53 and 66) in catalase protein. These changes may be responsible for activity losses. The two previously reported frame shift mutations (GA or G insertion in exon 2) cause early stop codon. This leads to production of truncated catalase proteins, which may be responsible for decreased catalase activity.

We found that the effects of +22348C>T polymorphism of catalase gene on glucose metabolism and bone status were gender specific. The appearance of T allele had protective metabolic effect, which was disadvantageous for the status of the femur in men due to the evolutionary negative relationship of energy and bone metabolism. The gender specificity of catalase gene polymorphism may be related to the distribution of fat (different ratio of visceral and subcutaneous fat) and the differences in adipokine (leptin) effects. Our results did not confirm the observation obtained in Korean postmenopausal women that the T allele associated with lower osteocalcin level and higher femur density.

We detected differentially expressed genes with “differential display analysis” in diabetic models, of which importance was later also demonstrated by genome studies.

We could not find any significant differences in the GRB10 +11275 G>A polymorphism between in control and diabetic groups in the Hungarian population. Based on gender-specific body fat, insulin sensitivity, leptin/adiponectin ratio and the relationship between allelic variants it can be assumed that the GG alleles may play a role in the development of type 2 diabetes.

Keywords: catalase, GRB10, polymorphism, diabetes

Kulcsszavak: kataláz, GRB10, polimorfizmus, diabétesz