

Potential relationship between peripheral blood mitochondrial DNA content and insulin resistance and secretion in offspring of type 2 diabetic patients

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Both qualitative and quantitative changes in mitochondrial DNA (mtDNA) have been implicated in the pathogenesis of diabetes mellitus. In this study, we investigate whether peripheral blood mtDNA (pb-mtDNA) is decreased and if there is any relation between its content and the parameters of both insulin resistance and secretion in offspring of diabetic subjects. The pb-mtDNA content was measured by real time polymerase chain reaction with mitochondrial- specific fluorescent probe, normalized by a nuclear DNA, 28S rRNA gene, in 42 offspring of type 2 diabetic patients and 12 age-, sex- and body mass index (BMI)-matched normal subjects. The correlations between pb-mtDNA content and the parameters of insulin resistance and secretion were studied. Our results indicated that the level of pb-mtDNA was lower in offspring of diabetic subjects than in control subjects (1230 +/- 0.05 vs. 1513 +/- 0.02 in the offspring and control subjects, respectively, $P < 0.05$). Also, pb-mtDNA content was significantly correlated with logarithmically transformed insulin sensitivity index ($r = 0.5$, $P < 0.05$), fasting C-peptide ($r = -0.8$, $P < 0.05$), acute insulin response ($r = -0.8$, $P < 0.05$) and late insulin response ($r = -0.7$, $P < 0.05$) in offspring of diabetic subjects. In conclusion, quantitative mtDNA status might be a hereditary factor associated with type 2 diabetes and is correlated negatively with indexes of insulin resistance and insulin secretion in offspring of diabetic patients. So, pb-mtDNA content could serve as an indicator of insulin sensitivity and insulin secretion in those subjects.