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Additional evidence of link between mtDNA copy number and body mass index

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Mitochondrial DNA (mtDNA) encodes core subunits of oxidative phosphorylation complex and as a result of a complex regulatory crosstalk between nuclear and mitochondrial genomes the total number of mtDNA copies fits the requirements of each cell type. Deviations from the optimal number of mtDNA copies are expected to be deleterious and thus can cause some diseases and aging. The reasons of potential deviations in mtDNA copies might be genetic or environmental such as hormonal imbalance in non-hereditary diseases. We studied 193 individuals (69 men; 124 women) who were divided into two cohorts, with and without obesity. Five types of tissues were analyzed from each individual peripheral venous blood, liver, Subcutaneous Adipose Tissues (SAT) and Visceral Adipose Tissue (VAT) from both greater omentum and mesenterium. The absolute mtDNA copies per cell were measured by droplet digital PCR and were significantly lower in peripheral blood than in the other tissues examined 228±31 in peripheral blood, 1158±151 in liver, 1312±142 in greater omentum, 1161±86 in mesenterium and 1418±219 in SAT. The Body Mass Index (BMI) correlates positively with the mtDNA copies in SAT and negatively with peripheral blood mtDNA copies. There are positive correlations between greater omentum and mesenterium mtDNA copies (cor=0.44, $p<0.05$) and between SAT and greater omentum (cor=0.48, $p<0.05$). Multiple regression model revealed that blood and SAT mtDNA copy number affect the change in BMI (Multiple R^2: 0.44, adjusted R^2: 0.34, p-value: 0.004). Thus, we revealed positive relationships between BMI and mtDNA copies in SAT and fat depots, but negative relationship between BMI and mtDNA copies in peripheral venous blood.

Biography

Daria Skuratovskaia has her research study in the field of genetic studies of the metabolic syndrome, its complications and also study of polymorphic variants of adipokine and cytokine genes responsible for the formation of insulin resistance in obesity.

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