Results Primarily we compared thickness of subcutaneous adipose tissue in girls-carriers of different genotypes in both groups. Girls with android obesity - carriers of AA genotype, thickness of subcutaneous adipose tissue in breast was 1.1 ± 0.2 cm; AG genotype - 0.94 ± 0.2 cm; GG-genotype - 0.93 ± 0.2 cm (pAA-AG; AAGG=0.04). Metabolism parameters: insulin in carriers of AA genotype was 25.2 ± 13.6; AG genotype - 15.5 ± 8.3; GG genotype - 18.1 ± 11.4 (pAA-AG=0.01); HOMA-IR, 6.1 ± 3.6; 3.4 ± 2.0; 4.4 ± 3.3 (pAA-AG=0.01), respectively. Leptin without statistically significant differences was elevated in AA genotype carriers 67.1 ± 25.1, in contrast to carriers of AG and GG genotypes: 54 ± 26.6; 50.8 ± 26.5, respectively. In girls with a gynoid obesity - carriers of AA genotype, thickness of subcutaneous adipose tissue in thighs was 2.0 ± 0.2 cm; AG genotype - 2.1 ± 0.3 cm; GG-genotype - 2.5 ± 0.8 cm (pAA-GG=0.03). Metabolism parameters: insulin in AA genotype carriers was 13.4 ± 5.1; AG genotype - 11.8 ± 6.3; GG genotype - 21 ± 14.2 (pAA-GG=0.04); pAG-GG=0.02). Leptin 34.5 ± 15.7; 32.2 ± 16.3; 55.8 ± 19.7 (pAA-GG=0.005; pAG-GG=0.003) respectively. HOMA-IR in carriers of AA genotype was 3.0 ± 1.6; AG genotype - 2.6 ± 1.4; GG-genotype - 4.5 ± 3.2 (pAG-GG=0.04). 

Conclusions In girls of android morphotype, the carriage of A-allele is associated with carbohydrate and energy metabolism disorders, and is a risk marker of excess fat deposition in chest area. For a gynoid morphotype, G-allele is a risk marker of excess fat deposition in the thighs, as well as with carbohydrate and energy metabolism disorders.

Six patients had significant developmental delay, particularly in the domains of speech and behaviour. Three of the patients have weights <9th centile. Five of the patients had documented head circumference, and all were normocephalic proportional to height and weight. Both patients with GAMPt deficiency had epilepsy which responded to treatment with creatine and ornithine. Three patients with CRTR also had epilepsy. Two patients with CRTR have been treated with creatine and creatine/arginine/glucose/S-adenosylmethionine in combination, without notable effect on clinical symptoms or MR spectroscopy findings, which is in keeping with expectations for this condition.

The four patients with CRTR are hemizygous for pathogenic mutations in the SLC6A8 gene, de novo in two patients and maternally inherited in another, one has not had parental testing. The siblings with GAMPt deficiency are compound heterozygous for mutations in the GAMPt gene.

Conclusion Although rare in Ireland, these treatable disorders are likely under-diagnosed. In a patient with developmental delay (particularly speech impairment) and behavioural difficulties, consideration should be given to sending a urine sample for analysis of creatine/creatinine ratio and guanidinoacetaete, particularly if there is comorbid epilepsy.

Mitochondrial disorders (MD) in childhood represent a heterogeneous group of disease. The most common cause of MD is respiratory chain complex I (CI) deficiency, which may be caused by mutations in either nuclear or the mitochondrial DNA (mtDNA). In the cohort of 106 unrelated families with mtDNA mutations from our region with 10.5 million of inhabitants, the multisystem MD due mtDNA mutations in MT-ND genes for structural subunits of CI were recognized in 12 families with 13 affected children.

Results In the group of 13 patients, altogether 8 different heteroplasmic mtDNA mutations in MT-ND genes were found. Mutations in MT-ND5 gene were most frequent including one novel mutation m.13091T>C. Six children with the mutation heteroplasm >60% had Leigh syndrome and significantly worse prognosis than five patients with heteroplasm <60%, who developed MELAS syndrome with stroke-like episodes. In last two children, the diseases started with optic neuropathy but both children transitioned later to multisystem diseases compatible with MELAS syndrome. The activities of CI in isolated muscle mitochondria were decreased in most patients and analyses with \([^{14}\text{C}]\text{Pyruvate, }[^{13}\text{C}]\text{Malate and }[^{14}\text{C}]\text{Succinate substrates revealed decreased CO}_2 \text{ production in some patients.}

Conclusions Children with the multisystem MD due to CI deficiency and heteroplasmic mtDNA mutations usually develop Leigh or MELAS syndromes and represent approximately 11% of families with maternally inherited MD diagnosed in our region. Early onset of the disease and higher level of heteroplasmy of mtDNA mutations resulted in Leigh