ADCK2 deficiency reduces weight gain and increases body temperature of mice in high fat diet

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Primary coenzyme Q (CoQ) deficiency causes a heterogeneous group of mitochondrial diseases with high variability in severity and tissue affection. It has been identified that ADCK2 gene is involved in CoQ10 biosynthesis and its mutation is responsible of a mitochondrial myopathy and liver dysfunction in humans. ADCK2 knockout mice in heterozygosis developed a skeletal muscle mitochondrial dysfunction and myopathy, liver steatosis and defects in oxidation of fatty acids under standard diet (ST). To understand the role of lipids in its phenotype, we have studied the consequences of a high fat diet (HFD) in ADCK2 knockout mice.

Wild type (WT) or ADCK2 knockout were assigned to either ST or HFD for seven months (WT-ST n=5, WT-HFD n=6, +/- ADCK2-ST n=4, +/- ADCK2-HFD n=4) and weights were obtained. Animals were housed individually to control weekly food ingestion. Ratio kilocalories ingested per gram of body mass (BM) was determined. Rectal body temperature was explored. Strength and running performance were investigated. Western blots and RT-PCR were performed. Descriptive statics and one-way ANOVA analyses were used.

**Results**

There were no significant differences in food or kilocalories intake among mice in the same diet independently of their genotype.

WT animals presented a higher weight than mutants after 3 weeks of study (WT: 31.15g vs. ADCK2 KO: 27.55g in ST and WT: 41.47g vs. ADCK2 KO: 35.20g in HFD; p<0.05). Weight gain significantly differed between the genotype and diets (WT: 2.00g vs. ADCK2: 2.50g in ST and WT: 14.47g vs. ADCK2: 5.55g in HFD; p<0.05).

**Conclusion**

ADCK2 KO showed a defective fat accumulation under HFD due to decreased weight gain associated to higher rectal temperature, which is apparently due to upregulation of UCPs proteins. These results support the role of ADCK2 encoded protein in mitochondrial oxidation of fatty acids and lipid metabolism.

**References**

3. Rowland LA, Maurya SK, Bal NC, Kosak L, Perlisamy M. Sarcolipin and uncoupling protein 1 play distinct roles in diet-induced thermogenesis and do not compensate for one another. Obesity (Silver Spring, Md) 2016 07; 24(7):1430-1433.