Mitochondria and antioxidants: the silent toll of childhood obesity to hepatic function

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Introduction

Childhood obesity is a worldwide serious public health. In 2016, 41 million children under the age of five, were overweight. Thus, it is urgent to fight this problem and find strategies to reduce obesity-related comorbidities later in life. A main contributor to obesity is a high-fat diet (HFD) which is related to physical changes, including hepatic mitochondrial dysfunction and increase in lipid peroxidation and ROS generation. Here we study the impact of switching from a HFD during childhood to a balanced diet, in hepatic mitochondrial function and antioxidant defenses.

Experimental design

Results and discussion

Figure 1: Body weight (g) variation during the experiment: CTRL = standard chow, HFD = high-fat diet, HFDt – reversion of high-fat diet. Results are expressed as the mean ± standard deviation. Results were tested with Two-way ANOVA with Sidak’s correction for multiple comparisons.

Figure 2: Serum glycemia (mg/dL) variation during the a) intraperitoneal Glucose Tolerance Test and b) intraperitoneal Insulin Resistance Test: CTRL = standard chow, HFD = high-fat diet, HFDt = reversion of high-fat diet. Results are expressed as the mean ± standard deviation. Results were tested with Two-way ANOVA with Sidak’s correction for multiple comparisons. Significance was considered whenever p < 0.05. CTRL vs. HFD, CTRL vs. HFDt, HFD vs. HFDt, CTRL vs. HFDt – diet correction.

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• HFD promoted gain in body weight, readily reverted after the change from HFD to standard diet in HFDt.
• Diet reversion avoided liver hypertrophy and changes in glucose homeostasis. However, liver was 20% heavier in HFD group than in CTRL group.
• Mice fed with a HFD presented higher glycemia levels and HFD, mice showed fasting glycaemia levels in line with CTRL group.
• There was no significant changes in the activity of the tested antioxidant enzymes between CTRL and HFD. More studies are required to conclude about long term effects of HFD in liver.

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