EVALUATION OF MITOCHONDRIAL OXIDATIVE CAPACITY IN HEART FROM JUVENILE ANIMALS SUBMITTED TO PERINATAL PROTEIN UNDERNUTRITION


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Introduction: Previous studies of our research group showed decrease the ability of mitochondrial oxidative phosphorylation in heart of adult animals that suffered a nutritional insult in the critical period of development. However, it is unknown whether these effects can already be seen in age closer to the insult. Aim: Our aim was evaluate the effects of perinatal undernutrition on the mitochondrial oxidative capacity and production of Reactive Oxygen Species (ROS) in the heart of juvenile animals.

Methods: Female Wistar rats which were submitted to undernutrition during pregnancy and lactation with a diet containing 8% (undernourished group U) and 17% (control group, C) casein. After weaning (21 days), pups began receive commercial chow. At 30 days of age, the rats were sacrificed and hearts removed for analysis of citrate synthase-CS activity; mitochondrial oxygen consumption; ROS production using dihydrodichlorofluorescein diacetate-DCF and the measure of mitochondrial membrane potential using the Safranin O. The values were expressed in Mean ± Standard error mean (SEM) considering significant p <0.05.

Results: Our results showed no difference between groups in the CS activity (C=235.4±12.9;U=206.0±17.0 U/mg prot, p=0.1). Related to oxygen consumption was observed a decrease in the state 2 (C=8.7±1.2;U=5.5±0.5nmolO2/min/mg prot, p=0.02) in the malnourished group compared to the control, but there was no difference in the state 3 (C=32.9±5.7;U=26.7±1.9nmolO2/min/mg prot, p=0.3). Analyzing the Respiratory Control (RC) we observe a decreased in the protein undernutrition group, (C=9.28±0.6;U=4.91±0.3,p<0.0001), which may explain the increase ROS production (C=1.21±0.1;U=2.7±0.3 a.u, p=0.005) in the same group. No differences were observed in the mitochondrial membrane potential (C=1.17±0.06;U=1.23±0.05 a.u, p=0.4) between the groups. Conclusions: Despite no difference in the activity of CS and the mitochondrial membrane potential, even in juvenile rats nutritional insult in perinatal period impair mitochondrial oxidative capacity and increased ROS production, which may induce heart dysfunction in adult age.

Keywords: Protein undernutrition, Mitochondrial bioenergetics, Heart.

Supported by: FACEPE