BUFFALO OOCYTES MATURED IN VITRO WITH ACETYL-L-CARNITINE IMPROVES CRYOTOLERANCE DUE TO CHANGE IN MITOCHONDRIAL FUNCTION AND THE MEMBRANE LIPID PROFILE

Huiyan Xu, Shuangshuang Geng, Tingting Li, Qiang Fu, Shengsheng Lu, Xingwei Liang, Yangqing Lu, Ming Zhang, Xiaogan Yang and Kehuan Lu

State Key Laboratory for Conservation and Utilization of Subtropical Agro-bioresources, China; Animal Reproduction Institute of Guangxi University, China

Introduction

The cryopreservation of oocytes is an essential strategy used to accelerate genetic improvements in livestock and lipid content dictates crucial physical and chemical properties, particularly membrane fluidity. The addition of ALC to the IVM medium influenced the distribution of lipid acid in lamb fresh oocytes and then improved oocytes quality and embryo development. However, whether ALC supplementation in oocytes mature medium impact the phospholipid profile of the oocyte membrane after vitrification still need to be discovered.

Materials and Methods

Cumulus-oocyte complexes (COCs) were matured and vitrified as three sets: Fresh, matured in unsupplemented maturation medium, not vitrified; 0 mM ALC vitrification, matured in unsupplemented maturation medium, then vitrified; 2.5 mM ALC vitrification, matured in maturation medium supplemented with 2.5 mM ALC, then vitrified. We then evaluated embryonic development, mitochondrial DNA copy number (mtDNA), mitochondrial membrane potential (MMP), and the lipid profile of oocyte membrane as markers for oocyte quality after vitrification.

Results and Discussion

Supplementation with ALC during IVM significantly improved the rates of oocyte cleavage, morulae and blastocysts and increased MMP after vitrification compared to unsupplemented vitrified oocytes ($P < 0.05$). Used multivariate data analysis based on positive ion matrix-assisted laser desorption ionization time of flight mass spectrometry (MALDI-TOF MS) data, identified five significant phospholipid ions (m/z 728.7[PC (32:3)], 746.9[PC (32:5)], 760.6[PC (34:1)], 768.8[PC(P-36:3)], and 782.6[PC (36:4)]; $P < 0.05$) were significantly more abundant in fresh oocytes than in unsupplemented vitrified oocytes. Meanwhile, three phospholipid ions (m/z 734.6[PC (32:0)], 760.6[PC (34:1)], and 782.6[PC (36:4)]; $P < 0.05$) were higher abundant in the ALC-supplemented vitrified oocytes compared to the unsupplemented vitrified oocytes. In Conclusion, supplementation of ALC during IVM might improve buffalo oocyte quality after vitrification by enhancing mitochondrial function and altering the phospholipid composition of the vitrified oocyte membrane.