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THE CONSEQUENCES OF HYPO- AND HYPERGLYCEMIA DURING LIPOLYSIS-LIKE CONDITIONS DURING BOVINE OOCYTE MATURATION ON BLASTOCYST MRNA TRANSCRIPT ABUNDANCE

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Next to elevated non-esterified fatty acid (NEFA) concentrations, lipolytic metabolic conditions can be associated with both hypo- and hyperglycemia. Preliminary research has shown that in the presence of high NEFAs, hypoglycemia (LO GLUC) during IVM is more deleterious to embryo development and its GLUC consumption compared to hyper- (HI GLUC) and normoglycemic conditions. Therefore we aimed to unravel underlying mechanisms by studying the effects on subsequent embryo gene expression. Bovine oocytes were matured under: 1) physiological NEFA (72µM palmitic, stearic, oleic acid) and routine IVM GLUC (5.5mM) (CONT), 2) pathophysiological NEFA (420µM) and routine GLUC (HI NEFA), 3) HI NEFA+HI GLUC (10mM) and 4) HI NEFA+LO GLUC (2.8mM). Mature oocytes were fertilized and cultured for 7 days. Blastocyst relative transcript abundance of selected genes (normalized to *H2AFZ* and *ACTB*) was examined and analyzed by one-way ANOVA. A significant reduction in *SCL2A1* was found in HI NEFA+HI GLUC compared with CONT suggesting compensatory decrease in GLUC transport. HI NEFA and HI NEFA+LO GLUC did not significantly alter *SCL2A1*. Compared with CONT, HI NEFA significantly reduced *LDHA* expression, but not in the presence of HI or LO GLUC. *UCP2* was significantly higher in HI NEFA+LO GLUC and HI NEFA+HI GLUC compared with CONT and HI NEFA blastocysts. No significant differences were found in the expression of other genes related to carbohydrate (*PFKM*, *G6PD*, *PDHA1)* and lipid metabolism (*CPT1*, *ACACA)*, oxidative stress (*SOD2*, *GPX1, NFE2L2)*, mitochondrial stress (*TFAM)* and insulin resistance (*IGF2R)*. In conclusion, although a reduction in embryo development was observed in HI NEFAs, being further exaggerated by LO GLUC, surviving blastocysts appear to maintain relatively normal gene expression profiles with few exceptions related to carbohydrate metabolism. Additional research is required to unravel mechanisms regulating the interaction between GLUC and elevated NEFAs on oocyte development.

Key words: NEFA, glucose, oocyte, metabolism, gene expression