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DNA methylation mediated cell-cell communication in bovine preimplantation embryos

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Suboptimal embryo culture condition decreases embryonic quality and hinders the developmental competence by altering the expression and DNA methylation patterns of developmentally related genes and pathways including focal adhesion pathway1,2. Focal adhesion is vital for several cellular functions and it refers to communication of cell with its extracellular matrix (ECM)3. However, the epigenetic regulatory mechanism through which culture condition altered the embryo development via focal adhesion pathway remains unclear. Hence, we aimed to investigate the effect of different culture media using continued or stage specific supplementation of epidermal growth factor (EGF) and/or hyaluronic acid (HA) on the expression and DNA methylation patterns of the focal adhesion pathway and the subsequent consequences on the development and quality of bovine preimplantation embryos. Results indicated that media supplemented with EGF + HA increased the mRNA and protein expression levels of focal adhesion pathway genes. Moreover, blastocysts cultured in media supplemented with EGF + HA during embryonic genome activation period (EGA) exhibited higher expression level of focal adhesion pathway compared to those supplemented before or after EGA. Furthermore, higher mRNA expression accompanied with alteration in the DNA methylation pattern (promoter and distal promoter) of focal adhesion pathway related genes. Blastocysts with higher expression of focal adhesion pathway exhibited reduction of reactive oxygen species and apoptotic cells with higher cryotolerance ability. In conclusion, the dynamic changes in the DNA methylation pattern and subsequently embryo development may rely on its epigenetic adaptability that resulted from interactions with surrounding environment via cell adhesion to ECM molecules.

Biography

Mohammed Saeed Zidane has completed his PhD and Postdoctoral studies from the Institute of Animal Science, Animal Genetics/Breeding and Husbandry group, Faculty of Agriculture, University of Bonn, Germany. Mohammed Zidane had a Master of Animal Reproductive Physiology and Bachelor of Animal Science. Mohammed Zidane published several papers in international journals and he presented in several international conferences.Mohammed Zidane is a member of organizing committee of the international meeting on Veterinary and animal Science.

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