

Differential Effect of Hexoses on in Vitro Culture of Porcine and Bovine Nuclear Transferred Emrbyos

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Monosaccharide hexose, may have different role in embryo development of different species. Glucose, fructose and galactose are glycolysible substrates but their effect on embryo development is not identical. Glucose has negative effect to early embryonic stage in several species whereas it is inevitable after compaction. For fructose, it can support blastocyst formation in hamster, mouse and bovine embryo. Effect of galactose is known as detrimental even at a low concentration while glucose has adverse effect only at high concentration in hamster. However the effect of galactose and fructose on bovine and porcine were not deeply investigated yet. The objective of the present study was to evaluate differential effect of hexoses both on porcine and bovine Nuclear Transferred(NT) embryos. Modified Synthetic Oviductal fluid (mSOF) was used as a base medium for bovine embryo and North Carolina State University (NCSU) 23 medium was used for porcine embryo. IVM-NT embryo was cultured at conventional concentration of glucose, fructose and galactose and evaluated the developmental competence. Cleavage rate was examined at 48h after activation for both bovine and porcine NT embryos, and blastocyst formation was checked at day 6 for porcine and at day 7 for bovine embryo.

In bovine, the cleavage rate was not significantly different ($p>0.05$) but galactose supplemented glucose-free mSOF showed developmental retardation (7% at day7, 29% at day8) compared with standard mSOF (32% at day7) and fructose supplementation showed better developmental competence(41% at day7; $p<0.05$). In porcine, there was no blastocyst formation when fructose was added to glucose free-NCSU23 medium whereas glucose or galactose can support porcine embryo to blastocyst stage (16.6%, 8% respectively) as a sole energy source. This result shows that fructose could possible replacement of glucose or even more appropriate energy source in bovine embryo development. And differential effect of fructose to bovine and porcine NT embryo indicate that different metabolic activity may exist for hexoses in two species. Further study is required to investigate the different enzyme activity and metabolic preferences between two species.