Transcriptional analysis of bovine blastocyst biopsies in relation to pregnancy success: A potential tool to identify direct candidate genes for developmental competence

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The purpose of this work is to address the relationship between transcriptional profile of embryos and the pregnancy success based on blastocyst biopsies taken prior to transfer to recipients. Biopsies (30-40% of the intact embryo) were taken from IVP day 7 blastocysts (n=98) and 60-70% part were transferred to recipients after re-expansion. Based on the success of pregnancy, biopsies were pooled in three groups: those resulted in no pregnancy (G1), reabsorbed embryos (G2) and those resulted in calf delivery (G3). Gene expression analysis of these groups (three biological and three technical replicates each group) of biopsies was performed using home made bovine specific array (219 clones) and BlueChip (with ~2000 clones). For this triplicate pools of biopsies (each 10 biopies) were used in dyeswap labelling system. Images were analysed using GenePix Pro Version 4.0 software (Axon Instruments, California, USA). Data were normalized using GPROCESSOR freeware (http://bioinformatics.med.yale.edu/softwarelist.html) and finally analysed using Significant Analysis for Microarray (SAM) software. Results revealed that a total of 52 genes were differentially regulated between G1 and G3, while 58 genes differentially regulated between G2 and G3. Biopsies resulted in calf delivery are enriched with genes necessary for implantation like Cox2 and Cdx2, carbohydrate metabolism (ALOX15), growth factor (BMP15), signal transduction (PLAU) and placenta-specific 8 (PLAC8). Biopsies resulted in reabsorbed embryos are enriched with transcripts involved protein phosphorylation (Cytokeratin A), plasma membrane (occludin) and glucose metabolism (PGK and aldose reductase). Biopsies resulted in no pregnancy are enriched with transcripts involved inflammatory cytokines (TNF1α), protein amino acid binding (EEF1A1), transcription factors (MSX1, PTTG1), glucose metabolism (PGK, aldose reductase) and CD9 which is inhibitor of implantation. In conclusion, we generated direct candidates of blastocyst specific genes which determine the fate of the embryo after transfer.