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## Large-scale Transcriptional Analysis of Bovine Oocytes Derived from Growth and Dominance Phases of Follicular Development

NASSER GHANEM, MICHAEL HOELKER, FRANCA RINGS, DANYEL JENNEN, KARL SCHELLANDER,  
DAWIT TESFAYE

*University of Bonn, Institute of Animal Science, Animal Breeding and Husbandry Group, Germany*

### Abstract

In previous studies it was indicated that oocytes aspirated at growth phase have higher blastocyst rate than those aspirated in dominance phase. However, the molecular mechanisms underlying this variation in developmental potential of the oocytes are not well elucidated. So, our objective was to investigate transcriptional activity of bovine oocytes derived from different stages of follicular development. Thirty oestrus-synchronised Simmental heifers were used, and the onset of oestrus was considered as day 0. Ultrasonography-guided ovum pick up was performed to collect oocytes from small follicles (3–5 mm) at growth (day 3) and dominance (day 7) phases of the first follicular wave. BlueChip (2000 clones) cDNA array was used for transcriptional analysis and 10 transcripts were validated by Real-time PCR. Data analysis revealed a total of 51 transcripts to be differentially regulated in the two oocyte groups and 8 out of 10 transcripts were confirmed to be in agreement with microarray results. Oocytes of day 3 were found to be enriched with transcripts involved in protein biosynthesis (RPLP0, RPL8, RPL24, ARL6IP, RpS14, RpS15, RpS4x and RPS3A) or as translation elongation (EF1A), energy production as mitochondrial clones (ATP5A1, FL396 mitochondrion and FL405 mitochondrion), cytoskeleton or chromosome organisation (Actin, beta-Actin, H2AZ and KRT8), calcium ion binding (S100A10 and ANXA2), signal transduction (G-beta like protein) and thiol-disulfide exchange intermediate (TXN). Oocytes of day 7 were enriched with genes involved in cell cycle (CCNB1, CKS2, UBE2D3 and CDC31), transcription factors (MSX1, PTTG1, FANK1 and PWP1), Aldehyde reductase activity (AKR1B1), nucleotide binding (TUBA6 and K-ALPHA<sup>-1</sup>), growth factor (BMP15), and fertilisation (ZP4). In conclusion, our results showed differences in oocyte transcriptional activity at different stages of follicular development which may explain their differences in developmental competence.

**Keywords:** Bovine, Follicular development, Gene expression, Oocyte