Imprinted gene expression in in vivo- and in vitro-produced bovine embryos and chorio-allantoic membranes

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ABSTRACT. Cloning by nuclear transfer is often associated with poor results due to abnormal nuclear reprogramming of somatic donor cells and altered gene expression patterns. We investigated the expression patterns of imprinted genes IGF2 and IGF2R in 33- to 36-day bovine embryos and chorio-allantoic membranes derived from in vivo- and in vitro-produced embryos by somatic cell nuclear transfer (SCNT), parthenogenetic activation, and in vitro fertilization (IVF). There was a lower IGF2 expression rate in the SCNT (0.19) and parthenogenetic (0.02) groups when compared to in vivo and IVF embryos (2.01; P < 0.05). In the chorio-allantoic membranes, IGF2 showed a baseline expression pattern (P < 0.05) in parthenotes (0.001) when compared to in vivo, IVF (3.13), and SCNT (0.98) groups. IGF2R was less expressed (P < 0.05) in SCNT chorio-allantoic membranes (0.25) when compared to the in vivo group. The low expression of IGF2 in parthenogenetic embryos and
chorio-allantoic membranes confirms its imprinted status in cattle. Alterations in the relative frequency of IGF2 and IGF2R transcripts were observed in SCNT-derived bovine embryos and chorio-allantoic membranes, respectively, supporting the hypothesis that abnormalities in the expression of imprinted genes are causes of the low efficiency of SCNT procedures in this species.

**Key words:** Cattle; Epigenetics; Genomic imprinting; IGF2; IGF2R; Nuclear transfer