Animal Reproduction

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Embriology, developmental biology and physiology of reproduction

Impairment on development and gene expression of bovine embryos derived from oocytes exposed to genistein

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Resumo

Genistein, the main isoflavone present in soy, affects the reproductive processes due to a potent steroidogenic action. Intrauterine exposure to genistein is able to affect the reproductive system of offspring, stimulate uterine cancer and cause changes in testicular epithelium. To understand the effects of genistein on in vitro embryo production, we aimed to evaluate the effects of genistein during COCs maturation on the production and quality of bovine in vitro-produced embryos. Therefore, ovaries from a local slaughterhouse were obtained and COCs were recovered and divided into three groups: control group (no genistein addition); GEN 100 (100 µM of genistein); and GEN 500 (500 µM of genistein). Concentrations were based on previous studies and tested by a pilot study. All the experimental groups contained the same base medium with 0.1 mM dimethyl sulfoxide (DMSO). The COCs were in vitro matured for 24 hours. After maturation, we submitted COCs to in vitro fertilization for 18 hours. Further, presumptive zygotes remained to in vitro culture for seven days. To evaluate the effects of genistein on IVEP we analyze the blastocyst yield and expression of genes related to embryo quality. The genes related to embryo quality observed were OCT4 (Octamer-binding transcription factor 4), PLAC8 (Placenta associated 8), and CDX2 (Caudal type homeobox 2); normalized with PPIA (Peptidylprolyl isomerase A - housekeeping gene). We analyzed the effect of oocyte exposure to genistein using ANOVA. Means were compared by orthogonal contrast and we considered different when $P<0.05$. For in vitro embryo production, we figure out ($P<0.0001$) that 500µM of genistein decreases blastocyst yield (13.05%) compared to GEN 100 group (46.11%) and control group (46.87%). Furthermore, GEN 500 group demonstrated lower OCT4 mRNA abundance compared to control group ($P<0.05$). On the other hand, genistein did not affect CDX2 expression ($P=0.21$). Taken together, we concluded that addition of 500 µM of genistein during COCs maturation impairs in vitro embryo development and down-regulates a key gene related to inner cells mass differentiation and embryo implantation.

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