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**In vivo and in vitro decidualisation of the canine uterus**

Felix R. Graubner¹, Selim Aslan², Murat Findik³, Serhan S. Ay³, Iris M. Reichler⁴, Alois Boos¹, Mariusz P. Kowalewski¹

¹Institute of Veterinary Anatomy, University of Zurich, Zurich, Switzerland; ²Department of Obstetrics and Gynecology, Veterinary Faculty, Near East University, Nicosia, Turkey; ³Department of Obstetrics and Gynaecology, Faculty of Veterinary Medicine, University of Ondokuz Mayis, Samsun, Turkey; ⁴Section of Small Animal Reproduction, Clinic of Reproductive Medicine, Vetsuisse Faculty, University of Zurich, Switzerland.

kowalewski@vetanat.uzh.ch

Canine reproduction is hallmarked by several species-specific endocrine regulatory mechanisms. Among the most peculiar ones is the lack of luteolysis in absence of pregnancy. This, together with the lack of placental steroidogenesis, results in similar profiles of circulating luteal steroids in pregnant and non-pregnant dogs. Consequently, only following placentaion, relaxin of fetal origin can be used as a reliable marker of pregnancy. Consequently also, in contrast to livestock that maintain ovarian cyclicity due to periodic production of a uterine luteolysin, the dog lacks the classical mechanisms of maternal recognition of pregnancy. Nevertheless, in the dog mechanisms preventing embryo rejection must exist to allow successful establishment of pregnancy. Driven by this assumption, recently we have studied the response of the canine uterus to the presence of free-floating (pre-attachment) embryos(1). Differential expression of early decidualization markers was identified, e.g., IGF2 and ERO. The expression of IGF1, its receptor IGFR1, ERβ and progesterone (P4) receptor (PGR) remained unaffected by the presence of embryos. Whereas prolactin receptor (PRLR) was upregulated, there was no or only weak PRL expression(1). Significant upregulation of selected prostaglandin family members was also noted, e.g., PGE2-synthase and PGF2α-synthase (AKR1C3) and their receptors (PGFR and PTGER2)(1). Additional functional terms and factors revealed by our microarray studies include 433 genes differentially expressed in early canine uterus in response to pre-attachment embryos. The strongest over-representation was found for terms related to inflammatory response, positive regulation of cell motion and migration, cell signaling and extracellular matrix (ECM) remodeling. Consequently, the expression of selected ECM proteins was investigated. The expression of ECM1, TIMP2 and -4 was positively modulated by presence of embryos, whereas fibronectin 1 (FN1) was negatively affected. None of the major collagens (COL1,-3,-4) were influenced by presence of embryos. It was therefore concluded that functional modulation, but not the initiation of morphological changes, is the main objective of the early embryo-maternal crosstalk in dogs. Following implantation and placentaion, the more intimate feto-maternal communication is being established, characterized by formation of maternal stroma-derived decidual cells. These are the only cells of the canine placenta expressing PGR, and the only cells, which together with maternal vascular endothelium are able to resist trophoblast invasion. Interfering with their function, e.g., by applying a selective PGR blocker, unequivocally triggers a luteolytic cascade resulting in a (pre-term)luteolysis(2). For better understanding of the biology of decidual cells, an *in vitro* decidualization model of canine stromal cells has been established and functionally characterized, providing us with a valuable tool for more detailed future studies on the underlying molecular and endocrine mechanisms(3). To bypass the senescence effects observed with primary cell cultures, in our still ongoing project, immortalized canine uterine stromal cell lines were successfully developed. Research supported by The Swiss National Science Foundation (SNSF); research grant number 31003A_160251. [1] Kautz, E., et al., Expression of genes involved in the embryo-maternal interaction in the early-pregnant canine uterus. Reproduction, 2014. 147(5): p. 703-17. [2] Kowalewski, MP., et al., Canine placenta: a source of prepartal prostaglandins during normal and antiprogestin-induced parturition. Reproduction, 2010. 139(3): p. 655-664. [3] Kautz, E., et al., In vitro decidualisation of canine uterine stromal cells. Reprod Biol Endocrinol, 2015. 13: p. 85.