The canine corpus luteum expresses IGF1 and its receptor: implications in luteal function
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Introduction and objectives

In the dog, insulin-like growth factor 1 (IGF1) is associated with nutritional status and adult body size and weight, but its function in reproduction is not known. Positive correlations between intrafollicular progesterone (P4) and plasma and follicular IGF1 levels were found in bitches by Reynaud et al1 implying a role in luteinization and steroidogenesis. We hypothesize that IGF1, acting through its receptor (IGF1R), increases luteal P4 production and corpus luteum (CL) development in the dog. The aim of the present study was to characterize time-related changes in gene expression and cellular distribution patterns of IGF1 and IGF1R in the CL during pregnancy and in diestrus of non-pregnant animals.

Materials and methods

Pregnant bitches were ovariohysterectomized 8-12 d (pre-implantation), 18-25 d (post-implantation), 35-40 d (mid-gestation) after mating (mating=d 0, performed 2 d after ovulation) and at prepartum luteolysis (n=3-5 per group). Non-pregnant dogs (not mated) were spayed 5, 15, 25, 35, 45 and 65 d after ovulation (n=4-5 per group). Luteal IGF1 and IGF1R mRNA was determined by semi-quantitative real-time (TaqMan) PCR. Immunohistochemistry using indirect avidin-biotin-immunoperoxidase procedure was performed to localize both proteins in the CL during gestation. Statistical analysis was carried out by one-way ANOVA followed by Tukey’s test, and by the Kruskal-Wallis test (IBM® SPSS® Statistics for Windows, Version 19.0; Armonk, NY). Data were logarithmically transformed when needed to approach normal distribution.

Results

Similar IGF1 expression patterns were found in pregnant and non-pregnant dogs; mRNA levels decreased from the early luteal stages to prepartum (P=0.015) and to d 65 postovulation (P=0.002), respectively. IGF1R expression was up-regulated at prepartum luteolysis compared to pre- and post-implantation (P≤0.008), but did not change significantly in non-pregnant bitches. From pre-implantation through mid-gestation, strong signals of IGF1 were detected in the cytoplasm of luteal cells, which became weak prepartum. Blood vessel intima and media also showed weak positive reaction. In general, positive signals of IGF1R were more prominent in blood vessels compared to luteal cells during pregnancy. In the prepartum luteolysis group staining of steroidogenic cells was weaker than in all other stages.

Conclusion

Insulin-like growth factor 1 may be luteotropic in the early CL supporting steroidogenesis and angiogenesis, hence luteal formation and growth.

Keywords: IGF1, pregnancy, diestrus, ovary, dog

Acknowledgement

This work was supported by the Forschungskredit of the University of Zurich, grant no. FK-13-056.

Reference