The novel effect of hCG administration on luteal function maintenance during the estrous cycle/pregnancy and early embryo development in the pig

E. Bołzan, A. Andronowska, G. Bodek, E. Morawska-Pucińska, K. Krawczyński, A. Dąbrowski, A.J. Zięcik

Institute of Animal Reproduction and Food Research of the Polish Academy of Sciences, Tuwima 10, 10-748 Olsztyn, Poland

Abstract

Two independent experiments were performed on cyclic (Experiment I) and pregnant (Experiment II) gilts to examine the effect of human Chorionic Gonadotropin (hCG) administration on day 12 of the estrous cycle/pregnancy on ovarian and endometrial secretory function. Animals were divided into hCG Group (injection of 750 IU hCG) and Control Group (injection of saline). In Experiment I, the prolonged lifespan of the corpus luteum (CL), extended progesterone (P4) production (P<0.05) and delayed luteolysis were found. In hCG Group increased ratio of PGE2:PGFM during 12 hrs period on day 15 (P<0.05) of the estrous cycle was observed. In both experiments, higher concentrations of E2 in hCG treated gilts (P<0.05) on days 14-15 of the estrous cycle/pregnancy were found. In Experiment II, hCG injection did not affect P4, PGE2 and PGFM concentrations in blood plasma, but reduced the number of resorbed embryos on day 30 of pregnancy. In the pregnant hCG treated gilts the immunostaining against von Willebrand Factor (vWF) demonstrated an enhanced (P<0.05) angiogenesis in CLs and endometrium. Furthermore, the flow cytometry revealed an increased (P<0.05) viability of cells in CLs of hCG Group. An augmented expression of Steroidogenic Acute Regulatory Protein (STAR; P<0.05) and LH/hCG receptor mRNA (P<0.05) in CLs of hCG Group were observed, but an elevated concentration of protein was confirmed only for STAR (P<0.05). Our studies revealed, for the first time, that administration of hCG affects PGE2:PGFM ratio during the estrous cycle as well as the development of conceptuses through enhanced angiogenesis and decreased luteal apoptosis in early pregnant pigs.

Key words: hCG, corpus luteum, early embryonic mortality, insufficient luteal function