The corpus luteum (CL) is an endocrine gland that arises cyclically in mature females during the estrous cycle as well as in pregnancy. During pregnancy, the CL remains in the ovary until delivery, while it degrades if fertilization does not occur. Maintenance of the corpus luteum during early pregnancy is one of the most important function of the reproductive system. The basic hormone produced by this structure is progesterone (P_4), which is necessary for the proper course of the estrous cycle, embryo development, implantation and maintenance of pregnancy. Besides P_4, the CL synthesizes 17β-estradiol (E_2). In addition to steroid hormones, the CL produces prostaglandins (PGs) E_2 take part in the CL formation and PG $F_{2\alpha}$ – involved in its degradation. Disorders in the CL activity may contribute to abnormal development of the endometrium, as well as problems with the embryo implantation and early miscarriages. One of the factors leading to disorders in the functioning of this structure is the inflammatory process. Inflammation in the CL can contribute, in both women and animals, to many disorders in the regulation of reproductive processes.

Previous studies have shown that peroxisome proliferator-activated receptors (PPARs) are involved in the regulation of the inflammatory process in the porcine endometrium and the synthesis of the cytokines. PPARs are transcription factors that can be activated by endogenous and exogenous substances. All isoforms of PPAR (-α, -β/δ and -γ) have been identified in the ovary of many species including rat, mouse, pig, sheep, cow and human. Our previous results indicate that PPARβ/δ activation inhibits the mRNA expression of nuclear factor kappa B (NF-κB) and interleukin 6 (IL-6) while increases – IL-1β and IL-8 in the porcine endometrium during the luteal phase of the estrous cycle and early pregnancy.

Take into consideration all the above, I formulate a research hypothesis that PPARβ/δ is involved in the regulation of the inflammatory process in the corpus luteum of pigs. To verify the hypothesis I propose to determine the effect of PPARβ/δ ligands (synthetic agonist and antagonist) on transcriptome and proteome of the porcine CL with inflammation induced by LPS during the mid-luteal phase of the estrous cycle. The study will be conducted on *in vitro* cultured porcine luteal cells, isolated from the corpus luteum. It should be emphasized that the pig is a very good experimental model for studying of various physiological processes due to the high similarity to humans in terms of many anatomical structures and physiological processes. For ethical reasons, it is often not possible to perform experiments on people and in such circumstances the use of the pig model is a reasonable and a good choice.

The effect of PPARβ/δ ligands on transcriptome and proteome profile of the luteal cells with induced inflammation has not yet been of scientific interest. The planned studies belong to a basic research category. The research methods: RNA-Seq for transcriptome analysis and LC-MS/MS for proteome analysis will provide a lot of valuable information about the PPAR-depended molecular mechanisms controlling inflammatory processes in the CL. This is particularly important in the context of increasing reproductive problems in animals and humans.