Corpus luteum (CL) is a transient endocrine gland in the ovary. It synthesizes progesterone (pregnancy hormone) that is necessary during pregnancy establishment, i.e. for embryo implantation and early embryo development. Impaired corpus luteum function may be one of the factor related to high embryonic mortality rates observed during early pregnancy in many mammal species, including the pig. The corpus luteum in the pig, likewise in the human and in the bovine, undergoes following phases: formation (early luteal), secretory phase (midluteal) and degradation (late luteal) during several days. These intensive changes involve physiological processes controlled by a number of different factors including hormones, growth factors and cytokines. However, the full sequence and hierarchy of molecular events occurring in functioning CL is still unknown. Among molecules potentially involved in regulation of the porcine corpus luteum activity is prokineticin 1. It is expressed mainly in cells that synthetize progesterone but also in blood vessels in the CL. Until now, prokineticin 1 has been not studied in the porcine corpus luteum and unknown etiology of high embryo mortality during early pregnancy is justification for more intensive studies. Moreover, there is no data about the expression and the role of PROK1 during early pregnancy in any species. In our preliminary experiment we observed that prokineticin 1 stimulated progesterone secretion by corpus luteum explants *in vitro*. The aim of the present project is to determine the role of prokineticin 1 in the porcine corpus luteum function during the estrous cycle and the early pregnancy.

In the first research task we plan to study the expression profile of prokineticin 1 and two specific receptors: prokineticin receptor type 1 and type 2 in the corpus luteum. Corpora lutea from animals in early luteal, midluteal and late luteal phases of the estrous cycle and from animals in early pregnancy will be investigated. Furthermore, in this task comparison between non-pregnant and pregnant pigs will be done. In the subsequent tasks the effect of embryo signal (estradiol-17β) and prostaglandin F2α (the signal for corpus luteum regression) on prokineticin 1 and its both receptors expression will be evaluated. In these experiments corpus luteum explants will be incubated in the presence of hormones mentioned above. Additionally, the effect of embryo signal will be studied by using *in vivo* model in which estradiol-17β was infused into the porcine uterine lumen to imitate embryo signal. Next, the effect of prokineticin 1 on corpus luteum function will be determined. We will study if prokineticin 1 is involved in progesterone secretion and blood vessels formation. Moreover, it will be investigated whether prokineticin 1 influences endothelial cell divisions and luteal cell survival.

Results obtained in the proposed project will improve knowledge concerning regulation of luteal function in the pig. The novelty of planned studies concerns, among others: studying prokineticin 1 effects in the corpus luteum during early pregnancy, its function in the pig, using *in vitro* model of ultrathin whole tissue luteal explants (about 180 μm diameter thin) which is more physiological than using one particular population of cells isolated from the CL. The experience of our scientific group in studies on the reproductive biology and well-equiped laboratories in the Institute of Animal Reproduction and Food Research of PAS are guarantee of succes of planned analyses. Realization of our research will increase the knowledge in the field of biology of reproduction and could be important for effective improvement of breeding techniques to reducing the embryonic mortality rate during such a critical steps as early pregnancy, implantation and embryo development.