

The scientific goal of the project is to understand the expression and role of the new neuropeptide – phoenixin - 14 in the regulation of endocrine function and angiogenesis of porcine corpus luteum (CL) cells. One of the most frequently observed causes of female infertility is the disorders of CL, its inadequate vascularization (angiogenesis) and endocrine disorders. CL is a transient, endocrine gland that arises during each sexual cycle and is present during pregnancy. It is the main source of progesterone (P4), a hormone necessary to prepare the uterine wall for implantation of the embryo and subsequent maintenance of its intrauterine development. Disorders arising during angiogenesis and endocrine CL activity are associated with luteal phase failure, pregnancy problems and miscarriages. It is also important that CL pigs, like women, undergo stages of formation, full functionality and regression, during short time, requires the body to activate mechanisms to maintain its stability during pregnancy, including by activating a series of cytokines, hormones or growth factors. However, so far many elements of the functioning of CL remain unexplained. The proposed project hypothesis assumes that one of the regulators of CL cell function is a new neuropeptide, phoenixin, discovered relatively recently in 2013. There are several phoenixin isoforms formed after post-translational modifications, of which phoenixin -14 and -20 are capable of producing a biological effect in the body. The phoenixin receptor is unknown, but the proposed GPR173 receptor has fulfilled this function so far. Originally, phoenixin was described in the literature as a regulator of gonadoliberein secretion from the hypothalamus and gonadotropins from the pituitary gland, but there were also the first reports of a positive effect on the processes occurring in follicular cells. So far, phoenixin -14 has not been studied in CL pigs and other animal species. The results of our preliminary experiments suggest that the expression of the phoenixin-14 protein and GPR173 receptor changes in CL depending on the phase of the oestrous cycle. Therefore, the goal of this project is to investigate the expression and role of the newly discovered neuropeptide phoenixin-14 in porcine CL function. The first step to achieve the goal will be to examine the expression of mRNA and protein of phoenixin -14 and GRP173 receptor; their immunolocation in CL from different stages of the porcine oestrus cycle. In addition, we also plan to determine the level of phoenixin-14 in blood serum during the luteal phase. Next, we will study the effects of local factors in CL such as LH, P4 and prostaglandins on the expression and secretion of phoenixin-14. In the next stage of the project, we will determine the role of phoenixin-14 on processes occurring in CL cells such as the secretion of steroid hormones and prostaglandins, angiogenesis and the activation of kinases. The final step will be to understand the potential molecular mechanism: the involvement of the ERK1 / 2 (mitogen activated kinase), PKA (protein kinase A) and GPR173 receptor pathways in the action of phoenixin in CL cells. The studies will be carried out on *in vitro* cultures of CL cells isolated from porcine ovaries. The pig is an excellent experimental model for studying various physiological and pathological processes due to its high similarity to humans in the anatomy and function of many internal organs. Understanding mechanisms for the regulation of CL cells gives the possibility of effective regulation of the luteal phase of the cycle in farm animals. The obtained results will also significantly contribute to a better understanding of human physiology. Therefore, learning about new regulators of processes such as endocrinology and CL angiogenesis may in the future lead to infertility therapy caused by CL disorders.