

DESCRIPTION FOR THE GENERAL PUBLIC

The physiological mechanisms of the reproduction and the energy homeostasis are closely related. It seems that the molecule involved in the regulation of these processes is chemerin. This hormone may induce pro-inflammatory and anti-inflammatory actions and also participates in the regulation of carbohydrate and fat metabolism. Recent studies also suggest the participation of chemerin in the control of the female reproductive system, especially at the level of the ovaries. The presence of chemerin and its receptors were found in the ovaries of women, rats and cows. Our results, obtained in the previously conducted project, confirmed the presence of chemerin and its receptors also in the porcine ovarian cells. During the oestrous cycle, the ovary undergoes cyclical changes and its proper functioning depends on processes such as steroidogenesis, cell proliferation, angiogenesis and apoptosis. It has been shown that chemerin affects steroidogenesis in the ovary. In the previous research, it has been demonstrated that chemerin inhibited FSH-induced secretion of progesterone and oestradiol by granulosa cells in rats, cows and the IGF-1-induced secretion of both steroids in granulosa cells of women. Our results also indicated the effect of chemerin on the basal and gonadotrophin-induced secretion of steroid hormones by the porcine ovarian cells. Disorders in ovarian steroidogenesis may be associated with the polycystic ovary syndrome. It has been also suggested that chemerin may be involved in the pathophysiology of polycystic ovary syndrome in humans through a direct influence on the ovary. Studies have shown an increased chemerin level in the serum of patients with this disorder. It has been proposed that chemerin, through the induction of apoptosis and inhibition of cell proliferation and differentiation, impede maturation and development of ovarian follicles in cows and rats. The pathways involved in the control of proliferation, angiogenesis and apoptosis include Wnt/ β -catenin and Salvador/Warts/Hippo signalling pathways. Nothing is known about the potential effects of chemerin on angiogenesis and apoptosis as well as on the activation of signalling pathways associated with these processes in the porcine ovary. Moreover, there is completely lack of data concerning the effect of chemerin on the proteome of the porcine luteal cells. Considering the indicated gaps in knowledge and our results, it seems reasonable to investigate the effect of chemerin on processes related to the proper functioning of the porcine ovary. The research hypothesis assumes the effect of chemerin on the proteomic profile of the porcine luteal cells, as well as the role of this hormone in the regulation of angiogenesis and apoptosis in the porcine ovaries during the oestrous cycle. The aim of the study is to examine the effect of chemerin on the proteome of the luteal cells. This technique will help to identify all the proteins/mechanisms that are directly affected by chemerin in luteal cells during the phase of the highest activity of the corpus luteum. Moreover, we intend to investigate the impact of chemerin on the concentration of factors and proteins directly related to angiogenesis and apoptosis, as well as to investigate the potential effect of chemerin on signalling pathways associated with these processes. **The proposed study may provide more detailed information on the effect of chemerin, the hormone known primarily for its control of energy homeostasis and modulation of the immune response, on porcine reproductive functions through the regulation of the corpus luteum physiology.** The understanding of mechanisms involved in the ovary functioning and the oestrous cycle-dependent differences in female individuals may affect the efficiency of pig farming and can help to resolve the problems in sow reproduction that cause financial loss in pig production. Moreover, the domestic pig is an economically important species, and also a good experimental model, as it is much more similar to the human being than the more frequently used laboratory rodents. Thus, results from the research project may also significantly contribute to a better understanding of human physiology, especially the ovary functioning.