

Streszczenie popularnonaukowe w języku angielskim

A growing body of evidence highlights the crucial role of vitamin D₃ in the regulation of reproductive processes in females. The role of vitamin D₃ in the female reproductive tract has been extensively investigated because its receptor is abundant in reproductive organs, including ovary. Besides expression of vitamin D₃ receptor, the ovary is an extrarenal site of vitamin D₃ metabolism in human and animals. Furthermore, vitamin D₃ deficiency has also been associated with ovarian pathologies such as polycystic ovary syndrome (PCOS). One of the metabolic symptoms occurring in women with PCOS is insulin resistance and hyperinsulinemia. Importantly, vitamin D₃ supplementation was shown to increase insulin sensitivity in PCOS patients. However the molecular mechanism of vitamin D₃ and insulin interaction at the ovary level has not been examined. According to that results the proposed project will be undertaken to examine the influence of vitamin D₃, insulin or combination of vitamin D₃ and insulin on the proteome of granulosa and theca interna cells of cultured ovarian follicles as well as on the proteome of exosomes isolated from follicular fluid. The present study will be conducted using pig as a model. The realization of the specific aims of the project will be conducted with the use of transmission electron microscopy, nanoparticle tracking analysis, Western blot analysis and molecular biology methods such as proteomic analysis with capillary liquid chromatography (nano-LC) coupled to tandem mass spectrometry MALDI-TOF/TOF and iTRAQ technology with bioinformatic analysis. To determine changes in the global protein profile of the ovarian follicle following vitamin D₃, insulin or combination of vitamin D₃ and insulin treatment, medium size antral follicles will be collected and incubated *in vitro*. Next granulosa and theca interna cells will be separated as well as exosomes will be isolated from follicular fluid for protein extraction. The experiments are planned to fulfill the lacking research area related to the direct vitamin D₃ and insulin interaction within the ovary, and would significantly contribute to extending of actual basic knowledge about mechanism of vitamin D₃ action during insulin resistance and hyperinsulinemia. Proteomic approach allows to reveal the complexity of vitamin D₃ and insulin interaction *via* the identification of a plethora of proteins involved in the mechanism of their action in the ovarian follicle. In the light of increasing problem with vitamin D₃ deficiency among reproductive-aged women, it seems to be reasonable to elucidate the undertaken research topic. The obtained results would be useful in relation to humans for preparation of vitamin D₃ supplementation in ovarian pathologies. It is worth to stress that pig is an excellent experimental model in biomedical research due to the fact that its anatomy and physiology reflect human biology.