

Maternal recognition of pregnancy and subsequent implantation of the embryo are the most complex and least understood processes during early pregnancy in mammals. Specific dialogue between mother and embryo occurs during this stage. Coordinated and sequentially occurring signal exchange between the embryo and the mother is governed by a number of factors such as hormones, adhesion molecules, cytokines, growth factors, and lipids. Previous studies have indicated the regulation of expression of several molecules crucial for pregnancy establishment at the level of transcription. However, still little is known about the post-transcriptional regulation of expression of the genes encoding these molecules. The processes of post-transcriptional RNA processing have a significant role in the regulation of gene expression, having an important impact on dynamic changes in many tissues, including in the reproductive tract. One of the mechanisms of the gene expression regulation is driven by small, single-stranded RNAs - microRNAs (miRNAs). Recent research indicates, that they can act not only in place of origin but also carried by extracellular vesicles (EVs), fulfilling their role in recipient cells. EVs is a heterogeneous group of vesicles, mainly represented by exosomes ( $\varnothing$  30-100 nm) and microvesicles ( $\varnothing$  100-1000 nm) that provide an alternative mode of cell-cell communication. They are membrane covered nanovesicles of endocytic origin secreted by most cell types *in vitro*. EVs have also been identified in many different body fluids including amniotic fluid, urine, and blood as well as human and ovine uterine luminal fluid. Unfortunately, it is still not much known about their actual physiological role in maternal-embryo interaction.

Thus, in present project we hypothesized that miRNA of endometrial/embryonic origin can be transported by extracellular vesicles between mother and embryo, having an impact on processes important during early pregnancy in pigs. To verify this hypothesis *in vitro* experiments of trophoblast primary cells will be performed. There will be analyzed effect of extracellular vesicles and transported miRNA on genes expression and cellular features, crucial during embryo implantation.

Taking under consideration intensity of the world's research on the knowledge of mechanisms of the successful embryo implantation in the uterus, as well as the fact that so far role of miRNAs transported by EVs during embryo-maternal communication have not been investigated, results of this project will be an important contribution to the development of the reproductive biology in the world. Results of this project will broaden the knowledge about early pregnancy processes such as proper embryo/conceptus development and implantation. Moreover, because of similarities in general mechanisms involved in embryo/conceptus implantation and placentation, the knowledge gained in this project may be used to form more general theories explaining embryo-maternal relationships. It can also serve as a basis of further research on the cellular and whole organism level. In details, these results will significantly contribute to the knowledge of participation of miRNA molecules in the cell-to-cell signaling between the mother and the embryo during early pregnancy. The implementation of this project in conjunction with current results on the mechanisms of maternal recognition of pregnancy and implantation in pigs performed by our research team will allow identification of miRNA molecules with high potential for gene expression regulation, critical for pregnancy establishment and maintenance.