

ABSTRACT

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Title of diploma thesis: Study on expression of selected ABC transporters in placenta

The placenta is a temporary organ through which the fetus is supplied with nutrients and oxygen from the mother's blood and conversely waste substances are transferred into the mother's blood during pregnancy. Substance transfer through the placenta is a complex process controlled by a number of physiological mechanisms, including passive diffusion, facilitated diffusion or active transport, which is realized by activity of membrane transporters with energy consumption. Presence of active ABCs efflux transporters in the placenta has been known for a long time and their function is associated primarily with limiting the entry of harmful substances into the placenta and further into the fetus, thus contributing to its protection. Among the best described transporters belong P-glycoprotein (MDR1/*ABCB1*), breast cancer resistance protein (BCRP/*ABCG2*) and multidrug resistance protein 2 (MRP2/*ABCC2*), whose expression has been confirmed in the apical membrane of the placental syncytiotrophoblast facing maternal blood, and further multidrug resistance protein (MRP1/*ABCC1*) located on the opposite basal membrane. Nevertheless, it also includes less described transporters such as multidrug resistance proteins 4 and 5 (MRP4/*ABCC4*, MRP5/*ABCC5*). Expression of ABC transporters in the placenta is very variable and may vary both in terms of placental development (differential quantitative expression during the 1st - 3rd trimester), so in terms of localization of transporters in different types of placental cells. In this thesis, we focused on comparing gene changes expression of the six ABC transporters mentioned above between samples obtained from the placentas after the termination of unwanted pregnancies in the first trimester and placentas obtained after terminating of physiological pregnancy at the end of the third trimester. Significant change of gene expression between trimesters was observed within MDR1, MRP1 and MRP2 transporters. On the contrary, the expression of BCRP, MRP4 and MRP5

transporters can be considered stable during pregnancy. Furthermore, we compared the expression of the given transporters between the cells of isolated trophoblasts and fetal endothelial cells from terminal placenta after delivery. Higher expression in trophoblasts was detected for MDR1, BCRP, MRP2 and MRP5 transporters. On the other hand, MRP1 and MRP4 were detected in the higher rate in endothelial cells. These results can contribute to a better understanding of transfer as well as distribution of endogenous and exogenous substances through and within the placenta during its development.

