

DESCRIPTION OF THE GENERAL PUBLIC (IN ENGLISH)

Placenta plays an important role during foetal growth and development. Its functions include providing an oxygen and nutrients to developing foetus and producing hormones supporting pregnancy. Perturbations in placenta functions lead to intrauterine growth restriction (IUGR) which is often defined as limited ability of the foetus to use its growth potential during pregnancy. Usually, IUGR is a consequence of anatomical and functional perturbations between foetus, placenta and mother of the foetus.

In the last year a significant increase in knowledge about prenatal growth and development of mammals was observed, however the etiology of genetically conditioned IUGR is still poorly understood. This is due to the difficulty of study IUGR, not only for ethical reasons but also because IUGR is diagnosed in advanced stages of pregnancy. However, in more than 50% of cases IUGR is diagnosed after the birth. Crucial role in this case play animal models.

IUGR is the second cause of foetal mortality and morbidity in the case of up to 6% of human pregnancies and emerging later chronic diseases of adulthood including: diabetes type 2 or cardiovascular disease. Among livestock species, stillbirth is mainly recorded in dairy cattle and is an important functional trait from both an economic and animal welfare standpoint. For example, in US Holstein cattle ~7% of all calves are stillborn.

Cattle have cotyledonary placenta which consists of two anatomical parts: foetal and maternal, and separating of this parts is very simple in the early stages of pregnancy, making it easier to conduct tissue-specific molecular tests. Typically, animal models for the study of IUGR were created using surgical methods and malnutrition of the pregnant mother or in the case of mice by genetic modifications. However, our proposed bovine model is unique because it was created without any surgical methods what significantly distinguish it from the other animal models. Moreover, our bovine model with *MIMT*^{Del/WT} will provide the basis to study IUGR in other mammalian species, including humans. The primary goal of the study is to analyze methylation status and changes in gene expression in the foetal and maternal part of the placenta of the *MIMT*^{Del/WT} bovine foetuses before any effect of genotype on foetal size became apparent. Our previous study shows that this occurs in the last trimester of pregnancy. In our project the following molecular studies will be done: absolute analysis of the gene expression changes, CpG methylation status analysis of the promoter regions. The project will give the basis for further functional and structural studies.