Abstract

MicroRNAs (miRNAs) are small noncoding RNAs of length ranging from 18 to 25 nucleotides that regulate gene expression at posttranscriptional level. Expression of some miRNAs is tissue specific. This task assumed that placental insufficiency related pregnancy complications may be characterised by the dysregulation of microRNAs that are crutial for the regulation of cardiovascular system and cardiovascular diseases.

The gene expresion of 32 cardiovascular miRNAs was studied in two types of biological material - placental tissue and maternal whole peripheral blood. Patient cohort of clinically manifested preeclampsia (PE), gestational hypertension (GH) and intrauterine growth restriction (IUGR) was compared with samples derived from normal pregnancies (FG). In total, 127 placental tissue samples (20 FG, GH 20, 20 IUGR , 67 PE) and 80 maternal whole peripheral blood samples (20 FG, GH 20, 20 IUGR , 20 PE) were processed. Before the research, two pilot studies focused on the selection of endogenous controls for data normalization of gene expression in both types of biological material were performed. Detection and quantification was carried out by quantitative real-time PCR. In a group of placental tissue several miRNAs showed elevated levels in GH (miR-1, miR-16, miR-17, miR-20a, miR-21, miR-23a, miR-24, miR-26a, miR-100, miR-126, miR-130b, miR-133a, miR-143, miR-146a, miR-155, miR-181a, miR-210, miR-499, miR-574-3p) and up-regulation in PE (miR-210 and miR-499) when compared with FG. The difference between IUGR and FG was not found as statistical significant. The placental tissue showed up-regulation of miR-210 and miR-499 in severe PE. In case of mild forms of PE miR-499 was up-regulated. The term birth after 34th week of gestation showed placental tissue samples overexpression of miR-1, miR-17, miR-20a, miR-155, miR-210, miR-499. Elevated levels of miR-499 were detected in PE with previous occurence of gestational hypertension. Up-regulation of miR-210 and miR-499 was detected in PE without previous hypertension. Maternal whole peripheral blood showed down-regulation of miR-20a, miR-21, miR-24, miR-26a, miR-29a, miR-100, miR-103, miR-126, miR-143, miR-146a, miR-195, miR-199a, miR-221, miR-342-3p, miR-574-3p in samples of PE and down- regulation of miR-199a in IUGR when compared with FG.

Results of this study suggest that the above- mentioned miRNAs that significantly contribute to the regulation of cardiovascular system may be involved in pathogenesis of pregnancy related complications, and may be used in clinical practice.