

## ABSTRACT

**Objectives:** Our study investigated the possible utilization of extracellular microRNAs as novel non-invasive biomarkers for diagnostics of pregnancy-related complications such as gestational hypertension (GH), preeclampsia (PE) and fetal growth restriction (FGR). First, we identified appropriate pregnancy-associated (placenta specific) microRNAs in maternal circulation in pregnancies with normal course of gestation. Then, we quantified selected extracellular C19MC microRNAs in maternal circulation overtime in normally progressing pregnancies. Subsequently, we compared C19MC microRNA expression profiles in maternal circulation between pregnancies with clinically established pregnancy-related complications (PE, FGR, GH) and gestational-age-matched controls. Finally, monitoring of selected placenta specific C19MC microRNAs in maternal circulation within the first trimester of gestation was performed with the aim to identify extracellular C19MC microRNAs able to differentiate between normal pregnancies and those at risk of subsequent development of pregnancy-related complications.

**Results:** The levels and expression profiles of extracellular placental specific microRNAs in circulation of non-pregnant individuals and pregnant women were performed using real-time RT-PCR. The selection of appropriate pregnancy associated microRNAs with the diagnostical potential was based on following criteria: (1) detection rate of 100 % in term placentas, (2) detection rate of  $\geq 67$  % in maternal plasma throughout gestation and (3) detection rate of 0 % in whole peripheral blood and plasma samples of non-pregnant individuals.

**Conclusion:** On the base of our results, new extracellular C19MC microRNA biomarkers were identified that could confirm the diagnosis of preeclampsia or predict later occurrence of GH and preeclampsia. Early diagnosis may afford benefits such as to start early treatment or even to start early prevention of later development of pregnancy-related disorders.