

Heat shock proteins (Hsp) are highly conserved proteins that are part of the universal stress response of the cell. Their main function is to protect cells against structural and functional damage. Organisms exposed to different forms of stress, such as e.g. a lack of nutrients or water, hypoxia, infection or inflammation, demonstrated an increased gene expression of these proteins. Pregnancy complications cause stress conditions for maternal and fetal organism, which may result in an increased gene expression of Hsp. In my thesis, I examined the concentration of extracellular mRNA for five different heat shock proteins (Hsp27, Hsp60, Hsp70, Hsp90, HspBP1) in the plasma of pregnant women and whether this concentration is affected by possible pregnancy complications (preeclampsia, fetal growth restriction and gestational hypertension). I also investigated a possible correlation between mRNA plasma concentration for Hsp and pulsatility index values (PI) obtained by Doppler ultrasound. This research should help to invent a new predictive method for pregnancy complications, based on a detection of specific biomarkers in the first trimester of pregnancy.

The research was conducted on plasma samples obtained from peripheral blood of pregnant women, whose collection was performed during clinical manifestations of pregnancy complications. The studied cohort included women with a normal pregnancy, preeclampsia, fetal growth retardation and gestational hypertension. I isolated RNA from plasma samples and subsequent quantification of Hsp mRNA was performed by using real-time quantitative RT-PCR. Changes in gene expression of Hsp were examined by using comparative Ct method (β -actin was used as an endogenous control). The results showed a significant increased concentration of Hsp70 mRNA in a group of women with pathological pregnancy (preeclampsia with / without fetal growth retardation, fetal growth retardation, gestational hypertension) compared with the group of women with physiological pregnancy. Analysis of mRNA levels in individual diagnoses groups showed a statistically significant increase in expression of Hsp70 in plasma of women with preeclampsia (with / without fetal growth retardation) and in women with gestational hypertension in comparison with the group of women with physiological pregnancy. Elevated concentration of Hsp70 mRNA was also observed in the groups of patients with mild and severe preeclampsia and in the groups of women with preeclampsia with terminated pregnancy before 34th week of gestation and after the 34th week of gestation. No correlation between Hsp mRNA concentration in plasma and pulsatility index values was found.