

ORIGINAL ARTICLE

Cardiovascular and cerebrovascular disease associated microRNAs are dysregulated in placental tissues affected with gestational hypertension, preeclampsia and intrauterine growth restriction

Gestační hypertenze, preeklampsie a intrauterinní růstová restrikce jsou asociované s mikroRNA dysregulovanými u kardiovaskulárních a cerebrovaskulárních onemocnění

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Published: 8. 2. 2016
Actual Gyn 2016, 8, 8
Free fulltext article at www.actualgyn.com

Received: 14. 1. 2016
ISSN 1803-9588

Accepted: 1. 2. 2016
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Cite as: Hromadnikova I, Kotlabova K, Hympanova L, Krofta L. Cardiovascular and cerebrovascular disease associated microRNAs are dysregulated in placental tissues affected with gestational hypertension, preeclampsia and intrauterine growth restriction. Actual Gyn. 2016;8:8

Aims: To demonstrate that pregnancy-related complications are associated with alterations in cardiovascular and cerebrovascular microRNA expression. Gene expression of 32 microRNAs (miR-1-3p, miR-16-5p, miR-17-5p, miR-20a-5p, miR-20b-5p, miR-21-5p, miR-23a-3p, miR-24-3p, miR-26a-5p, miR-29a-3p, miR-33a-5p, miR-92a-3p, miR-100-5p, miR-103a-3p, miR-122-5p, miR-125b-5p, miR-126-3p, miR-130b-3p, miR-133a-3p, miR-143-3p, miR-145-5p, miR-146a-5p, miR-155-5p, miR-181a-5p, miR-195-5p, miR-199a-5p, miR-208a-3p, miR-210-3p, miR-221-3p, miR-342-3p, miR-499a-5p, and miR-574-3p) was assessed in placental tissues, compared between groups (35 gestational hypertension, 80 preeclampsia, 35 intrauterine growth restriction and 20 normal pregnancies) and correlated with the severity of the disease with respect to clinical signs, delivery date, and Doppler ultrasound parameters. Initially, selection and validation of endogenous controls for microRNA expression studies in placental tissues affected by pregnancy-related complications have been carried out.

Results: The expression profile of microRNAs was different between pregnancy-related complications and controls. The up-regulation of miR-499a-5p was a common

phenomenon shared between gestational hypertension, preeclampsia, and intrauterine growth restriction. Preeclamptic pregnancies delivering after 34 weeks of gestation and IUGR with abnormal values of flow rate in the umbilical artery demonstrated up-regulation of miR-1-3b. Preeclampsia and IUGR requiring termination of gestation before 34 weeks of gestation were associated with down-regulation of miR-26a-5p, miR-103a-3p and miR-145-5p. On the other hand, some of microRNAs (miR-16-5p, miR-100-5p, miR-122-5p, miR-125b-5p, miR-126-3p, miR-143-3p, miR-195-5p, miR-199a-5p, miR-221-3p, miR-342-3p, and miR-574-3p) were only down-regulated or showed a trend to down-regulation just in intrauterine growth restriction pregnancies requiring the delivery before 34 weeks of gestation.

Conclusion: Epigenetic changes induced by pregnancy-related complications in placental tissue may cause later onset of cardiovascular and cerebrovascular diseases in offspring.

The work was supported by the Charles University research program PRVOUK P32.