

Effect of cadmium exposure by maternal cigarette smoking on expression of candidate microRNAs in maternal and cord blood plasma

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Women of reproductive age are a vulnerable population group for harmful effects of toxic metals, especially Cd. Besides diet, cigarette smoking is the main source of environmental Cd exposure. Cadmium interacts with essential elements, mimics estrogenic effects and may affect epigenetic mechanisms responsible for foetal programming during intrauterine life that could be reflected in altered expression of microRNAs (miRNAs) in mother-infant pairs. The aim of the study was to investigate the effect of increased Cd exposure by maternal cigarette smoking on the expression of circulating candidate miRNAs in healthy postpartum smoking (n=35) and non-smoking women (n=30) who gave birth at term by vaginal delivery in clinical hospitals in Zagreb. The miRNAs were isolated from maternal and cord blood plasma using miRNeasy Serum/Plasma Kit and transcribed to cDNA by miScript II Reverse Transcription Kit (Qiagen, DE). The expression of miR-1537, miR-190b, miR-16, miR-21 and miR-146a were measured by qPCR after preamplification (by miScript PreAMP PCR Kit) using custom miScript miRNA PCR Array (Qiagen, DE). Levels of Cd were analysed in maternal and cord blood by ICP-MS. There was a higher expression of miR-16 in maternal and miR-146a in cord plasma of smokers vs. non-smokers (p< 0.05) and the expression of other miRNAs did not differ in either maternal or cord blood plasma. Expression of miR-16 in maternal plasma was positively correlated with the number of cigarettes smoked and Cd levels in maternal and cord blood, whereas expression of miR-1537 in maternal plasma and miR-190b in cord plasma negatively correlated with Cd levels in maternal blood. These are the first results in the literature on the expression of circulating candidate miRNAs in maternal and cord blood plasma related to Cd exposure by maternal smoking that may serve as early markers of developmental origins of health and disease. (The study was funded by Croatian Science Foundation grant HRZZ-IP-2016-06-1998, METALORIGINS).