

# Investigation of Maternal Diabetes Effects on Metabolomic Profile of Umbilical Cord Blood Plasma by IVDr NMR Spectroscopy

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Diabetes mellitus (DM) is a systemic metabolic disease characterised by increased insulin resistance and/or  $\beta$ -cell defects. DM is one of the most common complications of pregnancy and, if left uncontrolled, often leads to negative short-term or long-term consequences for the newborn. Preeclampsia, macrosomia, low Apgar score, hypoglycaemia, hyperbilirubinaemia and cardiac anomalies are among the serious adverse effects of maternal diabetes (MD). In this study, we aimed to elucidate the effects of MD on neonatal metabolism and to identify potential biomarker metabolites. Accordingly, we performed targeted metabolomic analysis of umbilical cord blood (UCB) serum samples of newborns MD-affected using a Nuclear Magnetic Resonance (NMR) spectrometer in the “In-Vitro Diagnostic” (IVDr) system category specially developed for clinical screening. The study consisted of 20 newborns, MD-affected (n=5) and healthy newborns (n=15). UCB was collected within 5 minutes after birth and plasma isolation was performed. A total of 144 metabolites, including lipid derivatives, were quantitatively analysed in UCB plasma samples by IVDr NMR spectrometry. Moreover, differences in clinical and demographic data between the MD and control groups and their correlation with the metabolites showing variation were also examined. According to the results of NMR-based metabolomics analysis; the level of the 2-hydroxybutyric acid was found to be higher in the MD group compared to the control group ( $p < 0.001$ ); the levels of alanine, lactic acid and acetoacetic acid were found to be lower in the MD group compared to the control group ( $p < 0.05$ ). In clinical parameters, the capillary bilirubin level higher in the MD group ( $p < 0.05$ ). Further studies are needed to elucidate the effects of maternal diabetes on neonatal metabolism, to identify metabolites with biomarker potential and to integrate IVDr NMR technology into neonatal clinical screening.