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WHOLE GENOME EXPRESSION IN VERY LOW BIRTHWEIGHT (VLBW) INFANTS WITH AND WITHOUT RETINOPATHY OF PREMATURITY (ROP) - PRELIMINARY RESULTS

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Introduction: At present ROP is the most common cause of blindness in children. Owing to the microarray technique, expression of all potential human and animal genes may be reliably evaluated.

Aim: To compare whole genome expression in the first month of life in the groups of infants with and without ROP.

Methods: 33 VLBW newborns (mean birthweight 1047g (SD:272), mean gestational age 27.9 weeks (SD: 2.7)) were prospectively evaluated. Blood samples were drawn from all the study participants on the 5th, 14th and 28th days of life (DOL). AMBION RiboPure Blood kits were used to extract mRNA. The mRNA samples were evaluated for gene expression with the use of GeneChip® Human Gene 1.0ST microarrays. The infants were divided into 2 groups: A) no ROP or ROP not requiring treatment (n=22) and 2) ROP requiring laser therapy (n=11).

Results: 669 genes were significantly differentially expressed between the groups during the first month of life (325 genes on the 5th DOL, 269 on the 14th DOL and 260 on 28th DOL). 16 genes were consistently overexpressed and 15 genes were consistently underexpressed in all three measurements. Preliminary gene ontology analyses show that the genes expressed differently are mainly these involved in cell growth and differentiation.

Conclusion: Significant difference in 669 genes expression in the groups of infants with ROP were found. The impact of the over- and underexpressed genes needs further analysis.

Study supported by Financial Mechanism of European Economic Area (PL0226) and Polish Ministry of Science (E023/P01/2008/02/85)

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NEUROLOGICAL DAMAGE PREDICTION BY FETAL DOPPLER PARAMETERS IN INTRAUTERINE GROWTH RESTRICTED PRETERM INFANTS

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Background and aims: Intrauterine growth restriction (IUGR) increases the risk for adverse neurodevelopment. While prenatal prediction of mortality is now greatly improved, prediction of neurodevelopmental morbidity remains limited. We explored the value of fetal cardiovascular Doppler parameters to predict neonatal brain damage and abnormal neurobehavior in IUGR.

Methods: Doppler parameters (DV pulsatility index (PI), MPI, and AoI PI) were performed in a cohort of IUGR preterm (< 35 weeks) fetuses with abnormal umbilical artery Doppler. Neonates underwent several cranial ultrasound scans and the Neonatal-Behavioral-Assessment-Scale (NBAS) at 40 weeks of corrected age. Isolated and combined value of cardiovascular parameters to predict interventricular hemorrhage (IVH), periventricular leukomalacia (PVL), basal ganglia damage (BGD), and abnormal NBAS were evaluated by multiple logistic regression and decision tree analysis. Gestational age (GA), middle cerebral artery, and umbilical artery were included as covariates.

Results: Of 106 IUGR fetuses, 90 survivors were studied. Mean GA at birth was 30.9 weeks. Retrograde flow in the DV and the AoI were significantly associated with brain injury with adjusted odds ratios (OR) of 8.6 and 4.1 respectively. Decision tree analysis combining these parameters discriminated high (67%), moderate (52%), and low risk (12%) for any brain lesion at 40 weeks. Retrograde AoI PI identified a high risk of abnormal NBAS in habituation (OR 14.4) and attention capacity (OR 12.6).

Conclusions: Prediction of neonatal neurological morbidity might be greatly improved by fetal cardiovascular evaluation, influencing prenatal and neonatal management. The association of prenatal cardiovascular parameters with long-term neurodevelopment merits further investigation.

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ASSESSMENT OF GESTATIONAL AGE IN VERY PRETERM NEONATES USING CEREBELLAR MEASUREMENTS AT CRANIAL ULTRASOUND - WHAT IS THE BEST APPROACH?

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Background and aims: Clinical assessment of gestational age (GA) can be challenging. Several ultrasound approaches to estimate GA using cerebellar measurements have been reported, claiming to be simpler and more accurate than clinical assessment. We compare the accuracy of 3 previously described cerebellar measurements for estimating the GA in VLBW infants.

Methods: We studied prospectively VLBW infants under 32 weeks GA defined by certain dates, IVF date or early fetal ultrasound. We excluded infants with IUGR, neurological problems or scan abnormality except isolated GLH/transient flares. Ultrasound acquisition and cerebellar measurements were made by author AG. Measurements of the vermis anterior-posterior diameter (APD, Cuddihy 1999), transverse cerebellar diameter via anterior (TCDa, Makhoul 2000) and mastoid fontanelles (TCDm, Davies 2001) were obtained. Estimated GA was calculated using published equations, and compared to known GA using intraclass correlation coefficient (ICC).

Results: We studied 60 infants. Mean birth GA was 28.4 weeks and mean postnatal age at scan was 1 week. ICC was 0.801 for APD, 0.123 for TCDa and 0.802 for TCDm ($p < 0.001$). Best estimates of GA were obtained with TCDm (difference SD 1 week) and APD (difference SD 1.3 weeks).

Conclusions: APD and TCD gave good estimates of GA and can be recommended. We obtained similar measurements of TCD via the two approaches, but only the equation for the mastoid fontanelle gave a good estimate of GA with excellent ICC. Studies assessing the use of cerebellar measurements for estimating GA in growth restricted, neurologically abnormal and older infants are needed.

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POST-HAEMORRHAGIC VENTRICULAR DILATATION AND ADC MEASUREMENTS IN THE WHITE MATTER IN PRETERM BORN INFANTS AT TERM EQUIVALENT AGE

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Objective: Post-haemorrhagic ventricular dilatation (PHVD) might cause additional white matter (WM) injury due to increased pressure on surrounding tissue. The extent of associated WM injury seems to be the main predictor for an adverse neurodevelopmental outcome.

Aim: Assessing WM injury in preterm born neonates with PHVD at term-equivalent age (TEA) by measuring the ADC on diffusion-weighted MRI (DW-MRI).

Methods: In this retrospective patient-controlled study, 23 preterm infants with PHVD (median GA 27.3 weeks (range 25.6-30.6)), admitted to our neonatal intensive care unit (NICU), were matched to 23 control patients for gender and GA (median GA 27.4 (range 25.3-30.9)). DW-MRI was performed in all neonates at TEA. Regions of interest were drawn manually on the ADC-map with equal size and location in the frontal, parietal and occipital WM bilaterally.

Results: Results are presented in table 1. PHVD was associated with slightly higher ADC-values in the occipital WM ($p < 0.05$). No significant differences in ADC-values of the frontal and parietal WM were observed between both groups.

ADC ×10-3mm2/s (mean ± SE)	PHVD N=23	No PHVD N=23	p-value
Frontal	1.566±0.020	1.572±0.023	0.830
Parietal	1.632±0.022	1.594±0.025	0.288
Occipital	1.549±0.024	1.468±0.024	<0.05

[Table 1]