MMP-9) revealed changes in protein expression between asphyxia and control cases.

**Conclusion** Placental biopsies collected at up to 90 minutes after delivery show stable gene and protein expression and may provide useful early biomarkers in NE.

### 1063 CEREBELLAR AND THALAMIC GROWTH IN PRETERM INFANTS IN RELATION TO BIRTH WEIGHT (BW)

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**Background** Reduced cerebellar/thalamic growth affects neurode-velopment. The exact mechanisms are unknown.

**Aims** To compare cerebellar/thalamic growth of preterms in relation to BW and weight at 36 weeks' corrected (W36).

**Methods** Retrospective matched cohort-analysis: 4 BW groups matched for maternal smoking, chorioamnionitis, antenatal steroids, delivery mode, multiples and gender.

**Exclusions** growth restriction, congenital anomalies.

**Study Variables (table1)** gestational age (GA), BW, W36, head circumference at birth/36 weeks (HC/HC36), transverse cerebellar/thalamic diameter at birth/36 weeks (TCD/TTD and TCD36/TTD36).

**Confounding variables** ventilation days (V), oxygen requirement 36 weeks' corrected ( $O_2$ ), postnatal steroids (PS), NEC, days antibiotic treatment (ABX), days parenteral nutrition (TPN), phototherapy, IVH, PVL.

Statistics median (quartiles, 25<sup>th</sup>/75<sup>th</sup>), Friedman-/Cochran-Test.

There was a statistically significant difference in V, PS, O<sub>2</sub>, ABX, TPN, but not NEC, phototherapy, IVH, PVL.

**Conclusion** Cerebellar growth is more resilient than thalamus or cerebrum to the negative effects of established risk factors for poor neurodevelopmental outcome.

#### 1064 NEUROLOGICAL INVOLVEMENT OF ENTEROVIRUS INFECTION IN YOUNG INFANTS WITH SEPSIS-LIKE ILLNESS

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**Introduction** Enterovirus (EV) infection is common in young infants. Amongst those requiring intensive care seizures and cerebral white matter abnormalities with serious neurologic sequelae have been reported. We questioned whether similar neurologic features occur in less seriously ill infants with EV infection.

**Methods** From august 2011 onward we included children under 90 days of age, admitted to a medium care unit with sepsis-like illness due to EV infection but not requiring intensive care. Cerebral ultrasound imaging was performed during hospital stay, cerebral MRI and hearing screening 4–6 weeks post-infection. During all visits neurological examination was performed and developmental milestones determined.

**Results** Preliminary results of the first 13 infants included are presented. Seven had positive EV PCR in CSF and serum, 6 tested positive in serum only. None showed seizures or abnormal neurological examination at admission. Cerebral ultrasound was performed in 12/13 infants and showed no abnormalities. Cerebral MRI was performed in 10/13 infants; one showed diffuse white matter abnormalities in the frontal and occipital lobe. Hearing screening was normal in all infants. Neurological examination 4-6 weeks after infection showed slight hypertonia of the lower extremities in one infant. At 6 months of age all infants had normal neurologic examination.

**Conclusion** At 4–6 weeks following EV infection cerebral white matter abnormalities were found on MRI in one infant, whereas a slight hypertonia of the legs was found in another. At 6 months of age neurological examinations were normal in all infants. The long term implications of our findings are unclear.

# 1065 REFERENCE VALUES OF ULTRASOUND BRAIN MEASUREMENTS IN PRETERM NEWBORN INFANTS

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**Background and Aims** Ultrasonography is noninvasive and commonly used for neuroimaging in premature newborns. Studies on brain measurement techniques and reference values of brain diameters are lacking. This paper aimed at

- 1. determining average diameters of cerebral ventricles, brain and cerebellum in preterm infants;
- 2. describing discrepancies between left and right sides, and between type of transducers used;
- 3. assessing possible relationships between diameters measured and gestational age, head circumference, birth length, birth weight, and gender.

**Methods** 132 newborn infants were enrolled and each subject had 34 diameters measured and 6 ratios calculated. Area of cavum septum pellucidum (ACSP), ventricular index (VI), ventricular width (VW), brain width (BW), third ventricle width (3VW), frontal horn width (FHW) were assessed in coronal plane. Evans (ER) and Johnson (JR) ratios were calculated. Midbody of lateral ventricle (MLV) and thalamo-occipital distance (TOD) were studied in parasagittal

### Abstract 1063 Table 1

	<1000g(N=14)	1000–1499g(N=17)	1500–2499g(N=8)	≥2500g(N=46)	p-value
GA(weeks)	26(25-27)	30(28–31)	31(31–32)	39(38–40)	<0,001
BW(g)	762(585-882)	1200(1130–1390)	1670(1573–1765)	3345(2814–3668)	<0,001
HC(cm)	23.5(22.0-24,5)	27(26.0-27,3)	29.2(28.3-30,1)	34.2(33.5–35,5)	<0,001
TCD(cm)	2.4(2.3-2.7)	3.2(2.7-3.4)	2.9(2.6-3.5)	4.0(3.6-4.3)	0.002
TTD(cm)	1.8(1.7-2.0)	2.2(2.0-2,3)	2.4(2.3-2,4)	2.8(2.6-2,9)	<0,001
W36(g)	1702(1528–1850)	2050(1800–2200)	2250(2018–2350)	Not applicable	<0,001
HC36(cm)	29.8(28.4–31,6)	32(31.0-32,6)	32.3(30.3–32,8)	Not applicable	0,001
TCD36(cm)	3.3(3.2-3.7)	3.6(3.1-4.3)	4.0(3.5-4.4)	Not applicable	0.072
TTD36(cm)	2.4(2.3-2,6)	2.4(2.3-2,5)	2.7(2.6–2,9)	Not applicable	0,028

plane. Transverse cerebellar diameter (TCD), 4th ventricle width (4VW) and length (4VL) were assessed via mastoid fontanelle.

**Results** Sector probe gave significantly smaller measurement results than convex transducer. Left side measurements were significantly greater than right side ones. VI, VW, BW, TCD and 4VW were dependent on birth weight, birth length, head circumference and gestational age. ACSP, FHW, TOD and JR were independent of those factors. No relationships were found between gender and measured diameters or calculated ratios.

**Conclusions** Reference values for cranial measurements, ER and JR were determined for examined population of premature newborns. Described indices may be useful for everyday clinical practice in neonatal units.

#### 1066 ABNORMAL HEART RATE CHARACTERISTICS ARE ASSOCIATED WITH ABNORMAL BRAIN ULTRASOUND AND MRI IN EXTREMELY LOW BIRTH WEIGHT INFANTS

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**Background and Aim** Brain injury may lead to autonomic nervous system dysfunction reflected by abnormal heart rate characteristics (HRC). A HRC monitor was developed to analyze heart rate variability and decelerations and predict catastrophic illness in NICU patients (HeRO monitor). We tested the hypothesis that the HRC index would be abnormally high in preterm infants with abnormal brain ultrasound and MRI.

**Methods** We collected HRC data on extremely low birthweight infants who underwent brain MRI as part of a study of neurodevelopmental outcomes. Brain ultrasounds (US) were performed in the first week and as clinically indicated, and brain MRI was performed near discharge. US were scored as normal/mild (including grades 1–2 IVH) and moderate/severe (grades 3–4 IVH or cystic periventricular leukomalacia). MRI was scored 0–3 for gray and white matter injury.

**Results** 45 ELBW infants with MRI performed had HRC data available. MRI was classified as 0 (normal, n=22), 1 (mild, n=14), 2 (moderate, n=5) or 3 (severely abnormal, n=4) and US as normal/mild (n=36) or moderate/severe (n=9). Average HRC index in the first 28 days after birth (aHRC28) was highly correlated with severity of abnormal brain US and MRI. aHRC28 for patients with normal/mild US abnormalities was 1.37±0.48 (mean±SD) and with moderate/severe 2.53±0.69 (p<0.001). For MRI, aHRC28 for patients with classes 0–3 was 1.24±0.44, 1.59±0.53, 2.49±0.68\*, 2.72±0.82\*, (\*p<0.001 versus class 0). Differences persisted after adjustment for gestational age and birthweight.

**Conclusion** HRC monitoring may be a useful adjunct test for severity of brain injury in NICU patients.

# 1067 INITIAL EXPERIENCE OF EFFECT OF SELECTIVE HEAD COOLING IN NORMOTHERMIC AND HYPOTHERMIC INFANTS

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**The Aim of this Study** To evaluate the effect of selective head cooling (introduced 3 months ago in the Neonatal Intensive Care Unit at the University Children's Hospital in Skopje-Macedonia) on S100 B protein levels, previously measured only in normothermic infants after perinatal asphyxia and the preliminary neurodevelopment outcome at the age of 3 months.

**Methods** All risk neonates with severe asphyxia admitted within 24h of injury were eligible for inclusion in the study. One serum

blood sample was obtained from each patient the first day of admission, and 48h and 72h hours after admission. S100B levels were measured using ECLIA method (Electro-Chemil-Luminiscence Immuno Assay-Elecsys 2010-Roche Diagnostic).

**Results** The avarage serum S100B levels for the control group (N=48) was 0.12 microgL (-1) (cut-off point). Serum S100B levels were grossly elevated in both HT and NT groups of infants with asphyxia. The differences were statistically significant as follows: a) between the first (24h) and second (day 4) time interval significant at p<0.05; b) between the second (day 4) and third (day 7) time interval significant at p<0,005; c) between the first (24h) and third (day 7) time interval significant at p<0,005; c) between the first (24h) and third (day 7) time interval significant at p<0,001. Serum S100B values were lower in HT (selective head cooling infants) compared to NT infants (p=0.049 at 48 hours).

**Conclusion** Serum S100B levels were lower in the HT group after 72h, and strongly correlated with the neurodevelopment impairment. S100B levels are highly elevated following asphyxia. Serum S100B levels are lowering in the HT and strongly correlate with the early neurodevelopment outcome.

# 1068 CAN LOSS OF SLEEP-AWAKE CYCLICITY AT AEEG PREDICT POSTHEMORRHAGIC HYDROCEPHALUS IN PRETERM INFANTS WITH INTRAVENTRICULAR HEMORRHAGE?

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**Background and Aim** Intraventricular hemorrhage (IVH) is the most common brain injury in preterm infants. Among infants with IVH 30% develops posthemorrhagic hydrocephalus (PPH). Actually there is no predicting factor for the developing of PPH. We observed if loss of sleep-awake cyclicity, at aEEG evaluation, is predictive for PPH.

**Methods** 6 preterms of gestational age between 25 and 30 weeks were detected for IVH (II degree to IPH) at cerebral ultrasonography. Cerebral background activity was continuously performed by CFM (Brainz US).

**Results** Sleep-awake ciclicity was observed in all 6 infants in the first 24 hours after the detection of IVH. But in 2 of these we noted the loss of cyclicity few days after the diagnosis of the bleeding. These 2 patients developed posthemorrhagic hydrocephalus whereas the other 4 infants didn't develop PPH.

**Conclusions** Loss of sleep-awake cyclicity, at aEEG, has a high positive predictive value for the developing of PPH in preterm infants with IVH; therefore study of cerebral background activity and in particular of sleep-awake cyclicity can be used as a early prognostic tools in patients at risk of PPH.

# 1069 DOES CEREBRAL OXYGENATION AID IN OUTCOME PREDICTION IN ASPHYXIATED NEWBORNS SUBMITTED TO HYPOTHERMIA?

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**Background and Aims** Neurological outcome in asphyxiated newborns submitted to hypothermia is being predicted by aEEG and MRI. The aim of this study was to assess the value of regional cerebral oxygen saturation ( $rSO_2$ ) in early outcome prediction and its relation with aEEG and brain MRI.

**Methods**  $rSO_2$  was measured by NIRS INVOS monitor. Newborns were simultaneously monitored with aEEG during hypothermia and rewarming period. Values of  $rSO_2$  were analyzed in three groups of predicted outcome (normal, intermediate or abnormal) according