Conclusion PHH remains to be one of the most severe complications of IVH. In this small group of patients, high CO_2 levels, hypotension seem to be important risk factors.

1076 | **THE EFFECT OF HEAD MOTION ON DATA QUALITY FOR NEONATAL DTI**

[1,2]A Plaisier, [1,2]AM Heemskerk, [1]IKM Reiss, [2]MH Lequin, [3]A Leemans, [1,2]J Dudink. [1]Neonatology; [2]Pediatric Radiology, Erasmus MC - Sophia, Rotterdam; [3]Image Sciences Institute, University Medical Center Utrecht, Utrecht, The Netherlands

Background and Aims Diffusion Tensor Imaging (DTI) has become valuable for quantitative evaluation of white matter maturation in preterm infants. Because of the occurrence of head movement, gathering good quality data is challenging in neonatal neuroimaging. This is especially of concern for DTI, where motion can result in severe signal drop-out and therefore miscalculation of DTI parameters if data outliers are not handled correctly. This study was aimed to quantify the occurrence of motion artefacts in neonatal DTI and to evaluate different methods for tensor estimation.

Methods We prospectively collected DTI data of 27 preterm infants that were scanned at 30 weeks gestational age. DTI data was acquired in 25 directions. Percentage outliers per slice was calculated. With Explore DTI, we assessed the effect of motion artefacts on tensor estimation using different methods.

Results 60% of subjects had slightly corrupted data (>15 slices with >30% outliers) of which 40% had severely corrupted data (>10 slices with >50% outliers). Corrupted data resulted in erroneous DTI parameters. This was especially true for the tensor estimation (ordinary least squares) typically performed by vendors and popular DTI software. More advanced tensor estimations showed more reliable data.

Conclusions Motion artefacts are a major problem in neonatal DTI as it can compromise accurate calculation of DTI parameters. These results press the need for careful data inclusion and the use of reliable methods for tensor estimation. Targeted acquisition, processing and quality assessment is needed in this population to obtain reliable evaluation of white matter maturation.

1077 | **SEVERE NEONATAL BRAIN INJURY IN VERY LOW BIRTH WEIGHT NEONATES: TIME TRENDS OVER 20 YEARS**

[1]MT Moral, [2,3]L Gutierrez, [4]D Coca, [1]MJ Torres, [2,5]J De La Cruz, [1]CR Pallás. [1]Neonatology-SAMID; [2]Clinical Research, Hospital Universitario 12 de Octubre; [3]Preventive Medicine, HUC San Carlos; [4]Radiology; [5]CIBERESP-IMAS12, Hospital Universitario 12 de Octubre, Madrid, Spain

Background and Aim Cranial ultrasound (CUS) routine screening examinations have been routinely performed in preterm neonates for decades. The aim of this study is to explore changes over time in the occurrence of severe neonatal brain injury as a function of neonate characteristics and clinical practice features.

Methods Inborn neonates from a single centre (Hosp 12 Octubre, Madrid) in years 1991–2010 with birthweight (BW) <1500g entered a CUS protocol. Brain injury was defined after its full evolution. Three types of severe brain lesions were described: intraventricular haemorrhage (IVH) grade III, parenchymal lesion (PL) III-IV, and ventriculomegaly III. Time trends for brain injuries, neonate characteristics and clinical practice features were explored with generalized estimation equations for logistic regression.

Results 1574 neonates were included in the 20 year study period; 1298 (82.5%) survived the NICU, 33% BW <1000g. From 1991–2006, severe IVH was in the range 4–6% overall; between 3–4% in survivors and 17–31% in non-survivors, odds ratio 7(4–11). Severe parenchymal lesions dropped from 8–9% to 3–4% overall after year 1998,

OR 0.35(0.14–0.85); it was much higher in non-survivors (initially, 40%) than in survivors (down to 3% in 1999–2006, OR 5(3–8)). In the last 4 year period, a significant increase in severe HIV/PL was documented, particularly in BW <1000g, parallel to a further survival increase.

Conclusion No different time trends for severe brain injury were observed in survivors and non-survivors. Variations in characteristics (e.g. increased survival at lower gestational age) may be related with changes in neonatal brain injury outcomes over time.

1078 | **REGIONAL OXYGEN SATURATION DURING PRETERM NEONATAL TRANSITION**

[1]M Pocivalnik, [1]C Binder, [1]B Urlesberger, [1]E Kratky, [2]A Avian, [1]W Müller, [1]G Pichler. [1]Department of Pediatrics, Division of Neonatology, Medical University Graz; [2]Institute for Medical Informatics, Statistics and Information, Medical University Graz, Graz, Austria

Objective To evaluate arterial and regional tissue oxygen saturation during immediate transition after birth in late preterm infants with and without respiratory support.

Methods Prospective observational study. Using nearinfrared spectroscopy, changes in regional oxygen saturation of the brain (rSO2brain) and peripheral preductal tissue (rSO2pre) were measured during the first 15 minutes of life after elective caesarean section. SpO2 and heart rate were measured continuously. Fractional tissue oxygen extraction (FTOE) was calculated for all regions. According to need for respiratory support two groups were formed, respiratory support (RS) group and normal transition (NT) group (without need for respiratory support). Positive pressure ventilation was applied with the T-piece resuscitator, oxygen was applied according to SpO2 values. The Florian Respiratory Function Monitor was used to monitor all ventilation parameter. All was recorded including videography.

Results 49 preterm infants fulfilled entry criteria, 7 had to be excluded because need for intubation. Of the remaining infants, 21 formed NT group, and 21 RS group. Heartrate showed comparable courses in both groups. SpO2, rSO2brain and rSO2pre values showed significantly different courses in the two groups, always the NT group showing higher values. FTOE course was significantly different, showing a delayed decrease in RS group.

Conclusion First systematic analysis of behaviour of regional and arterial oxygen saturation in late preterm infants with and without need for respiratory support. Infants with respiratory support showed significantly different oxygen saturation values, all were decreased compared to a normal transition group.

1079 | **SLEEP-WAKE CYCLING IN HEALTHY TERM NEWBORN INFANTS IN THE IMMEDIATE POSTNATAL PERIOD**

[1,2]I Korotchikova, [1,2]CA Ryan, [1,2]GB Boylan. [1]Neonatal Unit/Neonatal Brain Research Group, Cork University Maternity Hospital; [2]Paediatrics and Child Health, University College Cork, Cork, Ireland

Background and Aims As sleep-wake cycling (SWCing) of healthy infants within hours of birth has not been quantified with conventional EEG monitoring, in this study we examine the SWC composition of healthy term infants in the immediate postnatal period using EEG, and investigate factors that might influence neonatal sleep.

Methods Multichannel video-EEG was recorded for up to 2.5 hours in healthy term infants soon after birth. The total amount and percentages of sleep states (SSs) were calculated for each infant. Parametric/non-parametric statistical testing was used to test the influence of maternal and infant-related factors on SSs.

Results Ninety-one healthy term infants aged 1 to 36 hrs were studied (< 6 hrs – 21, 6–12 hrs – 47, 13–24 hrs – 11, and 25–36 hrs – 12). A well-developed SWC was evident as early as within the first 6 hrs after birth. The mean (SD) percentage of active sleep (AS) was 52.1% (12.9), quiet sleep (QS) - 38.6% (12.5). AS was longer and QS shorter in infants delivered by elective caesarean section (CS) compared to infants delivered by vaginal delivery (AS: p=0.01; QS: p=0.02) or emergency CS (AS: p=0.04, QS: p=0.02). Five infants did not have any SWC present. Disrupted SWCs correlated significantly with the absence of a spontaneous onset of labour (p=0.03).

Conclusion This is the first time that SWC composition has been quantified using EEG monitoring so early in the postnatal period. AS dominates and SWC is clearly present immediately after birth. SWC composition appears to be influenced by labour and mode of delivery.

1080 | **3D DIGITAL CAPTURE OF HEAD GROWTH IN NEONATES - CORRELATION OF HEAD CIRCUMFERENCE AND HEAD VOLUME**

W Burkhardt, S Ifflaender, A Koch, M Rüdiger. *Department of Neonatology and Paediatric Intensive Care, University Hospital Carl Gustav Carus, Dresden, Germany*

Background Head circumference (HC) is measured in newborns to evaluate head growth. It is not known, whether HC is always an appropriate measure of head volume (HV). Digital capture of the neonatal head offers information on HC and HV.

Aims To determine

a) overall correlation of HC and HV and
b) with regard to postmenstrual age (PMA) and
c) with regard to the actual body weight (BW).

Methods Head measurements with STARscanner laser shape digitizer (Vorum research Corp., Vancouver, BC) were performed in preterm infants prior to discharge over a 12 month period. Data on HC and HV were calculated with STARscanner Laser Data Acquisiton System (Orthomerica, Orlando, FL) and analyzed in different subgroups.

Results Included were 243 neonates at time of discharge *(mean HC 32.8±1.9 cm, mean HV 356.7±64.3 ml).* a) There was an overall correlation between HC and HV *(r=0.90, R²=0.81, p<0.001).* Correlation between HC and HV was: b) in infants with a PMA < 37 *(r= 0.71, R²=0.52, p=0.001)* vs. PMA > 37 weeks (r=0.92, *R²=0.85, p<0.001) and* c) in BW < 2500g *(r=0.69, R²= 0.49, p=0.04)* vs. BW >2500g *(r=0.88, R²=0.77, p<0.001).*

Conclusions Neonates with comparable HC can show very different HV, especially in infants with low PMA or BW. Thus additional measurement of HV enables to detect variable patterns of head growth and shape. Underlying causes and the meaning for neurological outcome need to be determined.

1081 | **LEVELS OF SERUM N-TERMINAL PRO-BRAIN NATRIURETIC PEPTIDE, CYSTATIN C, AND URINARY Β2 MICROGLOBULIN IN NEWBORNS WITH HYPOXIC ISCHEMIC ENCEPHALOPATHY**

B Aydin, D Dilli, S Erol, E Ozyazici, S Beken, NE Cullas Ilarslan, A Zenciroglu, N Okumus. *Neonatology, Dr Sami Ulus Maternity and Children's Health and Diseases Training and Research Hospital, Ankara, Turkey*

Background and Aim Levels of serum N-terminal pro-brain natriuretic peptide (NT-proBNP), cystatin-C ve urinary β2 microglobulin in newborns with hypoxic ischemic encephalopathy (HIE) were examined in this study.

Methods In this study, 25 infants diagnosed with HIE were evaluated prospectively. The diagnosis was made according to criterias of American Gynaecelogy and Obstetric Academy (ACOG, 2003). Serum creatinine, NT-proBNP, cystatin C and urinary β2 microglobulin in all patients were measured on the 1st and 5th days of hospitalization.

Results The mean gestational age was 38.7 weeks and the birth weight was 3255 grams. Patients were classified as stage-1 (n=5), stage-2 (n=15) and stage-3 (n=5) HIE according to Sarnat classification. Therapeutic hypothermia was established in 6 patients. Acute renal failure (ARF) developed in 3 cases with stage 3 HIE. Peritoneal dialysis was performed for 2 of them. First day serum creatinine levels were higher than the 5th day levels (p=0.01). NT-proBNP and cystatin-C levels was significantly lower on the fifth day (p=0.01). Although not statistically significant, urinary β2 microglobulin (mg/g cre) levels on the 1st day were higher than the 5th day (p=0.40). On the first day of hospitalization, a statistically significant correlation between NT-proBNP and creatinine (p=0.02), cystatin-C (p=0.01) and urinary β2 microglobulin levels (p=0.01) were determined. NT-proBNP and cystatin-C levels were significantly high on the first day in infants developing ARF.

Conclusion It may be beneficial to evaluate serum N-terminal proBNP ve cystatin-C with creatinin levels in HIE patients for the diagnosis, severity and follow-up of ARF.

1082 | **BLOOD PRESSURE AND AMPLITUDE INTEGRATED ELECTROENCEPHALOGRAPHY CORRELATIONS IN FULL TERM NEONATES WITH HYPOXIC ISCHAEMIC ENCEPHALOPATHY**

[1]M Krasovitsky, [1,2]Z Kecskes. [1]*Medical School, Australian National University, Canberra;* [2]*Department of Neonatology, Canberra Hospital, Woden, ACT, Australia*

Background The correlation between systemic blood pressure (BP) and amplitude integrated electroencephalography (aEEG) in full term neonates with hypoxic ischaemic encephalopathy (HIE) is clinically complex, affecting therapy and prognosis.

Method Term infants with HIE and < 48 hours of age were identified from a prospectively kept database. Mean (MAP), systolic and diastolic blood pressure was recorded over a four hour period. aEEG patterns and corresponding output (in μV) of crosshead, right and left leads over the same period were recorded and analysed. The cohort was analysed according to a range of variables including treatment or non-treatment of hypotension and degree of encephalopathy.

Results Twenty-nine episodes of hypotension experienced by twenty-one full term neonates with HIE were recorded. In the cohort, MAP was correlated with aEEG changes two and three hours after hypotension at with a correlation coefficient (r) of 0.454 and 0.477. In the non-treated group, there was a significant correlation between MAP and all leads across the time period with r ranging from 0.498 to 0.768. Neonates with HIE stage III had a significantly stronger correlation between BP and aEEG over the time period compared to those with HIE stage II.

Conclusions There is a correlation between blood pressure and aEEG in neonates with HIE. This is especially evident in non-treated and the most encephalopathic neonates. These results may guide clinical practice in NICUs.

1083 | **THE HIGHLY SELECTIVE SIGMA-1 RECEPTOR AGONIST PRE-084 REDUCES INFLAMMATION-SENSITIZED HYPEROXIA-INDUCED INJURY IN THE DEVELOPING RAT BRAIN**