an early prognostic marker for later development of the metabolic syndrome. Lack of difference in obestatin concentrations between LGA and AGA groups could possibly suggest that obestatin may not be directly involved in the regulation of fetal adiposity and insulin sensitivity.

221 EFFECT OF FASTING ON METABOLISM IN TRANSGENIC MICE WITH RESPIRATORY CHAIN COMPLEX III DEFICIENCY

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Background and aim To generate ATP production, mitochondria host crucial metabolic pathways that interact continuously. Therefore, pathological interruptions in one process might disturb entire cell metabolism. To investigate a neonatal mitochondrial disorder (GRACILE syndrome), we developed a mouse model with c.232A>G mutation in *Bcs1l*, resulting in a lethal complex III (CIII) deficiency in homozygotes. Our aim was to analyze how CIII deficiency affects metabolic pathways by pressing the mechanisms with fasting.

Methods Homozygous ($Bcs1l^{G/G}$) and wild type ($Bcs1l^{A/A}$) mice were assessed before and after 4-hour fasting with blood glucose, lactate and ketones, and sacrificed. Liver tissue was obtained for histology (H&E, PAS staining for glycogen and ORO-staining for fat) and ATP measurement.

Results Before fasting, $Bcs1l^{G/G}$ had lower glucose (4.3±1.3 vs. 6.6±1.2, p<0.01) and higher ketone (0.6±0.3 vs. 0.3±0.1, p<0.01) levels, but similar lactate values (4.0±2.2 vs. 3.7±1.4 p=0.8). Glycogen depletion and microvesicular steatosis present in $Bcs1l^{G/G}$ hepatocytes increased after fasting. After fasting, $Bcs1l^{A/A}$ remained euglycemic with increased ketone body production, whereas in $Bcs1l^{G/G}$ mice glucose, ketone and lactate were lower. ATP production of $Bcs1l^{G/G}$ mice was lower than that of $Bcs1l^{A/A}$ (58%±24%).

Conclusion $Bcs1l^{G/G}$ mice switched their metabolism to β-oxidation before fasting and failed to build up compensatory metabolic mechanisms to fasting, resulting in low ATP production. These results elucidate mechanisms explaining the deterioration in $Bcs1l^{G/G}$ mice. The methods used can be implemented as outcome measures in intervention studies aiming at stimulating mitochondrial biogenesis and metabolism in the mouse model.

222 BRAIN VOLUMETRY IN INFANTS WITH CONGENITAL HEART DISEASE: PRE- AND POST-SURGERY ASSESSMENTS COMPARED TO HEALTHY CONTROLS

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Background and aims MRI studies in neonates with congenital heart disease (CHD) have demonstrated delayed brain maturation and mostly focal brain injury. To better define the distribution of cerebral injuries and regional brain growth in neonates with CHD, we compared volumetric measures from pre- and postoperative MRI of patients to healthy neonates.

Methods Cerebral MRIs of 32 term-born CHD patients, scanned before and after heart surgery (mean age: 6.8 days and 26.8 days, respectively), were manually segmented to measure volumes of total, grey and white matter and of selected brain regions. Results were compared with MRIs of 17 healthy term born neonates (mean age: 23.5 days).

Results Between pre- and postoperative MRI, patients showed significant brain growth, especially in the cortical grey matter (0.25%/day), cerebellum (0.20%/day), and deep gray matter structures (0.10–0.15%/day, all p<0.004). Volume increase of the white matter was 0.05–0.06%/day (left/right; p=0.017/0.003); increase of total brain volume was 0.14%/day (p<0.001).

Compared to healthy controls, the size of all brain structures (except ventricles and right amygdala) was significantly reduced postoperatively. Largest differences were found in deep gray matter structures (13.8–16.8%, p=0.05-< 0.001), cortical grey (12.1%, p=0.01) and white matter (11.8%, p<0.001). Total brain volumes were reduced by 11.3% (p<0.001).

Conclusions In neonates with CHD, significant differences of white and deep grey matter volumes were found postoperatively. Brain growth was high, with notable regional differences. Our results contribute to the knowledge on the timing of cerebral injury in neonates with CHD.

223 CLINICAL UTILITY OF AN AUTOMATED NEONATAL SEIZURE DETECTION ALGORITHM

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Background/Aims EEG is the gold standard for the identification of neonatal seizures as the vast majority of electrographic seizures do not have a clinical correlate. Both under and over diagnosis of seizures is common in the neonatal intensive care unit (NICU). Computer assisted methods of interpreting the EEG have the potential to improve the accuracy of seizure detection. The aim of this study was to determine the clinical utility of our current neonatal seizure detection algorithm (NSDA).

Methods Multi-channel video-EEG recordings of 70 term neonates admitted to the NICU were analysed: 35 babies with seizure (mixed aetiologies) and 35 babies without seizure. The EEGs were annotated by an experienced neurophysiologist. The performance of the NSDA was assessed using time and event based metrics. An additional, clinically relevant, performance metric (based on the number of neonates correctly administered an anti-epileptic drug (AED) as early as possible after electrographic seizure onset) was calculated.

Results The sensitivity and specificity of the NSDA were 83% and 97% respectively when comparing to the experts annotation. The seizure detection rate and false alarm rate were 80% and 0.7/hr respectively. Thirty-four percent of neonates with seizures received an AED within the defined optimal timeframe, while 20% of neonates without seizure received an AED. These results were improved to 71% and 11%, respectively, by supplementing decision making with the output of the NSDA.

Conclusion Current NSDA performance, while not perfect, would greatly improve the efficacy of seizure detection and optimal AED administration in the NICU.

224 AEEG AND NIRS DURING TRANSITION AFTER BIRTH

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Background and aims Easily applicable non-invasive devices to monitor cerebral activity and oxygenation continuously during neonatal transition and resuscitation are lacking. We aimed to identify

a method of directly monitoring cerebral activity and oxygenation during transition and resuscitation after birth.

Methods Neonates >34 weeks gestation born via caesarean section were included. Cerebral activity was continuously measured with amplitude integrated EEG (aEEG) and cerebral oxygenation (rSO2) with near-infrared-spectroscopy during the first ten minutes after birth. For quantitative analysis of aEEG the mean minimum amplitude (Vmin) and maximum amplitude (Vmax) was determined at every minute. Neonates with normal transition were compared to neonates with need of resuscitation.

Results Out of 224 eligible neonates 63 were included and 46 had reliable measurements: 31 with normal transition and 15 in need of resuscitation. Neonates with normal transition showed higher values for Vmin in the third minute and higher values for Vmax in the third and fourth minute compared to minute 10. Neonates requiring respiratory support had lower values for Vmin in the ninth minute compared to minute 10. In neonates with normal transition rSO2 values during the first six minutes were lower when compared to minute 10. rSO2 values in neonates requiring respiratory support remained lower over the first eight minutes when compared to minute 10.

Conclusions This is the first study demonstrating the feasibility of aEEG and rSO2 monitoring during neonatal transition. The cerebral activity pattern in compromised infants requiring resuscitation was different when compared to infants with normal transition.

225 EARLY PREDICTION OF OUTCOME IN EXTREMELY PRETERM INFANTS USING CRANIAL ULTRASOUND AND MRI SCORING SYSTEMS

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Background and aims Extremely preterm infants are at high risk of brain injury and adverse outcome. This study compares the predictive values of cranial ultrasound (CUS) and conventional magnetic resonance imaging (MRI) at term equivalent age (TEA) for cerebral palsy (CP) and/or severe cognitive delay.

Methods Eighty-four infants, born < 27 weeks of gestation, underwent MRI (1.5 T) and CUS (5–8 MHz) at TEA. Images were evaluated by three independent observers. A previously published (Horsch et al. 2010), modified CUS scoring system and a widely used MRI scoring system were applied (Woodward et al. 2006). At age 30 months corrected, 62 infants (74%) underwent neurological examination and assessment with the Bayley Scales of Infant and Toddler Development-III (BSITD-III). Cut off levels for developmental delay (–2 SD) were adjusted to an age and sex matched term born control group (n=85).

Results Both CUS and MRI scoring systems predicted CP with a sensitivity of 75%, while specificity was higher for MRI (96%, versus 91%). Predictive values for severe cognitive delay were equal and good, with sensitivities of 100% (specificity 95% for MRI, 90% for CUS).

Conclusion We conclude that, using the scoring systems applied in this study, both CUS and MRI at TEA are useful in predicting CP and/or severe cognitive delay at age 30 months. Furthermore, we suggest that these scoring systems, which can be used in clinical routine, are helpful tools in identifying infants who are at high risk of adverse outcome and should undergo MRI.

226 NUTRITION IN THE CRITICALLY ILL: ENTERAL AND PARENTERAL NUTRITION IN THE NEWBORN

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Initiating both parenteral nutrition with adequate protein:energy ratios and early enteral feedings strategies (within the first hours of life, whenever possible) seem to offer preventive advantage towards developing complicating illnesses and favour neurodevelopment. Human milk as early enteral feeding has trophic effects on the gastrointestinal tract and shows anti-infectious properties. The requirements of growth and organ development create a challenge in nutritional management of newborn infants, especially preterms and those with additional disorders, such as intestinal-failure, bronchopulmonary dysplasia, and sepsis. Nutritional support improves outcome in critically ill infants but is affected by fluid restriction, metabolic derangements, gastric intolerance and feeding interruptions. Few studies compare more critically ill infants with less critically ill infants as far as nutritional support during the initial weeks of life looking at growth and rates of adverse outcomes. Accordingly, the influence of critical illness on the risk of adverse outcomes seems to be mediated by energy intakes during the first week of life (Pediatr Res 2011; 69:522). Changes in amounts and ratios of protein and energy, fat quality (medium chain triglycerides, oleic acid and n-3 long-chain polyunsaturated fatty acids through parenteral nutrition), maintaining normoglycemia during full or partial parenteral nutrition, short- and medium term effects of either parenteral or enteral glutamine supplementations, daily supplemental zinc, rate of feeding advancements and avoidance of postnatal growth retardation represent the main items whose roles in critically ill preterm infants have been considered so far. Available data are still limited and do not allow for firm conclusions in most cases.

227 AMOUNT AND TIMING OF OWN MOTHERS MILK INTAKE IS ASSOCIATED WITH THE RISK OF NEC, SEPSIS OR DEATH IN PRETERM INFANTS

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Background Necrotising enterocolitis (NEC) incidence is lower in preterm infants who are fed their own mother's milk (OMM) compared to formula. Possible mechanisms include protective factors of human milk or detrimental effects of formula. OMM is often unavailable, especially in the first few days following birth, while frequently donor milk is not available either.

Objectives To quantify the association between OMM intake during the first days of life and the incidence of sepsis, NEC and death.

Methods Retrospective single centre study in infants with a birth weight < 1500g. Intake of OMM/formula during the first ten days of life were recorded. Episodes of sepsis, NEC and death were registered during 60 days. Statistics: Cox regression analysis.

Results n=349 infants. OMM intake during the first 5 days of life was associated with a lower incidence of NEC, sepsis and/or death during the first 60 days of life (hazard ratio(HR) of the category 0.01–50% OMM intake: 0.49 [95%CI 0.28, 0.87], HR of the category 50.01–100% OMM intake: 0.50 [95%CI 0.31, 0.83], compared to no OMM). During days 6–10, the protective effect was present if >50% of intake was OMM (HR=0.37 [95%CI 0.22, 0.65]).

Conclusion Any human milk during the first 5 days of life is associated with an decreased risk of NEC/sepsis/death, while the amount of human milk seems important from day 5–10.