Conclusions Only one study (Mercer 2010) reported a better neurodevelopmental outcome at 7 months of age for preterm infants receiving placental transfusion via DCC. To our knowledge this is the first report on 3.5 year follow-up in infants with DCC or MC. Our results indicate that MC could safely be used as an alternative to DCC. There were no excess events of typical prematurity related co-morbidities in the MC group. Ex-preterm infants seem to benefit from MC and DCC in their neurodevelopmental outcome. Large studies are needed to confirm the findings.

The study is reported on behalf of the Brighton Perinatal Study Group.

PO-0467 MATURATION OF ECHOGENICITY IN PRETERM STRIATUM

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Background and aims Preterm infants are at risk of brain injury. Cranial ultrasound is frequently used in neonatal care to detect and monitor brain injury. Anatomical structures and abnormalities can be distinguished by differences in echogenicity.

Our primary objective was to reliably measure sonographic grey values in basal ganglia. Secondary objectives included the influence of gestational age at birth on echogenicity and aspects of deep grey matter change at 30 weeks corrected GA.

Methods We prospectively collected CUS-data of 229 preterm infants (<29 weeks gestation). Parasagittal images through the gangliothalamic ovoid were assessed on mean grey value in putamen and globus pallidus. Intra- and interobserver for placement of ROI were analysed.

Results The method used produced a reliable globus pallidus to putamen ratio (GPP ratio). Mean GPP ratio was 0.786 (±0.085). Extreme preterm infants have significantly lower GPP at birth than did preterm infants above 28 weeks (0.755 ± 0.081 vs 0.808 ± 0.091; P-value <0.01). At 30 weeks corrected GA this was still the case (0.723 ± 0.051 vs. 0.818 ± 0.063; P-value <0.01).

Conclusion The putamen of extremely preterm infants is more hyperechoic then putamen of preterm infants of 29 weeks of gestation. Objective measurement of grey values can help to study brain injury.

PO-0468 ERYTHROPOIETIN FOR THE REPAIR OF CEREBRAL INJURY IN VERY PRETERM INFANTS (EPOREPAIR) – A RANDOMISED, DOUBLEBLIND AND MULTICENTRE INTERVENTIONAL STUDY

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Background Preterm infants suffering from intraventricular haemorrhage (IVH) are at increased risk for neurodevelopmental impairment. Observational data suggest that recombinant human erythropoietin (EPO) aimed at preventing anaemia also improves long-term cognitive outcome in infants with IVH (Neubauer AP *et al*., Annals Neurology, 2010). The recently completed first early high-dose EPO trial in very preterm infants did not raise any significant safety concerns (Fauchère J-C. *et al*., ESPR Annual Meeting, 2012). *Hypothesis*: High-dose EPO improves long-term neurodevelopmental outcome in preterm infants with IVH.

Methods Design: Double blind, 1:1 randomised clinical study in 11 perinatal centres (Germany and Switzerland). *Patients*: 120 very preterm (gestational age <32 weeks) and/or very low birth weight (<1500 g) infants with IVH (>I°) diagnosed by cranial ultrasound during the first 4 days of life. *Intervention*: 5 intravenous applications of EPO (2000 U/kg) or placebo spread over 3 weeks. *Primary objective*: Neurodevelopmental outcome at 5 years of age (Kaufmann-ABC or Son-R). *Secondary objectives*: (1) safety; (2) MRI at term equivalent age to quantitatively analyse brain injury and growth; (3) psychomotor development at 2 years of age (BSID-III). *Recruitment*: March 2014 to February 2016.

Results and conclusions Given the fact that long-term neurodevelopmental outcome cannot be reliably assessed until preschool age, the primary outcome of this study providing evidence as to whether high-dose EPO improves restitution of brain damage in preterm infants will not be reported before 2021. However, MRI data can be reported much earlier. (Funded by the Swiss National Science Foundation; Clinical Trials Registry: NCT02076373).

PO-0469 ALLOMETRIC SCALING OF BRAIN GROWTH IN PRETERM INFANTS AND IN PIGLETS

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Background The relationship between brain size (measured as head circumference) and body weight in human infants is allometric. This means that the relative growth rates of the body and the brain stays in a constant relation during infancy. We are in the process of developing a preterm piglet model to study nutritional interventions on the brain. Here we present an analysis of the growth pattern during the first weeks of life.

Materials and methods Piglets (n = 146) were delivered by planned C-section at 90% and 100% gestation. All piglets were part of nutritional intervention studies in which daily body weight gain and body and brain weight upon euthanasia (d0–26) were obtained.

Results An allometric scaling model was established by linear regression using the log-transformed values of brain and body weight for piglets at 4 different ages at euthanasia: -10d (preterm at birth), 0d (term at birth), 5d and 26d for term piglets. Preterm piglets aged 4–26 days at euthanasia (n = 52) gained less weight after birth compared to term (12 vs. 26g/(kg*d), ($p < 0.01$), but the relation between body and brain weight did not deviate from the allometric scaling model (mean Z-score 0.014, $p = 0.94$).

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Conclusion As in humans, the relationship between the piglet brain and body weight appears to follow allometric scaling regardless of gestational age at birth. Preterm piglets were extra-uterinely growth-restricted but the relationship between the brain and body growth did not deviate from the normal scaling relation.

PO-0470 STEREOLOGIC QUANTIFICATION OF BRAIN VOLUME DEVELOPMENT IN PRETERM PIGS IN THE PERINATAL PERIOD

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Background and aims Preterm birth is associated with an increased risk of brain injury, smaller brain volume and cognitive deficits. To gain insight into how premature birth affects brain development in a pig model of preterm birth, we evaluated the growth of the neocortex and cerebellum using designed based stereology.
Methods Piglets born preterm or at term (postconceptional age (PA) 106 and 118, respectively) were euthanized on postnatal day 0, 5 or 26 (n = 1–22). The left cerebral and cerebellar hemipheres were fixed in formalin, embedded in agar, and sectioned coronally. The grey and white matter volumes were estimated using the Cavalieri method. Data were analysed by ANCOVA including PA, postnatal age, weight, litter, and gender as covariates.
Results Cerebral and cerebellar grey and white matter volumes increased significantly with PA and postnanal age ($p < 0.05$). Interestingly, the cerebral white matter volume increased by 127% during the last 12 days of fetal life ($p < 0.001$) and by 37% ($p < 0.001$) from birth to postnatal day 26 in term piglets. The preterm piglets had smaller cerebral white matter and cerebellar grey and white matter volumes compared to term piglets of same postnatal age ($p < 0.05$).
Conclusions The large increase in white matter volume during the last 12 days of fetal life suggests that this is a very sensitive period for brain growth in the piglet. These data are in agreement with human studies and thus supports the use of the preterm pig as a model for brain development in premature human infants.

PO-0471 NEONATAL AROUSAL AND HOME-CAGE ACTIVITY ARE FEEDING-DEPENDENT IN PRETERM PI

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Background and aims Preterm infants exhibit delayed neonatal arousal and impaired motor function. Impaired neuromuscular development, probably interacting with gut and metabolic dysfunctions, may explain this. Using preterm pigs as models, we hypothesised that early initiation of enteral feeding stimulates both gut growth and neonatal arousal and physical activity.
Methods Experiment 1: Caesarean-delivered preterm and term pigs were fed parenteral nutrition (PN) or PN plus enteral bovine colostrum (BC) for five days. Other preterm pigs were fed PN with or without BC or formula for five days (Experiment 2), or increasing doses of BC, formula or human milk (HM) for 10 days (Experiment 3). Daily energy intake was matched among the groups in each experiment and home cage activity (HCA) was recorded by continuous camera surveillance.
Results Prematurity at birth delayed eye lid opening, first stand and walk, and reduced relative intestinal weight and HCA (Experiment 1, all $p < 0.01$). Supplementing PN with BC or formula increased intestinal weight and HCA values (Experiment 2, $p < 0.05$). Enteral BC feeding increased HCA and intestinal weights, relative to formula or HM (Experiment 3, $p < 0.05$).
Conclusions Prematurity decreased physical activity and relative gut weight within the first week after birth. Small volumes of enteral feeds increased the activity. This may result from general metabolic effects of enteral feeding but could also reflect a direct diet-dependent, gut-neuromuscular maturation in preterm neonates fed enterally. The results support the importance of early enteral feeding of preterm infants with adequate amounts of an optimal diet.

PO-0472 EVALUATION OF SECRETONEURIN AS THERAPEUTIC STRATEGY IN NEONATAL EXCITOTOXIC BRAIN INJURY

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Background Preterm brain injury causes neurodevelopmental disability. Excitotoxicity plays an important role in the pathogenesis of preterm brain injury. The neuropeptide secretoneurin (SN) was shown to enhance angiogenesis and neurogenesis in a rodent model of adult ischaemic brain damage. SN might be considered a promising substance in newborn brain injury.
Aim To evaluate the effect of SN as a therapeutic strategy in an established *in vivo* model of excitotoxic newborn brain injury.
Methods Five-day-old mice pups were subjected to an intracranial injection of ibotenic acid into the right brain hemisphere. After recovery for one hour, animals were randomly treated with an intraperitoneal injection of i) vehicle, ii) SN 0.25 µg/g body weight (bw) or iii) SN 2.5 µg/g bw. Brains were harvested 24 and 120 h after the insult and processed for histological analysis. As a primary outcome parameter lesion size in cortical grey and white matter was evaluated.
Results SN administration had no significant effect on lesion size 120 h after the insult. When evaluated 24 h after the excitotoxic insult, SN showed a marked, but non-significant trend towards a decreased lesion size in white matter (SN 0.25 µg/g 323.33 ± 128.82, SN 2.5 µg/g bw 298.46 ± 137.46, vehicle 440.00 ± 227.81, n = 13–19, $p = 0.06$). SN had no effect on lesion size in grey matter.
Conclusion This study shows a trend towards a reduced injury in white matter in an *in vivo* model of neonatal brain injury. We are currently performing immunohistochemical analysis to evaluate underlying mechanisms that could result in long-term protection.

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