

abnormalities. Although MRI does identify these lesions, clinical additional value is limited. Improved safety, better availability and tailored procedures are essential for MRI to increase its value in clinical care.

PS-332

BRAIN TISSUE VOLUMES AT TERM-EQUIVALENT AGE IN PRETERM INFANTS: BIOMARKER FOR NEURODEVELOPMENTAL OUTCOME UNTIL 5 YEARS OF AGE

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Objectives To assess the association of brain tissue volumes at term-equivalent age (TEA) with long-term neurodevelopment.

Methods 108 preterm infants (median GA 28.6 weeks; 25.0–30.9 weeks) were prospectively studied at TEA (median 41.6 weeks PMA; 39.7–43.6). Volumes of eight different tissue types were quantified using an automatic segmentation method (Anbeek, PLOSONe2013) and related to neurodevelopmental outcome using cognitive (CCs), fine motor (FMss), and gross motor scaled scores (GMss) of the BSITD-III at two years corrected age, Griffiths Mental Development Scales (DQ) at age 3.5, and WPPSI at age 5.5. Corrections were made for PMA at scan, intracranial volume and maternal education.

Results Significant results are presented in the table. Both ventricular (Vent) and cortical grey matter volume (CoGM) were inversely related to all included subscales of the BSITD-III and DQ. However, the association at age 3.5 was lost after excluding infants with severe brain lesions (venous infarction, PHVD with neurosurgical intervention, and severe cerebellar haemorrhages). CoGM volume demonstrated a borderline significant inverse correlation with performat IQ at age 5.5 (coefficient-3.2;-6.6–0.08), that did not change after adjustment for severe brain lesions. Cerebellar volume was related to cognitive outcome at 2 and 3.5 years, but the association was mediated by cerebellar injury.

Conclusion Vent and CoGM volumes at TEA may serve as biomarkers for long-term neurodevelopmental outcome in preterm infants. The relationship between larger CoGM volumes and adverse neurodevelopment may reflect disturbances in white matter-CoGM boundaries and warrants further investigation.

Abstract PS-332 Table 1

	CCs (n = 108)	FMss (n = 108)	GMss (n = 108)	DQ (n = 94)
Ventricles	-3.5;-6.1–0.9	-0.8;-1.3–0.2	-0.5;-0.9–0.1	-2.1;-3.8–0.4
Cerebellum	5.4;1.0–9.7	ns	ns	4.0;1.5–6.5
CoGM	-1.6;-2.8–0.5	-0.4;-0.7–0.2	-0.4;-0.5–0.2	-0.9;-1.7–0.2

Numbers reflect coefficients and 95%-confidence intervals

PS-333

DO CLINICAL RISK FACTORS AFFECT WHITE MATTER MICROSTRUCTURAL INTEGRITY (FA) AT TERM EQUIVALENT AGE IN A MULTI-CENTRE COHORT OF PRETERM NEONATES?

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Background and aims We aimed to investigate the effect of clinical risk factors on white matter structural integrity at term equivalent age (TEA), as measured by fractional anisotropy (FA). **Methods** Diffusion tensor imaging of sufficient quality was available for 182 infants (gestational age (GA) <28 weeks), scanned at TEA in two centres. FA values of 14 regions (posterior limb of the internal capsule (PLIC), cerebral peduncles, corpus callosum, sagittal stratum, superior/posterior corona radiata, posterior thalamic radiation, left and right side for all) were automatically calculated (ExploreDTI, Leemans ISMRN 2009) using an atlas-based approach (Oishi, NeuroImage 2011). Subjects with overt parenchymal injury were excluded. Clinical characteristics tested against FA in the multivariable linear regression analysis for each region were GA, gender, intra-uterine growth retardation (IUGR), hypotension, mechanical ventilation >7 days, morphine (yes/no), post-haemorrhagic ventricular dilatation (PHVD), surgery, postmenstrual age at scanning (PMA) and participating centre. A cut-off value of $p < 0.004$ (0.05/14) was used to correct for multiple comparison.

Results Statistically significant positive associations with FA were found for PMA in PLIC (right), Superior Corona Radiata and Posterior Corona Radiata (left) and GA in Corpus Callosum, Sagittal Stratum (left), Posterior Thalamic Radiation (left). Statistically significant negative associations with FA were found for Surgery in Sagittal Stratum (right) and IUGR in Posterior Thalamic Radiation (left). Centre was significantly associated with FA in 8/14 brain regions.

Conclusion The microstructure of the preterm brain at TEA depends on GA and PMA at scan, IUGR and surgery. A possible interaction between surgery and morphine warrants further investigation.

PS-334

BIOMARKERS OF DELAYED BRAIN DEVELOPMENT IN A PIG MODEL OF PRETERM BIRTH

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Background and aims Neurodevelopmental sequelae of premature birth involve cognitive and motor deficits, often persisting into adult life. The molecular mechanisms involved remain yet to be elucidated, but certain regions e.g. cerebellum and neocortex appear particularly sensitive. The current study aimed to evaluate the relevance of Brain derived neurotrophic factor (BDNF), involved in the formation of synaptic connexions, and Sonic Hedgehog (SHH), important for perinatal neuronal differentiation, as potential biomarkers of brain development.

Methods Piglets were born via planned C-section either at full term (gestational age 118d) or 12 days preterm. Euthanization and brain dissection was performed at postnatal day 5 (n = 11, n = 33) and day 26 (n = 22, n = 18), for terms and preterms respectively. BDNF and SHH levels were analysed by ELISA in pig cerebellar homogenates. Western blotting (WB) of downstream targets for BDNF (TrkB) and SHH (Patched, Smoothed, Gli-1) were included together with qPCR-array of 84