Background and aim Little is known about brain perfusion in neonates and its relation with brain development. The purpose of this study was to evaluate if Arterial Spin Labeling (ASL) Magnetic Resonance (MR) imaging can be used to evaluate the relation between brain perfusion and brain development.

Methods Pulsed ASL-images (Philips-3T) were acquired of 31 infants. Six infants were imaged at preterm age, 23 infants at term equivalent age (TEA) and 2 infants at 3-months equivalent age (3m). Serial MR imaging was performed in 4 infants. Total brain perfusion (TBP) was measured for each infant. Regions of interest (ROIs) were drawn within the occipital cortex (OC), the frontal cortex (FC) and one ROI covered the basal ganglia and thalamus (ROIs).

Results TBP increased from preterm age (7.1ml/100g.min) to TEA (12.6ml/100g.min) to 3m (30.2ml/100g.min). A relative decrease in perfusion towards the BGT and a relative increase towards the OC (12.6ml/100g.min) to 3m (30.2ml/100g.min). A relative decrease in perfusion towards the BGT and a relative increase towards the OC (12.6ml/100g.min) to 3m (30.2ml/100g.min).

Conclusions Arterial Spin Labeling MR images reflect the anatomical and functional maturation of the brain in neonates and are in agreement with previously obtained PET-images.
Background and aims Magnetic resonance imaging (MRI) at term age has been reported to be superior to cranial ultrasound (cUS) in detecting white matter abnormalities. The aim of this retrospective study was to compare sensitivity of MRI using SWI (susceptibility weighted imaging) and cUS in the detection of intracranial hemorrhage.

Methods 68 consecutive term and preterm neonates, who received 3 Tesla MRI of the brain with SWI (Magnetom Skyra, Siemens Healthcare, Erlangen, Germany) around term and serial cUS (Acuson sequoia 512, Siemens Healthcare) during neonatal care, were included in this study between 05/2011 and 02/2012. MRI was performed using a MR-compatible incubator with compatible head coil (LMT nomag, Luebeck, Germany) under sedation. MRI were analyzed by two radiologists independently. Intervertebral disk height was estimated by Cohen’s kappa coefficient.

Results MRI and cUS were feasible in all 68 neonates (38 girls, 30 boys, mean gestational age at birth 31.9 ± 3.0 weeks (range 30.7–35.7 weeks). MR imaging was done at 40.3 ± 3.0 weeks (range 30.7–55.7 weeks). Both radiologists independently identified (post-)hemorrhage alterations in 20 of 68 infants by SWI (inter-rater agreement: K=1). In 10 this was in agreement with cUS, but in 4 of them additional intraventricular and/or parenchymal hemorrhagic components were diagnosed by MRI. All patients with suspected intracranial hemorrhage by cUS were confirmed by SWI.

Conclusions We found improved detection of intracranial hemorrhage with high inter-rater agreement by MRI using SWI compared to cUS in term and preterm infants. All hemorrhages diagnosed by cUS could be confirmed by MRI.

**Discussion/conclusion** Our results indicate that the regional structural reorganization of cerebral cortex after preterm birth differs in IUGR and non-IUGR subjects. Preterm birth affects the higher order association areas with increased thickness or less thinning in IUGR than non-IUGR born children. These cortical changes might underlay the specific functional deficits observed in these children.

**Conclusions** These data suggest that diffuse wm injury is not an inevitable consequence of preterm birth, and imply there may be a window of opportunity between birth and term equivalent age where intervention with appropriate treatments may ameliorate the adverse effects of prematurity on wm development.

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