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NEWS

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Scientific Formal (Paper) Presentations

CODE: CL-PDS-SU5A
SESSION: CL-PDS-SUA
Maturation of White Matter and Grey Matter is 'Out-of-Sync' in Premature Born Infants

Date/Times

- **DATE: Sunday**
- **TIME: 12:30 -1:00 PM**
- **LOCATION: S101AB**

PARTICIPANTS

- Stefan Bluml PhD - Nothing to disclose.
- Jessica L Wisnowski PhD - Nothing to disclose.
- Lisa Paquette undefined - Nothing to disclose.
- Marvin D Nelson MD - Nothing to disclose.
- Ashok Panigrahy MD - Nothing to disclose.

SUBSPECIALTY CONTENT

- Pediatric Radiology

PURPOSE
To compare metabolism of white matter and grey matter at equivalent post-conceptional (PC) age in term and preterm infants.
METHOD AND MATERIALS
MR examinations and medical records of 656 patients aged between 270 (term) – 370 post-conceptional (PC) days were reviewed. All subjects had clinically indicated MR examinations. However, 81 subjects had normal MRI (including normal diffusion MRI) and unremarkable clinical follow-up for a minimum of six months. Among these infants, 51 were full-term (gestational age (GA) at birth: 40+/- 1 weeks) and 30 were premature-born (GA: 30+/- 5 weeks). MR spectra acquired with single voxel PRESS (echo time 35ms, repetition time = 1.5s, 128 averages) of parietal white matter (WM) and parieto/occipital grey matter (GM) were analyzed with automated LCModel software and absolute metabolite concentrations were obtained. Metabolite versus age curves for term and preterm cohorts were generated and compared for statistical significant differences.
RESULTS
Prematurity altered the developmental time courses of N-acetyl-aspartate, a marker for axonal and neuronal development, creatine, an energy metabolite, and choline, a membrane metabolite, in WM. Specifically, we found that the premature metabolic development initially precedes term maturation, but then progresses at a slower pace merging with term brain development at ≈340-370 post-conceptional days. In GM no statistical difference was observed for any metabolite.
CONCLUSION
The biochemical maturation of white matter of term and preterm infants is significantly different whereas no significant differences were observed for grey matter. This indicates that mainly processes of WM maturation, such as axonal growth and possibly myelination are affected by premature birth. Consequently, the timing and synchronization of white and grey matter maturation is disturbed. There appears to be a "false start" of some maturational processes in WM triggered by physiological and/or stimulatory events after birth. This may contribute not only to the greater risk of long-term neurological problems of premature babies, but also to their higher risk for brain injury.

CLINICAL RELEVANCE/APPLICATION
Therapeutic interventions that aim to alleviate the possible adverse impact of prematurity on brain function may need to emphasize strategies that prevent a "false start" of white matter maturation.