Background Fat emulsions used in Australia for PN in preterm neonates have been based on either soybean oil (SO) or olive oil (OO). OO based lipid Clinoleic has high ratio of n-6 to n-3 fatty acids (9:1) this may not be ideal for LC-PUFA supply. Newly available SMOFlipid has appropriate ratio n-6 to n-3 fatty acids (2.5:1). SMOFlipid also contains OO (25%), coconut oil (30%) and SO (30%). Better lipid clearance, reducing the risk of liver toxicity, reduced oxidative stress, lower immune-activity and anti-inflammatory effects are other potential advantages of SMOFlipid.

Method Preterm neonates (23–30 weeks) were randomised to receive Clinoleic or SMOFlipid emulsion for 7days using a standard protocol. Investigators and outcome assessors were masked to allocation. Plasma F2-isoprostanes (lipid peroxidation marker), RBC fatty acids, vitamin-E levels were measured before and after the study. Blood culture positive sepsis and growth was monitored for 30 days post study Docosahexaenoic acid (DHA) levels in both groups despite higher levels of DHA in SMOFlipid.

Conclusions SMOFlipid was safe, well tolerated and also showed beneficial effect in terms of reduction of oxidative stress by reducing lipid peroxidation levels in high risk preterm neonates.

Abstracts

CEREBRAL AUTOREGULATION IN THE NEWBORN

Vascular pressure reactivity is the ability of vascular smooth muscle to respond to changes in transmural pressure. In the cerebral circulation this reactivity - or autoregulation - limits cerebral blood flow variation over a range of cerebral perfusion pressures ensuring adequate perfusion and oxygenation to the brain.

In adults cerebrovascular pressure reactivity can be determined by observing the response of intracranial pressure (ICP) to changes in mean arterial blood pressure. Non-invasive techniques such as transcranial Doppler ultrasound and near-infrared spectroscopy have been validated against ICP measurements, which have enabled continuous assessment of cerebral autoregulation to be investigated in newborn infants.

A number of different techniques have been described, including static and dynamic measurements and analysis in the time and frequency domain, yet despite many years of research the characteristics of cerebral autoregulation in the newborn are still not clear.

Both the presence and limits of autoregulation has been much debated although there is increasing evidence that autoregulation, while present in healthy infants, is impaired in sick term and preterm neonates and that this impairment may be a predictor of poor outcome.

In clinical practice there is a reliance on blood pressure measurements alone to make informed clinical decisions, which ignores the complex circulatory control mechanisms that exist to optimize oxygen delivery to the brain. The ability to obtain continuous quantitative information on cerebral autoregulation at the cotside would represent a significant advance in the management of these patients.

Objective To investigate the hemodynamic changes during transition at birth obtaining non-invasive physiological data in healthy term infants.

Methods In 18 newborns (GA 39 weeks (38–39)) born by a caesar- tion section; arterial oxygen saturation (SaO 2) (preductally), heart rate (HR) and non-invasive blood pressure (BP) were measured and echocardiography using M-mode and Doppler flow was performed at 2, 5 and 10 minutes after birth.

Results Oxygen saturation and HR were within recommended target ranges. Mean BP did not change between measurement intervals (55 mm Hg at 2 min, 54 mm Hg at 5 min. and 54 mm Hg at 10 min) and was similar as BP measured at day 1. Left ventricle output (LVO) significantly increased between 2 min and 5 min.
Early postnatal changes in splanchnic circulation in healthy term newborns

Objective To characterize hemodynamic changes in celiac artery (CA) and superior mesenteric artery (SMA) in healthy term newborns during the first six hours after birth by means of Doppler ultrasonography.

Materials and methods The study included 30 healthy term newborns. The ultrasound examinations using Aloka α-10 were performed at the age of 2.4 and 6 hours after birth. The statistical analysis of Doppler variables was performed using the non-parametric Friedman test with all pairwise multiple comparisons. Presented results are shown as median (interquartile range).

Results A reversed blood flow in SMA, documented by negative values of end diastolic velocity (EDV) [-10.90 cm/s (-13.21–0.00)], changed to positive during the first six hours after birth (7.08 cm/s, p<0.001). In CA, EDV increased in this period, but negative values were not recorded [11.83 cm/s (9.34–13.86) and 18.08 cm/s (14.20–27.57)].

Conclusion Dramatic changes occur in splanchnic circulation during the first six hours after birth. In superior mesenteric artery, the negative diastolic blood flow turns to positive as a part of circulatory transition in the presence of a ductal steal.

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Survival of very preterm children born in 2011: first results of the EPICAGE 2 cohort study

Aims The number of neonates born preterm is increasing and children born at low gestational ages face a range of risks. We present the first results of the EPICAGE 2 study, a national cohort of very and moderately preterm children in France.

Methods EPICAGE 2 is a prospective population-based cohort study conducted in 25 regions of France in 2011 including extremely (22–26 weeks, 8-month recruitment), very (27–31 weeks, 1-month recruitment) and moderately preterm (32–34 weeks, 1-month recruitment) children. It aims to examine short and long term outcomes (survival, health and development) of these children and their determinants. Data on pregnancy, delivery, and neonatal events were extracted from the obstetric and neonatal records.

Results A total of 5565 births were included in the EPICAGE 2 study: 7152 were born extremely preterm (89% (51%) stillbirths and 84% (49%) live births), 2728 very preterm (29% (11%) stillbirths and 2430 (89%) live births), and 1085 moderately preterm (28% (2.5%) stillbirths and 1057 (97.5%) live births). The survival rates for extremely preterm babies were 23% of all births and 48% of live births. The corresponding survival rates were respectively 83% and 93% at 27–31 weeks and 96% and 99% at 32–34 weeks. In 1997 (EPICAGE 1 study), the survival rates were 20% of all births and 46% of live births at 22–26 weeks and 76% of all births and 88% of live births at 27–31 weeks.

Conclusion Survival has improved among very preterm children, but has not changed at extremely low gestational ages.

Altered fronto-temporal neuroanatomy in very preterm born adults during completion of a verbal fluency task

Background and aims Several studies have described poorer cognitive performance in various aspects of language such as comprehension, naming, expressive language and verbal fluency in individuals who were born very preterm compared to controls. Neuroimaging investigations have also described structural and functional changes that could underlie such language deficits. In this pilot study we used functional MRI to explore whether alterations in the neuroanatomy of phonological verbal fluency persisted into adulthood following very preterm birth.

Methods Twenty-two young adults (26–28 years old, females=11, males=11) were examined. Eleven individuals were born very preterm (gestational age: <38 weeks) and 11 were full-term born controls. All participants underwent functional MRI using a 3T scanner while completing a phonological verbal fluency task. All data pre- and post-processing was performed using FSL (www.fmrib.ox.ac.uk/fsl).

Results During successful verbal fluency trials, very preterm-born individuals showed significantly decreased blood-oxygen-level-dependent signal compared to controls in several brain areas including the orbitofrontal/medial frontal cortex bilaterally (z=-8mm, y=52mm, z=-28mm) and the left fusiform/parahippocampal gyrus (z=-34mm, y=-30mm, z=-24mm), p<0.05 family-wise error corrected (FWE). On-line performance did not significantly differ between the groups.

Conclusions Previous studies with functional MRI in younger samples have shown neuroanatomical alterations (increased and decreased activation) in fronto-temporal and fronto-striatal networks in very preterm born individuals when performing different cognitive tasks. Our results suggest that neuroanatomical alterations during language processing persist into adult life following very preterm birth, and specifically involve fronto-temporal networks, with important implications for a wide range of high order cognitive functions.

Neonatal cerebral oxygenation is associated with neurodevelopmental outcome of preterm infants at 2 to 3 years of age

Background and aims Previous studies of functional MRI in younger subjects have shown decreased oxygenation in the prefrontal cortex bilaterally in preterm infants during verbal fluency tasks. However, a neurodevelopmental outcome of preterm infants is still underestimated.

Methods Ten preterm infants (gestational age: 26–32 weeks) were examined at an age of 2–3 years. All infants were born preterm and had a history of bronchopulmonary dysplasia. Functional MRI was performed with a 3T scanner while the subjects performed a verbal fluency task (FREESTYLE). The statistical analysis was performed using首次's method of independent subject groups. The statistical analysis included the median in each age group and the results were compared using Mann-Whitney U test.

Results The median of the blood oxygenation values during the verbal fluency task was significantly higher in the preterm group compared to the control group (p<0.05). The correlation between the blood oxygenation values and the neurodevelopmental outcome of preterm infants was also found to be significant.

Conclusion Neonatal cerebral oxygenation is associated with neurodevelopmental outcome of preterm infants at 2 to 3 years of age.