Neonatal Society Autumn Meeting 2013

Charles Darwin House
12 Roger Street
London WC1N 2JU

Thursday 7th November 2013
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Tel: 0207 685 2400
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09.30 Coffee

Session 1:  Chair – Dr Richard Thwaites

10.15 J Dorling, University of Nottingham,
Acceptability of Honey Dressings in Premature and term infants

10.30 J Banerjee, Homerton University Hospital, London,
Effect of blood transfusion on intestinal blood flow and oxygenation during the first week of life in extreme premature infants

10.45 A Lewandowski, Oxford Cardiovascular Clinical Research Facility, University of Oxford
Defining the Heart of Young Adults born preterm: Cardiovascular Magnetic Resonance and Computational Atlas Formation Reveals Distinct differences in Mass, Geometry and Function

11.00 Morning Coffee

Session 2:  Chair – Dr Helen Budge

11.30 S Santhakumaran, Neonatal Data Analysis Unit, Imperial College London
A Regional Care Bundle Approach to Increasing Maternal Breast Milk Use in Preterm Infants: Outcomes of the East of England Network Quality Improvement Project

11.45 C Battersby, Neonatal Data Analysis Unit, Imperial College London
Enteral Feeding Exposures in babies born less than 32 weeks. On behalf of the UK Neonatal Collaborative Necrotising Enterocolitis (UKNC-NEC) Study Group

12.00 Annual General Meeting for Members of the Neonatal Society

13.00 Lunch Break
Session 3: Chair – Dr Matthew Hyde

14.00 E King, School of Medicine and Dentistry, University of Birmingham
Pulse Oximetry as a Screening Tool to Detect Hypoxia Associated with Early-Onset Sepsis in Asymptomatic newborns: A Feasibility Study in a Low-income Country

14.15 S Pereira, NICU, The Royal London Hospital,
Continuous Invasive Blood Pressure is Directly Related to EEG Measures of Continuity in Preterm infants in the first three days of life.

14.30 E Chakkarapani, School of Clinical Sciences, University of Bristol
Influence of Therapeutic Hypothermia on the Evolution of MRI Brain Lesions in Infants with Neonatal Encephalopathy

14.45 S Pereira, NICU, The Royal London Hospital,
Relationship Between Carotid Blood Flow, Cardiac Output and Blood Pressure in Extremely Preterm Infants.

15.00 E Molloy, Paediatrics, National Maternity Hospital, Dublin
Systemic Innate Immune Dysregulation in Severe Neonatal Brain Injury

15.15 Afternoon Tea

Session 4: Chair – Professor Neena Modi, President of the Neonatal Society

15.45 C Gale, Imperial College London
Infant Sex and Longitudinal Adiposity in Early Life

16.00 D Vieten, Bristol Royal Hospital for Children,
Trefoil Factor 1 (TFF1) Expression in Intestinal Neuroendocrine Cells in Necrotising Enterocolitis

16.15 Presentation of Prize for best free paper by a trainee

16.20 The Widdowson Lecture: Dr Susan Ozanne, University of Cambridge, "Intrauterine nutrition and life-long health."

17.20 Drinks and Close of Meeting
Title (Upper case)

ACCEPTABILITY AND SAFETY OF HONEY DRESSINGS IN PREMATURE AND TERM INFANTS

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

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Institution(s)

University of Nottingham, Division of Child Health, Obstetrics and Gynaecology
Department of Neonatology, Nottingham University Hospital

Introduction (include hypothesis)

Honey Dressings have been demonstrated in children and adults to have important anti-infective and wound healing properties[1]. Mechanisms of action include osmotic action on bacteria and other organisms and anti-inflammatory action without inhibition of cell growth. They have yet to be adequately studied in newborn infants. We undertook a feasibility study to determine if they are safe and acceptable to staff and parents.

Methods (include source of funding and ethical approval if required)

Following written informed parental consent, a questionnaire was given to the parents of babies treated with Active Manuka Honey Dressings to examine the acceptability and performance of the dressings (Advancis Activon Tulle). Members of staff who applied and removed the dressings during the 9 month study period completed a similar questionnaire. The study was funded by Bliss and fully approved by the Nottingham 2 Research Ethics Committee.

Results

82% of participants were male and 18% female. Median gestational age at birth was 25 weeks (range 166 – 284 days), median age at entry into the study was 6 days (2 – 64 days). Median birth weight, 770g, (500- 5305g). 28 wounds were dressed using the Active Manuka Honey dressings on 8 different types of wounds. No infant developed hyperglycaemia that was felt to be due to the dressings.

<table>
<thead>
<tr>
<th>Parents Ratings</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 N/A</th>
<th>Staff Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable to look at</td>
<td>8%</td>
<td>0%</td>
<td>8%</td>
<td>25%</td>
<td>42%</td>
<td>17%</td>
</tr>
<tr>
<td>Pain on application</td>
<td>50%</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>33%</td>
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<tr>
<td>Pain on removal</td>
<td>17%</td>
<td>25%</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>42%</td>
</tr>
</tbody>
</table>

Conclusions

Honey Dressings were easy to apply, well tolerated and associated with little pain on application or removal. No infant required pain relief treatment escalation and none developed hyperglycaemia that was felt to be due to the Honey dressings. These results suggest that Honey dressings are safe and useful dressings in newborn babies.

References (include acknowledgement here if appropriate)

Effect of blood transfusion on intestinal blood flow and oxygenation during the first week of life in extreme premature infants

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

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Institution(s)

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2. Barts and the London School of Medicine and Dentistry, Queen Mary University of London, UK
3. Department of Medical Physics and Bioengineering, University College London, London, UK

Introduction (include hypothesis)

90% of Extremely Low Birth Weight (ELBW) infants receive a blood transfusion (BT) 1. The benefits of BT are not clear 2, 3.

Methods (include source of funding and ethical approval if required)

Aim: To study the effect of blood transfusion on intestinal blood flow and oxygenation during the first week of life in extreme premature infants. Superior mesenteric artery (SMA) peak systolic and diastolic velocities were measured to assess intestinal blood flow using Doppler ultrasound scan (Logic P6, GE Healthcare) 30-60 minutes before and after BT. Intestinal oxygenation was measured using a near infrared spectroscopy (NIRS) device (NIRO 300, Hamamatsu Photonics Ltd, Japan), from 20-30 minutes before, during and 20-30 minutes post BT. Vital parameters (HR, respiratory rate, SaO2 and BP) were recorded continuously using ixtrend 2.0 software (ixellence, GmbH, Germany) during the NIRS measurement. Other data collected: gestational age, birth weight, pre and post-transfusion haemoglobin (Hb), blood gas (pH, pCO2 and lactate) and feeding details. Data were analysed using STATA 12.0 statistical software. Continuous variables were compared using a paired t-test. The study was approved by Charing Cross REC, adopted as a NIHR Portfolio study (Study ID: 13594) and written parental consent was obtained.

Results

20 infants were studied. Doppler measurements of all 20 infants were included in the analysis, 3 infants excluded from the NIRS analysis due to poor quality of data. The median gestational age was 26 weeks (range 23 - 27), birth weight 762.5 g (600 - 1180), age on day of BT 5 days (1 to 7) and male: female ratio 12:8. 50% of the infants were fed; 3 were receiving feeds >50 ml/kg/day. There was no significant change in heart rate, respiratory rate and saturation, but BP increased significantly following BT. The Hb significantly increased (p<0.0001; 95% CI 2.12 to 3.04) and lactate decreased (p=0.02; 95% CI 0.11 to 1.30), and there was no difference in pCO2 (p=0.47) or pH (p=0.51) following BT. There was no significant difference between the pre-BT (0.65 m/s) and post-BT (0.59 m/s) mean SMA peak systolic velocity (p=0.35). The mean pre-BT SMA peak velocity was higher in fed (n=10, 0.78 m/s) compared to unfed (n=10, 0.52 m/s) infants (p=0.06). The changes in SMA peak systolic velocity following BT was not significantly different between the fed and unfed infants (p=0.72). There was a significant increase in intestinal HbO2 concentration (mean difference 14.85 µM; p=0.04) following BT. The mean pre-BT intestinal tissue oxygenation index (TOI) (35.48%) also increased significantly post-BT (50.07%; p=0.03).

Conclusions

BT had no impact on intestinal blood flow but improved intestinal tissue oxygenation in extreme premature infants during the first week of life.

References (include acknowledgement here if appropriate)

Defining the Heart of Young Adults Born Preterm: Cardiovascular Magnetic Resonance and Computational Atlas Formation Reveal Distinct Differences in Mass, Geometry, and Function

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

1,2 Adam J Lewandowski, 1,2 Daniel Augustine, 3 William M. Bradlow, 4,5 Pablo Lamata, 3 Esther F Davis, 6 Andrew R Wilkinson, 7 Atul Singhal, 7 Alan Lucas, 6 Nic Smith, 6 Stefan Neubauer, 6 Kenny McCormick, 1,2 Paul Leeson,

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Institution(s)

1 Oxford Cardiovascular Clinical Research Facility and 2 Oxford Centre for Clinical Magnetic Resonance Research, Division of Cardiovascular Medicine, University of Oxford. 3 Queen Elizabeth Hospital, Birmingham. 4 Department of Computer Science, University of Oxford. 5 Department of Biomedical Engineering, King’s College London. 6 Department of Paediatrics, John Radcliffe Hospital, Oxford. 7 MRC Childhood Nutrition Research Centre, Institute of Child Health, University College London.

Introduction (include hypothesis)

Preterm birth leads to an early switch from fetal to postnatal circulation before completion of cardiac in utero development. We developed and applied novel cardiovascular magnetic resonance post-processing tools to determine whether preterm birth is associated with distinct changes in both cardiac structure and function in young adulthood.1,2

Methods (include source of funding and ethical approval if required)

234 individuals aged 20-39 years underwent cardiovascular magnetic resonance on a 1.5T Siemens Sonata scanner. 102 had been followed prospectively since preterm birth (gestational age=30.3±2.5weeks and birthweight=1.30±0.29kilograms) and 132 were born at term to uncomplicated pregnancies. Left ventricular (LV) and right ventricular (RV) mass, volumes, and dimensions were quantified using Argus and novel computational atlas methods, and LV and RV function were quantified using TomTec 2D Cardiac Performance Analysis MR.

Results

Individuals born preterm had increased LV and RV mass and reduced LV and RV end-diastolic volumes (EDV) compared to term-born young adults (LV and RV mass: P<0.001; LV and RV EDV: P<0.001) and term-born adults a decade older (LV and RV mass: P<0.001; LV EDV: P<0.001; RV EDV: P=0.01). Differences in right ventricular mass and function were proportionally greater than for the left ventricle, which was most apparent for systolic function. Ejection fraction (EF) was preserved for the left ventricle but reduced for the right ventricle compared to the term-born young adults (LVEF: P>0.99; RVEF: P=0.006) and the term-born adults a decade older (LVEF: P>0.99; RVEF: P=0.04). Both LV and RV longitudinal peak systolic strain and peak systolic strain rate were reduced in the preterm-born young adults compared to the term-born young adults and adults a decade older (P<0.01). Furthermore, LV and RV longitudinal peak diastolic strain rate were reduced compared to the term-born young adults (P<0.01) but not the older term-born adults (P>0.10).

Conclusions

We have demonstrated for the first time that individuals born preterm have unique differences in cardiac geometry and function. A better understanding of the mechanisms underlying these changes in structure and function will be used to determine possible pathways to prevent future cardiac complications of preterm birth.

References (include acknowledgement here if appropriate)

A REGIONAL CARE BUNDLE APPROACH TO INCREASING MATERNAL BREAST MILK USE IN PRETERM INFANTS: OUTCOMES OF THE EAST OF ENGLAND NETWORK QUALITY IMPROVEMENT PROJECT

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)


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Institution(s)
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2 East of England Operational Delivery Network
3 Luton and Dunstable Hospital

Introduction (include hypothesis)

Maternal breast milk (MBM) has been shown to improve neurodevelopmental outcomes, and reduce late-onset sepsis and NEC in the preterm infant 1. The EoE perinatal network introduced a care bundle to increase the use of MBM in the hope that this would lead to a reduction in NEC, and other longer-term benefits. Here we present an evaluation of the impact of the care bundle on the proportion of preterm babies receiving MBM at discharge (exclusive or any) and percentage of care days where any MBM was received.

Methods (include source of funding and ethical approval if required)

Data were extracted from the National Neonatal Research Database (NNRD) for 17 neonatal units in the East of England (EoE) perinatal network and 144 neonatal units in the rest of the UK Neonatal Collaborative (UKNC) for babies born ≤32+6 weeks gestation admitted to neonatal specialised care between 2009 and 2012. An interrupted time series approach was used to compare feeding outcomes between the 25-month period pre-implementation (Jan 2009-Jan 2011) and the 23-month period post-implementation (Feb 2011 to Dec 2012). Results were compared against the rest of the UK NC, where the care bundle was not implemented.

Results

Data were included for 3,680 babies in EoE and 29,492 in the rest of UKNC. Improvements in exclusive and any MBM at discharge were seen in EoE over the 4-year evaluation period. There was no evidence of a step change or trend change in MBM at discharge in relation to the introduction of the care bundle but the rate of exclusive MBM at discharge improved significantly faster in EoE than the rest of the UKNC (0.22% (95% CI 0.11, 0.34) increase per month vs 0.05% (95% CI 0.01, 0.09), p=0.007 for difference). The rate of any MBM at discharge increased by 0.23% (95% CI 0.1, 0.36, p<0.001) per month though this was not significantly different to the UKNC trend. In EoE the percentage of care days where babies received MBM was in decline prior to the introduction of the bundle (-0.3% per month, 95% CI (-0.6, -0.06) p=0.02) but showed a significant improvement post introduction (difference in trends 0.5% (0.04, 1.0) p=0.03).

Conclusions

We highlight the importance of examining pre-existing trends prior to the introduction of quality improvement interventions and including population-based comparator data where possible. In employing the NNRD, we illustrate the strength of using operational electronic clinical records to evaluate health service interventions.

References (include acknowledgement here if appropriate)

ENTERAL FEED EXPOSURES IN BABIES BORN LESS THAN 32 WEEKS: ON BEHALF OF THE UK NEONATAL COLLABORATIVE NECROTISING ENTEROCOLITIS (UKNC-NEC) STUDY GROUP

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)
Cheryl Battersby, Nicola Fitz-Simon, Neena Modi
Introduced to the Society by Professor Neena Modi
Corresponding author e-mail address: c.battersby@imperial.ac.uk

Institution(s)
Imperial College London, Neonatal Data Analysis Unit (NDAU)

Introduction (include hypothesis)
Enteral feed exposures are widely believed to influence the susceptibility to NEC. However, due to the limited evidence available to inform optimal feeding strategies, there is variation in feeding practices [1]. Feeding information is entered on a daily basis by the UKNC-NEC study group, comprised of neonatal teams committed to entering high quality routinely collected data for the UKNC-NEC study. We hypothesise that due to the increased risk of NEC, babies of younger gestational ages are fed more cautiously; they are less likely to receive formula and commencement of feeds is delayed compared to more mature babies.

Methods (include source of funding and ethical approval if required)
26 variables from babies born between 23 and 31 +6 weeks and first admitted in year 2012 to 146 neonatal units in the UKNC-NEC study group was extracted from the National Neonatal Research Database. Data completeness was assessed for daily type of feed and daily volume and reported as proportion of total daily records with available data. For each baby, an individual continuous daily feeding record, for each type of feed, from birth to the final daily record of care was created. For babies who were fed during neonatal care, the median and interquartile range for days to first feed by gestational age was reported. The study is funded by Medicines for Neonates Programme and received research ethics approval (11/LO/1430).

Results
The final analysis included 6720 babies born between 23 and 31 +6 weeks and first admitted in year 2012 to 146 neonatal units. Daily type of feed was well completed (98%) compared to daily volume (59%). 6377 babies were fed during their admission to neonatal care. 316 died and 9 were transferred before receiving enteral feeds, 9 had not received enteral feeds and 5 had no feeding data. For the 6377 babies who were fed, the median and interquartile (IQ) range of days to first feed was 4 (3-6) for babies born 24 weeks, 4 (3-5) for babies born 26 weeks, 3 (2-4) for babies born 28 weeks and 2 (2-3) for babies born 30 weeks. Babies of younger gestational ages were more likely to be fed later but there is greater variation compared to more mature babies. Babies of younger gestational ages were more likely to receive maternal breast milk (MBM) for a longer period of time before formula or donor milk is introduced.

Conclusions
Preterm babies are predominantly fed MBM initially but the more immature babies are fed later compared to the more mature babies with greater variation in timing of first feed. Further analyses in the UKNC-NEC study will compare enteral feed exposures between babies who do and do not develop NEC.

References (include acknowledgement here if appropriate)
SYSTEMIC INNATE IMMUNE DYSREGULATION IN SEVERE NEONATAL BRAIN INJURY

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

Fiona M. O’Hare¹,², R William G Watson², Amanda O’Neill², Alfonso Blanco², Deirdre Sweetman¹,³, John Murphy¹,²,⁷, Anne Twomey¹, Colm O’Donnell¹,³,⁷, Bryan Lynch¹,⁴, Veronica Donoghue¹,⁵, Eleanor J. Molloy¹,²,⁶,⁷

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Institution(s)

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Introduction (include hypothesis)

Inflammatory cytokines may play a role in the final common pathway in the pathogenesis of hypoxic-ischaemic injury in experimental models and elevated Toll-like receptor 4 (TLR4) expression is associated with worse outcome in adult and animal models of brain injury. Our aim was to profile the systemic inflammatory response over the first week of life in infants at risk of neonatal encephalopathy (NE) and correlate early cytokine as well as neutrophil and monocyte endotoxin responses with outcome.

Methods (include source of funding and ethical approval if required)

Prospective observational study in a tertiary referral university hospital including 41 infants requiring resuscitation at birth who had 10 cytokines measured serially in the first week of life. In a subgroup (n=22) we also measured serial neutrophil and monocyte CD11b, (Reactive oxygen intermediates) ROI and TLR4 before and after lipopolysaccharide (LPS;endotoxin) stimulation ex vivo and compared to neonatal controls. This study was approved by the ethics committee and written informed consent was obtained. The project was funded by the National Children’s Research centre, Ireland.

Results

Infants with NE and abnormal neuroimaging had significantly elevated Interleukin(IL)-8 concentrations at birth with increased Granulocyte macrophage colony stimulating factor (GM-CSF) (day 2) and lower Interferon(IFN)-γ, Tumour Necrosis Factor (TNF)-α, Vascular Endothelial Growth Factor (VEGF)(Day 3) and IL-1α, IL-10 (Day 7). Significantly elevated levels of IL-8 and TNF-α in the first 24 hours were associated with mortality. All neonates requiring resuscitation at delivery had higher neutrophil and monocyte CD11b and TLR4 expression compared with adults and neonatal controls. Neonates with abnormal neuroimaging and/or NE II/III had increased CD11b, ROI and TLR4. Increased PMN TLR4 expression was associated with increased mortality in NE.

Conclusions

Serum cytokine changes and innate immune dysregulation in the first week of life predict mortality, severity of NE and abnormal neuroimaging. This persistent inflammatory response may be amenable to immunomodulation.

References (include acknowledgement here if appropriate)
PULSE OXIMETRY AS A SCREENING TOOL TO DETECT HYPOXIA ASSOCIATED WITH EARLY-ONSET SEPSIS IN ASYMPTOMATIC NEWBORNS: A FEASIBILITY STUDY IN A LOW-INCOME COUNTRY

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

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Institution(s)

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Introduction (include hypothesis)

Neonatal sepsis is often missed in the developing world, contributing to increased morbidity and mortality. Pulse oximetry used to screen asymptomatic newborns infants for congenital heart disease also frequently identifies cases of sepsis¹. Aims: i) To assess the feasibility of using pulse oximetry as a screening tool in low-income countries to detect hypoxemia associated with early-onset sepsis in asymptomatic newborns. ii) To evaluate the acceptability of pulse oximetry screening to mothers and healthcare professionals.

Methods (include source of funding and ethical approval if required)

Study design: Prospective cohort study. Place and Duration of Study: Saint Francis Referral Hospital, Ifakara, Tanzania between January and March 2013. Methodology: All eligible asymptomatic newborns of more than 33 weeks gestational age born during the study period were screened on two occasions using pulse oximetry. Newborns with oxygen saturations below predefined thresholds were test positive. We recorded the proportion of eligible newborns screened, time taken for the test and the acceptability of pulse oximetry use to mothers and healthcare professionals. The rates of hypoxaemia and clinical diagnosis of sepsis in asymptomatic newborns were evaluated. Ethical approval was gained from the University of Birmingham and St Francis referral hospital and funding was provided by the Arthur Thompson Trust.

Results

A total of 316 asymptomatic newborns were screened, of which eighteen (5.7%) were classified as test positive. Clinical examination led to the diagnosis of sepsis in 41 newborns (13%), including eight newborns who tested positive with pulse oximetry screening. Mothers (n=50) and healthcare professionals (n=18) were predominantly satisfied with screening.

Conclusions

It is feasible to evaluate the role of pulse oximetry as a screening tool to detect early-onset sepsis in a low-income setting. The test is acceptable to mothers and healthcare professionals. Further studies are needed to assess the accuracy of the test in detecting sepsis in asymptomatic newborns and its clinical impact on neonatal health.

References (include acknowledgement here if appropriate)

CONTINUOUS INVASIVE BLOOD PRESSURE IS DIRECTLY RELATED TO EEG MEASURES OF CONTINUITY IN EXTREMELY PRETERM INFANTS IN THE FIRST THREE DAYS OF LIFE.

Authors

Pereira SS¹, Kempley ST², Wertheim D³, Sinha AK¹ and Shah DK¹

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Institutions

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Introduction

Electroencephalographic (EEG) activity may be affected by changes in cerebral perfusion in extremely preterm infants (1) so that a reduction in cerebral perfusion may be associated with reduced electrocortical activity. The relationship between invasively measured systemic blood pressure and EEG activity in this group remains to be determined. We hypothesised that systemic blood pressure and cerebral perfusion are directly related to measures of EEG continuity in extremely preterm infants in the first three days of life.

Methods

Infants born < 29 weeks gestation were prospectively recruited within 12 hours of birth. They had continuous invasive arterial blood pressure and amplitude-integrated EEG (aEEG) recording. Cross cerebral aEEG was assessed for minimum and maximum amplitude, measures of lower and upper aEEG margin, percentage of time minimum amplitude below 5 microvolts and for seizures. Left ventricular output (LVO), common carotid artery blood flow (CCAF) and mean arterial blood pressure (averaged over a 2 hour epoch) were related to EEG measures over the same epoch. Non-parametric correlation and multiple linear regression analysis were used for analysis (SPSS v21). Research ethics approval (12/LO/1553) and written parental consent were obtained.

Results

Median (range) gestation and birthweight were 25.8 (23.4-28.9) weeks and 735 (515-1470) grams respectively. In simple rank correlation, all EEG parameters were significantly associated with blood pressure on Days 1 and 3, and with gestation on Day 1. In stepwise multiple regression analysis, only blood pressure was retained.

<table>
<thead>
<tr>
<th></th>
<th>Day 1 of life (n=15)</th>
<th>Day 3 of life (n=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Min amplitude</td>
<td>Upper aEEG margin</td>
<td>Lower aEEG margin</td>
</tr>
<tr>
<td>&lt; 5 μV (P5)</td>
<td>(median μV)</td>
<td>(median μV)</td>
</tr>
<tr>
<td>Median (range)</td>
<td>93% (77-99)</td>
<td>11.1 (9.8-14.3)</td>
</tr>
<tr>
<td></td>
<td>3.0 (2.3-3.8)</td>
<td>3.4 (2.6-3.8)</td>
</tr>
<tr>
<td>Correlation coefficients (Spearman’s rho) between EEG measure and independent variable (*=p&lt;.05, **=p&lt;0.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gestation</td>
<td>-0.69**</td>
<td>0.66**</td>
</tr>
<tr>
<td></td>
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<tr>
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<td>RCCA flow</td>
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<tr>
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<tr>
<td>Blood pressure</td>
<td>-0.79**</td>
<td>0.83**</td>
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</table>

Conclusions

We found a strong relationship between continuous systemic mean arterial blood pressure and measures of EEG continuity, suggesting that at lower blood pressures there is an increase in EEG discontinuity.

References

INFLUENCE OF THERAPEUTIC HYPOTHERMIA ON THE EVOLUTION OF MRI BRAIN LESIONS IN INFANTS WITH NEONATAL ENCEPHALOPATHY

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

Ela Chakkarapani, K J Poskitt, S P Miller, J Zwicker, Qi Xu, D Wong, A Hill, E Roland, V Chau

Institution(s)

1 School of clinical Sciences, University of Bristol, UK. 2 Neonatology University of British Columbia & BC women's Hospital, Vancouver, Canada. 3 Pediatrics (Neurology & Radiology), BC Children's Hospital, Vancouver, Canada. 4 University of Toronto, Ontario, Canada. 5 Pediatric Neurology, Hospital for sick children. Toronto, Ca.

Introduction (include hypothesis)

Therapeutic hypothermia following neonatal encephalopathy (NE) is associated with reductions in MRI brain lesions. This study aimed to determine the effect of TH on the evolution with time (predominant pattern and extent) of brain lesions on MRI.

Methods (include source of funding and ethical approval if required)

Term infants with NE [non-cooled & cooled] born from 2004 to 2012 underwent brain MRI (DWI, T1 & T2) on day of life (DOL) 3-6 (MRI-I) and DOL 10-14 (MRI-II). Evolution of the extent and injury pattern of the basal ganglia (BG) and watershed (W) regions, and agreement between “MRI-I” and “MRI-II” were ascertained by a validated scoring system and kappa (κ) statistic respectively. Cohort was classified to group A, if MRI-I occurred before DOL 3.5 and group B, if it occurred between DOL 3.5-6. UBCREC approved the study.

Results

Group A included 33 non-cooled and 13 cooled infants. Group B included 17 non-cooled and 26 cooled infants. Cooling was associated with less multifocal white matter lesions, normal watershed region and more normal MRIs (P<0.001). There was perfect agreement in the pattern of lesions between “MRI-I” and “MRI-II” in both non-cooled [group A(κ:0.92); group B(κ:1.0)] and cooled [group A(κ:0.81); group B(κ:0.94)] infants. All non-cooled [5/5(100%)] and [1/3(33%)] cooled infants with decreased extent of BG lesions on “MRI-II” had resolution of neuroimaging features of neonatal hypoglycaemia; [2/4 (50%)] non-cooled and [1/1 (100%)] cooled infants with worsening of extent of W lesion on “MRI-II” developed discrete white matter lesions. Cooling was significantly associated with worsening of extent of BG lesion, in particular to the perirolandic cortex, on “MRI-II” compared with non-cooled infants (9.3% versus 0%, p = 0.05).

Conclusions

In cooled infants with NE, the early MRI reliably estimated the pattern of brain lesion and extent of watershed lesions, but underestimated the extent of BG lesions missing the perirolandic cortex.

References (include acknowledgement here if appropriate)

Title (Upper case)

RELATIONSHIP BETWEEN CAROTID BLOOD FLOW, CARDIAC OUTPUT AND BLOOD PRESSURE IN EXTREMELY PRETERM INFANTS.

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

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Introduction (include hypothesis)

Cardiovascular problems, including low flow and hypotension are common in extremely preterm infants. Low cerebral blood flow is associated with poor long-term outcome (1). Common carotid artery flow (CCAF) provides a reproducible non-invasive measure of blood flow to the brain, but there are no studies of CCAF in extremely preterm infants. We wanted to investigate the relationship between CCAF, cardiac output and blood pressure, in a group of babies being studied in a randomised trial of blood pressure intervention levels.

Methods (include source of funding and ethical approval if required)

We studied 16 infants born < 29 weeks gestation. Right common carotid artery (RCCA) blood flow and left ventricular output (LVO) using Doppler ultrasound was measured on day 1 and 3 of life. Right common blood flow was calculated by using time averaged mean velocity and RCCA diameter. LVO was measured using velocity time integral and diameter across the aortic valve. Mean arterial blood pressure was measured at the time of recording the carotid blood flow. Non-parametric statistics were used for analysis (SPSS v21). Research ethics committee approval was granted (Reference 12/LO/1553) and written parental consent obtained.

Results

Median (range) gestation and birth weight was 25.8 (23.4-28.9) weeks and 735 (515-1470) grams respectively. 16 (100%) babies were ventilated on day 1 compared to 12 (75%) babies ventilated on day 3. PDA was present in 14 (87%) babies on day 1 and 11 (68%) babies on day 3. The following parameters were measured on day 1 and day 3. Median (range) RCCA flow of 11.7 (8.5-12.4) ml/kg/min on day 1 and 15.1 (11.8-19.5) ml/kg/min on day 3 (p = 0.017). Median LVO (range) of 163 (140-189) ml/kg/min on day 1 and 215 (163-254) ml/kg/min on day 3 (p = 0.005). Median BP (range) of 33 (21-59) mmHg on day 1 and 34 (27-64) mmHg on day 3 (p =0.088). There were no statistically significant correlations between RCCA flow and blood pressure, LVO, CO2 or serum lactate in this cohort on day 1 or day 3 of life.

Conclusions

RCCA blood flow increased between day 1 and day 3 of life in extremely preterm infants, which reflects, improved cardiac output. We found no significant relationship between RCCA flow, blood pressure and LVO in our babies. Values in this cohort were lower than previously reported in more stable and more preterm infants, particularly on day 1.

References (include acknowledgement here if appropriate)

1. Hunt R. Low superior vena cava flow and neurodevelopment at 3 years in very preterm infants. J Pediatr 2004
Sexual dimorphism in adipose tissue distribution and ectopic lipid are well described in adults and adolescents, but the point in childhood when differences in adiposity begin to manifest is unknown. We aimed to describe the longitudinal changes in directly measured adiposity and hepatic lipid that occur in early infancy, in healthy term babies and in relation to infant sex.

Methods
Research Ethics Committee and NHS approvals were obtained. With informed maternal consent, healthy, term infants underwent whole body magnetic resonance imaging and hepatic spectroscopy to assess body composition and intrahepatocellular lipid (IHCL) content. Investigations were performed in natural sleep on two occasions, shortly after birth (T1), and between two and three months (T2) in accordance with our previously published protocols (1, 2). Anthropometric measurements were obtained at both visits. Total adipose tissue volume was calculated as the sum of six individually quantified adipose tissue compartments (superficial subcutaneous abdominal (SSCA), superficial subcutaneous non-abdominal (SSCNA), deep subcutaneous abdominal (DSCA), deep subcutaneous non-abdominal (DSCNA), internal abdominal (IA), and internal non-abdominal (INA)). We used multivariable regression to examine total and regional adipose tissue volumes in relation to sex, with adjustment for body weight at scan. Mean differences in adipose tissue volumes (litres) between male and female infants are presented as mean (95% confidence interval). IHCL is non-normally distributed therefore loge transform was taken.

Results
Sixty-nine infants (39 male), mean (SD) birthweight 3.402kg (0.400), gestational age 40\(^{+2}\) (1\(^{+2}\)) and maternal BMI 23.5 (3.9), underwent longitudinal scans at a median [interquartile range] age of 13 [7-19] days at T1 and 63 [56-70] days at T2. No significant differences were detected in anthropometric measures at birth, T1 or T2 between male and female infants. Data for mean differences in adiposity (litres), male infants compared to female infants and after adjustment for weight, are presented in table 1. No significant difference in IHCL was detected between male and female infants at T1 or T2.

<table>
<thead>
<tr>
<th></th>
<th>Scan 1</th>
<th></th>
<th>Scan 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean difference</td>
<td>p</td>
<td>Mean difference</td>
<td>p</td>
</tr>
<tr>
<td>Total AT</td>
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<td>-0.193 (-0.312, -0.074)</td>
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<td>-0.039 (-0.070, -0.007)</td>
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<tr>
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<td>0.09</td>
<td>-0.124 (-0.205, -0.043)</td>
<td>0.003</td>
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<tr>
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<td>0.23</td>
<td>-0.007 (-0.014, -0.001)</td>
<td>0.04</td>
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<tr>
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<tr>
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<td>0.69</td>
</tr>
<tr>
<td>INA</td>
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<td>0.07</td>
<td>-0.019 (-0.032, -0.005)</td>
<td>0.007</td>
</tr>
</tbody>
</table>

Table 1: Mean differences (95% confidence intervals) between male and female infants.

Conclusions
Female infants are more adipose than male infants in the neonatal period and this difference becomes more pronounced in early infancy. The greater relative adiposity that characterises female infants is explained by more subcutaneous adipose tissue; no significant differences are seen in internal abdominal adipose tissue or in IHCL. Sex specific differences in subcutaneous adipose tissue are in keeping with those described in later life and suggest that sexual dimorphism in adiposity is, at least in part, established in the perinatal and infant period. The absence of detectable differences in internal abdominal adipose tissue and IHCL is in contrast to the pattern observed in adults, suggesting that alternate mediators of these lipid stores may operate in early life.

References

Corresponding Author email address: Christopher.gale@imperial.ac.uk
Introduction (include hypothesis)
Trefoil peptides play a key role in epithelial restitution and repair. TFF1 is thought to be part of a regulatory system that modulates mucosal structure and function and may be involved in regulation of secretion of other protective proteins in the intestinal mucosa. This study examined the expression of TFF1 in intestinal mucosal cells to assess the potential role as a modulator of epithelial regeneration and secretion of mucosal barrier proteins in necrotising enterocolitis and normal neonatal controls.

Methods (include source of funding and ethical approval if required)
Parents of neonates up to 44 weeks’ gestation undergoing bowel resection were approached for consent. Samples from resection specimens were fixed in formalin and embedded in paraffin blocks. TFF1 protein localisation was determined by immunohistochemistry. Neuroendocrine cells were highlighted by staining adjacent sections for chromogranin A. For chromogranin A and TFF1 co-localisation two-layer immunohistochemistry was performed with fluorogenic signals.

Results
50 bowel samples (28 with NEC(18 acute, 10 recovery) and 22 controls) were analysed. There was no TFF1 expression in normal controls. There was occasional TFF1 staining seen in goblet and neuroendocrine cells in 50% of NEC patients. 100% of the recovering patients had neuroendocrine cell hyperplasia and strong staining for TFF1 protein localised to these cells. Although the TFF1 acute phase response was mostly lost in the NEC bowel samples examined compared to reports of adult inflammatory bowel disease, expression in neuroendocrine cells in the recovery phase was marked.

Conclusions
TFF1-3 up-regulation in response to gut mucosal injury is linked with roles in epithelial cell migration and protection against apoptosis. The secretion of the same protein from goblet cells and neuroendocrine cells is unusual and indicates a potentially important role for TFF1 in the secretory process of mucus and neuroendocrine regulatory peptides that are essential for mucosal protection and repair in necrotising enterocolitis.
Self Certificate of Attendance

Please complete the form below and have it signed by a member of the neonatal society committee if you wish to claim RCPCH CPD points

Neonatal Society Autumn Meeting 2013
Charles Darwin House, London
Thursday November 7th

Name of person claiming CPD points:
(Blockletters).........................................................

Place of Work:............................................................

Number of CPD points claimed : .....................................................

(1 point per hour of attendance – up to a maximum of 5 CPD Points)

Claimant’s Signature.............................................

Name and signature of Neonatal Society Committee member

.................................................................

Helen Budge/Howard Clark/Richard Thwaites/Neena Modi/Matthew Hyde/Jane Norman/James Boardman (please delete as appropriate)