Neonatal Society Spring Meeting 2013
The Institute of Child Health, London
Wednesday 27th March
The Neonatal Society Spring Meeting, Wednesday 27th March 2013

Institute of Child Health, Guilford St, London WC1N 1EH

09.45 Coffee

Session 1: Chair – Professor Neena Modi, President of the Neonatal Society

10.30 A Saboo, Neonatal Unit, Post Graduate Institute of Medical Education and Research, Chandigarh, India
Digital Palpation of Endotracheal Tube Tip as a Method of Confirming Endotracheal Tube Position in Neonates: an Open-label, Three-armed Randomized Controlled Trial

10.45 COF Kamlin, Royal Women’s Hospital, Melbourne, Australia
Exhaled CO2 during Mask Ventilation of Preterm Infants in the Delivery Room – a Novel Tool for Assessing Lung Aeration

11.00 A Singh, Birmingham Women’s Hospital
Pulse Oximetry Screening for Critical Congenital Heart Defects: A UK National Survey and Impact of Screening on a Regional Neonatal Unit

11.15 COF Kamlin, Royal Women’s Hospital, Melbourne, Australia
A Randomised Controlled Trial of Face Mask or Nasal Tube to Provide Respiratory Support to Preterm Infants in the Delivery Room

11.30 Keynotes Lecture: Professor Nicky Best, Professor of Statistics and Epidemiology, Imperial College London
Bayesian approaches and the evaluation of evidence in child protection

12.30 Lunch Break

13.30 Tea/Coffee

Session 2: Chair – Dr Richard Thwaites

14.00 S Naqvi, Department of Paediatric Surgery, St George’s Hospital, London
Preformed Silo and Gastroschisis: Size doesn’t matter

14.15 R Gunda, University Hospitals Southampton NHS Foundation Trust
Parental perception of Therapeutic Hypothermia for Hypoxic Ischaemic Encephalopathy

14.30 B Thyagarajan, Neonatal Medicine, Princess Anne Hospital, Southampton
An Evaluation of the Use of Enteral Nutrition during Hypothermia Treatment for Perinatal Hypoxic Ischaemic Encephalopathy

14.45 PJ Lally, Academic Neonatology, University College London
Tract Based Spatial Statistics Analysis of White Matter Fractional Anisotropy in Neonatal Encephalopathy: Correlation with Thalamic Proton Magnetic Resonance Spectroscopy Metabolite Peak-Area Ratios

15.00 E Smit, School of Clinical Sciences, University of Bristol
Factors Associated with permanent Hearing Impairment after Therapeutic Hypothermia for Perinatal Asphyxial Encephalopathy

15.15 GB Northam, UCL Institute of Child Health, London
Language Outcomes after Perinatal Arterial Territory Stroke
15.30 Afternoon Tea / Coffee

Session 3: Chair – Dr Helen Budge, General Secretary of the Neonatal Society

16.00 NJ Andreas, Section of Neonatal Medicine, Chelsea and Westminster campus, Imperial College London
The Association between Leptin Concentrations in Breastmilk and Maternal Characteristics

16.15 JRC Parkinson, Section of Neonatal Medicine, Chelsea and Westminster campus, Imperial College London
The Association between Intrahepatocellular Lipid and Regional Adiposity in Preterm Infants at Term Age

16.30 The McCance Lecture: Dr Anne McCartney, Senior Research Fellow, Food Microbial Sciences Unit, Reading University
Early Nutrition and the Gut Microbiota

17.30 Drinks and Close of Meeting
Title: Digital Palpation of Endotracheal Tube Tip as a Method of Confirming Endotracheal Tube Position in Neonates: an Open-label, Three-armed Randomized Controlled Trial

Authors: Ashwin Saboo, Sourabh Dutta, Kushaljit Singh Sodhi*. Introduced by: Dr Richard Thwaites

Institution: Neonatal Unit, Department of Pediatrics, and Department of Radiodiagnosis*, Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, India.

Background/Introduction Due to the short airways in premature neonates, an accurate position of the endotracheal tube (ETT) after orotracheal intubation, is crucial for adequate mechanical ventilation. After intubation, the incidence of malposition of the tip of the ETT on radiography can be as high as 50% (1). A chest X-ray (CXR) to evaluate placement is often not immediately available in the delivery room and clinical examination is unreliable in ascertaining depth of intubation (2). Unlike nomogram based methods, digital palpation offers a direct method to determine the ETT tip position. There is only one randomized control trial (RCT) showing applicability of suprasternal digital palpation technique for ETT tube positioning in neonates (3).

Methods: Design: Open-label, RCT. Setting: Level III NICU. Subjects: All new born babies admitted in NICU requiring intubation. Interventions: Subjects were randomly allocated to one of three groups, wherein IL was determined by (1) weight-based nomogram alone or (2) weight-based nomogram combined with suprasternal palpation of ETT tip performed by specially trained Neonatology fellows or (3) combination of weight-based and suprasternal methods by personnel not specially trained. Primary Outcome: Rate of malposition of ETT as judged on CXR. The Institute Ethics Committee approved the protocol. We sought permission to obtain deferred consent in cases where there was no time to seek consent, but when time was available for randomization. In other cases, we obtained informed written consent from a parent prior to patient enrolment.

Results: 57 babies were randomized into group 1 (n=15), group 2 (n=20) & group 3 (n=22). The proportion of correct ETT placement was highest in group 2; being 66.7%, 83.3% and 66.7% in groups 1 through 3 respectively (p value = 0.58). No complication was attributable to the palpation technique.

Conclusions: Suprasternal palpation shows promise as a simple, safe, teachable method of confirming ETT position in neonates.

References

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EXHALED CO\textsubscript{2} DURING MASK VENTILATION OF PRETERM INFANTS IN THE DELIVERY ROOM – A NOVEL TOOL FOR ASSESSING LUNG AERATION?

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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2. Dept. of Neonatology, Royal Alexandra Hospital, Edmonton, Canada
3. The Ritchie Centre, Monash Institute for Medical Research, Melbourne, Australia

Introduction (include hypothesis)

Positive pressure ventilation (PPV) remains the cornerstone of respiratory support for infants after birth. Although gas flow in and out of the lung can be measured with a respiratory function monitor, gas exchange may only be confirmed by presence of exhaled CO\textsubscript{2} (ECO\textsubscript{2}).

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

Deliveries of preterm infants < 32 weeks’ gestation were attended. During PPV we measured airway pressures, gas flow and tidal volume (V\textsubscript{T}) and mainstream ECO\textsubscript{2} using the NICO cardiopulmonary management system (Novametrix Medical System, Connecticut). Heart rate and oxygen saturations were measured using a Masimo oximeter. We compared delivered V\textsubscript{T} and heart rate before and after ECO\textsubscript{2} was detected.

Results

ECO\textsubscript{2} and respiratory function were recorded in 10 preterm infants; mean (SD) birth weight 902 (287) g and gestational age 27 (2) weeks. The median (IQR) V\textsubscript{T} when no CO\textsubscript{2} was detected was 1.9 (1.0-3.8) mL/kg compared to 8.3 (2.1-10.3) mL/kg when exhaled CO\textsubscript{2} was detected (p<0.0025). The mean (SD) heart rate while no CO\textsubscript{2} was exhaled was 61 (6) beats per minute compared to 104 (41) beats per minute 60 seconds after CO\textsubscript{2} was detected.

Conclusions

Delivered V\textsubscript{T} and heart rate were significantly lower when no CO\textsubscript{2} was exhaled. The presence of exhaled CO\textsubscript{2} was accompanied by increases in HR. Our study provides proof of principle that detection of exhaled CO\textsubscript{2} may provide useful information on lung aeration of infants after birth.

References (include acknowledgement here if appropriate)
PULSE OXIMETRY SCREENING FOR CRITICAL CONGENITAL HEART DEFECTS: A UK NATIONAL SURVEY AND IMPACT OF SCREENING ON A REGIONAL NEONATAL UNIT

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Introduction
A recent systematic review showed that Pulse oximetry is highly specific for detection of critical congenital heart defects with moderate sensitivity that meets criteria for universal screening.

Aims: We conducted a UK national survey to see the opinion regarding pulse oximetry screening. We also looked at the impact of pulse oximetry screening on our regional neonatal unit.

Methods
The survey was conducted by sending a questionnaire via electronic mails to the unit lead clinicians. We retrospectively reviewed all unexpected admissions to the neonatal unit over a two year period, specifically examining indication for admission, clinical diagnosis, management and outcome.

Results
204/ 204 (100%) Units responded to the survey. Routine screening was done in 36 (18%) units. 8 units were in the process of introducing routine screening. Commonest concerns regarding pulse oximetry screening were resource issues, lack of national and local guidelines, excess false positives, delayed discharge and cross infection. There were 1021 unexpected admissions to our regional neonatal unit and 123 babies (12%) were admitted for failed pulse oximetry. Diagnosis in babies admitted for failed pulse oximetry included: 8 significant congenital heart disease, 33 congenital pneumonia, 17 sepsis, 8 pulmonary hypertension and 28 other significant conditions. 29 babies had transitional circulation. During the study period no baby collapsed on the postnatal wards. 39 echocardiograms were performed for failed pulse oximetry and 16 were abnormal.

Conclusions
There is a shift of opinion of among UK Neonatologists regarding pulse oximetry screening with a significant majority now in favour, albeit with some reservations. Routine use of Pulse oximetry identifies babies with illnesses, which if not identified early could potentially lead to postnatal collapse. It leads to a modest increase in the number of echocardiograms performed.

References
A RANDOMISED CONTROLLED TRIAL OF FACE MASK OR NASAL TUBE TO PROVIDE RESPIRATORY SUPPORT TO PRETERM INFANTS IN THE DELIVERY ROOM (DR)

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

Kamlin COF\textsuperscript{1,2}, Schilleman K\textsuperscript{3}, Dawson JA\textsuperscript{1,2}, Loprioire, E\textsuperscript{3}, Donath SM\textsuperscript{2}, Schmoelzer, GM\textsuperscript{1}, Walther FJ\textsuperscript{3}, Davis PG\textsuperscript{1,2}, tePas AB\textsuperscript{3}

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Institution(s)

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\textsuperscript{3}Leiden University Medical Center, Leiden, Netherlands

Introduction (include hypothesis)

Positive pressure ventilation (PPV) using a manual ventilation device and a face mask is recommended for compromised newly born infants in the DR. Mask ventilation is associated with airway obstruction and leak which may contribute to failure of resuscitation\textsuperscript{1}. A nasal tube is an alternative interface. Its safety and efficacy have not been evaluated in extremely preterm infants.

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

An RCT conducted in two centres. Variable block sizes were used and infants were stratified by GA, (24-25 & 26-29 weeks), and centre. Infants were randomized immediately prior to birth to receive PPV and/or continuous positive airway pressure (CPAP) with either a nasal tube or Laerdal size 00 round silicone mask. Resuscitation protocols were standardised; respiratory support was delivered using a T Piece ventilator commencing in room air. Criteria for intubation included need for cardiac compressions, apnoea, CPAP > 7cmH\textsubscript{2}O and FiO\textsubscript{2} > 0.4. The primary outcome was endotracheal intubation in the first 24 hours from birth.

Results

Three hundred and sixty three infants (63 & 300 in lower and higher gestational subgroups respectively were randomised. Baseline variables were similar and there were no significant differences in any of the outcomes. The primary outcome of endotracheal intubation in the first 24 hours from birth was 54% and 55% in the nasal tube and face mask groups respectively [OR (95%CI) 0.99 (0.65-1.54)]. The composite outcome of either death or BPD at 36 weeks corrected gestational age was 36% and 37% in the nasal tube and face mask groups respectively [OR (95%CI) 0.97 (0.61-1.51)].

Conclusions

Conclusions: In infants < 30 weeks gestation receiving PPV in the DR, using a nasal tube does not reduce the risk of early intubation compared to soft silicone round face mask. Either interface can be used to stabilise preterm infants.

References (include acknowledgement here if appropriate)

1. Schilleman, K. et al ADC Fetal Neonatal Ed. 2010
**Title (Upper case)**

**PREFORMED SILO AND GASTROSCHISIS: SIZE DOESN’T MATTER**

**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)*

The method of gastroschisis closure is controversial. Closure using a preformed silo (PFS) is being used more frequently. Predicting which patients are most suitable for this technique is yet to be determined.\(^1\,^2\).

**Aim:** To determine whether the size of the ventral defect (diameter in centimetres), at birth, predicts complications (particularly subsequent ventral hernia) in patients managed with a PFS.

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

A retrospective notes review of a prospectively maintained neonatal database of babies born with gastroschisis and managed with a PFS, over a 7 year period (January 2006 to December 2012) was carried out. Subsequent closure was achieved by sutured operative closure (SOC) under general anaesthetic or suture-less non-operative closure (SLNOC). Parameters collected were gestational age (GA), birth weight (BW), size of defect, number of days to full enteral feeds, complications, mortality and length of follow-up. Data is presented as median (range), 0.05 taken as significant and the Mann-Whitney U test was used to compare observations.

**Results**

During the study period 55 patients with gastroschisis were treated. Complete data was available for 37 patients managed with a PFS: BW 2332g (1454g – 3450g), GA 37 weeks (33 – 39 weeks), defect size 3.5 cm (3 – 6 cm). Sixteen (43%) patients were managed with sutured operative closure (SOC) and 21 (57%) patients with suture-less non-operative (SLNOC) closure. Time to full feeds was 24 days (13 – 165 days). Complications include wound infection (2), ventral hernia (11), sepsis (9), necrotising enterocolitis and evisceration. There was no mortality. Follow-up was 9 months (3 months to discharge). There was no statistical difference in the in the size of the ventral defect at birth when patients that developed a ventral hernia were compared to patients that did not develop a ventral hernia.

**Conclusions**

The size of the ventral defect at birth, in patients with gastroschisis managed with a PFS, does not predict which patients will develop a ventral hernia. Further investigation is necessary to define which patients with gastroschisis are most suitable for PFS closure.

**References** *(include acknowledgement here if appropriate)*

# Parental Perception of Therapeutic Hypothermia for Hypoxic Ischemic Encephalopathy

**Authors:** R Gunda¹,², B Thyagarajan¹, D Hart¹, L Leppard¹, B Vollmer¹,², V Baral¹

*Introduced to the Society by Professor Howard Clark*

**Institution:** ¹University Hospitals Southampton NHS Foundation Trust; ²University of Southampton

## Background/Introduction

It is recognised that having a newborn in an intensive care environment is a very stressful experience for parents and can influence future parenting as well as outcomes [1, 2]. Little is known regarding parental experience and perceptions of therapeutic hypothermia (TH) for hypoxic ischemic encephalopathy (HIE). The aim of our study was to explore parental perceptions of this relatively new treatment modality.

## Methods

A postal questionnaire survey of all parents whose babies received TH at Princess Anne Hospital (PAH) from September 2009 – August 2012 (n=51) was carried out. The questionnaire was developed in consultation with the neonatal medical, nursing and family liaison support teams. There were 23 questions covering aspects such as communication, clinical management, follow-up and care in general. Each question had several tick box options and space for free-text comments. A reminder was sent at 4 weeks to families who did not respond to the initial questionnaire. The responses were anonymised and quantitative data analysed in SPSS. We used descriptive statistical analysis and calculated odds ratio and relative risk. Free text comments were analysed by qualitative analysis. The project received local R&D approval.

## Results

Thirty one families responded (60%) of which 58% were inborn and 42% outborn. Of the nine babies who died only one family completed and returned the questionnaire. Almost all parents felt that the treatment and its benefits were explained to them in sufficient detail but only 61.3% felt that they had a good understanding of the therapy before it was started. Overall 50% recall having had sufficient opportunities to speak to staff before start of the treatment.

Seventy percent of parents felt that bonding between them and their baby was affected by TH, but almost all of them commented that it was only temporary and they bonded well with their baby later.

Ninety seven percent of the newborns had an MRI of the brain; 72% of parents recall having results explained along with potential long term implications of findings. Some families (10%) felt that follow up was not timely and appropriate and these were all outborns transferred to PAH for TH. They commented on being “lost in the system to follow-up”.

There were also comments on differences in understanding and perception within families, and parents attributed this to circumstances at or after birth and lack of communication opportunities with the neonatal team as a result. Although 61.3% felt that they did not have good understanding of what TH involved prior to commencing treatment the majority of parents were happy that this was initiated without delay and they trusted the judgement and clinical decisions made by involved teams.

## Conclusions

The survey revealed parental perceptions of this relatively new treatment. Of note were the perceived lack of understanding of TH and issues around communication and delivery of information to parents and between hospital teams. The survey also highlighted albeit temporarily, the effect of TH on bonding between parents and their newborn baby.

## References


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AN EVALUATION OF THE USE OF ENTERAL NUTRITION DURING HYPOTHERMIA TREATMENT FOR PERINATAL HYPOXIC ISCHAEMIC ENCEPHALOPATHY

B. Thyagarajan,1 E. Tillqvist,2, B. Hallberg,2, B. Vollmer,2,3 M. Blennow,2, V. Baral1.

Introduction

Delayed introduction of enteral feeding during therapeutic hypothermia is common practice in many UK neonatal units1 while Swedish neonatal units encourage early enteral feeding. There are no randomised trials supporting either practice in paediatric or adult population. We compared the safety and efficacy of early versus delayed enteral feeding in neonates receiving therapeutic hypothermia following hypoxic ischemic encephalopathy. Ethical approval was obtained in Sweden and in the UK for this study.

Methods

Retrospective cohort study (January 2009 - December 2011). Cooled infants at Karolinska Hospital, Stockholm (KH) received early enteral feeding (study group) and were compared to similar infants at Princess Anne Hospital (PAH) Southampton, who had delayed feeding (control group). Infants also received early parenteral nutrition in both centres. Statistical analysis (Kaplan-Meier curves, the Log Rank test and chi square tests) were done in SPSS.

Results

A complete data set was available for 34/37 infants at PAH compared to 51/51 at KH. Mean baseline parameters at PAH/KH were gestation at birth (39+3/ 40+1 weeks+days), birth weight (3420/3723 g), male sex (47.1%/54.9 %), umbilical arterial pH (7.02/7.05) and base deficit (-14.5/-12.03). There were significant differences between PAH/KH in enteral feeding rates (33.3%/91.7%), mean time to initiation of enteral feeds (86.7/28.7 hours) and mean daily volume of enteral feeds during hypothermia.

There was no significant difference between the groups in time to achieve full enteral feeding (Figure 1). The KH cohort reached full oral feeding and were discharged home significantly later than the PAH cohort (Figure 2,3). There were no significant differences between the two groups regarding adverse events necrotising enterocolitis, clinically confirmed sepsis or persistent pulmonary hypertension.

![Figure 1](image-url)
Conclusions

Early enteral feeding during hypothermia appears to be safe and not associated with additional morbidity. Delayed introduction of enteral feeds does not delay the time to reach full oral feeds or prolong the length of stay at hospital. Further prospective randomized controlled trials are needed to verify these findings and to see if early enteral feeding during therapeutic hypothermia leads to improved outcomes.

References (key references should be included)


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TRACT BASED SPATIAL STATISTICS ANALYSIS OF WHITE MATTER FRACTIONAL ANISOTROPY IN NEONATAL ENCEPHALOPATHY: CORRELATION WITH THALAMIC PROTON MAGNETIC RESONANCE SPECTROSCOPY METABOLITE PEAK-AREA RATIOS

Authors
Lally PJ\(^1\), Price DL\(^2\), Pauliah SS\(^1\), Shankaran S\(^3\), Guhan B\(^4\), Bainbridge A\(^5\), Cady EB\(^6\), Thayyil S\(^1\) on behalf of Peacock Trial Collaborators
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Institution(s)
\(^1\)Academic Neonatology, University College London, London, UK; \(^2\)Medical Physics & Bioengineering, University College London Hospitals, London, UK; \(^3\)Neonatal-Perinatal Division, Wayne State University, Detroit, USA and \(^4\)Neonatal Medicine, Calicut Medical College, Calicut, India.

Introduction (include hypothesis)
Both white matter (WM) fractional anisotropy (FA) in magnetic resonance imaging (MRI) analysed by tract-based spatial statistics (TBSS) and thalamic proton magnetic resonance spectroscopy (MRS) metabolite peak-area ratios correlate with adverse neurological outcome following neonatal encephalopathy [1-2]. TBSS WM changes correlate with short term morbidities and with conventional MRI grading [3-4], and MRS enables visualisation of WM injury associated with abnormal thalamic metabolism (the latter is poorly understood).

Methods (include source of funding and ethical approval if required)
Consecutive infants with neonatal encephalopathy (5 min Apgar score <5 and Thompson score >5 at <6 h age) admitted to Calicut Medical College over a 6-month period were recruited after parental consent. Conventional MRI, diffusion tensor imaging (DTI, 21 directions, \(b = 0 \text{ & } 1000 \text{ s/mm}^2\)) and MRS (echo time 288 ms, 37x8 echoes summed) were performed aged <3 wk at 1.5 Tesla (Siemens Avanto, Erlangen, Germany). MRS data were post-processed using jMRUI software [5-6]. Image analysis used the FMRIB Software Library [7-8], incorporating a gestational age correction. The study was approved by the Calicut Medical College and University College London ethics committees.

Results
Fifty-four infants with neonatal encephalopathy were recruited; 12 were therapeutically cooled. Thirty-one had usable TBSS data of which 20 also had usable MRS results. Mean FA axial, coronal and sagittal image skeletons are shown in green (Figure). Significantly reduced WM FA (yellow \(p<0.01\); red \(p<0.05\); see Figure) was observed globally when thalamic N-acetylaspartate (NAA)/total choline (Cho) was \(\leq 0.72\) (2/20 infants). A small region of significant WM FA reduction was observed when lactate (Lac)/NAA was \(\geq 0.29\) (2/20 infants). WM FA was not associated with Lac/total creatine (Cr) (3/20 infants with Lac/Cr \(\geq 0.39\)).

Conclusions
TBSS WM FA correlated well with NAA/Cho and to a lesser extent with Lac/NAA, but not with Lac/Cr. Combining DTI and MRS biomarkers shows promise in highlighting characteristic thalamic metabolism and WM integrity abnormalities in neonatal encephalopathy. A large prospective international study qualifying such biomarkers is currently in progress (MARBLE: Magnetic Resonance Biomarkers in Neonatal Encephalopathy).

References (include acknowledgement here if appropriate)
Title: Factors associated with permanent hearing impairment in infants undergoing therapeutic hypothermia for perinatal asphyxial encephalopathy

Authors: 
Elisa Smit1,2, Xun Liu1, Sally Jary1,2, Hemmen Sabir1, Hannah Gill1, Marianne Thoresen1,2,3

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2University Hospitals Bristol, St Michael’s Hospital, Neonatal Unit, Bristol, United Kingdom
3Department of Physiology, Institute of Basic Medical Sciences, University of Oslo, Oslo, Norway

Background/Introduction
Infants with perinatal asphyxial encephalopathy (PAE) are at risk of developing hearing loss. The large RCTs of hypothermia versus normothermia for PAE found 4-8% severe hearing loss in cooled infants (1). Therapeutic hypothermia (TH) has been standard practice in our NICU since 2007; furthermore many infants were enrolled in the ongoing cooling trials. Gentamicin in combination with penicillin is a common first-line drug combination in cooled infants. Gentamicin has been described as potentially oto and nephrotoxic. The objective of this study was to define the incidence of hearing loss, document plasma gentamicin concentrations and identify factors associated with permanent hearing loss in infants undergoing TH for moderate to severe PAE.

Methods
With ethical permission, data (demographic and clinical variables, gentamicin dose and trough level, creatinine values) were collected prospectively in our tertiary neonatal unit, which is the regional cooling centre. Cooled infants >36 wks gestation with moderate to severe PAE were included if a full data set was available. We administer gentamicin as a single dose of 4 mg/kg/d and routinely check a trough level prior to administration of the 3rd dose. All infants underwent a newborn hearing screen prior to discharge from hospital and were at least 1 year old on follow-up, when full hearing investigation and diagnosis had taken place. Stepwise logistic regression was used to identify factors associated with hearing loss.

Results
A total of 108 infants were included. Nine infants died and amongst the survivors 10.1% developed a permanent hearing impairment. Thirty-seven percent of infants in our cohort had a trough gentamicin level above the recommended cut-off of 2mg/L. Stepwise logistic regression showed that high trough gentamicin levels, poor cord pH and hypoglycaemia following birth were all significantly associated with hearing loss.

<table>
<thead>
<tr>
<th>Normal hearing, n=89</th>
<th>Hearing loss, n=10</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male sex, n (%)</td>
<td>52 (68)</td>
<td>4 (40)</td>
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<tr>
<td>Birth weight, g, mean (SD)</td>
<td>3405 (576)</td>
<td>3464 (811)</td>
</tr>
<tr>
<td>Gestational age, weeks, mean (SD)</td>
<td>39 (1)</td>
<td>38 (1)</td>
</tr>
<tr>
<td>10 minute Apgar, median (IQR)</td>
<td>7 (5-9)</td>
<td>4 (4-8)</td>
</tr>
<tr>
<td>Cord pH, mean (SD)</td>
<td>7.03 (0.18)</td>
<td>6.88 (0.12)</td>
</tr>
<tr>
<td>Cord base excess, mEq/L, mean (SD)</td>
<td>-14.65 (7.26)</td>
<td>-20.5 (2.12)</td>
</tr>
<tr>
<td>Hypoglycaemia first hour of life, n (%)</td>
<td>11 (12)</td>
<td>7 (70)</td>
</tr>
<tr>
<td>Need for inotropic support, n (%)</td>
<td>58 (65)</td>
<td>10 (100)</td>
</tr>
</tbody>
</table>

Conclusions
High trough serum gentamicin levels, poor cord pH and hypoglycaemia were associated with permanent hearing impairment in infants undergoing TH for PAE.

References

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LANGUAGE OUTCOME AFTER PERINATAL ARTERIAL TERRITORY STROKE

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)

1) UCL Institute of Child Health and 2) Great Ormond Street Hospital, 3) Imperial College London and 4) Imperial College Health Care Trust

Introduction (include hypothesis)

Children with perinatally-acquired focal hemispheric lesions develop normal everyday language, even when lesions are large and encroach on left hemisphere language areas. This may be due to the capacity of the developing brain to compensate by functional reorganisation. However, as language abilities have not been fully characterised in this group (i.e. with formal testing) it is unclear whether subtle deficits persist. We predicted that language scores would be: (i) reduced in children with left hemisphere injury; (ii) associated with injury to perisylvian tissue (including the arcuate fasciculus); and (iii) that this relationship would be modified by reorganisation of language functions to the contralateral hemisphere.

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

Two groups were studied: (1) term-born children with perinatal ischaemic or haemorrhagic stroke (n=30, mean age 13.1yrs, 18 males): all were followed longitudinally and had neonatal neuroimaging (many were included in Ricci et al. 2008) and (2) control children, group-matched for parental education, age and sex (n=44). Neuropsychological evaluation of speech, language and intelligence (IQ) was performed together with detailed neuroimaging, including fMRI (to determine language dominance), DWI and volumetric T1-W imaging. Side of lesion was: Left =22, Right=7, Bilateral (L>R)=1. Ethical approval was given by the Institute of Child Health REC and funding was obtained from Action Medical Research UK.

Results

Children with a history of perinatal stroke had IQ scores within the average range (mean 99±14) but 13 points lower than controls. There was no significant change in verbal or performance IQ scores between age 6 and 13 years (current study). Language performance (CELF-3rd scores) was reduced after correcting for non-verbal IQ in children with left-sided injury only. Reorganisation of language functions to Broca’s homologue in the right hemisphere was observed in 44% of children with left-sided lesions. Unexpectedly, neither language scores nor atypical language lateration was related to the integrity of the left arcuate fasciculus. Rather, interhemispheric reorganisation was associated with lesions predominantly affecting the extreme capsule/uncinate fasciculus in the left hemisphere. Importantly, there was no difference in language abilities in children with typical (left hemisphere) language dominance versus those with atypical (right) representation.

Conclusions

Children with hemispheric lesions acquired in the perinatal period have language and IQ scores in the average range, but performance is nevertheless significantly lower than controls. Importantly, language ability is not related to lesion location, even when left hemisphere language areas are involved; this is possibly due to compensatory interhemispheric reorganisation in the developing brain.

References (include acknowledgement here if appropriate)

Title: The association between leptin concentrations in breastmilk and maternal characteristics

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Background/Introduction: Leptin plays a fundamental role in the development and subsequent control of key metabolic pathways. The aim of this study was to determine if there was a relationship between leptin concentration in breastmilk and key maternal characteristics.

Methods: This study was carried out under research ethics approval (REC: 12/LO/0203). Mothers were recruited to the study from the post-natal ward at Chelsea and Westminster Hospital. Breast milk samples (10ml) were collected seven days post-delivery from lactating mothers (n=37), with the aid of a breast pump. Timing of sample collection was standardised to the morning in order to reduce the influence of diurnal variations in breastmilk composition. Samples were stored at -20°C. 1ml of sample was sonicated using an ultrasound probe prior to analysis. Leptin was measured using commercially available leptin ELISA kit (Millipore, UK). Concentrations of leptin in breastmilk were correlated with maternal data (age, pre-pregnancy BMI, pre-pregnancy weight, duration of pregnancy, 28 week glucose tolerance test, weight and BMI at the time of sample collection). Linear regression was performed in SPSS 20.

Results: Correlation analysis revealed a significant association between leptin and both maternal weight at sample collection (r=0.4, R² = 0.15, p=0.015) (Figure 1) and maternal BMI at sample collection (r: 0.34, R²=0.12, p=0.05). Linear regression analysis revealed the change in leptin per 1kg increase in maternal weight at sample collection was 0.003ng/ml (95%CI: 0.001, 0.005). No association was observed between leptin and other maternal characteristics (age, pre-pregnancy BMI, pre-pregnancy weight, duration of pregnancy, 28 week glucose tolerance test).

![Figure 1](image-url) Plot of maternal weight at sample collection (kg) and leptin concentration (ng/ml). Line of best fit (solid) and 95% CI (hatched) are also shown.

Conclusions: These data indicate an association between foremilk leptin concentration with maternal weight and BMI, at the time of sample collection. Though the bioactivity of breastmilk leptin is unknown, we speculate that this may be part of a feedback mechanism serving to regulate infant milk intake.

References:
(1) Konstantinos M (2012) The complex interaction between obesity, metabolic syndrome and reproductive axis: A narrative review. Metabolism

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Title: The association between intrahepatocellular lipid and regional adiposity in preterm infants at term age
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Background/Introduction: In adults, there is a positive association between intrahepatocellular lipid (IHCL) and internal abdominal adipose tissue (IAAT) (1), with both depots linked to insulin resistance and type 2 diabetes (2, 3). Previous work from our group has shown elevated levels of both IHCL and IAAT in ex-preterm adults (4). However, the relationship between IHCL and IAAT in preterm infants is unknown. The aim of this study was to describe the relationship between IHCL and total/regional AT depots in preterm infants at term age.

Methods: We utilised data from two research ethic approved studies. Preterm infants (<32 weeks GA at birth) underwent whole body magnetic resonance (MR) imaging and ¹H MR spectroscopy of the liver at term age according to a previously described and established protocol (1). Total and regional AT volumes were calculated by Vardis (http://vardisgroup.com) using a thresholding technique. IHCL values were adjusted for T1 & T2 effects using hepatic water as an internal standard (4). IHCL data was log transformed for analysis and linear regression performed in SPSS 20, adjusting for GA at scan.

Results: 24 preterm infants (11 male) were evaluated. Birth weight and birth GA were (mean (SD)) 1.32kg (0.35kg) and 29.3 weeks (2.3 weeks) respectively. The results of linear regression analysis between log-transformed IHCL and individual adipose depots are shown in Table 1. A non-significant trend towards an association was observed between IHCL and both deep subcutaneous AT (% change in IHCL per 1ml of DSCA (95% CI): 5.4 (-1.0, 106.4, p=0.054) and IAAT (5.0 (-6.4, 103.7), p=0.08) with wide confidence intervals observed for both depots (Table 1).

<table>
<thead>
<tr>
<th>Adipose tissue (AT) type</th>
<th>% change in IHCL per 1ml of depot</th>
<th>95% Confidence Interval</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total AT</td>
<td>0.1</td>
<td>-1.6</td>
<td>4.0</td>
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<tr>
<td>Internal AT</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• Internal non-abdominal AT</td>
<td>2.3</td>
<td>-5.7</td>
<td>50.8</td>
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<tr>
<td>• Internal abdominal AT</td>
<td>3.2</td>
<td>-19.7</td>
<td>81.8</td>
</tr>
<tr>
<td>Superficial Subcutaneous AT</td>
<td>5.0</td>
<td>-6.4</td>
<td>103.7</td>
</tr>
<tr>
<td>Deep Subcutaneous AT</td>
<td>5.4</td>
<td>-1.0</td>
<td>106.4</td>
</tr>
</tbody>
</table>

Table 1 Linear Regression Analysis Percentage change in IHCL per 1ml change in adipose tissue (adjusted for gestational age at time of MR imaging).

Conclusions: These data indicate no clear association between adipose tissue depots and IHCL in preterm infants at term age. From a functional standpoint, deep subcutaneous AT behaves similarly to IAAT in adults. The trend towards an association with IHCL may anticipate the relationship in adulthood indicative of adverse metabolic health. Studies examining the natural progression of IHCL deposition and AT depots are required to test this hypothesis.


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Neonatal Society Spring Meeting 2013
The Institute of Child Health, London
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